Southington Board of Education Meeting

Thursday, December 8, 2022 6:30 PM
John Weichsel Municipal Center Public Assembly Room, 200 North Main Street, Southington, CT 06489
200 North Main Street
Southington, CT 06489

COMMITTEE OF THE WHOLE - OPERATIONS

1. CALL TO ORDER
2. Executive Session
   a. Student Matters
3. Reconvene Meeting - Regular Session 7:00 p.m.
4. Pledge of Allegiance - Moment of Silence
5. Approval of Minutes - November 10, 2022
6. Public Communications
   a. Communications from Student Board Representatives
   b. Communications from Board of Education
   c. Communications from Administration
   d. Communications from Public
7. Committee Reports
   a. Policy & Personnel Committee - November 16, 2022
8. Superintendent's Report
   a. Personnel Report
9. Old Business
   a. Town Government Communications
   b. Policy 5143 Revised and Adopted as Policy 4118.31 - School Employee Reports of Suspected Abuse or Neglect of Children or Reports of Sexual Assault of Children - Revised - Second Reading
   c. Policy 5127 - Completion Rates of the Free Application for Federal Student Aid (FAFSA) - New - Second Reading
   d. Policy 5144 - Physical Activity, Undirected Play - REVISED - Second Reading
   e. SHS Introduction to Psychology Course Curriculum - Second Reading
   f. SHS Classical Mythology New Course Curriculum - Second Reading
   g. SHS General Chemistry Unit/Bundle 2: Bonding and Intermolecular Forces - Second Reading
   h. SHS Accelerated Physics Unit 2: Forces and Motion - Second Reading
   i. SHS Accelerated Biology Unit 1: The Chemistry of Life - Second Reading
   j. Science Grade 3 Unit 2: Grand Canyon Seashells - Second Reading
   k. Science Grade 4 Unit 3: Energizing Everything - Second Reading
   l. Science Grade 5 Unit 1A/1: Spectacular Sights in the Sky - Second Reading
   m. Science Grade 7 Unit 3: Ecosystem Dynamics - Second Reading

10. New Business
    a. Approval of Out of State/Overnight Field Trip
    b. Proposed 2023-2024 School Calendar - First Reading
    c. 2021-2022 School Resource Officer Report
    d. Winchester Estates Development - District Attendance Designation
    e. Capital Improvement Plan 2023-24 to 2027-28 - First Reading (tabled from 11-10-22 Meeting)
    f. Superintendent's Proposed Goals for 2022-2023 (tabled from 11-10-22 Meeting)
    g. Student Expulsion 2022-23-08
    h. Student Expulsion 2022-23-10
11. Adjournment

The minutes presented within this document provide a summary of the discussion that took place at the Board of Education meeting. For the complete discussion of the agenda items, please view the video of the Board meeting on our website at www.southingtonschools.org. These minutes are considered a draft until approved at the following regular Board of Education meeting.

SOUTHINGTON BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

REGULAR MEETING
NOVEMBER 10, 2022

The regular meeting of the Southington Board of Education (Committee of the Whole - Operations) was held on Thursday, November 10, 2022, at 7:00 p.m. as a public meeting in the John Weichsel Municipal Center Public Assembly Room, 200 North Main Street, Southington, Connecticut with an Executive Session preceding at 6:30 p.m.

1. CALL TO ORDER

Mrs. Colleen Clark, Chairperson, called the meeting to order at 6:35 p.m.

Board members present: Mrs. Dawn Anastasio, Mr. Joseph Baczewski, Mrs. Terri Carmody, Mr. Sean Carson, Mr. James Chrzanowski *(arrived 6:38 p.m.)* Mrs. Colleen Clark, Mr. David Derynoski. Absent were Mr. Zaya Oshana and Mr. Jasper Williams

Cabinet administrator present: Mr. Frank Pepe, Assistant Superintendent

Others present: Southington Deputy Police Chief Bill Palmieri *(left 6:58)*

2. EXECUTIVE SESSION – School Safety & Security and Student Matters

MOTION: by Mr. Derynoski, seconded by Mr. Baczewski:

"Move to go into Executive Session, excluding the public and the press, for the purpose of discussing School Safety & Security and Student Matters, and upon conclusion reconvene to public session."

Motion carried unanimously by voice vote.

Mrs. Clark ended Executive Session at 7:08 p.m.
The Regular Board Meeting was reconvened at 7:10 p.m.

3. RECONVENE MEETING – REGULAR SESSION

Board members present: Mrs. Dawn Anastasio, Mr. Joseph Baczewski, Mrs. Terri Carmody, Mr. Sean Carson *(left meeting at 7:33 p.m.)*, Mr. James Chrzanowski, Mrs. Colleen Clark, Mr. David Derynoski. Absent were Mr. Zaya Oshana and Mr. Jasper Williams

Cabinet administrators present: Mr. Frank Pepe, Assistant Superintendent, and Mrs. Jennifer Mellitt, Director of Business & Finance

Student Representatives present were Angelina Micacci and Uptej Singh.

4. PLEDGE OF ALLEGIANCE & MOMENT OF SILENCE:

The student representatives led in reciting the Pledge of Allegiance.

Mrs. Clark explained that Mr. Steven Madancy, Superintendent, and Board Members Mr. Jasper Williams and Mr. Zaya Oshana were absent due to family or work obligations.

MOTION: by Mr. Derynoski, seconded by Mr. Baczewski:

"Move to add Agenda Item 10.r 'Student Expulsion' to the agenda."

Motion carried unanimously by voice vote.

Mrs. Clark called for a moment of silence in memory of:

Francis "Franny" Falco, who passed away on October 20, 2022. He started as a substitute Crossing Guard in 2016 and then became the regular Crossing Guard for Derynoski Elementary School until resigning the summer of 2022.

Joseph Orsene, who passed away on October 23, 2022. He was hired in September 1952 and taught Physical Education for 39 years. While working in Southington he also served as basketball, football, baseball, and track coach throughout his career until his retirement in June of 1991.

Kathy McGrath, former Principal of Southington High School, who passed away October 26, 2022. Ms. McGrath began her Southington Public Schools career as a Language Arts Teacher, Assistant Principal, and in 2002 she became the first woman to become Principal of Southington High School.

5. APPROVAL OF MINUTES – October 13, 2022

MOTION: Mrs. Carmody, seconded by Mr. Derynoski:

"Move to approve the Regular Board of Education Minutes of October 13, 2022, as submitted."

Motion carried unanimously by voice vote.

6. PUBLIC COMMUNICATIONS

a. Communications from Student Board Representatives

Angelina Micacci reported on the following:

SHS Homecoming Dance on November 18 in the SHS cafeteria for juniors and seniors only; National Honor Society held their induction ceremony on October 20 with 31 students inducted; the first Quarter ended Thursday, November 3; Robotics CyberKnights Team have their first tournament on Saturday, November 12 at Daniel Hand High School; SHS Drama Club will be presenting the 24th Annual Putnam County Spelling Bee on December 2 & 3 and tickets cost $15; the Blue Knights Marching Band held their 29th Annual Music of the Knight Competition; the Marching Band placed third at the New England State Championship held in New Britain and placed ninth at the National Competition. The Bands annual Veterans Day concert was held November 9.

Angelina reported that Thalberg School held a Cereal Food Drive and donated 927 boxes to Southington Community Services. Kelley School honored 34 Veterans with an in-school program in the morning and a car parade for Veterans in the afternoon with students lining the school driveway.

Uptej Singh reported on the following: He gave an updated report on the Fall athletic season and tournaments to date for: Girls Volleyball won the CCC League Class LL Championship Tournament second round; Blue Knights Field Hockey had their best season and will be hosting the state quarter finals; Girls Soccer hosted the second round of the CIAC Tournament and won; SHS Football hosted the annual Military Appreciation Day game on Veterans Day; Girls Diving Team will be competing in the CIAC Diving Championship and the Girls Swimming Team will compete in the CIAC Class LL meet; the Girls Cross Country team finished fifth place at the CIAC Class LL meet and 12th place in the State Open Championship; all SHS Blue Knights sports teams qualified for post season championships this fall including the Boys Soccer team who lost in the first round of the tournament. Uptej reported that DePaolo Middle School (JAD) held activities honoring Veterans Day and students brought in toiletry items, gift cards and cash donations for the Veterans Home in Rocky Hill; the JAD Boys Cross Country team made school history by winning second place in the large school state division competition with hundreds of runners from 40 middle schools; JAD Spanish students learned about a Spanish holiday and traditions; JAD Grade 6 Blue Team students met a Paleo-Oceanography scientist from the Netherlands and currently working in France through the "Skype-a-Scientist" Program. Kennedy Middle School (JFK) Girls Volleyball team played JAD at the annual "Dig Pink" Game with all proceeds donated to the Side-out Foundation that provides research for metastatic breast cancer in honor of a JFK parent who lost her battle with breast cancer in October; JFK thanked Mr. Ron Ingriselli and the UNICO Club for their generous donation to the Unified Theatre Program; SHS and surrounding vocational schools were in the process of visiting JFK 8th grade students regarding programs; JFK students collected over 975 non-perishable food items for Southington Community Services; JFK had a visit from Veterans who gave a presentation.

b. Communications from Board Members

The Board members addressed the passing of Kathy McGrath and Coach Joe Orsene; Veterans Day, Friday, November 11th; sports tournaments; athletic events and sportsmanship. Mrs. Anastasio reported that the SHS Agriculture / Future Farmers of America (FFA) would be holding their annual Holiday Wreath, Poinsettias, and Cemetery Boxes Sale to benefit the FFA Scholarship Fund starting November 22.

c. Communications from Administration

Mr. Pepe stated that the Red Ribbon Rally that was held on the Town Green was well attended and supported by community leaders. He addressed the following:

1. Safety Training at the Municipal Center and SHS: Mr. Pepe reported that there were two safety training sessions conducted by the Southington Police Department and that all Board of Education central office staff and town employees have received ALICE active shooter training. On November 8, School Security and Safety training continued for school employees with the police and fire departments, town, and EMS (Emergency Medical Services).
2. Ten and 20-year Board Member Recognitions: Mr. Pepe reported that at the upcoming CABE/CAPPS Conference on November 18 Board members will be honored

for their years serving on the Board of Education and congratulated David Derynoski (31 years), Terri Carmody (14 years), Collen Clark (14 years), and Zaya Oshana (11 years).

3. Music of the Knight: Mr. Pepe stated that the SHS Marching Band hosted the annual Music of the Knight and thanked the Band Backers and all those involved for their time and efforts for the phenomenally successful program.

4. UNICO Donation: Mr. Pepe reported that Ron Ingriselli from UNICO presented the Unified Arts Program at Kennedy Middle School with a donation of $1,000 and thanked them for their generosity.

5. Athletic Complex Referendum Results: Mr. Pepe reported that at the Tuesday, November 8 Mid-Term Election and Referendum, the SHS Roof Replacement was on the ballot and was approved by the voters. He thanked the community; however, the SHS Athletic Sports Complex did not pass and would be added to the Capital Improvement Plan to address those needs, which would be discussed at a future Board meeting.

d. Communication from Public

Mr. Carson left the meeting.

Mrs. Elyse Krantz, 44 Bridle Path Drive, addressed an October 3, 2022 email that she sent to the Board members requesting that the Jewish celebrations of Rosh Hashanah (Jewish New Year) and Yum Kippur (most holy Jewish holiday), which requires a 25-hour fast from sunset to the following sunset, for 13 years old and older, to be included as official school holidays. She discussed the current rise of antisemitism and the difficulty and challenge of observance when school is in session on those holidays. Mrs. Krantz noted that there was a number of Jewish families, faculty, and staff in Southington. She pointed out that neighboring school districts such as Cheshire, Hamden, Waterbury, Newington, Farmington, Middletown, Glastonbury, and West Hartford, close for Jewish holidays. She recognized that other religions also have their special holiday celebrations that the school district does not close for although students are given excused absences.

The YouTube video of the meeting is posted on both the Board of Education and Town of Southington websites for detailed information.

7. COMMITTEE REPORTS

a. Policy & Personnel Committee – October 12, 2022

Mr. Pepe reported that the committee met and discussed the following: Policy 5143 was revised to incorporate Reports of Sexual Assault of children and renumbered as 4118.31; Policy 5127 focused on increasing the completion rate of the Free Application for Federal Student Aid (FAFSA) by students in Grade 12; Policy 5141.21 was reviewed with no suggested changes; Policy 5144 reflects revisions based on recent legislation with language providing guidelines for staff. The committee also discussed Maintenance HVAC/Plumbing job description revisions that now align with the needed skill set; an Open Choice Liaison stipend was proposed for two positions funded with Open Choice grant funds with the positions serving as liaisons between Open Choice students, families and the school system and designating coordination of transportation for special community events.

b. Curriculum & Instruction Committee – October 13, 2022

Mr. Baczewski reported that the committee met and received curriculum presentations from teachers and administrators on the following: 1) A new half-year elective course called *Introduction to Psychology for Juniors and Seniors*. Students who successfully complete this course may choose to enroll in AP Psychology. 2) A new course curriculum titled *Classic Mythology*, which is a UCONN ECE full-year experience. 3) Southington High School General Chemistry Unit/Bundle 2, *Bonding and Intermolecular Forces*, which is an accelerated general chemistry class. 4) The second unit in Accelerated Physics. 5) The first unit of an accelerated biology course titled, *The Chemistry of Life*. 6) The last of the new K-grade 5 Science Curriculum, which is engaging with a strong focus on critical thinking, collaboration, and the collection/analysis and application of data. 7) Grade 7, third unit titled *Ecosystem Dynamics*. The committee members were impressed with all the curriculum presenters and their presentations.

c. Elementary Facilities Committee – October 17, 2022

Mrs. Clark reported that the committee had met sporadically. At the October meeting they reviewed again the SLAM Redistricting Scenario and student population. Because of changes at the state level, the committee will meet with the state to discuss costs and to arrange for a presentation to the full Board. Mr. Derynoski questioned who was SLAM? Mrs. Clark stated that SLAM was part of Milone & MacBroom, a construction and engineering firm, which recently merged with SLR International Corporation.

d. Finance Committee Meeting – October 24, 2022 & November 7, 2022

Mr. Chrzanowski reported that the committee met two times since the last full Board meeting. He was not present at the October 24 meeting; therefore, Mrs. Mellitt gave the report for that meeting. She reported that they discussed in detail the Self Insurance Report, a budget transfer, update on the SMART (School Meals Assistance Revenue for Transition) Funds, and Title I Funding change of a reduction of $256,932 due to a drop in Southington's poverty level.

1. Transfer of Funds

<u>MOTION</u>: by Mr. Chrzanowski, seconded by Mr. Baczewski:

"Move to approve the Transfer of Funds from the Guidance Counselor Salaries Accounts to the Social Worker Salaries Account, as presented."

Motion carried unanimously by voice vote.

Mr. Chrzanowski reported that at the November 7 meeting, the committee discussed in detail the Sound Attenuation Proposal at Kennedy Middle School for Service 1 from Trane with an estimated reduction of 5-7 decibels for a cost of $39,843; Fortinet Firewall and Antivirus Agreement for a three-year financing lease through SHI (Simple Help Editor) and DLL (Dynamic Link Library) for the Fortinet and FortiEDR (antivirus) protection in the amount of $43,885.51 per year; a request to use Non-lapsing FY'21 funds up to $120,000 to conduct a Request for Proposal (RFP) for school entryway redesigns to current entryways for security enhancements for five elementary schools and the high school; School Lunch price increase for 2022-2023 by $0.25 to support the cost of the program when the SMART (School Meals Assistance Revenue for Transition) funds end effective November 30, 2022. Mr. Chrzanowski gave a detailed summary of these agenda items and explanation for the motions below.

2. Sound Attenuation Proposal JFK

MOTION: by Mr. Chrzanowski, seconded by Mr. Derynoski:

> **"Move to approve the Sound Attenuation Proposal for Kennedy Middle School to Trane U.S. Inc., as presented."**

Motion carried unanimously by voice vote.

3. Approval of three-year lease for Firewall & EDR (Endpoint Detection Response)

MOTION: by Mr. Chrzanowski, seconded by Mrs. Carmody:

> **"Move to approve the three-year lease through SHI & DLL for the Fortinet and FortiEDR Protection in the amount of $131,657 with three annual payments of $43,885.51 in years 2023, 2024, and 2025."**

Mrs. Clark questioned if this equipment was just for the Board of Education or split with the Town. Mrs. Mellit explained that the Town had already implemented it for their network and this equipment was just for the Board of Education.

Motion carried unanimously by voice vote.

4. Request to use Non-lapsing FY'21 Funds for School Entryway Design Request For Proposal (RFP)

MOTION: by Mr. Chrzanowski, seconded by Mr. Baczewski:

> **"Move to approve the use of Non-lapsing FY'21 Funds for the Security Entryway Redesign at Hatton, Oshana, South End, Strong and Thalberg Elementary Schools, and Southington High School in an amount up to $120,000."**

Mrs. Carmody questioned if an outside firm would be hired. Mr. Baczewski questioned if a vendor was secured. Mrs. Mellitt explained that the Request for Proposal (RFP) was currently out for bid now and next week Mr. Romano, Director of Operations, would meet with interested vendors for a walk-through and the award of the RFP would be brought back to the Finance Committee and then the full Board for action.

Motion carried unanimously by voice vote.

5. School Lunch Price Increase 2022-2023

MOTION: by Mr. Chrzanowski, seconded by Mr. Baczewski:

> **"Move to approve twenty-five cents ($0.25) increase for school breakfast and lunch prices effective December 1, 2022.**

Motion carried unanimously by voice vote.

Mr. Chrzanowski reported that the committee discussed an additional 457 Plan (Equitable) option for employees. Employees, who are expecting a sick payout upon retirement, are looking to open a 457 Plan before retiring to allow an additional tax deferral. The district accounting system would allow for one other investment firm option but would not allow for more. The committee agreed to leave the options as they are for now.

8. SUPERINTENDENT'S REPORT

a. Personnel Report

__MOTION__: by Mr. Derynoski, seconded by Mrs. Carmody.

"Move to approve the Personnel Report, as submitted."

Motion carried unanimously by voice vote.

9. OLD BUSINESS

a. Town Government Communications

There was no Town Government Communications to report.

10. NEW BUSINESS

a. Student Data Presentation

Mrs. Amy Zappone, Director of Teaching and Learning, Mrs. Stephanie Lawlor, K-8 ELA (English Language Arts) Curriculum Coordinator, and Ms. Sara Baranauskas, District Mathematics and Science Coordinator gave a PowerPoint presentation on student achievement data. They spoke at length on the 2021-2022 Summative Assessment Results for the Southington Public Schools. They highlighted the district performance indicators that included the percentage of students demonstrating mastery of grade level standards and those exceeding mastery in ELA, Math and Science. They addressed the Smarter Balance Summative Performance Overview for ELA, Math and Science Achievement in 2021-2022 for grades 3-8 including historical data, percentage of students meeting Level 3/Level 4 in our DRG D (District Reference Group), Smarter Balanced Growth Data showing state and district growth and targets achieved.

The presentation contained the College Board SAT achievement data for ELA / ERW (English Reading & Writing) and Math including goals, and Southington High School / State percentages that were met. Mrs. Clark questioned when the SAT test was administered, and the skill set of students at that time. Mrs. Zappone explained that the SAT was taken in March of 2022. Discussed was the SAT ELA and Math Achievement DRG comparison and meeting the goals. Addressed was the NGSS (Next Generation Science Standards) with an overview of the 2021-22 percentage of students proficient at Level 3 or 4 comparing the district and state averages for grades 5, 8, and 11. This summative data showed years 2019 and 2022; the data for years 2020-2021 were not available due to COVID. Also addressed was the District Performance Indicators for students demonstrating mastery of grade level standards and exceeding grade level standards in ELA, Math and Science in subgroups of Special Education, English Language Learners, and the Free/Reduced student population. The presentation included historical data and percentages of High Needs/Non-High Needs/All students Level 3/Level 4. Discussed at length was the District Performance Indicators and percentage of elementary, middle, and high school students' attendance rates 90% of the school year, number/percentage in academic tiered intervention levels, and K-8 ELA and Math tiered interventions by grade level and number of students in Tier 2 or 3.

The Board members had many questions. Mr. Chrzanowski questioned who determined what is at level or above. Mrs. Zappone stated that the assessments used were from certain vendors, which are Criterion-Referenced or Norm-Referenced such as STAR. Mr. Derynoski noted the major impact that COVID had on scores and questioned how Southington was trending to get back on track. Mrs. Zappone stated that there was only a slight dip in learning loss. However, one-year post-COVID they are not too far off in moving upward. Teachers were confident to get to where they were pre-COVID and to surpass it with continuous improvement. Mrs. Lawlor stated that every school had put in an intervention block to do what was best for every student. Mr. Baczewski questioned the state vs. district comparisons and the comparisons within the DRG. Mrs. Zappone explained that Southington was in right in the middle of DRG D (like districts), which was higher than the state average. Mr. Baczewski questioned if the higher performing districts would be consulted. Mr. Pepe responded that all administrators were linked with broader groups that included constant sharing. Southington focuses on the Student Growth Model. Mr. Baczewski expressed that he wanted Southington to be at the top within the DRG. Mrs. Clark noted that each child is looked at individually to see what each child needs and thanked the teachers for their challenging work.

b. Policy 5143 Revised and Adopted as Policy 4118.31 – School Employee Reports of Suspected Abuse or Neglect of Children or Reports of Sexual Assault of Children – *Revised* – First Reading
c. Policy 5127 – Completion Rates of the Free Application for Federal Student Aid (FAFSA) – *New* – First Reading
d. Policy 5144 – Physical Activity – Undirected Play – *Revised* – First Reading
e. Approval of Job Descriptions – Maintenance (HVAC/Plumbing) Technician I Job Description – Revised; Open Choice Liaison Stipend Position – *New*

MOTION: by Mr. Derynoski, seconded by Mrs. Carmody:

"Move to approve the Job Description – Maintenance (HVAC/Plumbing) Technician I, as presented."

Motion carried unanimously by voice vote.

f. SHS – Introduction to Psychology Course Curriculum – First Reading
g. SHS – Classical Mythology New Course Curriculum – First Reading
h. SHS General Chemistry Unit/Bundle 2: Bonding and Intermolecular Forces – First Reading
i. SHS Accelerated Physics Unit 2: Forces and Motion – First Reading
j. SHS Accelerated Biology Unit 1: The Chemistry of Life – First Reading
k. Science Grade 3 Unit 2: Grand Canyon Seashells – First Reading
l. Science Grade 4 Unit 3: Energizing Everything – First Reading
m. Science Grade 5 Unit 1A/1: Spectacular Sights in the Sky – First Reading
n. Science Grade 7 Unit 3: Ecosystem Dynamics – First Reading

Mrs. Clark requested that if any Board member had any questions on the curriculum first readings to contact Mr. Pepe or Mr. Baczewski.

o. Capital Improvement Plan 2023-24 to 2027-28 – First Reading

Mrs. Mellitt explained that the administration would be meeting to revisit the Capital Plan based on the recent referendum results and a revised plan would be brought to the December Board meeting as a First Reading. Mrs. Clark acknowledged that this agenda item should then be tabled as a First Reading.

MOTION: by Mr. Derynoski, seconded by Mr. Baczewski:

"Move to table the Capital Improvement Plan 2023-24 to 2027-28 as a First Reading until the next Board of Education meeting as a First Reading."

Motion carried unanimously by voice vote.

Mr. Pepe pointed out that under Agenda Item 10.e there was the Open Choice Liaison Stipend, which was a new position and was omitted in the motion that needed to be voted on.

MOTION: by Mrs. Carmody, seconded by Mr. Derynoski:

"Move to approve the Open Choice Liaison Stipend Position."

Motion carried unanimously by voice vote.

p. Superintendent's Annual Report – 2021-2022

MOTION: by Mr. Baczewski, seconded by Mrs. Anastasio:

"Move to approve the Superintendent's Annual Report for the 2021-2022 School Year."

Mrs. Clark stated that this report needed to be shared with the community. Mr. Derynoski added that this was the third year in a row that it was so well done and easy to follow. Mr. Pepe stated that Mr. Madancy's intent was to push it out to the public because it illustrates the incredible work that is done in the schools.

Motion carried unanimously by voice vote.

q. Superintendent's Proposed Goals for 2022-2023

MOTION: by Mr. Derynoski, seconded by Mrs. Carmody:

"Move to table this agenda item until the Superintendent is present to discuss."

Motion carried unanimously by voice vote.

r. Student Expulsion

MOTION: by Mr. Derynoski, seconded by Mrs. Carmody:

"Move to expel Student #2022-2023-01, as recommended by the Superintendent."

Motion carried unanimously by voice vote.

11. ADJOURNMENT

MOTION: by Mr. Derynoski, seconded by Mr. Baczewski:

"Move to adjourn."

Motion carried unanimously by voice vote.

The meeting adjourned at 8:50 p.m.

Respectfully submitted,
Linda Blanchard
Recording Secretary

Board of Education

Administrative Report

December 8, 2022

1. Free lunch program
2. Karen Smith Academy staff
3. Mental Health Grant
4. Excess Cost

Steven G. Madancy
Superintendent of Schools

Frank M. Pepe
Assistant Superintendent of Schools

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Southington Public Schools

Board of Education
Southington, Connecticut
Policy & Personnel Committee Meeting Minutes
Wednesday, November 16, 2022 - 5:30pm
Superintendent's Conference Room
Municipal Center, 200 North Main Street
Southington, CT 06489

Members Present: Committee Chair Jasper Williams, Dawn Anastasio, David Derynoski. **Members Absent**: Zaya Oshana

Administration Present: Assistant Superintendent Frank Pepe

The meeting was called to order by Chairman Jasper Williams at 5:38PM.

Policy 9325 and related samples were reviewed. Policy 9325 was revised last year and increased the potential allotted time to each speaker during public comment from three to five minutes.

The current discussion considered two separate public comment sections each meeting. The first would occur as it typically does within the agenda and be dedicated first to items on the agenda. A time limit would be designated. The second public comment section would occur at the end of the meeting in case a Southington resident did not have the earlier opportunity to speak.

The Personnel and Policy Committee members want to ensure the public has every opportunity to speak to educational items whether or not the item is on the agenda, and balance the time needed to complete the "business of the Board".

Mr. Pepe was directed to draft a revision of Policy 9325 to reflect these parameters and present to the committee at the next scheduled meeting.

The committee reviewed the Proposal to Restructure Curricular Stipend Positions. Middle School Curriculum Leaders in ELA, math, science, unified arts (physical education, family and consumer science, art, health, technology education and computers) remain unfilled.

Social Studies and Special Education are the only positions currently filled. The vacant positions are attributed to a reallocation plan which occurred over eight years ago. As curricular cycles never cease, these areas need oversight and development. The proposed reorganization considers elementary areas which can be linked with the middle level for clearer vertical articulation. The proposal below is dependent each year on grant funding. If the funding is not secured, the positions cannot be filled. With approval, stipend job descriptions will be created and presented at a future meeting.

Steven G. Madancy
Superintendent of Schools

Frank M. Pepe
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Southington Public Schools

Proposal to Restructure Curricular Stipend Positions

- 6-8 Curriculum Specialists
  - ELA (Unfilled, one at each middle school)
  - Math (Unfilled, one at each middle school)
  - Science (Unfilled, one at each middle school)
  - Unified Arts (Unfilled, one at each middle school)
  - Special Education (one at each middle school)
  - Social Studies (one at each middle school)

- 6-12 World Language Specialist (1 position)

- K-12 Music Specialists (1 position)

Proposal to Reorganize and Reinstitute Stipends

- Middle School Curriculum Specialist-Science
  - (1) 6-8 Science Specialist to serve both middle schools

■ Cost: $5,836

■ Rationale: There is a need for the curriculum specialist to work collaboratively with the Director of Teaching and Learning, school-based administration, and the high school department leader to ensure alignment of curriculum and instructional practices across the 6-12 domain. The curriculum specialist will support the professional development needs of the 6-8 science department through planning and facilitating high quality professional learning experiences that support the Vision of the Graduate. The curriculum specialist will also assist with the development and vetting of curricular resources.

- K-8 Physical Education/Health Specialist
  - (1 Position)

■ Cost: $5,836 to serve 10 schools (both middle and all elementary)

■ Rationale: There is a need for the curriculum specialist to work collaboratively with the Director of Teaching and Learning, school-based administration, and the high school department leader to ensure alignment of curriculum and instructional practices across the K-8 domain. In addition, the curriculum specialist will support the professional development needs of the K-8 physical education department through planning and facilitating high quality professional learning that support the Vision of the Graduate. The curriculum specialist will also assist with the development and vetting of curricular resources.

- K-8 Art Specialist
  - (1 Position)

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■ Cost: $5,836 to serve 10 schools (both middle and all elementary)

■ Rationale: There is a need for the curriculum specialist to work collaboratively with the Director of Teaching and Learning, school-based administration, and the high school department leader to ensure alignment of curriculum and instructional practices across the K-8 domain. In addition, the curriculum specialist will support the professional development needs of the K-8 art department through planning and facilitating high quality learning experiences that support the Vision of the Graduate. The curriculum specialist will also assist with the development and vetting of curricular resources.

● Middle School Curriculum Specialist- Family Consumer Science
  ○ (1 position)

■ Cost: $1,658 to serve both middle schools

■ Rationale: To support the unique needs of the middle school Family and Consumer Science department, a Curriculum Specialist is requested to assist with curriculum work, resources and professional learning needs. This teacher will work closely with the Director of Teaching and Learning and high school department leader to support a vertical articulation of curriculum across 6-12. The curriculum specialist will also assist with the development and vetting of curricular resources.

● Middle School Curriculum Specialist- Technology Education
  ○ (1 position)

■ Cost: $1,658 to serve both middle schools

■ Rationale: To support the unique needs of the middle school Technology Education department, a Curriculum Specialist is requested to assist with curriculum work, resources, and professional learning needs. This teacher will work closely with the Director of Teaching and Learning and high school department leader to support a vertical articulation of curriculum across 6-12. The curriculum specialist will also assist with the development and vetting of curricular resources.

Total New Requests Cost-Combined: $20,824

The meeting was adjourned at 6:16 PM.

Respectfully Submitted,

Frank Pepe

Frank Pepe

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ______________________ Board Meeting Date December 8, 2022

Decision Requested X Agenda Code 8 a

AGENDA REPORTING FORM

Agenda Topic: Personnel Report

Summary of Issue: This Personnel Report includes appointments, resignations, retirements, and transfers for certified and classified personnel for the 2022-2023 school year. This report includes activity for the month of November 2022.

Background: The human resource department provides the Board of Education with a monthly update of personnel additions/reductions/changes.

Alternative Strategies: ______________________

Cost (if applicable): N/A **Funding Source:** Board of Education

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: Recommend that the Board of Education approve the Personnel Report as submitted by the human resource department.

Michelle Passamano
Signature of Staff Member Submitting Report

Steven Madancy
Signature of Superintendent

Included:
Personnel Report

Personnel Report
November 2022

APPOINTMENTS

	NAME	POSITION	SCHOOL	FTE	EFFECTIVE	DEGREE	SALARY
CLASS	Badr, Zeinab	Paraeducator, FT	JAD	1.0	11-4-2022	N/A	$18.36
CLASS	Cieslak, Jadwiga	Paraeducator, PT	STELLAR	.80	11-7-2022	N/A	$19.59
CLASS	Kelly, Amy	ABA therapist, LIDS	KES	1.0	11-7-2022	N/A	$19.59
CLASS	Meade, Lorraine	Paraeducator, FT	JAD	1.0	11-14-2022	N/A	$18.36
CERT	Michalak, Rosemary	World Language French	JAD	1.0	11-7-2022	MA	$54,000
CLASS	Pernal, Hailee	Custodian, PT	KES	.50	11-16-2022	N/A	$15.94
Non-Union	Porteus, Lisa	Parent educator, FRC	SES	.80	11-21-2022	N/A	$20.97

RESIGNATIONS/RETIREMENTS

	NAME	POSITION	SCHOOL	EFFECTIVE	YRS	RET/RES
CLASS	DePaolo, Wayne	Custodian, PT	DES	11-5-2022	3 mo.	RESIGN
CLASS	Guarnaccia, Rudolph	Crossing guard	JFK	9-17-2022	1	RESIGN
CERT	Nolan, Lara	World Language Spanish	JFK	9-24-2022	21	RESIGN
CLASS	Perreault, Diane	Parent educator, FRC	SES	11-4-2022	3	RESIGN
CERT	Stannard, Marion	AGSCI dept. leader	SHS	6-30-2023	35	RETIRE
CERT	Victor, Stephen	Math teacher	SHS	6-30-2023	35	RETIRE

ASSIGNMENT CHANGE

	FROM (PREVIOUS ASSIGN)		TO (NEW ASSIGN)		
NAME	POSITION/SCHOOL	FTE	POSITION/SCHOOL	FTE	EFFECTIVE
Coleman, Maureen	RN nurse float	1.0	Nursing Supervisor	1.0	11-21-2022
Crouch, Simone	Lead TESOL teacher, District	1.0	Interim Asst Principal, SHS	1.0	11-3-2022
Dubois, Carlie	Paraeducator, FT, STELLAR	1.0	ABA therapist, LAUNCH	1.0	11-2-2022

TRANSFERS

	FROM (PREVIOUS ASSIGN)		TO (NEW ASSIGN)		
CERT NAME	POSITION/SCHOOL	FTE	POSITION/SCHOOL	FTE	EFFECTIVE
None to report					

STIPENDS

Coaching Stipends ~ Resignations/Non-Renewals

Garry, Michael	Girls' basketball coach	JAD	STIPEND
Massarelli, Michael	Asst. baseball coach	SHS	STIPEND
Migani, Nicholas	Indoor head track coach	SHS	STIPEND

Coaching Stipends ~ Appointments

Other Stipends ~ Resignations/Non-Renewals

Other Stipends ~ Appointments

Ruiz-Diaz, Katherin	Silver Star Band Director	District	STIPEND

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ______________________ **Board Meeting Date** December 8, 2022

Decision Requested X **Agenda Code** 9 b.

AGENDA REPORTING FORM

Agenda Topic: Policy 5143 Revised and Adopted as Policy 4118.31 – School Employee Reports of Suspected Abuse or Neglect of Children or Reports of Sexual Assault of Children - Revision - Second Reading

Summary of Issue: The Policy & Personnel Committee has reviewed Policy 5143 Revised and Adopted as Policy 4118.31 – School Employee Reports of Suspected Abuse or Neglect of Children or Reports of Sexual Assault of Children.

Background: The Policy and Personnel Committee reviews policies with the administration to ensure they are current and appropriate.

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Policy & Personnel Committee is bringing the draft Policy 5143 Revised and Adopted as Policy 4118.31 to the full Board for a Second Reading.

Titles of Attachments:

1. DRAFT Policy 5143 Revised and Adopted as Policy 4118.31

Frank Pepe
Signature of Staff Member Submitting Report

Steven Madancy
Signature of Superintendent of Schools

Policy 5143 Revised and Adopted as Policy 4118.31

School Employee Reports of Suspected Abuse or Neglect of Children or Reports of Sexual Assault of Children – Policy Revision

Draft

School Employee Reports of Suspected Abuse or Neglect of Children or Reports of Sexual Assault of Children

Conn. Gen. Stat. Section 17a-101 et seq. requires school employees who have reasonable cause to suspect or believe (1) that any child under eighteen has been abused or neglected, has had a nonaccidental physical injury, or injury which is at variance with the history given of such injury, or has been placed at imminent risk of serious harm, or (2) that any person who is being educated by the Technical Education and Career System or a local or regional board of education, other than as part of an adult education program, is a victim of sexual assault, and the perpetrator is a school employee, to report such suspicions to the appropriate authority. In furtherance of this statute and its purpose, it is the policy of the Southington Board of Education ("Board") to require all employees of the Board of Education to report suspected abuse and/or neglect, nonaccidental physical injury, imminent risk of serious harm, or sexual assault of a student by a school employee, in accordance with the procedures set forth below.

1. Scope of Policy

   This policy applies not only to school employees who are required by law to report suspected child abuse and/or neglect, nonaccidental physical injury, imminent risk of serious harm, or sexual assault of a student by a school employee, but to all employees of the Board.

2. Definitions

   For the purposes of this policy:

   "Abused" means that a child (a) has had physical injury or injuries inflicted upon the child other than by accidental means, or (b) has injuries which are at variance with the history given of them, or (c) is in a condition which is the result of maltreatment, such as, but not limited to, malnutrition, sexual molestation or exploitation, deprivation of necessities, emotional maltreatment, or cruel punishment.

   "Neglected" means that a child (a) has been abandoned, or (b) is being denied proper care and attention, physically, educationally, emotionally, or morally, or (c) is being permitted to live under conditions, circumstances, or associations injurious to the child's well-being, or (d) has been abused.

School Employee Reports of Suspected Abuse or Neglect of Children or Reports of Sexual Assault of Children

"School employee" means (a) a teacher, substitute teacher, school administrator, school superintendent, guidance counselor, school counselor, psychologist, social worker, nurse, physician, school paraprofessional or coach employed by the Board or who is working in a Board elementary, middle or high school; or (b) any other person who, in the performance of that person's duties, has regular contact with students and who provides services to or on behalf of students enrolled in the Southington Public Schools ("District"), pursuant to a contract with the Board.

"Sexual assault" means, for the purposes of the mandatory reporting laws and this policy, a violation of Sections 53a-70, 53a-70a, 53a-71, 53a-72a, 53a-72b or 53a-73a of the Connecticut General Statutes.

"Statutorily mandated reporter" means an individual required by Conn. Gen. Stat. Section 17a-101 et seq. to report suspected abuse and/or neglect of children or the sexual assault of a student by a school employee. The term "statutorily mandated reporter" includes all school employees, as defined above, any person who is a licensed behavior analyst, and any person who holds or is issued a coaching permit by the State Board of Education, is a coach of intramural or interscholastic athletics, and is eighteen years of age or older.

3. What Must Be Reported

a) A report must be made when any employee of the Board of Education in the ordinary course of such person's employment or profession has reasonable cause to suspect or believe that any child under the age of eighteen years:

   i) has been abused or neglected;

   ii) has had nonaccidental physical injury, or injury which is at variance with the history given for such injury, inflicted upon the child;

   iii) is placed at imminent risk of serious harm; or

b) A report must be made when any employee of the Board of Education in the ordinary course of such person's employment or profession has reasonable cause to suspect or believe that any person, regardless of age, who is being educated by the Technical Education and Career System or a local or regional board of education, other than as part of an adult education program, is a victim of the following sexual assault crimes, and the perpetrator is a school employee:

i) sexual assault in the first degree;

ii) aggravated sexual assault in the first degree;

iii) sexual assault in the second degree;

iv) sexual assault in the third degree;

v) sexual assault in the third degree with a firearm; or

vi) sexual assault in the fourth degree.

c) The suspicion or belief of a Board employee may be based on factors including, but not limited to, observations, allegations, facts or statements by a child or victim, as described above, or a third party. Such suspicion or belief does not require certainty or probable cause.

4. Reporting Procedures for Statutorily Mandated Reporters

The following procedures apply only to statutorily mandated reporters, as defined above.

a) When an employee of the Board of Education who is a statutorily mandated reporter and who, in the ordinary course of the person's employment, has reasonable cause to suspect or believe that a child has been abused or neglected or placed at imminent risk of serious harm, or a student is a victim of sexual assault by a school employee, as described in Paragraph 3, above, the following steps shall be taken.

(1) The employee shall make an oral or electronic report as soon as practicable, but not later than twelve (12) hours after having reasonable cause to suspect or believe that a child has been abused or neglected or placed at imminent risk of serious harm, or a student is a victim of sexual assault by a school employee.

(a) An oral report shall be made by telephone or in person to the Commissioner of the Department of Children and

School Employee Reports of Suspected Abuse or Neglect of Children or Reports of Sexual Assault of Children

(b) Families ("DCF") or the local law enforcement agency. DCF has established a 24-hour Child Abuse and Neglect Careline at 1-800-842-2288 for the purpose of making such oral reports.

(c) An electronic report shall be made in the manner prescribed by the Commissioner of DCF. An employee making an electronic report shall respond to further inquiries from the Commissioner of DCF or Commissioner's designee made within twenty-four (24) hours. Such employee shall inform the Superintendent or Superintendent's designee as soon as possible as to the nature of the further communication with the Commissioner or Commissioner's designee.

(2) The employee shall also make an oral report as soon as practicable to the Building Principal or Building Principal's designee, and/or the Superintendent or Superintendent's designee. If the Building Principal is the alleged perpetrator of the abuse/neglect or sexual assault of a student, then the employee shall notify the Superintendent or Superintendent's designee directly.

(3) In cases involving suspected or believed abuse, neglect, or sexual assault of a student by a school employee, the Superintendent or Superintendent's designee shall immediately notify the child's parent or guardian that such a report has been made.

(4) Not later than forty-eight (48) hours after making an oral report, the employee shall submit a written or electronic report to the Commissioner of DCF or the Commissioner's designee containing all the required information. The written or electronic report should be submitted in the manner prescribed by the Commissioner of DCF. When such report is submitted electronically, the employee shall respond to further inquiries from the Commissioner of DCF or Commissioner's designee made within twenty-four (24) hours. Such employee shall inform the Superintendent or Superintendent's designee as soon as possible as to the nature of the further communication with the Commissioner or Commissioner's designee.

(5) The employee shall immediately submit a copy of the written or electronic report to the Building Principal or Building Principal's

designee and to the Superintendent or the Superintendent's designee.

(6) If the report concerns suspected abuse, neglect, or sexual assault of a student by a school employee holding a certificate, authorization or permit issued by the State Department of Education, the Commissioner of DCF (or Commissioner of DCF's designee) shall submit a copy of the written or electronic report to the Commissioner of Education (or Commissioner of Education's designee).

5. Contents of Reports

Any report made pursuant to this policy shall contain the following information, if known:

a) The names and addresses of the child* and the child's parents or other person responsible for the child's care;

b) the age of the child;

c) the gender of the child;

d) the nature and extent of the child's injury or injuries, maltreatment or neglect;

e) the approximate date and time the injury or injuries, maltreatment or neglect occurred;

f) information concerning any previous injury or injuries to, or maltreatment or neglect of the child or the child's siblings;

g) the circumstances in which the injury or injuries, maltreatment or neglect came to be known to the reporter;

h) the name of the person or persons suspected to be responsible for causing such injury or injuries, maltreatment or neglect;

i) the reasons such person or persons are suspected of causing such injury or injuries, maltreatment or neglect;

School Employee Reports of Suspected Abuse or Neglect of Children or Reports of Sexual Assault of Children

j) any information concerning any prior cases in which such person or persons have been suspected of causing an injury, maltreatment, or neglect of a child; and

k) whatever action, if any, was taken to treat, provide shelter or otherwise assist the child.

6. Investigation of the Report

a) The Superintendent or Superintendent's designee shall thoroughly investigate reports of suspected abuse, neglect, or sexual assault if/when such report involves an employee of the Board of Education or other individual under the control of the Board, provided the procedures in subparagraph (b), below are followed. In all other cases, DCF shall be responsible for conducting the investigation with the cooperation and collaboration of the Board, as appropriate.

b) Recognizing that DCF is the lead agency for the investigation of child abuse and neglect reports and reports of a student's sexual assault by school employees, the Superintendent's investigation shall permit and give priority to any investigation conducted by the Commissioner of DCF or the appropriate local law enforcement agency. The Superintendent shall conduct the District's investigation and take any disciplinary action, consistent with state law, upon notice from the Commissioner of DCF or the appropriate local law enforcement agency that the District's investigation will not interfere with the investigation of the Commissioner of DCF or the local law enforcement agency.

c) The Superintendent shall coordinate investigatory activities to minimize the number of interviews of any child or student victim of sexual assault and share information with other persons authorized to investigate child abuse or neglect, as appropriate.

d) Any person reporting child abuse or neglect or the sexual assault of a student by a school employee or having any information relevant to alleged abuse or neglect or of the sexual assault of a student by a school employee, shall provide the Superintendent with all information related to the investigation that is in the possession or control of such person, except as expressly prohibited by state or federal law.

School Employee Reports of Suspected Abuse or Neglect of Children or Reports of Sexual Assault of Children

e) When the school district is investigating suspected abuse or neglect or sexual assault of a student by an employee of the Board or other individual under the control of the Board, the Superintendent's investigation shall include an opportunity for the individual suspected of abuse, neglect, or sexual assault to be heard with respect to the allegations contained within the report. During such investigation, the Superintendent may suspend a Board employee with pay or may place the employee on administrative leave with pay, pending the outcome of the investigation. If the individual is one who provides services to or on behalf of students enrolled in the District, pursuant to a contract with the Board of Education, the Superintendent may suspend the provision of such services, and direct the individual to refrain from any contact with students enrolled in the District, pending the outcome of the investigation.

7. Evidence of Abuse, Neglect or Sexual Assault by a School Employee

a) If, upon completion of the investigation by the Commissioner of DCF ("Commissioner"), the Superintendent has received a report from the Commissioner that the Commissioner has reasonable cause to believe that (1) a child has been abused or neglected by a school employee, as defined above, and the Commissioner has recommended that such employee be placed on the DCF Child Abuse and Neglect Registry, or (2) a student is a victim of sexual assault by a school employee, the Superintendent shall request (and the law provides) that DCF notify the Superintendent not later than five (5) working days after such finding, and provide the Superintendent with records, whether or not created by DCF, concerning such investigation. The Superintendent shall suspend such school employee. Such suspension shall be with pay and shall not result in the diminution or termination of benefits to such employee.

b) Not later than seventy-two (72) hours after such suspension, the Superintendent shall notify the Board of Education and the Commissioner of Education, or the Commissioner of Education's representative, of the reasons for and the conditions of the suspension. The Superintendent shall disclose such records to the Commissioner of Education and the Board of Education or its attorney for purposes of review of employment status or the status of such employee's certificate, permit or authorization, if any.

c) The suspension of a school employee employed in a position requiring a certificate shall remain in effect until the Superintendent and/or Board of Education acts pursuant to the provisions of Conn. Gen. Stat. §10-151. If the contract of employment of such certified school employee is terminated, or such certified school employee resigns such employment, the Superintendent shall notify the Commissioner of Education, or the Commissioner of Education's representative, within seventy-two (72) hours after such termination or resignation.

d) The suspension of a school employee employed in a position requiring an authorization or permit shall remain in effect until the Superintendent and/or Board of Education acts pursuant to any applicable termination provisions. If the contract of employment of a school employee holding an authorization or permit from the State Department of Education is terminated, or such school employee resigns such employment, the Superintendent shall notify the Commissioner of Education, or the Commissioner of Education's representative, within seventy-two (72) hours after such termination or resignation.

e) Regardless of the outcome of any investigation by the Commissioner of DCF and/or the police, the Superintendent and/or the Board, as appropriate, may take disciplinary action, up to and including termination of employment, in accordance with the provisions of any applicable statute, if the Superintendent's investigation produces evidence that a child has been abused or neglected by a school employee or that a student has been a victim of sexual assault by a school employee.

f) The District shall not employ a person whose employment contract is terminated or who resigned from employment following a suspension pursuant to Paragraph 8(a) of this policy and Conn. Gen. Stat. § 17a-101i, if such person is convicted of a crime involving an act of child abuse or neglect or an act of sexual assault of a student, as described in Paragraph 2 of this policy.

8. <u>Evidence of Abuse, Neglect or Sexual Assault by an Independent Contractor of the Board of Education</u>

If the investigation by the Superintendent and/or the Commissioner of DCF produces evidence that a child has been abused or neglected, or a student has been sexually assaulted, by any individual who provides services to or on behalf of students enrolled in the District, pursuant to a contract with the Board, the Superintendent shall permanently suspend the provision of such services, and direct the individual to refrain from any contact with students enrolled in the District.

9. Delegation of Authority by Superintendent

The Superintendent may appoint a designee for the purposes of receiving and making reports, notifying, and receiving notification, or investigating reports pursuant to this policy.

10. Disciplinary Action for Failure to Follow Policy

Except as provided in Section 14 below, any employee who fails to comply with the requirements of this policy shall be subject to discipline, up to and including termination of employment.

11. The District shall not hire any person whose employment contract was previously terminated by a board of education or who resigned from such employment, if such person has been convicted of a violation of Section 17a-101a of the Connecticut General Statutes, as amended, relating to mandatory reporting, when an allegation of abuse or neglect or sexual assault has been substantiated.

12. Non-Discrimination Policy/Prohibition Against Retaliation

The Board of Education expressly prohibits retaliation against individuals reporting child abuse or neglect or the sexual assault of a student by a school employee and shall not discharge or in any manner discriminate or retaliate against any employee who, in good faith, makes a report pursuant to this policy, or testifies or is about to testify in any proceeding involving abuse or neglect or sexual assault by a school employee. The Board of Education also prohibits any employee from hindering or preventing or attempting to hinder or prevent any employee from making a report pursuant to this policy or state law concerning suspected child abuse or neglect or the sexual assault of a student by a school employee or testifying in any proceeding involving child abuse or neglect or the sexual assault of a student by a school employee.

School Employee Reports of Suspected Abuse or Neglect of Children or Reports of Sexual Assault of Children

13. Distribution of Policy, Guidelines and Posting of Careline Information

This policy shall annually be distributed electronically to all school employees employed by the Board. The Board shall document that all such school employees have received this written policy and completed the training and refresher training programs required by in Section 14, below. Guidelines regarding identifying and reporting child sexual abuse developed by the Governor's task force on justice for abused children shall annually be distributed electronically to all school employees, Board members, and the parents or guardians of students enrolled in the schools under the jurisdiction of the Board. The Board shall post the Internet web site address and telephone number for the DCF Child Abuse and Neglect Careline in a conspicuous location frequented by students in each school under the jurisdiction of the Board.

14. Training

a) All new school employees, as defined above, shall be required to complete an educational training program for the accurate and prompt identification and reporting of child abuse and neglect. Such training program shall be developed and approved by the Commissioner of DCF.

b) All school employees, as defined above, shall take a refresher training course developed and approved by the Commissioner of DCF at least once every three years.

c) The principal for each school shall annually certify to the Superintendent that each school employee, as defined above, working at such school, is in compliance with the training provisions in this policy and as required by state law. The Superintendent shall certify such compliance to the State Board of Education.

d) Beginning July 1, 2023, all school employees, as defined above, shall complete the (1) training regarding the prevention and identification of, and response to, child sexual abuse and assault; (2) bystander training program; and (3) appropriate interaction with children training program. Each employee must repeat these trainings at least once every three years. Such trainings shall be identified or developed by DCF.

School Employee Reports of Suspected Abuse or Neglect of Children or Reports of Sexual Assault of Children

15. Records

a) The Board shall maintain in a central location all records of allegations, investigations, and reports that a child has been abused or neglected by a school employee employed by the Board or that a student has been a victim of sexual assault by a school employee employed by the Board, as defined above, and conducted in accordance with this policy. Such records shall include any reports made to DCF. The State Department of Education shall have access to such records upon request.

b) Notwithstanding the provisions of Conn. Gen. Stat. §10-151c, the Board shall provide the Commissioner of DCF, upon request and for the purposes of an investigation by the Commissioner of DCF of suspected child abuse or neglect by a teacher employed by the Board, any records maintained or kept on file by the Board. Such records shall include, but not be limited to, supervisory records, reports of competence, personal character and efficiency maintained in such teacher's personnel file with reference to evaluation of performance as a professional employee of the Board, and records of the personal misconduct of such teacher. For purposes of this section, "teacher" includes each certified professional employee below the rank of superintendent employed by the Board in a position requiring a certificate issued by the State Board of Education.

Beginning July 1, 2023, and annually thereafter, information regarding the sexual abuse and assault awareness and prevention program identified or developed by DCF shall be distributed electronically to all school employees, Board members, and the parents or guardians of enrolled students.

School Employee Reports of Suspected Abuse or Neglect of Children or Reports of Sexual Assault of Children

Legal References:

Connecticut General Statutes:

Section 10-151	Employment of teachers. Definitions. Tenure. Notice and hearing on failure to renew or termination of contract. Appeal.
Section 10-221s	Posting of Careline telephone number in schools. Investigations of child abuse and neglect. Disciplinary action.
Section 17a-101 et seq.	Protection of children from abuse. Mandated reporters. Educational and training programs. Model mandated reporting policy.
Section 17a-101q	Statewide Sexual Abuse and Assault Awareness and Prevention Program.
Section 17a-103	Reports by others. False reports. Notifications to law enforcement agency.

Public Act No. 22-87, "An Act Concerning the Identification and Prevention of and Response to Adult Sexual Misconduct Against Children."

Policy 5143 Revised and adopted as 4118.31: October 2022

~~**Series 5000: Students**~~

~~**Child Abuse/Neglect**~~

~~**Reporting of Suspected Child Abuse/Neglect**~~

~~The Board of Education recognizes that a student's mental and physical health will have an affect on the student's ability to obtain the most benefit from attending school. In order to increase the student's ability to learn while in school, the Board of Education realizes the importance of identifying students who may be suffering from abuse, neglect or placed in imminent danger of serious harm. Pursuant to state law, when any school nurse, psychologist, physical therapist, teacher, administrator, guidance counselor, paraprofessional, social worker, coach of intramural or interscholastic athletics, or any other mandated reporter prescribed by law has reasonable cause to suspect or believe that a child under the age of 18 has been abused or neglected or has been placed in imminent risk of serious harm, he/she shall as soon as practicable but not later than twelve (12) hours make an oral report by telephone or in person to the Department of Children and Families (DCF), or a law enforcement agency. The Superintendent of Schools or his/her designee, principal, shall be notified immediately after the oral report has been made. The Superintendent of Schools or his/her designee, principal, shall not be notified if he/she is the alleged perpetrator of abuse and neglect.~~

~~Reports of abuse or neglect by the above mentioned personnel ("mandatory reporters") shall include the following information, if known:~~

1. ~~the names and addresses for the child and his/her parent(s)/guardian(s) or other person responsible for the child's care~~
2. ~~the age of the child~~
3. ~~the gender of the child~~
4. ~~the nature and extent of the child's injury or injuries, maltreatment or neglect~~
5. ~~the approximate date and time of the injury or injuries, maltreatment or neglect occurred~~
6. ~~information concerning any previous injuries to, maltreatment of or neglect to the child or his/her siblings~~
7. ~~the circumstances in which the injuries, maltreatment or neglect came to be known to the mandatory reporter~~
8. ~~the name of the person or persons suspected to be responsible for causing such injury or injuries, maltreatment or neglect, and~~
9. ~~whatever action, if any, was taken to treat, provide shelter or otherwise assist the child~~

~~Series 5000: Students~~

~~Child Abuse/Neglect~~

~~Reporting of Suspected Child Abuse/Neglect (continued)~~

~~The mandatory reporter shall submit a written report to DCF containing the above-mentioned information within 48 hours of making the oral report. The reporter shall also submit a copy of the written report to the Superintendent of Schools, except when the Superintendent is the alleged perpetrator of abuse. If the report concerns abuse or neglect by a school employee, the Superintendent shall immediately notify the child's parent/guardian or other person responsible for the child's care that a report of abuse or neglect has been made; if the report concerns abuse or neglect by a certified school employee, the Superintendent shall send a copy of the written report the Commissioner of Education. In making all written reports required under this policy, the reporter may use the "DCF-136" form.~~

~~Reports under this policy should be made where a mandatory reporter in the ordinary course of such person's employment or professional has reasonable cause to suspect or believe that any child under the age of eighteen~~

1. ~~Has been abused in one or more of the following ways:~~
    - ~~a. Has had physical injury or injuries inflicted upon him/her other than by accidental means~~
    - ~~b. Has injuries which are at variance with the history given of them c. Is in a condition which is the result of maltreatment such as, but not limited to, malnutrition, sexual molestation or exploitation, deprivation of necessities, emotional maltreatment or cruel punishment~~

2. ~~Has been neglected in one or more of the following ways:~~
    - ~~a. Has been abandoned~~
    - ~~b. Is being denied proper care and attention, physically, educationally, emotionally, or morally~~
    - ~~c. Is being permitted to live under conditions, circumstances, or associations injurious to the child's well-being~~

3. ~~Has had non-accidental physical injury, or injury which is at variance with the history given of such injury, inflicted upon such child; or~~

4. ~~Is placed at imminent risk of serious harm~~

~~5143~~

~~Series 5000: Students~~

~~Child Abuse/Neglect~~

~~Reporting of Suspected Child Abuse/Neglect (continued)~~

~~When the Superintendent or his/her designee has been notified that an investigation by DCF is being conducted regarding an allegation that a child has been abused by a school employee who holds a certificate, permit or authorization issued by the State Board of Education, the Superintendent may immediately suspend such employee with pay and without termination of benefits.~~

~~When an investigation by DCF has determined that there is reasonable cause to believe that a child has been abused by a school employee who holds a certificate, permit or authorization issued by the State Board of Education, the Superintendent shall suspend such employee with pay and without termination of benefits, and shall notify the Board of Education and the Commissioner of Education or his representative of the reasons for and conditions of the suspension within seventy-two (72) hours after the suspension. The Superintendent shall also disclose those records provided by DCF concerning its investigation to the Commissioner of Education and the Board of Education or its attorney. If the contract of employment of such a certified school employee is terminated as the result of an investigation of abuse, the Superintendent shall notify the Commissioner of Education or his representative within seventy-two (72) hours after such termination.~~

~~The Superintendent is authorized to delegate his or her responsibilities for receiving and making reports, notifying and receiving notification, and conducting investigations to a designee acting in his or her behalf. Under state law, the Superintendent of Schools is authorized to receive notice from the State's Attorney of convictions of certified school employees for crimes involving an act of child abuse or neglect or sexual assault.~~

~~Penalty~~

~~Under state law, any person who is required to report suspected child abuse/neglect and fails to make such a report shall be fined in accordance with current state law, and shall be required to participate in an educational and training program established by DCF, the cost of which shall be paid by the participating mandatory reporter. Under state law, any person who knowingly makes a false report of child abuse or neglect shall be fined or imprisoned not more than one year or both in accordance with current state law.~~

~~5143~~

~~Series 5000: Students~~

~~Child Abuse/Neglect~~

~~Reporting of Suspected Child Abuse/Neglect (continued)~~

~~Legal Risk~~

~~Under state law, any person who in good faith makes or in good faith does not make a report of suspected child abuse/neglect is immune from any civil or criminal liability.~~

~~Emergency Health Care and Reasonable Inquiry~~

~~When reasonable cause to suspect or believe that a child has been abused, or is placed in serious risk of imminent harm, or when a child has a visible injury, public school personnel may make reasonable inquiry of the child regarding such suspicion or visible injury.~~
~~If a school nurse or school medical advisor is not readily available and the rendering of emergency first aid is necessary, other public school personnel who have completed a course in first aid offered by the American Red Cross, the American Heart Association, the Connecticut Department of Health Services or other recognized medical provider may render such emergency first aid to a child. In accordance with state law, any person providing such aid is not liable for civil damages for any personal injuries which result from acts or omissions by such person rendering the emergency first aid, which constitute ordinary negligence. The immunity does not apply to acts or omissions constituting gross, willful or wanton negligence.~~

~~Interviewing the Child~~

~~Public school personnel who believe that an interview in the school setting may be necessary in order to protect the child must notify DCF as early in the day as possible to provide both DCF and the school administration ample time to coordinate appropriate activities and actions. Upon receipt of such notice, DCF will advise school personnel whether the child must be interviewed in the school. If school personnel then retain the child after the scheduled school day in order to ensure an interview by DCF or local or state police, school personnel must attempt to notify the parent(s)/guardian(s) of the child, except where the alleged abuse involves the parent(s)/guardian(s).~~

~~Child Abuse/Neglect~~

~~Reporting of Suspected Child Abuse/Neglect (continued)~~

~~Emergency Health Care and Reasonable Inquiry Preparation for the Interview~~

~~If DCF determines that a school interview is appropriate, the DCF social worker shall be required to notify the Superintendent of Schools prior to the school visit with as much advance notice as possible. If the DCF social worker is not known to school personnel, a verifying call to the local DCF office shall be made. If~~

~~deemed appropriate by DCF or the administration, the parent/guardian of the child will be notified prior to the interview. DCF personnel are solely responsible for scheduling such interviews. If the DCF social worker does not arrive as scheduled and school personnel decide that the retention of the child beyond the school day Is necessary to protect the child's physical well-being, school personnel must attempt to notify the parent(s)/guardian(s) of the child that the child will be late, except where the alleged abuse involves the parent(s)/guardian(s).~~

~~The Interview~~

~~To ensure confidential communication, the school administration shall provide a private place to interview the child. As part of the investigative process, the DCF social worker may request that school personnel be present during the interview. The investigation is to be conducted solely by the DCF social worker.~~

~~The removal of clothing as part of an investigation into an injury which may have been caused by child abuse shall be done only at the request of the school medical advisor or the school nurse. Neither school nurse nor a school doctor may remove or insist that a child remove clothing to confirm suspected abuse or neglect, except in those circumstances where there is a need of emergency medical treatment.~~

~~Legal Reference:~~
~~Connecticut General Statutes~~
~~§17a-101 *et seq.*~~

Policy Amended: September 2004
Policy Revised: January 2007
Policy Revised: October 2022

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ______________________________ **Board Meeting Date** December 8, 2022

Decision Requested X **Agenda Code** 9 c.

AGENDA REPORTING FORM

Agenda Topic: Policy 5127 – Completion Rates of the Free Application for Federal Student Aid (FAFSA) – Revision - Second Reading.

Summary of Issue: The Policy & Personnel Committee has reviewed Policy 5127 – Completion Rates of the Free Application for Federal Student Aid (FAFSA)

Background: The Policy and Personnel Committee reviews policies with the administration to ensure they are current and appropriate.

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Policy & Personnel Committee is bringing the draft Policy 5127 to the full Board for a Second Reading.

Titles of Attachments:

1. DRAFT Policy 5127

Frank Pepe

Signature of Staff Member Submitting Report

Steven Madancy

Signature of Superintendent of Schools

Policy 5127

Completion Rates of the Free Application for Federal Student Aid (FAFSA) – New Policy

Draft

Completion Rates of the Free Application for Federal Student Aid (FAFSA)

The Southington Board of Education (the "Board") understands that completion of the Free Application for Federal Student Aid ("FAFSA") is an important step in the path to postsecondary education and is associated with higher rates of college enrollment. The Board is committed to improving the completion rates of the FAFSA for students enrolled in the Southington Public Schools (the "District").

To improve the completion rates of the FAFSA by students enrolled in grade 12, the District shall develop a systematic program through which such students are educated about the purpose and content of the FAFSA, encouraged to complete the FAFSA, and assisted in the completion of the FAFSA, as may be necessary and appropriate. The Board directs the Superintendent or designee to develop administrative regulations in furtherance of this policy. The Board further directs the Superintendent or designee to conduct periodic assessments of such regulations, at least annually, to determine effectiveness in improving completion rates of the FAFSA.

Any information contained in a FAFSA, held by the Board, shall not be a public record for purposes of the Freedom of Information Act and thus shall not be subject to disclosure under the provisions of section 1-210 of the Connecticut General Statutes.

Each year, the Superintendent or designee will report to the Board the FASFA completion rate for each high school in the District.

The Board may accept gifts, grants and donations, including in-kind donations, to implement the provisions of this policy.

Legal Reference:
PA 21-199

Conn. Gen. Stat. § 10a-11i
Conn. Gen. Stat. § 10-223m

Adopted October 2022

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ______________________ **Board Meeting Date** December 8, 2022

Decision Requested X **Agenda Code** 9 d.

AGENDA REPORTING FORM

Agenda Topic: Policy 5144 – Physical Activity, Undirected Play – Revision - Second Reading.

Summary of Issue: The Policy & Personnel Committee has reviewed Policy 5144 – Physical Activity, Undirected Play

Background: The Policy and Personnel Committee reviews policies with the administration to ensure they are current and appropriate.

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Policy & Personnel Committee is bringing the draft Policy 5144 to the full Board for a Second Reading.

Titles of Attachments:

1. DRAFT Policy 5144

Frank Pepe

Signature of Staff Member Submitting Report

Steven Madancy

Signature of Superintendent of Schools

Policy 5144

Physical Activity, Undirected Play – Policy Revision

Draft

PHYSICAL ACTIVITY, UNDIRECTED PLAY

It is the policy of the Southington Board of Education (the "Board") to promote the health and well-being of district students by encouraging healthy lifestyles including promoting physical exercise and activity as part of the school day.

For the purposes of this policy, a "school employee" is defined as (1) a teacher, substitute teacher, school administrator, school superintendent, guidance counselor, school counselor, psychologist, social worker, nurse, physician, school paraprofessional or coach employed by the Board or working in the district schools, or (2) any other individual who, in the performance of his or her duties, has regular contact with students and who provides services to or on behalf of students enrolled in the district schools pursuant to a contract with the Board.

I. Deprivation of Physical Exercise Period or Undirected Play Period as a Form of Discipline

For elementary school students, the Board includes a time of not less than twenty (20) minutes in total, during the regular school day, to be devoted to physical exercise, except that a planning and placement team ("PPT") may develop a different schedule for students requiring special education and related services.

The administration may include additional time, beyond the twenty minutes required for physical exercise, devoted to undirected play during the regular school day for elementary school students.

To promote physical exercise and undirected play, the Board prohibits school employees from disciplining elementary school students by preventing them from participating in the full 20 minutes of time devoted to physical exercise or additional time devoted to undirected play during the regular school day, except in accordance with this policy or as determined by a student's Section 504 team or PPT.

A. *<u>Physical Exercise Period</u>*

School employees may prevent or otherwise restrict a student from participating in the entire time devoted to physical exercise in the regular school day as a form of discipline <u>only</u> under the following circumstances:

1) When a student poses a danger to the health or safety of other students or school personnel; or

2) If there are two or more periods devoted to physical exercise in a school day, then when the prevention or restriction of physical exercise is limited to the period devoted to physical exercise that is the shortest in duration, provided that the student still participates in at least twenty minutes of physical exercise in a school day.

School employees may prevent or restrict a student from participating in the entire time devoted to physical exercise in the regular school day as a form of discipline, in accordance with this policy, only one time during a school week, unless the student is a danger to the health or safety of other students or school personnel.

School employees may not prevent or restrict a student from participating in the entire time devoted to physical exercise in the regular school day if such prevention or restriction is related to the student's failure to complete schoolwork on time or to the student's academic performance.

This policy distinguishes between a) discipline that is imposed before the time devoted to physical exercise begins and b) discipline imposed during such time devoted to physical exercise or methods used to redirect a student's behavior during such time. School personnel may impose discipline during time devoted to physical exercise as a result of student's behavior during such time, if such discipline is in accordance with Board policies and procedures. School personnel may also use methods to redirect a student's behavior, in the event such behavior warrants redirection, during the time devoted to physical exercise. For clarity, the prohibition against preventing or restricting a student's participation in the time devoted to physical exercise shall apply to student conduct that occurs prior to the physical exercise time, rather than during the physical exercise time.

B. *<u>Undirected Play Period</u>*

School employees may not discipline elementary school students by preventing them from participating in the full time devoted to undirected play, if any, during the regular school day, except when a student poses a danger to the health or safety of other students or school personnel, or as determined by a student's Section 504 team or PPT.

II. Prohibition on Compulsion of Physical Activity as a Form of Discipline

For all students, the Board prohibits school employees from disciplining students by requiring students to engage in physical activity as a form of discipline during the regular school day.

III. Disciplinary Action for Failure to Follow Policy

Any employee who fails to comply with the requirements of this policy may be subject to discipline, up to and including termination of employment. Any contracted individual who provides services to or on behalf of students enrolled in the district and who fails to comply with the requirements of this policy may be subject to having the individual's contract for services suspended by the district.

<u>Discipline/Punishment</u>

Reasonable physical force may be used to the extent that a teacher or other person entrusted with the care and supervision of a minor for school purposes believes it necessary to:

a. protect himself/herself or others from immediate physical injury; b. obtain possession of a dangerous instrument or controlled substance, upon or within the control of such student;
c. protect property from physical damage;
d. restrain student or remove student to another area to maintain order.

Physical force may not be used a disciplinary measure.

Legal Reference:
Connecticut General Statutes

§ 10-221o Lunch periods. Recess. Boards to adopt policies addressing limitation of physical exercise

§ 10-221u Boards to adopt policies addressing the use of physical activity as discipline

Public Act No. 22-81 “An Act Expanding Preschool and Mental and Behavioral Services for Children”

PA 89-186 The use of reasonable physical force defense by teachers and certain other persons.

(cf. 4148 – Employee Protection)

Policy Adopted: January 1990
Policy Reviewed: August 2002
Policy Revised: October 2022

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ____________ **Board Meeting Date** December 8, 2022

Decision Requested X **Agenda Code** 9 e.

AGENDA REPORTING FORM

Agenda Topic: SHS – Introduction to Psychology Course Curriculum - Second Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed SHS – Introduction to Psychology Course Curriculum.

Background:

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Curriculum & Instruction Committee is bringing the SHS – Introduction to Psychology Course Curriculum to the full Board for a Second Reading.

Titles of Attachments:

1. Course Proposal

Signature of Staff Member Submitting Report

Signature of Superintendent of Schools

Unit Overview	
Unit Title:	Unit 0: Defining Psychology
Author(s):	Candace Patten/Heather Allenback
Grade Level/Course:	Introduction to Psychology/Grades 11-12
Length/Dates:	4-5 Days
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	This unit examines: Both the importance of studying psychology and the major approaches used by psychologists to explain behavior & thinking.

Stage 1: Desired Results

Transfer Goals List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s). **Collaboration Transdisciplinary Goal:** Students flexibly and cooperatively work with others in physical and virtual environments and assume shared responsibility for completing a project or achieving a goal. **Communication Transdisciplinary Goal:** Students effectively communicate and use interpersonal skills in a range of formal and informal contexts.

Priority Standards for the Unit Grade Level/Subject Standard(s) List the Content Standards, Guiding Principles, or Cross-Curricular Skills this unit will address
What content standards will be assessed and drive your unit? **PSY(SIRM) 1:** Students understand the nature of psychological science **Social Studies INQ 9-12.11** Construct explanations using sound reasoning, correct sequence (linear or nonlinear), examples, and details with significant and pertinent information & data, while acknowledging the strengths & weaknesses of the explanation given its purpose

Other Goal(s) List the Disciplinary Transfer Goals that this unit will address
Students identify the most credible and relevant evidence from a variety of sources to generate and refine effective claims and counterclaims. (INQ 8, 9, 10, 11)

Essential Question(s):	Students will keep considering… ● How does psychology relate to my life?

These questions are related to the enduring understandings and provide relevance for the learning in the unit.	• Why are there various ways to explain thinking and behavior?

Enduring Understanding(s): What are the big picture understandings that are transferable across contexts, places, and times?	Students will understand that… • Psychology is the scientific study of the mind and behavior. • A variety of perspectives shaped the development of psychological thought. • There are strengths and limitations of applying theories to explain behavior.

What will students know... Factual information, vocabulary and basic concepts related to each indicator	**What will students be able to do (skilled at)...** Skills, processes and/or knowledge that are related to each indicator and which students will be able to use in new contexts/with new material
K1. Psychologists aim to describe, explain, predict, control, and improve individual behavior and thinking. K2. There are 7 individual perspectives utilized by psychology in studying behavior & thinking: biological, evolutionary, psychodynamic, cognitive, behavioral, humanistic, and socio-cultural. K3. The contemporary perspective is called the biopsychosocial perspective, reflecting the understanding that not all behavior and thinking can be reduced to one perspective.	S1. Define psychology. S2. Describe and compare different theoretical approaches in explaining behavior. S3. Explain real-world behavior using these perspectives. S4. Write an explanation that is clear, thorough and accurate.

Stage 2: Evidence of Student Learning

Performance Task(s)

Assessment Evidence What will the student produce?
GRASPS • **Goal:** Students will apply their knowledge of psychology's perspectives to a real-world scenario • **Role:** School Psychologist • **Audience:** Administrator investigating an incident • **Situation:** A student bumps another student in the crowded hallway while walking to class. The student who got bumped immediately turns and shoves the student who bumped saying, "What's your problem?!" Things escalate to an all out fist fight with the student body looking/cheering on. Using a specific perspective, explain why this violence might have occurred.

- **Product/Performance/Purpose:** Written explanation
- **Tools**: Written for the Role of School Psychologist
  Students who need a graphic organizer according to IEP and 504 - add this into their document
- **Standards and Criteria for Success** (link rubric)
    - Use Critical Thinking rubric: reasoning indicator, understanding & evidence strands
    - Use Communication rubric: listening indicator, feedback strand

Stage 3: Instructional Design

<table>
<tr><th colspan="3">How I will get there (learning targets & lessons):</th></tr>
<tr><td>What will I learn?</td><td>Why will I learn this?</td><td>How will I know when I have learned it?</td></tr>
<tr><td>Lesson 1: What is Psychology?

I will learn the definition of psychology.</td><td>I will learn this because understanding what psychology is will help me be successful in the course.</td><td>I will know I have learned this when I can define psychology in my own words and when I can make connections to the content throughout the course.</td></tr>
<tr><td colspan="3">Lesson 1: Introduction to psychology and definition of psychology
• Definition and why it’s important to study psychology
• What is psychology (opening questions and goals of psychology)</td></tr>
<tr><td>Lesson 2: The Perspectives

I will be able to identify and explain the various perspectives used in psychology to explain behavior and thinking.</td><td>I will learn this because I will refer back to these perspectives throughout the course.</td><td>I will know I have learned this when I can correctly identify a perspective explaining a behavior.</td></tr>
<tr><td colspan="3">Lesson 2: The Perspectives (summary)
• Intro perspectives - Perspectives Wheel activity
  ○ Reading options for summary info:
    ■ Perspectives in Modern Psychology
    ■ Psychological Perspectives for Psychology
  ○ Identify the perspectives in action</td></tr>
<tr><td colspan="3">Performance Task</td></tr>
</table>

Unit Overview	
Unit Title:	Unit 1: Biological Influences on Behavior
Author(s):	Candace Patten/Heather Allenback
Grade Level/Course:	Introduction to Psychology/Grades 11-12
Length/Dates:	4 weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	Students will understand the different structures and development of the brain, as well as the processes of sleeping and dreaming. They will be able to apply this knowledge through a variety of activities including critiquing a children's toy for its age-appropriate effectiveness on brain development.

Stage 1: Desired Results

Transfer Goals List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s). **Creativity/Innovation Transdisciplinary Goal:** Students work creatively to design and refine implementation of ideas by taking risks, persevering, and exploring possibilities. **Communication Transdisciplinary Goal:** Students effectively communicate and use interpersonal skills in a range of formal and informal contexts.

Priority Standards for the Unit Grade Level/Subject Standard(s) List the Content Standards, Guiding Principles, or Cross-Curricular Skills this unit will address
What content standards will be assessed and drive your unit? **PSY (BIO) #1:** Students understand the structure & function of the nervous system in human and non-human animals **PSY (CON) #2:** Students understand the characteristics and functions of sleep and theories that explain why we sleep & dream **PSY (SIRM) #2:** Students will understand research methods and measurements to study behavior and mental processes. **Social Studies INQ 9.10-11** Construct explanations using sound reasoning, examples, and details with significant and pertinent information and data, while acknowledging the strengths and weaknesses of the explanation given its purpose.

Other Goal(s) List the Disciplinary Transfer Goals that this unit will address

1. Students identify the most credible and relevant evidence from a variety of sources to generate and refine effective claims and counterclaims. (INQ 6)

Essential Question(s): These questions are related to the enduring understandings and provide relevance for the learning in the unit.	Students will keep considering… - How do psychologists study the brain and how it works? - What makes an explanation strong, weak, or limited? - How is a child's brain different from an adolescent's brain? - How can the environment impact brain development? - How is technology shaping what we know about the brain? - How do biological processes impact behavior? - What does critical thinking mean? What are the steps in the critical thinking process? - What is the purpose of sleep? - What impact does sleep deprivation have on an individual?

Enduring Understanding(s): What are the big picture understandings that are transferable across contexts, places, and times?	Students will understand that… - The different tools available to study the brain have strengths and limitations - The brain is not fixed; it is complex and continues to grow with stimulation and throughout a person's life. - A clear explanation uses sound reasoning, correct sequencing, and pertinent information. - Research questions do not have a single source or answer; instead the answer will require analysis, synthesis, and evaluation of all sources. - Sleep is vital to brain development and health.

What will students know... Factual information, vocabulary and basic concepts related to each indicator	**What will students be able to do (skilled at)...** Skills, processes and/or knowledge that are related to each indicator and which students will be able to use in new contexts/with new material
K1 The structure and function of the central nervous system K2 How plasticity enables the brain to function K3 The different parts and functions of the brain. K4 How the study of the brain has evolved from case studies to imaging tools K5 The developmental stages and milestones of a child's brain K6 The stages of sleep, their characteristics and how they are studied.	S1 Describe the structures & functions of the various parts of the central nervous system S2 Apply their understanding of the brain through the evaluation of a toy. S3 Explain how plasticity has the ability to change the brain's physical structure often in response to something in the environment. S4 Synthesize resources in order to apply knowledge S5 Determine the difference between a strong and weak explanations

K7 The most common sleep disorders and their characteristics. K8 The different theories regarding why we dream	S6 Describe the characteristics and importance of sleep. S7 Identify the symptoms of the most common sleep disorders and their impact on everyday functioning. S8 Apply multiple theoretical perspectives to dream interpretation

Stage 2: Evidence of Student Learning

Performance Tasks

Assessment Evidence What will the student produce?
GRASPS: Toy Evaluation **Goal**: Students research critical periods of brain development during early childhood and design or evaluate a developmentally appropriate educational toy for a child of a particular age. **Role**: Team of psychologists (your classmates) have been hired by a prominent toy company **Audience**: Specific age group (2 months - 5 year old) **Situation**: • Evaluate a newly developed toy that is on the market **or** • Create a new toy for the company. **Performance/Product**: Create or evaluate a toy with written justification of the appropriateness for selected age group **Tools:** Helping a Child's Brain Grow with Toys **Standards/Scoring**: Rubric **GRASPS: Sleep** **Goal:** Students demonstrate their knowledge of sleep by applying this understanding to a choice of case study **Role:** Psychologist with expertise in sleep **Audience:** Chosen client **Situation:** Client has come to psychologist to ask for help; psychologist must provide advice to help client sleep better **Performance/Product:** Write up summarizing analysis of problem and providing advice **Tools:** Dear Sleepy **Standards/Scoring:** Rubric

Resources Any materials and resources related to the performance task that the teacher or student would need to be successful.
CDC Milestones Slides for development of brain Slides for Sleep & the Brain

Stage 3: Instructional Design

<table>
<tr><th colspan="3">How I will get there (learning targets & lessons):</th></tr>
<tr><td>What will I learn?</td><td>Why will I learn this?</td><td>How will I know when I have learned it?</td></tr>
<tr><td>Lesson 1:
I will learn what the function of the nervous system is.</td><td>I will learn this to understand my own nervous system and how it works. This will help me understand how the brain works.</td><td>I can close read (annotate) Nervous System Reading/WS and summarize my learning in the attached graphic organizer.</td></tr>
<tr><td colspan="3">A. Introduction to the brain- Brain games episode 7- introduces the brain. Questions
B. Introduction to the brain- animal v. human Animal v Human Brain - BrainGames Season 6, Episode 5)
C. To learn the nervous system have students read and answer the questions Nervous System Reading/WS</td></tr>
<tr><td>Lesson 2a:
I will learn what a case study is.</td><td>I will learn this to understand how case studies provide information to psychologists about specific functions of the brain.</td><td>I can work with classmates to analyze important case studies regarding the research of the brain.</td></tr>
<tr><td colspan="3">Case Study- Slides with case studies

Resources:
Brain injury slides and case studies</td></tr>
<tr><td>Lesson 2b:
I will learn how psychologists study the brain and the specific tools used.</td><td>I will learn this to understand how psychologists know what they know. This will help me understand how the brain works.</td><td>I can identify the different tools psychologists use to understand the brain. I will be able to answer the question- How does technology shape our knowledge of the brain?</td></tr>
<tr><td colspan="3">Mapping the Brain lesson plan activity - PDF</td></tr>
<tr><td>Lesson 3:
I will learn the different parts and functions of the brain.

3a. Parts of the brain activity
3b.Speed Dating activity</td><td>I will learn the different parts and functions of the brain to help me create and/or evaluate a children's toy. (Performance task)
I will also learn the different parts and functions of the brain to understand my own brain and how it impacts my relationships, learning, and life.</td><td>I can identify the different parts and functions of the brain and apply this knowledge to the evaluation of a children’s toy.</td></tr>
<tr><td colspan="3">Introduce the brain structures- Slides
Speed dating- Slides
Speed dating- handouts
Speed dating- sign up sheet

Brain check- in to see what they know-- Slides (peardeck activity)
Will use this information for the performance task- to explain which parts of the brain are being targeted by the toy and why.</td></tr>
<tr><td>Lesson 4: Plasticity - How does the brain change as we learn and experience new things?
I will learn how plasticity allows</td><td>I will learn this to help me understand how the brain works and will help me understand how a toy can impact brain development.</td><td>I will be able to explain the concept of plasticity and how it has the ability to change the brain’s structure often in response</td></tr>
</table>

<table>
<tr><td>the brain to grow.</td><td></td><td>to something in the environment.</td></tr>
<tr><td colspan="3">Lesson Plans with activities and video - Lesson Plan Topic 4 F_0.pdf
Articles- Neuroplasticity: How Experience Changes the Brain
The Plasticity of the Brain: Guiding the Damaged Brain to Recover From Injury and the Healthy Brain to Improve Itself | HuffPost Impact

Videos
https://www.brainfacts.org/archives/2011/neuroplasticity
For students who need it Khan Academy Article

What you can do
1. Have students in pairs or groups read the articles
2. Develop their own definition of plasticity and how does the brain recover after injury
3. Post it on the white board, poster board, or Peardeck (whatever teacher wants to use for the class)
4. Whole class watches the following video- Your Brain is Plastic
5. Class discussion about definitions and video
6. Case studies about plasticity - half a brain Jodi Miller and/or Half a brain Jodi
- For students who are advanced here is phantom limb and plasticity article - Phantom Limbs and Neural Plasticity | Neurology
- Or you can have students research new research in plasticity and explain findings to the class.
Answer the following questions:
1. What does research suggest about plasticity?
2. What are some real life examples?
3. How does the brain change as we learn and experience new things?</td></tr>
<tr><td>Lesson 5: Development of the brain
I will learn the different milestones in child brain development

Lesson 5B: Strong and weak explanations (within this lesson)
I will learn the criteria to develop a strong explanation using evidence to support my response.</td><td>I will learn this to help me create and/or evaluate a developmentally appropriate toy for a specific age group.

I will learn the difference between a strong and weak explanation to help myself write clear, strong, and concise explanations for the course.</td><td>I will be able to create or evaluate a toy by writing a strong explanation as to how appropriate the toy is for a certain age group.</td></tr>
<tr><td colspan="3">Performance Task 1</td></tr>
<tr><td colspan="3">Article to read about development and brain - Why Ages 2-7 Matter So Much for Brain Development | Edutopia (on brain slides there is a slide with questions for this article)

Developmental Brain Slides</td></tr>
<tr><td>Lesson 6: Purpose of Sleep
I will learn the stages of sleep, their characteristics and how they are studied along with the purpose of sleep.</td><td>I will learn this to help me understand why sleep is vital to my health, learning, and brain development.</td><td>I will be able to create a PSA (my choice of format) to demonstrate my understanding of the purpose and why it is vital for the overall health and brain development.</td></tr>
<tr><td colspan="3">Purpose of sleep- slides
Sleep PSA assignment and rubric (quiz grade)</td></tr>
<tr><td>Lesson 7: Different theories of dreams
I will learn the different theories of dreams and be able to understand</td><td>I will learn this to help me understand the purpose of dreams to better understand myself and theories in psychology.</td><td>I will be able to apply my knowledge by analyzing a dream by using the different theories of sleep</td></tr>
</table>

the purpose of dreams.		
Purpose of dreams - Slides (some links are assignments) Dream Analysis- Dream analysis assignment Examples for students to use		
Lesson 8: Common sleep disorders I will be able to learn the different sleep disorders and how it impacts a person's overall health.	I will learn this to help me apply this knowledge to write the letter for the performance task.	I will be able to research a sleep disorder and share the information with my classmates. I will be able to summarize a sleep disorder, explain its impact, and different types of treatment for this sleep disorder.
Students will sign up for a sleep disorder and create a one pager about the disorder. - Gallery walk about sleep disorders - Students will have to explain the impact of the sleep disorder on the person Wrap up: 1. What are some common causes of sleep disorders? 2. How can sleep disorders impact an individual? 3. What are some future studies psychologist should consider about sleep, sleep disorders, and the brain? Rubric		
Performance Task 2		

Resources:

- Speed Dating - Folder
  Tour of brain Franklin Institute
- Brain games episode 7- introduces the brain. Questions
- Animal v Human Brain - BrainGames Season 6, Episode 5)
- Animal brain v. human brain (students research and share out)

Unit Overview	
Unit Title:	Unit 2: Memory
Author(s):	Candace Patten/Heather Allenback
Grade Level/Course:	Introduction to Psychology: Grades 11 and 12
Length/Dates:	3 Weeks (15-17 Days of 1 semester course)
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	This unit examines the process of memory and the different factors that impact the efficacy of memory. Students will be able to apply what they learn by developing an effective study plan for students.

Stage 1: Desired Results

Transfer Goals List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s). **Creativity Transdisciplinary Goal:** Students work creatively to design and refine implementation of ideas by taking risks, persevering, and exploring possibilities. **Collaboration Transdisciplinary Goal:** Students flexibly and cooperatively work with others in physical and virtual environments and assume shared responsibility for completing a project or achieving a goal.

Priority Standards for the Unit Grade Level/Subject Standard(s) List the Content Standards, Guiding Principles, or Cross-Curricular Skills this unit will address
PSY (MEM) #1: Students understand the processes of memory **PSY (MEM) #2:** Students understand the factors influencing memory **PSY (SIRM) #2:** Students will understand research methods and measurements to study behavior and mental processes. **Social Studies INQ 9-12.6 - Gathering relevant information** Gather relevant information from multiple sources representing a wide range of views while using the origin, authority, structure, context and corroborative value of the sources to guide the selection. **Social Studies INQ 9-12.11 - Construct explanations using sound reasons and examples.** Construct explanations using sound reasoning, correct sequence (linear or nonlinear), examples, and details with significant and pertinent information & data, while acknowledging the strengths & weaknesses of the explanation given its purpose.

Other Goal(s) List the Disciplinary Transfer Goals that this unit will address

Students identify the most credible and relevant evidence from a variety of sources to generate and refine effective claims and counterclaims. (INQ 8, 9, 10, 11)

Essential Question(s): These questions are related to the enduring understandings and provide relevance for the learning in the unit.	Students will keep considering… ● How and why do we remember? ● How does my memory help me everyday? ● What role does memory play in our behavior? ● What factors affect the reliability of memory? ● How can memory be improved in both the short-term and long-term? ● What is the purpose of an experiment?

Enduring Understanding(s): What are the big picture understandings that are transferable across contexts, places, and times?	Students will understand that… ● Memories define our lives. ● Memory is the imperfect process in which we store and retrieve information. ● Experimentation can determine cause and effect between variables. ● Empirically-sound experiments are a reliable way to study human behavior.

What will students <u>know...</u> Factual information, vocabulary and basic concepts related to each indicator	**What will students <u>be able to do (skilled at)...</u>** Skills, processes and/or knowledge that are related to each indicator and which students will be able to use in new contexts/with new material
K1. Memory is the process of encoding, storing, and retrieving information. K2. Memory includes factual and general information, experiences of events, and skills. K3. The three stages of memory storage input are sensory memory, short-term or working memory, and long-term memory. K4. The three tasks of remembering are recognition, recall, and relearning. Failure of any of these results in forgetting. K5. Forgetting occurs for several reasons including decay, interference, encoding failure, amnesia, repression, and misinformation. K6. The ways to improve memory include chunking, mnemonic devices, repetition, mindfulness & exercise. K7. Experiments consist of a hypothesis, variables (IV, DV, confounding), groups (experimental, control), random (selection, assignment), constants, and results	S1. Identify the structure and function of memory. S2. Explain why and how humans forget. S3. Apply memory knowledge to real life situations. S4. Identify the key components of an experiment. S5. Write a clear explanation using reasoning and evidence. S6. Find and use source information.

Stage 2: Evidence of Student Learning

Performance Task

Assessment Evidence What will the student produce?
GRASPS ● **Goal:** Students will apply what they learned about memory structure/function and how they can improve memory. ● **Role:** 9th grade teacher ● **Audience:** Students transitioning from middle school to high school. ● **Situation:** Students who are transitioning from middle school to high school are struggling with memory, retaining and retrieving information for higher stake assessments. ● **Product/Performance/Purpose:** Using class notes and range of outside sources and with a partner, students will create a video, brochure, letter, one-page guide, or slides to help students with their upcoming testing. To wrap up the product, each student writes a one-page reflection of the collaboration efforts of the group. ○ *Tools:* (insert assignment) ● **Standards and Criteria for Success:** (insert rubric with strands below) ● PSY 1: Students understand the processes of memory ● PSY 2: Students understand the factors influencing memory ● Creativity Rubric- Creative production and innovation ● Collaboration Rubric- Self reflection ● Critical thinking- Reasoning ● Social Studies Inq 9-10.6 - Gathering relevant information

Additional Resources Any additional materials and resources related to the performance task that the teacher or student would need to be successful.
Quiz (after Lesson 2)

Stage 3: Instructional Design

How I will get there (learning targets & lessons):		
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**
Lesson 1: Introduction to Memory I will learn about the cognitive perspective in psychology of which memory is a major component.	I will learn this because memory is a fundamental piece of our cognitive processes which help to define our lives.	I will know I have learned this when I can define and explain memory in my own words.
Lesson 1: Introduction to Memory - Hook (Write down everything you did yesterday that did not involve memory) - TOPSS Unit page 31-32 - Discussion questions: ● What extent does memory impact behavior? ● How does memory help me everyday? ● Depending on the list- discuss some of the things they wrote- and discuss is it memory (dreaming, waking up) ● With no memory who would you be? How would your identity be affected?		

- Brief slides on definition of memory, cognitive perspective

Lesson 2a: Structure of Memory (models) I will learn about the structure of the multi-store model of memory and how psychology's understanding of that system has evolved.	I will learn this because understanding how memory works allows me to apply the system to my own life.	I will know I have learned this when I can correctly identify & explain the components of the memory model as well as explain the difference between the multi-story and working memory systems.

Lesson 2a: Memory structure (conceptual): sensory, STM/Working, LTM

- Multi-store model (slides)
    - Model of Memory Activities
    - Multi-store model reading comprehension activity
        - Include Sperling's Sensory Memory Experiment, Miller's Capacity of STM Experiment, Long-term Memory (more in-depth next lesson)
    - Formative assessment (students reconstruct model from memory by moving parts around)
- Baddeley's Working Memory
    - Working Memory GO - answer key
- Evaluating the Muti-store Model of Memory v. Working Model of Memory
- Answer Key for Evaluating…
- Formative assessment - answer key

Lesson 2b: Types of Memory I will learn the different types of memory.	I will learn this because understanding the different types of memory allows me to appreciate my unique memories.	I will know I have learned this when I can provide examples of the different types of memory.

Lesson 2b: Types of Memory (all LTM)

- Types of Memory: explicit, implicit = semantic, procedural, prospective, episodic, flashbulb
    - Long Term Memory - explain activity
    - Reading (optional)
    - Categorizing different types (optional)
    - Memory Hierarchy (missing prospective)
    - Your Most Vivid Memories Aren't As Accurate As You Think

Lesson 3a: How Memory Works I will learn the processes involved in memory: encoding, storage & retrieval and their connection to levels of processing.	I will learn this because knowing these processes provide a foundation for improving them.	I will know I have learned this when I can apply this knowledge to a real-life situation.

Lesson 3a: How does memory work?

- Process of memory: encoding, storage & retrieval
- Demo 3.2 TOPSS lesson plan
- Levels of Processing Activities

Lesson 3b: The Brain's Role in Memory I will learn the parts of the brain involved in memory formation and recall.	I will learn this because what is physiological is simultaneously psychological.	I will know I have learned this when I can explain the brain functions involved in memory.

Lesson 3b: The Brain's Role

- Brain parts involved: hippocampus, amygdala, associative areas on cortex
    - Anatomy of Memory Reading & Brain diagram (part 2 of lesson)
    - Parts of the Brain Involved with Memory | Introduction to Psychology
    - H.M Case Study
- Ted Ed: How Memories Form & How We Lose Them

Lesson 3c: How to Improve Memory (introduction) I will learn strategies to improve memory.	I will learn this because I can use these strategies for my own success in life.	I will know I have learned this when I can correctly explain how each of the strategies presented in class are used.

Lesson 3c: Improving Memory

- Reading #1: Encoding Memories
- Reading #2: These Are the Best Ways to Improve Your Memory | Time

Lesson 4: Experiments I will learn the systematic process of conducting an experiment in psychological research.	I will learn this because experiments are a major tool in psychological science and a common method used to study memory.	I will know I have learned this when I can accurately identify the purpose and components of an experiment.

Lesson 4: Psychological Research - Experiment

- What is an experiment? (cross-curricular connex to science/scientific method)
    - Learning the parts
    - Conducting a (Memory) Experiment - need to add to incorp elements
    - Non-memory experiment review (optional)

Lesson 5a: How & Why We Forget I will learn the various factors that cause humans to forget.	I will learn this because I will then better understand my own forgetting experiences.	I will know I have learned this when I can apply these reasons to real-life scenarios.

Lesson 5a: Forgetting

- Hook: penny (Demo 3.1 TOPSS lesson plan)
- The Psychology of Forgetting (Reading)
- Forgetting can happen at any stage of memory
- Crash Course - Remembering & forgetting
- Formative: Decay, interference, encoding failure, amnesia, repression

Lesson 5b: Eyewitness Testimony I will learn the problems that come with reconstruction of memory.	I will learn this because understanding the reconstructive nature of memory can help me understand my own thinking and that of others.	I will know I have learned this when I can explain the work of Elizabeth Loftus and reconstructive memory.

Lesson 5b: Eyewitness Testimony

- Hook: Loftus Simulation
- Elizabeth Loftus's Wording Experiment OR Loftus Palmer Experiment (need to add slide to identify IV, DV, etc)
- Eyewitness testimony: Eyewitness Identification - Getting it Right - the Innocence Project
- "Memory is not a recording device. It is like a Wikipedia page that can be changed by you or by somebody else." ~Elizabeth Loftus

Lesson 6: Finding Nemo (optional) I will learn to identify various processes/elements of memory "in action."	I will learn this because it will serve as a review of memory prior to completing the performance task.	I will know I have learned this when I can find examples of various memory phenomena in a major motion picture.
Lesson 6: Finding examples of memory processes (optional or extra evidence of learning) - Finding Nemo: Finding Examples (1hr 40mins)		
Performance Task		

Unit Overview	
Unit Title:	Unit 3: Personality and Gender Development Theory
Author(s):	Candace Patten/Heather Allenback
Grade Level/Course:	Introduction to Psychology/Grades 11 and 12
Length/Dates:	3-4 Weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	This unit examines the factors that play a role in personality development and whether personalities are stable across situations and time. By the end of the unit, students will be provided an opportunity for introspection and will use the knowledge they acquired to evaluate their own personality theory with sound reasoning and evidence.

Stage 1: Desired Results

Transfer Goals List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s). **Collaboration Transdisciplinary Goal:** Students flexibly and cooperatively work with others in physical and virtual environments and assume shared responsibility for completing a project or achieving a goal. **Communication Transdisciplinary Goal:** Students effectively communicate and use interpersonal skills in a range of formal and informal contexts. **Citizenship Transdisciplinary Goal** Students demonstrate an empathetic understanding of social issues and value different perspectives so that they can contribute to local and global communities.

Priority Standards for the Unit Grade Level/Subject Standard(s) List the Content Standards, Guiding Principles, or Cross-Curricular Skills this unit will address
PSY (PERS) #1: Students understand the empirical approaches to studying & understanding personality **PSY (PERS) #2:** Students understand how personality is assessed. **PSY (M&GEN) #2:** Students understand psychological constructs of gender and sexual orientation. **PSY (SIRM) #2:** Students will understand research methods and measurements to study behavior and mental processes. **Social Studies INQ 9-12.6** Gather relevant information from multiple sources representing a wide range of views while using the origin, authority, structure, context, and corroborative value of the sources to guide the selection. **Social Studies INQ 9-12.10** Construct arguments using precise & knowledgeable claims, with evidence from multiple sources, while acknowledging counterclaims and evidentiary weaknesses.

Other Goal(s) List the Disciplinary Transfer Goals that this unit will address

Students identify, explain, & determine the most relevant & valid sources that take into consideration multiple points of view. (INQ 6) Students identify the most credible and relevant evidence from a variety of sources to generate and refine effective claims and counterclaims. (INQ 8, 9, 10, 11)

Essential Question(s): These questions are related to the enduring understandings and provide relevance for the learning in the unit.	Students will keep considering… • Does nature or nurture have a bigger impact on personality? • Does any one theory best explain the definition and development of personality? • Who am I? How am I both similar and different from others? • What impacts one's self-concept? • How does addressing a counterclaim strengthen your argument?

Enduring Understanding(s): What are the big picture understandings that are transferable across contexts, places, and times?	Students will understand that… • Psychologists study personality to discover patterns of feelings, motives, and behavior that set people apart from one another. • Both biological and environmental factors interact to influence personality. • Personality can be measured scientifically. • Each society has its own "gender curriculum" which leads to different expectations and treatment starting at birth. • Arguments need strong evidence to support their claims that are supported by research.

What will students <u>know...</u> Factual information, vocabulary and basic concepts related to each indicator	**What will students <u>be able to do (skilled at)...</u>** Skills, processes and/or knowledge that are related to each indicator and which students will be able to use in new contexts/with new material
K1. Trait, psychoanalytic, social-cognitive, & humanistic theories contribute to the description & understanding of one's personality. K2. Surveys & personality inventories (tests) are used to study personality scientifically. K2. Self concept is a general term used to refer to how someone thinks about, evaluates or perceives themselves. K3. There are multiple facets of a society's "gender curriculum", including gender roles and stereotypes which impact self-concept. K4. Arguments and evidence are multifaceted.	S1.Determine the strengths and weaknesses for each personality theory. S2. Compare and contrast sex, gender identity, and sexual orientation. S3. Synthesize evidence and choose what's most effective to support an argument.

Stage 2: Evidence of Student Learning

Performance Task

Assessment Evidence What will the student produce?

Performance Task

- Students may need a graphic organizer to support this work
- Chapter 7: Critical Thinking and Evaluating Information

- **Goal:** 2-3 page reflective paper
- **Role:** A student of personality development
- **Audience:** Psychology teacher
- **Situation:** Students must reflect upon their own theory of personality using the information learned in the unit about the influences on the development of personality, the role of gender & sexual identity development and the idea of self-concept
- **Product/Performance/Purpose:**
  - Answer the following question: To what extent does my personal theory of personality reflect the current understandings of personality development?
    Consider:
    - The role of nature & nurture
    - The idea of continuity & change
    - The development of a self-concept
    - The role of gender & sexuality identity in personality development
    - The 1 or 2 existing theories that most resonate with you
  - *May need to provide graphic organizer to help with paper structure*
  - Use 2-3 direct quotes from outside resource
- **Standards and Criteria for Success**
  - Critical Thinking - Reasoning indicator - Explanations with evidence; reflection indicator
  - Students are able to explain self-concept, 1-2 approaches to explaining personality, and how one's gender & sexual identity play a role.

Stage 3: Instructional Design

How I will get there (learning targets & lessons):		
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**
Lesson 1: Introduction to Personality I will learn the definition of personality, the debate over nature or nurture influences on personality & the definition of self-concept.	I will learn this so that I can understand the complexity of defining one's personality.	I will know I have learned this when I can explain the importance of twin studies in personality research.

Lesson 1: Introduction to Personality

- Hook: definition/personal views of personality
- Intro Activity 1 from TOPSS Unit on Personality
- Nature v. Nurture - Slides (overview)
  - Does nature or nurture have a bigger influence on personality?
  - Twin Studies (options)
    - #1: Discussion & Video
    - #2: Slides Worksheet Answer Key
- What is a self-concept? (*general term used to refer to how someone thinks about, evaluates or perceives themselves - to be aware of oneself is to have a concept of oneself*)
  - Self-Concept in Psychology: Definition, Development, Theories

<table>
<tr><td colspan="3"></td></tr>
<tr><td>Lesson 2: Research Methodology

I will learn about personality assessment.</td><td>I will learn this so that I understand this type of research method in psychology.</td><td>I will know I have learned this when I can identify three challenges to developing and using a personality assessment.</td></tr>
<tr><td colspan="3">Lesson 2: Research Methodology - Personality Assessment
- Use Activity 2 from TOPSS Unit on Personality
- It takes 2 days but should lead to some interesting discussion about reliability, validity, difficulties of self-reporting, issues with testing traits</td></tr>
<tr><td>Lesson 3: Ways to evaluate personality

I will learn how self-report questionnaires, behavioral measures and tests are used to study personality.</td><td>I will learn this so that I can continue to understand the complexity of personality.</td><td>I will know I have learned this when I can explain the issues of validity related to these types of measures.</td></tr>
<tr><td colspan="3">Lesson 3: Ways to evaluate personality (Use TOPSS unit to develop brief lecture/don’t get too deep into types of reliability & validity)
- Self-report questionnaires & Behavioral measures
    - When to Use Surveys in Psychological Research
    - What are the advantages and disadvantages of surveys?
- Personality Assessment | Psychology
    - Objective tests (MMPI) - forced choice
    - Projective tests (TAT, Rorschach) - self-report
- What does research suggest about the validity of each of these types of tests?
        - Personality Tests | Psychology Today</td></tr>
<tr><td>Lesson 4a: The Theories

I will learn the general ideas of the trait, psychoanalytic, social-cognitive, & humanistic theories of personality.</td><td>I will learn this to support the development of my own theory of personality.</td><td>I will know I have learned this when I can find evidence of each theory impacting real-world behavior.</td></tr>
<tr><td colspan="3">Lesson 4a: The Theories
- What are they - using the perspectives, etc.
    - Mean Girls Slides (Theory overviews - no names)
    - Mean Girls Personality Viewing Guides
    - Movie: 1 hr 37 mins</td></tr>
<tr><td>Lesson 4b: Getting to know the theories even more

I will learn more specific personality theories that reflect one of the general categories outlined in the previous lesson.</td><td>I will learn this to continue to develop my understanding of contemporary personality theory and integrate it with my own ideas.</td><td>I will know I have learned this when I can 1) produce a “social media account” of one individual’s personality theory and 2) critique another personality theory</td></tr>
<tr><td colspan="3">Lesson 4b: Getting to know the theories even more
- Social Media Activity - Who’s Who?</td></tr>
</table>

- Freud (just structure not psychosexual), Jung, Horney, Adler, Rogers, Erikson, Bandura, Maslow, Big 5, Myers & Briggs, Allport, Mischel, Eysenck
  - Perspective represented
  - Theory components
  - Criticism (evaluation) of theory
  - Comment response		

Lesson 5: Identity (gender, sexuality, & personality) I will learn the diversity of gender identity and sexual orientation as part of one's personality development.	I will learn this to understand how one's gender and sexual orientation, and accompanying stereotypes, shape an individual's personality.	I will know I have learned this when I can argue why or why not dress codes perpetuate stereotypes.

Lesson 5: Identity (gender, sexuality, & personality)
- How formed (lots to choose from!) - remember, race and religion are part of culture, not necessary to discuss here)
  - Personal Identity Wheel
  - Social Identity Wheel
  - Blue is for Boys/Pink is for Girls…or is it? & PPT
  - The Gender Spectrum
  - Knowing the Difference
  - Genderbread Person
  - CNN article- Why can girls be boyish but boys cannot be girlish?
  - Teaching about Gender Stereotypes (Educators 4 Social Change site - many lessons)
  - Why do we still have girl stuff and boy stuff (NYT)
  -
- Gender Stereotypes Intro & Writing Exercise about dress code - have a debate?
- Psychological effects of stereotypes/discrimination		

Performance Task		

Unit Overview	
Unit Title:	Unit 4: Mental & Physical Health
Author:	Candace Patten/Heather Allenback
Grade Level/Course:	Introduction to Psychology/Grades 11 and 12
Length/Dates:	3 weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	Students will be able to understand the impact of psychological disorders on an individual and the many societal stigmas that cause people to not seek treatment. They will also be able to understand the definition of stress and the impact stress has on one's health and wellness.

Stage 1: Desired Results

Transfer Goals List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s). **Communication Transdisciplinary Goal:** Students effectively communicate and use interpersonal skills in a range of formal and informal contexts. **Citizenship Transdisciplinary Goal** Students demonstrate an empathetic understanding of social issues and value different perspectives so that they can contribute to local and global communities.

Priority Standards for the Unit Grade Level/Subject Standard(s) List the Content Standards, Guiding Principles, or Cross-Curricular Skills this unit will address
PSY (STR) #1: Students understand stress & coping **PSY (STR) #2:** Students understand psychological science promotes mental and physical health and wellness **PSY (DIS) #1:** Students understand perspectives of abnormal behavior **PSY (DIS) #2:** Students understand categories of psychological disorders **Social Studies INQ- 9-12.1** Explain how a question reflects an enduring issue in the field. **Social Studies INQ- 9-12.4** Explain how supporting questions contribute to an inquiry and how, through engaging source work, new compelling and supporting questions emerge. **Social Studies INQ 9-12.5** Determine the kinds of sources that will be helpful in answering compelling and supporting questions, taking into consideration multiple points of view represented in the sources, the types

of sources available, and the potential uses of the sources.

Social Studies INQ 9-12.10 Construct arguments using precise & knowledgeable claims, with evidence from multiple sources, while acknowledging counterclaims and evidentiary weaknesses.

Other Goal(s)

List the Disciplinary Transfer Goals that this unit will address

1. Students recognize enduring issues in Social Studies, evaluate and formulate compelling and supporting questions to develop a pathway for inquiry.
2. Students identify the most credible and relevant evidence from a variety of sources to generate and refine effective claims and counterclaims.
3. As active participants in democracy, students construct, critique and present authentic arguments and conclusions in order to address global issues.

Essential Question(s): These questions are related to the enduring understandings and provide relevance for the learning in the unit.	Students will keep considering… - How do psychologists measure and define abnormal behavior? - What impact do psychological disorders have on individuals, families, communities, and society? - What is stigma? How do we fight the stigma associated with psychological disorders? - Why are compelling and supporting questions important in the inquiry process? - What makes a source credible? - Why is it necessary to have multiple perspectives when conducting research?

Enduring Understanding(s): What are the big picture understandings that are transferable across contexts, places, and times?	Students will understand that… - Stress is a psychophysiological response to the environment - Psychologists use certain criteria to determine abnormal behavior. - Stigma in society causes many people not to seek treatment which can have a negative impact on relationships, the community, and society. - There are many different treatment options besides medication for the various types of psychological disorders. - Compelling and supporting questions guide the research process to develop a deeper understanding of the topic/issue. - Multiple sources need to be considered when conducting research.

What will students know... Factual information, vocabulary and basic concepts related to each indicator	**What will students be able to do (skilled at)...** Skills, processes and/or knowledge that are related to each indicator and which students will be able to use in new contexts/with new material
K1. The definition of normal vs. abnormal K2. The criteria psychologists use to diagnose psychological disorders. K2. The definition of stigma K3. Impact stigma has on individuals suffering from a psychological disorder. K4. The different treatment options for various types of psychological disorders. K5. The definition of stress and its physiological response to the environment. K6. The physiological and psychological consequences of stress for health and wellness	S1. Explain physiological, cognitive, and behavioral strategies to deal with stress S2. Identify evidence-based strategies that promote health and wellness S3. Evaluate behaviors for evidence of disorder S4. Explain and analyze the impact of psychological disorders on the individual, family & society S5. Describe & apply different treatment options for the various types of psychological disorders. S6. Describe different types of biomedical & psychological treatments S7. Use research skills to develop an argument

Stage 2: Evidence of Student Learning

Performance Task

Assessment Evidence What will the student produce?
Summative Assessment: Fight the Stigma Assignment **Goal**: Students will develop their own solution in how to fight the stigma related to mental health. **Role**: Students are at the end of their first year of study in the Introduction to Psychology course. They will be able to apply their knowledge from the course and create a product to help society understand the impact stigma has on people suffering from a mental illness. **Audience**: Students will present their findings to an "advisory board" of other students who will ask clarifying questions and/or give suggestions to improve their creation. **Situation**: The "board" of other students will hear the different ways to fight the stigma and ask clarifying questions to help students revise their work. **Performance/Product**: Students will research the issue, making sure to review multiple perspectives on the issue. After their research, they will prepare a response (written and oral) to fight the stigma associated with mental illness. **Standards/Criteria for Scoring**: Students will produce a product to stop the stigma that is supported with evidence from reliable sources. Students will need to address misconceptions about mental illness and how to help society fight stigma associated with mental illness and/or a particular disorder. Note to teacher: Before you present this assignment, teacher will need to go over the concept of creativity

Stage 3: Instructional Design

How I will get there (learning targets & lessons):		
Lesson 1: What impact can stress have on an individual? I will learn the definition of stress and the psychological impact of	I will learn this to better understand my own stressors. I will also learn this to help me understand how stress can impact	I will be able to create a personal reflection of what stress is, what stressors I have in my life, what impact stress will have on my life

stress has on an individual's well-being.	one's psychological, mental, and physical well-being.	(emotionally, physically, and psychologically) and create a plan to help me deal with my stress in healthy ways.
Hook: Have students take high school stress test (to evaluate their own stress levels) - High School Stress test What is stress- slides General Adaptation Syndrome (Stress Model) - Drag & Drop Activity & Key Evaluating Stressors - Activity Stress Journal/Reflection Assignment Resources for teachers: Articles- Understanding the Stress response - Surprising benefits of stress Tedtalk- How to make stress your friend? (discussion questions in slides) Stress: Fact or Myth activity Connex to psychodynamic perspective: Freud's defense mechanisms are a response to stress • Assignment & PPT Some information for teacher (discussion questions)- Stress and resilience		
Lesson 1b: Observational Method I will learn the complexities of natural observation as a method of gathering information in research	I will learn this because observation is a critical tool in research and assessment of human behavior	I will know I have learned this when I can to identify some of the strengths of observational research compared to experimental research, and when I can also identify some of the limitations of the controlled experimental approach
Counting Fidgets - Lesson from TOPPS Unit		
Lesson 2a: What is normal? I will learn the definition of normal vs. abnormal	I will learn this to understand the criteria that is associated with what is the definition of "normal" along with the criteria that is associated with "abnormal"	I will be able to understand the difference between what is considered normal and abnormal and create a class definition.
What is normal and Unit 4- Slides (Has assignment links embedded in slides) Resources: Psychological Disorders exit slips DSM - Disorders handout		
Lesson 2b: What are psychological disorders and how are they diagnosed?	I will learn this to understand how a psychological disorder impacts one's life and the treatment that is available for disorders.	I will be able to create a vignette, or short story, of a person who has been diagnosed with a psychological disorder, how it

<table>
<tr><td>I will learn the criteria for diagnosing psychological disorders and how they are classified in the DSM</td><td></td><td>impacts their life, how the person is coping with the disorder, and treatment that the person is undergoing.

I will be able to read classmates' short stories and identify the different psychological disorders that are displayed.</td></tr>
<tr><td colspan="3">Slides for diagnosing (Is above on Unit 4 slides)

Vignette Assessment or they can create Psychological disorder One-Pager (both using the same criteria but not---- they cannot copy and paste information. Should go over the critical thinking portion of the rubric to explain how they need to create this assignment.
This will lead to a gallery walk for students to understand the different types of disorders, treatments, and how it impacts an individual. This will help for the last performance task- Fight the Stigma

Homework- For students to familiarize themselves with the American Psychological Association

If running out of time or need to review more for psychological disorders- Here is a celebrity Psychological Disorder to check for understanding activity.

Psychological Disorder Checkin- can be a quiz</td></tr>
<tr><td>Lesson 4: What is stigma?
I will learn what sigma is and how it relates to psychological problems.</td><td>I will learn the impact stigma has on individuals with mental illness and how it impacts treatment.</td><td>I will be able to create a product to fight the stigma in society to help society understand mental illness.</td></tr>
<tr><td colspan="3">Article for students to read (homework)- What is stigma?

Stigma- Slides</td></tr>
<tr><td colspan="3">Performance Task</td></tr>
</table>

Introduction to Psychology

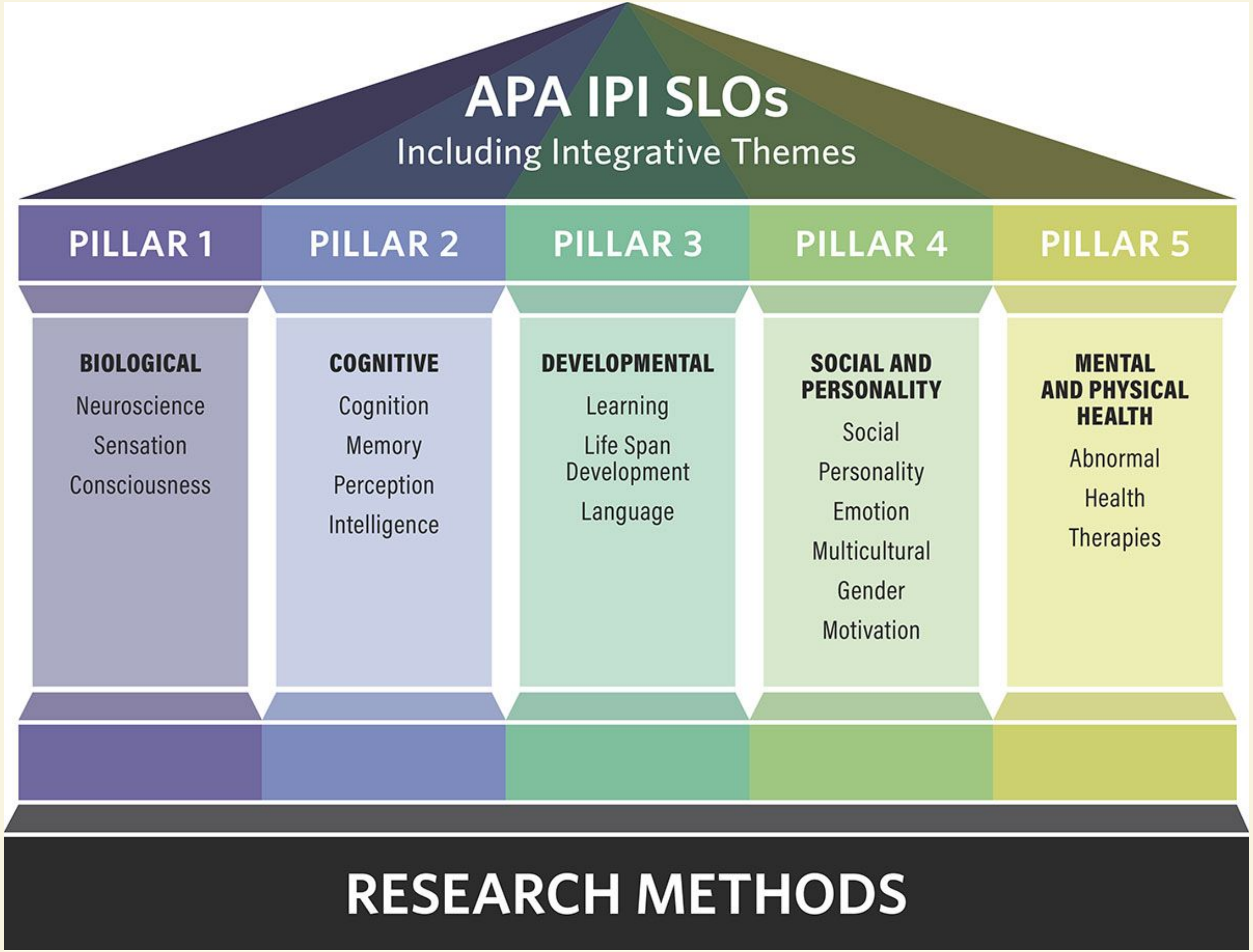
Half Year Course

11th and 12th Grade

What is Psychology?

The scientific study of an organism's thoughts, feelings, and behavior and how these processes are affected by the environment, physical states, and mental states.

The questions that psychology tries to answer are often complex & concern many different variables.



National standards for high school psychology curricula

Unit 0: Defining Psychology

Students will learn the importance of studying psychology and the major approaches used by psychologists to explain behavior & thinking.

Performance Task

- Students take the role of a school psychologist and apply their knowledge of the psychological perspectives to explain behavior.

Unit 1: Biological Influences

Students will understand the different structures and development of the brain, as well as the processes of sleeping and dreaming.
Students will also understand the importance of sleep and the impact sleep deprivation can have on one's emotional, psychological, and physical well-being.

Performance Tasks

- Students research critical periods of brain development during early childhood and design or evaluate a developmentally appropriate educational toy for a child of a particular age.
- Students apply their knowledge about the importance of sleep by creating a sleep plan for a client.

Unit 2: Memory

Students will learn how memory works and the different factors that impact the efficacy of memory.

Performance Task

- Students create a video, brochure, letter, one-page guide, or slides to help 9th grade students prepare for upcoming testing.

Unit 3:Personality and Gender Development Theory

Students will learn the factors that play a role in personality development and whether personalities are stable across situations and time. By the end of the unit, students will be provided an opportunity for introspection and use the knowledge they acquired to evaluate their own personality theory using sound reasoning and evidence.

Performance Task

- In a 2-3 page paper, students reflect upon their own theory of personality using the information learned in the unit about the influences on the development of personality, the role of gender & sexual identity development and the idea of self-concept.

Unit 4: Mental & Physical Health

Students will understand the impact of psychological disorders on an individual and the many societal stigmas that cause people to not seek treatment. Students will also be able to understand the definition of stress and the impact stress has on one's health and wellness.

Performance Task

- Students develop their own solution/product on how to fight the stigma related to mental health and present their findings to an "advisory board" of other students.

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ______________________ **Board Meeting Date** December 8, 2022

Decision Requested X **Agenda Code** 9 f.

AGENDA REPORTING FORM

Agenda Topic: SHS – Classical Mythology New Course Curriculum - Second Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed SHS – Classical Mythology New Course Curriculum

Background: ______________________

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Curriculum & Instruction Committee is bringing the SHS – Classical Mythology New Course Curriculum to the full Board for a Second Reading.

Titles of Attachments:

1. Course Proposal

Frank Ripa
Signature of Staff Member Submitting Report

Steven Madancy
Signature of Superintendent of Schools

Unit Overview	
Unit Title:	Unit 1 - What is Classical Mythology?
Teacher:	Foresman
Grade Level/Course:	Classical Mythology/ Grades 11-12
Length/Dates:	6 weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	This unit examines: ● The definition of “classical mythology”, as well as the various definitions of “myth,” and looks at how myth is still alive and well in our modern culture. ● The birth and origins of the Olympian gods and the important concepts of Homeric epic, such as double-determination. ● The stories of the Trojan War. ● The relationship of classical mythology to the modern world, in particular creation myths and heroic myths.

Stage 1: Desired Results

Other Goal(s) List the Disciplinary Transfer Goals that this unit will address
1. Students can read closely and analytically to comprehend a range of increasingly complex literary and informational texts. (critical thinking) 2. Students can produce effective and well-grounded writing for a range of purposes and audiences. (communication) 3. Students can engage in research/inquiry to investigate topics, and to analyze, integrate, and present information.

Transfer Goals List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s). **Collaboration Transdisciplinary Goal:** Students flexibly and cooperatively work with others in physical and virtual environments and assume shared responsibility for completing a project or achieving a goal. **Communication Transdisciplinary Goal:** Students effectively communicate and use interpersonal skills in a range of formal and informal contexts.

Priority Standards for the Unit Grade Level/Subject Standard(s) List the Content Standards, Guiding Principles, or Cross-Curricular Skills this unit will address

What content standards will be assessed and drive your unit?

RL/RI 1 11-12: Cite strong and thorough text evidence to support analysis of what the text says explicitly as well as inferences drawn from the text **including determining where the text leaves things uncertain.**

W4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

SL 1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners by building on others' ideas, expressing their own clearly and persuasively, and addressing **alternative or opposing perspectives.**

Essential Question(s): These questions are related to the enduring understandings and provide relevance for the learning in the unit.	Students will keep considering... • What is Classical Mythology and what is its relationship to the modern world? • How is myth (and myth making) still alive and relevant in our culture? • How are creation myths, origins myths, and heroic myths defined, and what is their purpose, in both the classical and modern world? • How do authors for each of the above myths arrange and develop their ideas to accomplish their purpose? Address their task? Address the audience? • What does it mean to be an effective communicator and collaborator?

Enduring Understanding(s): What are the big picture understandings that are transferable across contexts, places, and times?	Students will understand that… • Mythology is a type of narrative story-telling that reveals a cultural truth-value. • Mythology is alive and relevant in modern culture. • Creation myths, origin myths, and heroic myths each have a unique formula and a unique cultural purpose. • Writers choose and organize details to achieve clarity and coherence. • Writers make deliberate choices to address a task, purpose, and audience. • An effective participant poses and responds to questions, and clarifies, verifies, or challenges alternative or opposing perspectives. • The level of preparedness contributes to the quality of your collaboration and communication.

What will students **know...** Factual information, vocabulary and basic concepts related to each indicator	What will students **be able to do (skilled at)...** Skills, processes and/or knowledge that are related to each indicator and which students will be able to use in new contexts/with new material

Students will know:	Students will be able to:
• Relevant definitions and concepts (classical mythology, creation myth, origin myth, heroic myth, cultural truth-value, double-determination). • Various interpretations of & approaches to mythology (euhemerism, myth-ritualist, structuralist, psychoanalytical) • The origin stories of the Olympian gods and elements of the Trojan War saga (in particular, the *Odyssey* Book 1-4) • Organizational structures for each type of myth • Audience dictates appropriate tone and style • Appropriate writing formats based on task • A variety of organizational skills that help prepare for collaboration and conversations • The elements of effective listening: decipher meaning, ask for clarification, confirm, agree, disagree, confusion, extension review • The difference between literal, analytical, and interpretive questions • Elements and methods for negotiation	• Define classical mythology and summarize other types of myths. • Summarize the concept of cultural truth-value and double-determination. • Summarize, discuss, and apply various interpretations of & approaches to mythology. • Summarize the origin stories of the Olympian gods and the Trojan War saga. • Create an organization that establishes a clear relationship between ideas. • Determine a specific audience • Use appropriate writing formats based on task • Use annotation, other note taking systems • Implement a system of organization that will allow retrieval of ideas • Ask appropriate clarifying questions • Convey ideas clearly • Respectfully challenge ideas • Formulate literal, analytical, and interpretive questions. • Provide constructive feedback • Consider and build on others' ideas

Stage 2: Evidence of Student Learning

Performance Tasks

Assessment Evidence What will the student produce?
• **Goal-** To compare ancient and modern mythologies • **Role-** Modern mythographer • **Audience-** Citizens of the Classical world (Greece and/or Rome) • **Situation-** As a time traveling mythographer, you must select an example of a modern myth, like a movie, pop song, or video game, that expresses a modern cultural truth-value and explain it to the citizens of the Classical world. • **Product/Performance/Purpose-** Lab report • **Standards and Criteria for Success-** Modern myth example (from 1940s or later); understanding of definition of myth (narrative expression of cultural truth-value); references/comparison to Classical myth example; analyze modern & classical myths in terms of cultural truth-value; 500-750 word length (not including brief modern myth summary)

Resources Any materials and resources related to the performance task that the teacher or student would need to be successful.
Lab Report Instructions (from Professor Travis, UConn)

Lab Report Instructions (Foresman) Lab Report Model - Module 1 graphic organizer / outline guide

Comments Frame this as any information that would be helpful for a new teacher or a teacher teaching this course for the first time.
The performance task, as outlined by Professor Roger Travis at UConn, is to write what he calls a "lab report" at the end of each module (unit). The format in his course is the same for all seven units, it is simply the topic that changes based on the unit theme(s). I have adapted the performance task to have a more specialized format (particularly the role, audience, & situation). This will hopefully provide the students with additional focus during their performance task but also allow them some creativity as they approach it.

Other Evidence

Assessment Evidence Include other assessment strategies such as tests, quizzes, exit tickets, and any other strategies you may use as information-recall.
• reading guides / reading questions • reader response checks (open ended) • vocabulary lists of important terms • quizzes • online discussions • in class discussions

Resources Any materials and resources related to the assessment that the teacher or student would need to be successful.
Online Discussion Guidelines (from Professor Travis, UConn) Online Discussion Guidelines (Foresman) Communication Rubric Collaboration Rubric

Stage 3: Instructional Design

UNIT: Unit 1 - What is Classical Mythology?		
Big Picture Learning		
What will I learn?	**Why will I learn this?**	**How will I know when I have**

		learned it?
I will learn what constitutes mythology, the different types of mythologies, and why mythologies are created.	I will learn about the different mythologies and their application to the modern world to not only understand my world better but also to create a well written and thought out comparison.	I can create a comparison of ancient and modern mythologies.
	Daily Learning Experiences	
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**
I will learn what classical mythology is.	In order to write/talk about mythology, I have to know what it is.	I can define classical mythology.
I will learn what other types of myths there are (creation myth, origin myth, heroic myth).	In order to write/talk about mythology, I have to know what it is.	I can summarize other types of myths. I can compare the different myths–similarities, differences, purposes.
I will learn mythological terminology (cultural truth-value, double-determination).	In order to write/talk about mythology, I have to know the relevant terminology.	I can summarize the concept of cultural truth-value and double-determination
I will learn how mythology has been interpreted, studied, and explained (euhemerism, myth-ritualist, structuralist, psychoanalytical).	In order to write/talk about mythology, I need to know the ways it has been interpreted and studied.	I can compare the different interpretations of mythology.
Organizational structures for each type of myth.	In order to talk about mythology, I need to understand the structures of each type of myth and how they are determined by the intended audience.	I can compare the different structures of each type of myth.
Audience dictates appropriate tone and style.	In order to talk about mythology, I need to understand the structures of each type of myth and how they are determined by the intended audience.	I can apply the particular audience to the type of myth.
Appropriate writing formats based on task.	In order to write about mythology, I need to understand how to select the appropriate writing format for my intended audience.	I can choose the appropriate writing format for my intended audience.
The origin stories of the Olympian gods.	In order to write/talk about Classical mythology, I have to know the chief Olympian gods.	I can summarize the origin stories of the Olympian gods.

The elements of the Trojan War saga (in particular, the *Odyssey* Book 1-4).	In order to write/talk about Classical mythology, I have to know the story of the Trojan War.	I can discuss the important elements of the Trojan War saga.
A variety of organizational skills that help prepare for collaboration and conversations.	In order to discuss mythology and the themes of this course, I need to be organized and prepared for discussions - both in person and online.	I can implement a system of organization that will allow retrieval of ideas in order to contribute to class conversations, both in person and online.
The elements of effective listening: decipher meaning, ask for clarification.	In order to discuss mythology and the themes of this course, I need to listen effectively in order to understand the contributions of my classmates.	I can ask appropriate clarifying questions and decipher meaning during class conversations, both in person and online.
The elements of effective listening: confirm, agree, disagree.	In order to discuss mythology and the themes of this course, I need to listen effectively in order to understand the contributions of my classmates.	I can consider & build on others' ideas, whether I agree or disagree with their position, during class conversations both in person and online.
The elements of effective listening: confusion, extension review.	In order to discuss mythology and the themes of this course, I need to listen effectively in order to understand the contributions of my classmates.	I can convey ideas clearly and provide constructive feedback during class conversations, both in person and online.
The difference between literal, analytical, and interpretive questions.	In order to discuss mythology and the themes of this course, I need to ask questions for clarification.	I can formulate literal, analytical, and interpretive questions during class conversations, both in person and online.
Elements and methods for negotiation.	In order to discuss mythology and the themes of this course, I need to negotiate meaning & understanding during discussions.	I can respectfully challenge ideas during class conversations, both in person and online.

Resources
Support varied student needs and learning styles and include a range of media and print materials.

Suggested Resources
- Module 1 Readings A
- Module 1 Readings B
- Module 1 Readings C
- reading outlines / reading questions
- module videos from Professor Travis

Suggested Technology Integration
- Canvas discussion boards

Unit Overview	
Unit Title:	Unit 2 - The *Andra* and the War
Teacher:	Foresman
Grade Level/Course:	Classical Mythology/ Grades 11-12
Length/Dates:	5 weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	This unit examines: ● The Trojan War saga, in particular *Odyssey* Book 5-8. ● Important concepts in classical epic, such as the male/female double standard, wild vs. cultivated, and the *kleos* bargain. ● The key stories of the Olympians, Hermes and Poseidon, and their divine essence as boundary-deity and erupting force, respectively. ● The relation of classical epic concepts (male/female double standard, wild vs. cultivated, and the *kleos* bargain) to the modern world.

Stage 1: Desired Results

Other Goal(s) List the Disciplinary Transfer Goals that this unit will address
1. Students can read closely and analytically to comprehend a range of increasingly complex literary and informational texts. (critical thinking) 2. Students can produce effective and well-grounded writing for a range of purposes and audiences.(communication) 3. Students can engage in research/inquiry to investigate topics, and to analyze, integrate, and present information.

Transfer Goals List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s). **Collaboration Transdisciplinary Goal:** Students flexibly and cooperatively work with others in physical and virtual environments and assume shared responsibility for completing a project or achieving a goal. **Communication Transdisciplinary Goal:** Students effectively communicate and use interpersonal skills in a range of formal and informal contexts.

Priority Standards for the Unit Grade Level/Subject Standard(s) List the Content Standards, Guiding Principles, or Cross-Curricular Skills this unit will address
What content standards will be assessed and drive your unit? RL/RI 1 11-12: Cite strong and thorough text evidence to support analysis of what the text says explicitly as well as inferences drawn from the text **including determining where the text leaves things uncertain.** W4 Produce clear and coherent writing in which the development, organization, and style are appropriate to

task, purpose, and audience.

SL 1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners by building on others' ideas, expressing their own clearly and persuasively, and addressing **alternative or opposing perspectives.**

Essential Question(s): These questions are related to the enduring understandings and provide relevance for the learning in the unit.	Students will keep considering...
	• What is the male/female double standard in classical epic?
	• What does it mean to be wild or cultivated in mythology?
	  ○ Is it better to be wild or cultivated?
	• What is *kleos* and why is it important in mythology?
	• Who is the trickster figure in mythology?
	  ○ Who is the trickster figure in modern culture?
	• How are the concepts of male/female double standard, wild vs. cultivated, and *kleos* still relevant in the modern world?
	• How do authors of myths (both ancient and modern) arrange and develop their ideas to accomplish their purpose? Address their task? Address the audience?
	• How do I develop a clear message when communicating using 21st century tools?
	• What are effective communication strategies to exchange information and read, interpret, and respond to collaborators' work?

Enduring Understanding(s): What are the big picture understandings that are transferable across contexts, places, and times?	Students will understand that… • The male/female double standard applies to what actions and attitudes are acceptable for male or female figures/characters. • The male/female double standard means that male and female figures/characters are held to different, often uneven, standards. • Being wild and being cultivated both have a place in classical mythology and that they are often balanced against each other. • *Kleos* is the concept of glory or fame won by one's deeds and accomplishments. • *Kleos* is granted to the hero but is derived from the stories told about the hero by the bard. • Figures in mythology are often motivated by their *kleos*. • The trickster figure is one who can pass through/manipulate boundaries, a transitional figure. • Writers choose and organize details to achieve clarity and coherence. • Writers make deliberate choices to address a task, purpose, and audience. • A range of contemporary tools, transmissions and processes allow learners to communicate interactively and effectively. • Appropriate use of format, level of formality, and style help to develop a clear message and to convey ideas effectively. • Working productively in a team involves shared responsibility and requires individual contributions to be valued.

What will students <u>know...</u> Factual information, vocabulary and basic concepts related to each indicator	**What will students <u>be able to do (skilled at)...</u>** Skills, processes and/or knowledge that are related to each indicator and which students will be able to use in new contexts/with new material

Students will know:	Students will be able to:
• Relevant definitions and concepts ◦ male/female double standard ◦ wild and cultivated ◦ *kleos* ◦ trickster • The relation of the above concepts to the modern world. • The elements of the Trojan War saga (in particular, the *Odyssey* Book 5-8). • The key stories of the Olympians, Hermes and Poseidon, and their divine roles. • The roles of mythological characters in the modern world. • Organizational structures for myths. • Audience dictates appropriate tone and style. • Appropriate writing formats based on task. • Available 21st century tools for communication and collaboration. • The elements of format, formality, and style that help develop and deliver a clear message and convey ideas. • Team productivity and shared responsibility.	• Define ◦ male/female double standard ◦ wild and cultivated ◦ *kleos* ◦ trickster • Discuss the relation of the above concepts to the modern world. • Summarize the Trojan War saga (in particular the events of the *Odyssey* Book 5-8). • Summarize the stories of Hermes and Poseidon and discuss their divine roles. • Draw connections between the stories and roles of Hermes and Poseidon to the modern world. • Create an organization that establishes a clear relationship between ideas. • Determine a specific audience. • Use appropriate writing formats based on task. • Use 21st century tools to communicate interactively and effectively. • Convey ideas effectively using appropriate format, level of formality, and style. • Work productively in a team.

Stage 2: Evidence of Student Learning

Performance Tasks

Assessment Evidence What will the student produce?
• **Goal-** To analyze a myth of a trickster from modern culture • **Role-** Prosecutor in mythological court • **Audience-** Jury made up of citizens from the Classical world (Greece and/or Rome) • **Situation-** A person/character from modern culture has been charged as a "trickster". As the prosecutor assigned to the case, you must demonstrate that they fit the definition of a trickster, as modeled by the classic examples of Odysseus and/or Hermes, and prove that they are guilty of being a trickster. • **Product/Performance/Purpose-** Lab report in the form of a courtroom closing argument • **Standards and Criteria for Success-** Modern myth example (from 1940s or later); understanding of definition of myth (narrative expression of cultural truth-value); understanding of trickster figure from mythology; references/comparison to Classical myth example; analyze modern & classical myths in terms of cultural truth-value; 500-750 word length (not including brief modern myth summary)

Resources Any materials and resources related to the performance task that the teacher or student would need to be successful.

Lab Report Instructions (Foresman)

Lab Report Model - Module 2

graphic organizer / outline guide

Comments
Frame this as any information that would be helpful for a new teacher or a teacher teaching this course for the first time.

The performance task, as outlined by Professor Roger Travis at UConn, is to write what he calls a "lab report" at the end of each module (unit). The format in his course is the same for all seven units, it is simply the topic that changes based on the unit theme(s).

I have adapted the performance task to have a more specialized format (particularly the role, audience, & situation). This will hopefully provide the students with additional focus during their performance task but also allow them some creativity as they approach it.

Other Evidence

Assessment Evidence
Include other assessment strategies such as tests, quizzes, exit tickets, and any other strategies you may use as information-recall.

- reading guides / reading questions
- reader response checks (open ended)
- vocabulary lists of important terms
- quizzes
- online discussions
- in class discussions

Resources
Any materials and resources related to the assessment that the teacher or student would need to be successful.

Online Discussion Guidelines (from Professor Travis, UConn)

Online Discussion Guidelines (Foresman)

Communication Rubric

Collaboration Rubric

Stage 3: Instructional Design

Big Picture Learning		
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**

I will learn what constitutes a trickster myth, what distinguishes being wild from being cultivated, and what the importance of *kleos* is.	I will learn about the different mythological concepts and their application to the modern world to not only understand my world better but also to create a well written and thought out comparison.	I can create a comparison of ancient and modern mythologies, in particular a comparison of trickster figures.
Daily Learning Experiences		
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**
I will learn mythological terminology (male/female double standard, wild and cultivated, *kleos*, trickster).	In order to write/talk about mythology, I have to know the relevant terminology.	I can summarize the concepts of male/female double standard, wild and cultivated, *kleos*, and trickster.
I will learn about the role of the trickster.	In order to understand mythology and the themes of this course, I have to know the characters and archetypes from mythology.	I can draw connections between ancient examples of a trickster and modern ones.
The elements of the Trojan War saga (in particular, the *Odyssey* Book 5-8)	In order to write/talk about Classical mythology, I have to know the story of the Trojan War.	I can discuss the important elements of the Trojan War saga.
The key stories of Hermes and Poseidon and their divine roles.	In order to write/talk about Classical mythology, I have to know the chief Olympian gods and their roles in the pantheon.	I can summarize the stories of Hermes and Poseidon and discuss their divine roles.
The roles of mythological characters in the modern world.	In order to discuss mythology and the themes of this course, I need to understand the role of mythological characters in the modern world.	I can draw connections between the stories and roles of Hermes and Poseidon to the modern world.
Organizational structures for myths.	In order to talk about mythology, I need to understand the structures of myths and how they are determined by the intended audience.	I can compare the different structures of myths.
Audience dictates appropriate tone and style.	In order to talk about mythology, I need to understand the structures of myth and how they are determined by the intended audience.	I can apply the particular audience to the myth.
Appropriate writing formats based on task.	In order to write about mythology, I need to understand how to select the appropriate writing format for my intended audience.	I can choose the appropriate writing format for my intended audience.
Available 2st century tools for communication and collaboration.	In order to talk about mythology in both synchronous and asynchronous environments, I	I can use 21st century tools to communicate with my classmates interactively and effectively.

	need to know what tools are available for use.	
Elements of format, formality, and style.	In order to write about mythology, I need to know how to make my message clear for my audience.	I can convey my ideas clearly and effectively using appropriate format, level of formality, and style.
How to share responsibility while working productively in a team.	In order collaborate on topics of mythology, I need to be able to work in a team and share responsibility for the task.	I can work productively in a team to achieve a prescribed task.

Resources
Support varied student needs and learning styles and include a range of media and print materials.

Suggested Resources
Module 2 Readings A
Module 2 Readings B
reading outlines / reading questions
supplemental notes - Hermes, Poseidon
module videos from Professor Travis

Suggested Technology Integration
Canvas discussion boards

Unit Overview	
Unit Title:	Unit 3 - *Kleos* and *Nostos:* The Balancing Act
Teacher:	Foresman
Grade Level/Course:	Classical Mythology/ Grades 11-12
Length/Dates:	5 weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	This unit examines: ● The Trojan War saga, in particular *Odyssey* Book 9-12. ● Important concepts in classical epic, such as *kleos*, *nostos*, eschatology, and the hero-cult. ● The myth of Jason, Medea, and the Argonauts as well as the curse-myths of Mycenae and Thebes. ● The mythological geography of the afterlife. ● The relation of classical epic concepts (*kleos*, *nostos*, eschatology, and the hero-cult) to the modern world.

Stage 1: Desired Results

Other Goal(s) List the Disciplinary Transfer Goals that this unit will address
1. Students can read closely and analytically to comprehend a range of increasingly complex literary and informational texts. (critical thinking) 2. Students can produce effective and well-grounded writing for a range of purposes and audiences.(communication) 3. Students can engage in research/inquiry to investigate topics, and to analyze, integrate, and present information.

Transfer Goals List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s). **Collaboration Transdisciplinary Goal:** Students flexibly and cooperatively work with others in physical and virtual environments and assume shared responsibility for completing a project or achieving a goal. **Communication Transdisciplinary Goal:** Students effectively communicate and use interpersonal skills in a range of formal and informal contexts.

Priority Standards for the Unit Grade Level/Subject Standard(s) List the Content Standards, Guiding Principles, or Cross-Curricular Skills this unit will address
What content standards will be assessed and drive your unit? RL/RI 1 11-12: Cite strong and thorough text evidence to support analysis of what the text says explicitly as well as inferences drawn from the text **including determining where the text leaves things uncertain.** W4 Produce clear and coherent writing in which the development, organization, and style are appropriate to

task, purpose, and audience. SL 1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners by building on others' ideas, expressing their own clearly and persuasively, and addressing **alternative or opposing perspectives.**

Essential Question(s): These questions are related to the enduring understandings and provide relevance for the learning in the unit.	Students will keep considering... • What is the mythological concept of *kleos*? • What is the mythological concept of *nostos*? ○ How are the two concepts related? How must they be balanced? • What is eschatology? • What is a hero-cult and how are they formed/maintained? • What is a *heros* (ἥρως)? • How do authors of myths (both ancient and modern) arrange and develop their ideas to accomplish their purpose? Address their task? Address the audience? • How do I build positive relationships and resolve conflicts with collaborators? • How do I participate relevantly in conversations (both in person and online)?

Enduring Understanding(s): What are the big picture understandings that are transferable across contexts, places, and times?	Students will understand that… • *Kleos* is the concept of glory or fame won by one's deeds and accomplishments. • *Nostos* is the journey home, especially the hero's journey home. • Eschatology is mythology (and, in some cases, theology) dealing with death, judgment, and the afterlife. • Hero-cults were the Greek tradition of offering sacrifices to the heroes of the past in the same way they would their own dead. • The ancient Greek concept of *heros* is not the same as our modern idea of a "hero" or "superhero." • Writers choose and organize details to achieve clarity and coherence. • Writers make deliberate choices to address a task, purpose, and audience. • Effective interpersonal skills during conversation build positive relationships with collaborators. • Posing and responding to questions propel a conversation, as do clarifying, verifying, and challenging ideas with diplomacy. • Discussion and consensus building activities help resolve conflicts and address challenges in group activities.

What will students <u>know...</u> Factual information, vocabulary and basic concepts related to each indicator	**What will students <u>be able to do (skilled at)...</u>** Skills, processes and/or knowledge that are related to each indicator and which students will be able to use in new contexts/with new material

Students will know:	Students will be able to:
• Relevant definitions and concepts: ◦ *kleos* ◦ *nostos* ◦ eschatology ◦ hero-cult • The relation of the above concepts to the modern world. • The elements of the Trojan War saga (in particular, the *Odyssey* Book 9-12). • The myth of Jason and the Argonauts. • The key curse myths from Mycenae and Thebes. • The roles of mythological themes (curse myths, afterlife mythology) in the modern world. • Organizational structures for myths. • Audience dictates appropriate tone and style. • Appropriate writing formats based on task. • Effective interpersonal skills to use during conversation (both in person and online). • Conversation skills, such as posing and responding to questions. • Ways of clarifying, verifying, and challengings ideas during conversations.	• Define ◦ *kleos* ◦ *nostos* ◦ eschatology ◦ hero-cult • Discuss the relation of the above concepts to the modern world. • Summarize the Trojan War saga (in particular the events of the *Odyssey* Book 9-12). • Summarize the myth of Jason and the Argonauts. • Summarize the curse myths of Mycenae and Thebes. • Draw connections between the story of Jason and the Argonauts and the ancient curse myths to the modern world. • Create an organization that establishes a clear relationship between ideas. • Determine a specific audience. • Use appropriate writing formats based on task. • Build positive relationships with collaborators, using effective interpersonal skills. • Pose and respond to questions during conversations. • Clarify, verify, and challenges ideas with diplomacy during conversations.

Stage 2: Evidence of Student Learning

Performance Tasks

Assessment Evidence What will the student produce?
• **Goal-** To analyze of myth of *kleos* (fame/glory) from modern culture • **Role-** Speech writer • **Audience-** Audience at the "Glories" award ceremony • **Situation-** A person/character from modern culture has been awarded a "Glory" (think Oscar, Emmy, etc.) and have chosen you to write their acceptance speech. In their speech, you must demonstrate an understanding of *kleos* (fame/glory) and how/why this person/character is deserving (or not deserving) of this award. • **Product/Performance/Purpose-** Lab report (award ceremony acceptance speech form) • **Standards and Criteria for Success-** Modern myth example (from 1940s or later); understanding of definition of myth (narrative expression of cultural truth-value); understanding of *kleos* (fame/flory) from mythology; references/comparison to Classical myth example; analyze modern & classical myths in terms of cultural truth-value; 500-750 word length (not including brief modern myth summary)

Resources

Any materials and resources related to the performance task that the teacher or student would need to be successful.
Lab Report Instructions (Foresman) Lab Report Model - Module 3 graphic organizer / outline guide

Comments Frame this as any information that would be helpful for a new teacher or a teacher teaching this course for the first time.
The performance task, as outlined by Professor Roger Travis at UConn, is to write what he calls a "lab report" at the end of each module (unit). The format in his course is the same for all seven units, it is simply the topic that changes based on the unit theme(s). I have adapted the performance task to have a more specialized format (particularly the role, audience, & situation). This will hopefully provide the students with additional focus during their performance task but also allow them some creativity as they approach it.

Other Evidence

Assessment Evidence Include other assessment strategies such as tests, quizzes, exit tickets, and any other strategies you may use as information-recall.
• reading guides / reading questions • reader response checks (open ended) • vocabulary lists of important terms • quizzes • online discussions • in class discussions

Resources Any materials and resources related to the assessment that the teacher or student would need to be successful.
Online Discussion Guidelines (from Professor Travis, UConn) Online Discussion Guidelines (Foresman) Communication Rubric Collaboration Rubric

Stage 3: Instructional Design

Big Picture Learning		
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**
I will learn what constitutes a *kleos* myth, how *kleos* and *nostos* are balanced (and/or imbalanced), and what the importance of the hero-cult is.	I will learn about the different mythological concepts and their application to the modern world to not only understand my world better but also to create a well written and thought out comparison.	I can create a comparison of ancient and modern mythologies, in particular a comparison of *kleos* myths.
Daily Learning Experiences		
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**
I will learn…	I will learn this because…	I will know I have learned this when…
I will learn mythological terminology (*kleos*, *nostos*, eschatology, hero-cult).	In order to write/talk about mythology, I have to know the relevant terminology.	I can summarize the concepts of *kleos*, *nostos*, eschatology, and hero-cult.
The elements of the Trojan War saga (in particular, the *Odyssey* Book 9-12).	In order to write/talk about Classical mythology, I have to know the story of the Trojan War.	I can discuss the important elements of the Trojan War saga.
The myth of Jason and the Argonauts.	In order to write/talk about Classical mythology, I have to know the story of Jason and the Argonauts.	I can discuss the important elements of the Jason and the Argonauts myth.
The key curse myths from Mycenae and Thebes.	In order to write/talk about Classical mythology. I have to know the curse myths from Mycenae and Thebes.	I can summarize the curse myths of Mycenae and Thebes.
The roles of mythological themes (curse myths, afterlife mythology) in the modern world.	In order to discuss mythology and the themes of this course, I need to understand the role of mythological themes in the modern world.	I can draw connections between curse myths and the mythology of the ancient afterlife to the modern world.
Organizational structures for myths.	In order to talk about mythology, I need to understand the structures ofmyth and how they are determined by the intended audience.	I can compare the different structures of myths.
Audience dictates appropriate tone and style.	In order to talk about mythology, I need to understand the structures of myth and how they are determined by the intended audience.	I can apply the particular audience to the myth.
Appropriate writing formats based on task.	In order to write about mythology, I need to understand how to select	I can choose the appropriate writing format for my intended

	the appropriate writing format for my intended audience.	audience.
Effective interpersonal skills to use during conversation (both in person and online).	In order to talk about mythology with my classmates, I need the appropriate interpersonal skills.	I can build positive relationships with collaborators, using effective interpersonal skills.
Conversation skills, such as posing and responding to questions.	In order to talk about mythology with my classmates, I need to understand how to keep a conversation going using questions.	I can pose and respond to questions appropriately to keep a conversation moving forward, both in person and online.
Ways of clarifying, verifying, and challenging ideas during conversations.	In order to talk about mythology with my classmates and have constructive debates, I need to know how to effectively and appropriately challenge ideas and also clarify and verify my own and my classmates' positions.	I can clarify, verify, and challenge ideas with diplomacy during conversations, both in person and online.

Resources
Support varied student needs and learning styles and include a range of media and print materials.

Suggested Resources
- Module 3 Readings A
- Module 3 Readings B
- reading outlines / reading questions
- supplemental notes - afterlife myth, Jason, curse myth
- module videos from Professor Travis

Suggested Technology Integration
- Canvas discussion boards

Unit Overview	
Unit Title:	Unit 4 - Odysseus, (anti)Hero of *Metis*
Teacher:	Foresman
Grade Level/Course:	Classical Mythology/ Grades 11-12
Length/Dates:	5 weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	This unit examines: ● The Trojan War saga, in particular *Odyssey* Books 13-24. ● Important concepts in classical epic, such as the warrior virgin, *homophrosune*, rite of passage, and masculine anxiety. ● The key stories of the Olympians, Athena, Artemis, and Aphrodite, and their divine essence as warrior virgin, huntress virgin, and sex, respectively. ● The relation of classical epic concepts (warrior virgin, *homophrosune*, rite of passage, masculine anxiety) to the modern world.

Stage 1: Desired Results

Other Goal(s) List the Disciplinary Transfer Goals that this unit will address
1. Students can read closely and analytically to comprehend a range of increasingly complex literary and informational texts. (critical thinking) 2. Students can produce effective and well-grounded writing for a range of purposes and audiences.(communication) 3. Students can engage in research/inquiry to investigate topics, and to analyze, integrate, and present information.

Transfer Goals List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s). **Collaboration Transdisciplinary Goal:** Students flexibly and cooperatively work with others in physical and virtual environments and assume shared responsibility for completing a project or achieving a goal. **Communication Transdisciplinary Goal:** Students effectively communicate and use interpersonal skills in a range of formal and informal contexts.

Priority Standards for the Unit Grade Level/Subject Standard(s) List the Content Standards, Guiding Principles, or Cross-Curricular Skills this unit will address
What content standards will be assessed and drive your unit? RL/RI 1 11-12: Cite strong and thorough text evidence to support analysis of what the text says explicitly as well as inferences drawn from the text **including determining where the text leaves things uncertain.** W4 Produce clear and coherent writing in which the development, organization, and style are appropriate to

task, purpose, and audience.

SL 1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners by building on others' ideas, expressing their own clearly and persuasively, and addressing **alternative or opposing perspectives.**

Essential Question(s): These questions are related to the enduring understandings and provide relevance for the learning in the unit.	Students will keep considering... • Who is the warrior virgin in mythology and what is (usually) her role? • What is the mythological concept of *homophrosune?* • What is a rite of passage in mythology and who participates? • What is the mythological concept of masculine anxiety? • How do authors of myths (both ancient and modern) arrange and develop their ideas to accomplish their purpose? Address their task? Address the audience? • How do I listen effectively to decipher meaning and understand a speaker's values, attitudes, and intentions? • How do I work in a team so that all team members have a role and relevance to the team's work?

Enduring Understanding(s): What are the big picture understandings that are transferable across contexts, places, and times?	Students will understand that… • The warrior virgin is a (usually) female figure/character partaking in the stereotypical masculine activity of war. • *Homophrosune* (ὁμοφροσύνη) is the concept of "like-mindedness" or two people feeling/thinking alike. ○ This concept is best exemplified by the relationship between Odysseus and Penelope in the *Odyssey*. • The rite of passage was an important transitional activity for youths and that young men and young women had different passages. • Masculine anxiety focuses on issues of gender-roles, sex, and power. • Writers choose and organize details to achieve clarity and coherence. • Writers make deliberate choices to address a task, purpose, and audience. • Listening actively and attentively assists in deciphering meaning and understanding a speaker's values, attitudes, and intentions. • Consistently asking questions can help clarify a speaker's intended message. • Clarifying roles during collaborative activities ensures each member of the group takes responsibility for their share. • Clear understanding of the scope of the team's work allows all team members to have a relevant role.

What will students <u>know...</u> Factual information, vocabulary and basic concepts related to each indicator	**What will students <u>be able to do (skilled at)...</u>** Skills, processes and/or knowledge that are related to each indicator and which students will be able to use in new contexts/with new material

<table>
<tr>
<td>
Students will know:
● Relevant definitions and concepts:
○ warrior virgin
○ homophrosune
○ rite of passage
○ masculine anxiety
● The relation of the above concepts to the modern world.
● Elements of the Trojan War saga (in particular, the Odyssey Books 13-24).
● The key stories of Athena, Artemis, and Aphrodite, and their divine roles.
● The roles of mythological characters in the modern world.
● Organizational structures for myths.
● Audience dictates appropriate tone and style.
● Appropriate writing formats based on task.
● Effective listening skills to use during in-class conversations.
● Conversation skills, such as asking questions for clarification.
● Relevant roles and responsibilities necessary for effective team work.
</td>
<td>
Students will be able to:
● Define
○ warrior virgin
○ homophrosune
○ rite of passage
○ masculine anxiety
● Discuss the relation of the above concepts to the modern world.
● Summarize the Trojan War saga (in particular the events of the Odyssey Book 13-24).
● Summarize the stories of Athena, Artemis, and Aphrodite and discuss their divine roles.
● Draw connections between the stories and roles of Athena, Artemis, and Aphrodite to the modern world.
● Create an organization that establishes a clear relationship between ideas.
● Determine a specific audience.
● Use appropriate writing formats based on task.
● Decipher meaning and understand a speaker's values, attitudes, and intentions during in-class conversations.
● Clarify a speaker's intended message by listening actively and asking questions consistently during in-class conversations.
● Fulfill their role and responsibility during collaborative activities.
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Stage 2: Evidence of Student Learning

Performance Tasks

Assessment Evidence What will the student produce?
• **Goal-** To analyze a myth of gender-roles from modern culture • **Role-** Magazine article writer • **Audience-** Magazine readers • **Situation-** As a writer for a gendered magazine (either real - Seventeen, GQ, Men's Health, etc. - or imaginary), you have been asked to write a think-piece on changing gender-roles as demonstrated by a piece of modern culture of your choosing. The editors of the magazine are particularly interested in how this example of gender-role compares to ancient conceptions of gender. You must demonstrate an understanding of gender-role in both modern and ancient contexts and explain how your chosen piece interacts with (either supporting or - more often - subverting) those gender-roles. • **Product/Performance/Purpose-** Lab report (magazine article form) • **Standards and Criteria for Success-** Modern myth example (from 1940s or later); understanding of definition of myth (narrative expression of cultural truth-value); understanding of gender-roles in mythology; references/comparison to Classical myth example; analyze modern & classical myths in terms of cultural truth-value; 500-750 word length (not including brief modern myth summary)

Resources
Any materials and resources related to the performance task that the teacher or student would need to be successful.

Lab Report Instructions (Foresman)

Lab Report Model - Module 4

graphic organizer / outline guide

Comments
Frame this as any information that would be helpful for a new teacher or a teacher teaching this course for the first time.

The performance task, as outlined by Professor Roger Travis at UConn, is to write what he calls a "lab report" at the end of each module (unit). The format in his course is the same for all seven units, it is simply the topic that changes based on the unit theme(s).

I have adapted the performance task to have a more specialized format (particularly the role, audience, & situation). This will hopefully provide the students with additional focus during their performance task but also allow them some creativity as they approach it.

Other Evidence

Assessment Evidence
Include other assessment strategies such as tests, quizzes, exit tickets, and any other strategies you may use as information-recall.

- reading guides / reading questions
- reader response checks (open ended)
- vocabulary lists of important terms
- quizzes
- online discussions
- in class discussions

Resources
Any materials and resources related to the assessment that the teacher or student would need to be successful.

Online Discussion Guidelines (from Professor Travis, UConn)

Online Discussion Guidelines (Foresman)

Communication Rubric

Collaboration Rubric

Stage 3: Instructional Design

Big Picture Learning		
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**
I will learn what constitutes a gender-role myth, how the warrior virgin and the concept of masculine anxiety are related, and what the importance of *homophrosune* and rites of passage are.	I will learn about the different mythological concepts and their application to the modern world to not only understand my world better but also to create a well written and thought out comparison.	I can create a comparison of ancient and modern mythologies, in particular a comparison of gender-role myths.
Daily Learning Experiences		
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**
I will learn…	I will learn this because…	I will know I have learned this when…
I will learn mythological terminology (warrior virgin, *homophrosune*, rite of passage, masculine anxiety).	In order to write/talk about mythology, I have to know the relevant terminology.	I can summarize the concepts of warrior virgin, *homophrosune*, rite of passage, and masculine anxiety.
The elements of the Trojan War sage (in particular, the *Odyssey* Book 13-24).	In order to write/talk about Classical mythology, I have to know the story of the Trojan War.	I can discuss the important elements of the Trojan War saga.
The key stories of Athena, Artemis, and Aphrodite and their divine roles.	In order to write/talk about Classical mythology, I have to know the chief Olympian gods and their roles in the pantheon.	I can summarize the stories of Athena, Artemis, and Aphrodite and discuss their divine roles.
The roles of mythological characters in the modern world.	In order to discuss mythology and the themes of this course, I need to understand the role of mythological characters in the modern world.	I can draw connections between the stories and roles of Athena, Artemis, and Aphrodite to the modern world.
The roles of mythological themes (warrior virgin, masculine anxiety, rite of passage, *homophrosune*) in the modern world.	In order to discuss mythology and the themes of this course, I need to understand the role of mythological themes in the modern world.	I can draw connections between the character of the warrior virgin, the event of a rite of passage, and the concepts of masculine anxiety and *homophrosune* to the modern world.
Organizational structures for myths.	In order to talk about mythology, I need to understand the structures ofmyth and how they are determined by the intended audience.	I can compare the different structures of myths.

Audience dictates appropriate tone and style.	In order to talk about mythology, I need to understand the structures of myth and how they are determined by the intended audience.	I can apply the particular audience to the myth.
Appropriate writing formats based on task.	In order to write about mythology, I need to understand how to select the appropriate writing format for my intended audience.	I can choose the appropriate writing format for my intended audience.
Effective listening skills to use during in-class conversations.	In order to talk about mythology with my classmates, I need the appropriate interpersonal skills.	I can decipher meaning and understand a speaker's values, attitudes, and intentions during in-class conversations.
Conversation skills, such as asking questions for clarification.	In order to talk about mythology with my classmates, I need to understand how to seek clarification to improve the conversation.	I can clarify a speaker's intended message by listening actively and asking questions consistently during in-class conversations.
Relevant roles and responsibilities necessary for effective team work.	In order to talk about and explore mythology with my classmates and work as a member of a team, I need to know how to divide up roles and responsibilities.	I can fulfill my role and responsibility during collaborative class activities.

Resources
Support varied student needs and learning styles and include a range of media and print materials.

Suggested Resources:
- Module 4 Readings A
- Module 4 Readings B
- reading outlines / reading questions
- supplemental notes - Athena, Artemis, Aphrodite
- module videos from Professor Travis

Suggested Technology Integration:
- Canvas discussion boards

Unit Overview	
Unit Title:	Unit 5 - Who Was Ovid & Why Did He Destroy Mythology?
Teacher:	Foresman
Grade Level/Course:	Classical Mythology/ Grades 11-12
Length/Dates:	5 weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	This unit examines: ● The mythology of Ovid, in particular *Metamorphoses* Books 1-4. ● Important concepts in classical mythology, such as anti-epic, exaltation, ecstasy, and tragedy. ● The key stories of the Olympians, Apollo and Dionysus and their divine essence as god of exaltation & oracles and god of ecstasy & tragedy respectively. ● The relation of classical mythology concepts (anti-epic, exaltation, ecstasy, tragedy) to the modern world.

Stage 1: Desired Results

Other Goal(s) List the Disciplinary Transfer Goals that this unit will address
1. Students can read closely and analytically to comprehend a range of increasingly complex literary and informational texts. (critical thinking) 2. Students can produce effective and well-grounded writing for a range of purposes and audiences.(communication) 3. Students can engage in research/inquiry to investigate topics, and to analyze, integrate, and present information.

Transfer Goals List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s). **Collaboration Transdisciplinary Goal:** Students flexibly and cooperatively work with others in physical and virtual environments and assume shared responsibility for completing a project or achieving a goal. **Communication Transdisciplinary Goal:** Students effectively communicate and use interpersonal skills in a range of formal and informal contexts.

Priority Standards for the Unit Grade Level/Subject Standard(s) List the Content Standards, Guiding Principles, or Cross-Curricular Skills this unit will address
What content standards will be assessed and drive your unit? RL/RI 1 11-12: Cite strong and thorough text evidence to support analysis of what the text says explicitly as well as inferences drawn from the text **including determining where the text leaves things uncertain.** W4 Produce clear and coherent writing in which the development, organization, and style are appropriate to

task, purpose, and audience. SL 1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners by building on others' ideas, expressing their own clearly and persuasively, and addressing **alternative or opposing perspectives.**

Essential Question(s): These questions are related to the enduring understandings and provide relevance for the learning in the unit.	Students will keep considering... • What is an anti-epic and how does it fit into the classical epic tradition? • What is the mythological concept of exaltation? • What is ecstasy in mythology and when is it experienced? • What constitutes a mythological tragedy? • How do authors of myths (both ancient and modern) arrange and develop their ideas to accomplish their purpose? Address their task? Address the audience? • How do I communicate effectively and show cultural understanding in diverse environments? • How do I negotiate in order to reach workable solutions during collaborative activities?

Enduring Understanding(s): What are the big picture understandings that are transferable across contexts, places, and times?	Students will understand that… • Anti-epic is a deliberate mythic dismantling that fits into the classical epic tradition by directly and intentionally playing against the expectations and norms of epic. • Exaltation is the concept of "lifting on high" and relates to prophecy. • The experience of ecstasy in mythology was one of forgetting who you are (literally "standing away" from yourself) and it occurs under certain circumstances. • Tragedies often occur in mythology when one tries to hold on to or control either exaltation or ecstasy for too long, with disastrous results. • Writers choose and organize details to achieve clarity and coherence. • Writers make deliberate choices to address a task, purpose, and audience. • Avoiding communication barriers (such as colloquialisms, jargon, and slang) is important while communicating in diverse environments. • Consideration of other people's world views, frames of reference, and beliefs shows cultural understanding and helps communication. • Taking other's ideas, opinions, and perspectives into consideration helps reach workable solutions during collaborative activities.

What will students <u>know...</u> Factual information, vocabulary and basic concepts related to each indicator	**What will students <u>be able to do (skilled at)...</u>** Skills, processes and/or knowledge that are related to each indicator and which students will be able to use in new contexts/with new material

Students will know:	Students will be able to:
- Relevant definitions and concepts: - anti-epic - exaltation - ecstasy - tragedy - The relation of the above concepts to the modern world. - Elements of the mythology of Ovid (in particular, *Metamorphoses* Books 1-4). - The key stories of Apollo and Dionysus, and their divine roles. - The roles of mythological characters in the modern world. - Organizational structures for myths. - Audience dictates appropriate tone and style. - Appropriate writing formats based on task. - Effective communication skills for diverse environments. - Conversation skills, such as empathy and feedback. - Negotiation skills to use during collaborative activities.	- Define - anti-epic - exaltation - ecstasy - tragedy - Discuss the relation of the above concepts to the modern world. - Summarize Ovid's myths (in particular, those from *Metamorphoses* Books 1-4). - Summarize the stories of Apollo and Dionysus and discuss their divine roles. - Draw connections between the stories of Apollo and Dionysus to the modern world. - Create an organization that establishes a clear relationship between ideas. - Determine a specific audience. - Use appropriate writing formats based on task. - Avoid communication barriers (such as colloquialisms, jargon, and slang) while communicating in both in-person and online conversations. - Take other people's world views, frames of reference, and beliefs into consideration during both in-person and online conversations. - Negotiate workable solutions that address other's ideas, opinions, and perspectives during collaborative activities.

Stage 2: Evidence of Student Learning

Performance Tasks

Assessment Evidence What will the student produce?
Goal- To analyze an example of mythic dismantling from modern culture   **Role-** Self   **Audience-** Readers of a local newspaper   **Situation-** You have found an excellent example of mythic dismantling in modern culture and you want to make sure others in your local community understand and appreciate it. You write an opinion piece, hoping it will be published in your local newspaper, outlining the brilliance of this particular example of mythic dismantling.   **Product/Performance/Purpose-** Lab report (newspaper opinion piece form)   **Standards and Criteria for Success-** Modern myth example (from 1940s or later); understanding of definition of myth (narrative expression of cultural truth-value); understanding of mythic dismantling; references/comparison to Classical myth example; analyze modern & classical myths in terms of cultural truth-value; 500-750 word length (not including brief modern myth summary)

Resources
Any materials and resources related to the performance task that the teacher or student would need to be successful.

Lab Report Instructions (Foresman)

Lab Report Model - Module 5

graphic organizer / outline guide

Comments
Frame this as any information that would be helpful for a new teacher or a teacher teaching this course for the first time.

The performance task, as outlined by Professor Roger Travis at UConn, is to write what he calls a "lab report" at the end of each module (unit). The format in his course is the same for all seven units, it is simply the topic that changes based on the unit theme(s).

I have adapted the performance task to have a more specialized format (particularly the role, audience, & situation). This will provide the students with additional focus during their performance task but also allow them some creativity as they approach it.

Other Evidence

Assessment Evidence
Include other assessment strategies such as tests, quizzes, exit tickets, and any other strategies you may use as information-recall.

- reading guides / reading questions
- reader response checks (open ended)
- vocabulary lists of important terms
- quizzes
- online discussions
- in class discussions

Resources
Any materials and resources related to the assessment that the teacher or student would need to be successful.

Online Discussion Guidelines (from Professor Travis, UConn)

Online Discussion Guidelines (Foresman)

Communication Rubric

Collaboration Rubric

Stage 3: Instructional Design

Big Picture Learning		
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**
I will learn what constitutes mythic dismantling (anti-epic), how exaltation and ecstasy are related, and how tragedy is interconnected with mythology.	I will learn about the different mythological concepts and their application to the modern world to not only understand my world better but also to create a well written and thought out comparison.	I can create a comparison of ancient and modern mythologies, in particular a comparison of mythic dismantling.
Daily Learning Experiences		
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**
I will learn mythological terminology (anti-epic, exaltation, ecstasy, tragedy).	In order to write/talk about mythology, I have to know the relevant terminology.	I can summarize the concepts of anti-epic, exaltation, ecstasy, and tragedy.
The elements of the mythology of Ovid (in particular, *Metamorphoses* Books 1-4)	In order to write/talk about Classical mythology, I have to know the stories from Ovid.	I can discuss the important elements of the myths of Ovid.
The key stories of Apollo and Dionysus and their divine roles.	In order to write/talk about Classical mythology, I have to know the chief Olympian gods and their roles in the pantheon.	I can summarize the stories of Apollo and Dionysus and discuss their divine roles.
The roles of mythological characters in the modern world.	In order to discuss mythology and the themes of this course, I need to understand the role of mythological characters in the modern world.	I can draw connections between the stories and roles of Apollo and Dionysus to the modern world.
The roles of mythological themes (anti-epic, exaltation, ecstasy, tragedy) in the modern world.	In order to discuss mythology and the themes of this course, I need to understand the role of mythological themes in the modern world.	I can draw connections between the function of anti-epic in the mythic tradition, the events of exaltation and ecstasy, and the concept of tragedy to the modern world.
Organizational structures for myths.	In order to talk about mythology, I need to understand the structures of myth and how they are determined by the intended audience.	I can compare the different structures of myths.
Audience dictates appropriate tone and style.	In order to talk about mythology, I need to understand the structures	I can apply the particular audience to the myth.

	of myth and how they are determined by the intended audience.	
Appropriate writing formats based on task.	In order to write about mythology, I need to understand how to select the appropriate writing format for my intended audience.	I can choose the appropriate writing format for my intended audience.
Effective communication skills for diverse environments.	In order to talk about mythology with my classmates, I need the appropriate interpersonal skills.	I can avoid communication barriers (such as colloquialisms, jargon, slang) during in-person and online conversations.
Conversation skills, such as empathy and feedback.	In order to talk about mythology with my classmates, I need to be able to provide and receive feedback and converse with empathy.	I can take other people's world views, frames of reference, and beliefs into consideration during in-person and online conversations.
Negotiation skills to use during collaborative activities.	In order to talk about and explore mythology with my classmates and work as a member of a team, I need to know how to negotiate to reach workable solutions.	I can negotiate workable solutions that address other's ideas, opinions, and perspectives during collaborative activities.

Resources
Support varied student needs and learning styles and include a range of media and print materials.

Suggested Resources
- Module 5 Readings A
- Module 5 Readings B
- reading outlines / reading questions
- supplemental notes - Apollo, Dionysus
- module videos from Professor Travis

Suggested Technology Integration: Canvas discussion boards

Unit Overview	
Unit Title:	Unit 6 - Who is “Mythic Guy” and Why Isn’t He a Hero?
Teacher:	Foresman
Grade Level/Course:	Classical Mythology/ Grades 11-12
Length/Dates:	5 weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	This unit examines: ● The mythology of Ovid, in particular *Metamorphoses* Books 5-8. ● Important concepts in classical mythology, such as “mythic guy,” mystery religion, ideology as well as important historical time periods, such as the Minoan and Athenian empires. ● The key stories of the Olympian, Demeter and her divine essence as a goddess of mystery. ● The hero stories of Perseus and Theseus. ● The relation of classical mythology concepts (“mythic guy,” mystery religion, ideology) to the modern world.

Stage 1: Desired Results

Other Goal(s) List the Disciplinary Transfer Goals that this unit will address
1. Students can read closely and analytically to comprehend a range of increasingly complex literary and informational texts. (critical thinking) 2. Students can produce effective and well-grounded writing for a range of purposes and audiences.(communication) 3. Students can engage in research/inquiry to investigate topics, and to analyze, integrate, and present information.

Transfer Goals List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s). **Collaboration Transdisciplinary Goal:** Students flexibly and cooperatively work with others in physical and virtual environments and assume shared responsibility for completing a project or achieving a goal. **Communication Transdisciplinary Goal:** Students effectively communicate and use interpersonal skills in a range of formal and informal contexts.

Priority Standards for the Unit Grade Level/Subject Standard(s) List the Content Standards, Guiding Principles, or Cross-Curricular Skills this unit will address
What content standards will be assessed and drive your unit? RL/RI 1 11-12: Cite strong and thorough text evidence to support analysis of what the text says explicitly as well as inferences drawn from the text **including determining where the text leaves things uncertain.** W4 Produce clear and coherent writing in which the development, organization, and style are appropriate to

task, purpose, and audience. SL 1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners by building on others' ideas, expressing their own clearly and persuasively, and addressing **alternative or opposing perspectives.**

Essential Question(s): These questions are related to the enduring understandings and provide relevance for the learning in the unit.	Students will keep considering... • Who is the "mythic guy" and how does he differ from the mythological concept of a *heros*? • What is a mystery religion? • What is ideology and what does it have to do with mythology? • How do authors of myths (both ancient and modern) arrange and develop their ideas to accomplish their purpose? Address their task? Address the audience? • How do I reflect upon my own communication skills in order to improve them? • How do I prepare appropriately and take responsibility for group work?

Enduring Understanding(s): What are the big picture understandings that are transferable across contexts, places, and times?	Students will understand that… • The "mythic guy" is a hero (in our modern conception) but not a *heros* (ἥρως) as the ancient Greeks understood. • The "mythic guy" follows an archetypal journey or path (sometimes called "The Hero's Journey") that appears to be universal across differing cultures and times. • A mystery religion is one in which only the initiates (*mystai* - μύσται) are allowed to know its secret and in turn are given access to a blessed afterlife. • Ideology is "the sum total of a community's assumptions," essentially another way of talking about "truth-value". • Writers choose and organize details to achieve clarity and coherence. • Writers make deliberate choices to address a task, purpose, and audience. • Accurately identifying causes that influence communication challenges will lead to improved communication. • Identifying the quality of communication during group work allows for the accomplishment of tasks and goals. • Employing a wide range of project management strategies supports all members of the group and enhances the group's effectiveness.

What will students <u>know...</u> Factual information, vocabulary and basic concepts related to each indicator	**What will students <u>be able to do (skilled at)...</u>** Skills, processes and/or knowledge that are related to each indicator and which students will be able to use in new contexts/with new material

Students will know:	Students will be able to:

• Relevant definitions and concepts:
  ○ “mythic guy”
  ○ *heros*
  ○ mystery religion
  ○ ideology
• The relation of the above concepts to the modern world.
• Elements of the mythology of Ovid (in particular, *Metamorphoses* Books 5-8).
• The key stories of Demeter and her divine role.
• The hero stories of Perseus and Theseus.
• The roles of mythological characters in the modern world.
• Organizational structures for myths.
• Audience dictates appropriate tone and style.
• Appropriate writing formats based on task.
• Effective skills for reflecting, reinforcing, and improving communication skills.
• Responsibility for individual tasks during group work.
• A range of project management strategies.
	• Define
	  ○ “mythic guy”
	  ○ *heros*
	  ○ mystery religion
	  ○ ideology
	• Discuss the relation of the above concepts to the modern world.
	• Summarize Ovid’s myths (in particular, those from *Metamorphoses* Books 5-8).
	• Summarize the stories of Demeter and discuss her divine role.
	• Summarize the stories of Perseus & Theseus.
	• Draw connections between the stories of Demeter, Perseus, and Theseus to the the modern world.
	• Create an organization that establishes a clear relationship between ideas.
	• Determine a specific audience.
	• Use appropriate writing formats based on task.
	• Reflect on their own communication skills to reinforce good habits and improve weaknesses.
	• Work appropriately in a group setting, taking responsibility for their portion of the task/work.
	• Employ project management strategies during collaborative activities.

Stage 2: Evidence of Student Learning

Performance Tasks

Assessment Evidence What will the student produce?
• **Goal-** To analyze a “mythic guy” from modern culture • **Role-** Modern mythographer • **Audience-** Citizens of the Classical world (Greece and/or Rome) • **Situation-** As a time traveling mythographer, you must select an example of a modern “mythic guy”, from a movie, pop song, or video game, and convince the citizens of the Classical world that he/she is, in fact, a “mythic guy”. • **Product/Performance/Purpose-** Lab report (persuasive essay/speech form) • **Standards and Criteria for Success-** Modern myth example (from 1940s or later); understanding of definition of myth (narrative expression of cultural truth-value); understanding of “mythic guy” (a hero, but not a *heros*); references/comparison to Classical myth example; analyze modern & classical myths in terms of cultural truth-value; 500-750 word length (not including brief modern myth summary)

Resources Any materials and resources related to the performance task that the teacher or student would need to be successful.

Lab Report Instructions (Foresman)

Lab Report Model - Module 6

graphic organizer / outline guide

Comments
Frame this as any information that would be helpful for a new teacher or a teacher teaching this course for the first time.

The performance task, as outlined by Professor Roger Travis at UConn, is to write what he calls a "lab report" at the end of each module (unit). The format in his course is the same for all seven units, it is simply the topic that changes based on the unit theme(s).

I have adapted the performance task to have a more specialized format (particularly the role, audience, & situation). This will provide the students with additional focus during their performance task but also allow them some creativity as they approach it.

Other Evidence

Assessment Evidence
Include other assessment strategies such as tests, quizzes, exit tickets, and any other strategies you may use as information-recall.

- reading guides / reading questions
- reader response checks (open ended)
- vocabulary lists of important terms
- quizzes
- online discussions
- in class discussions

Resources
Any materials and resources related to the assessment that the teacher or student would need to be successful.

Online Discussion Guidelines (from Professor Travis, UConn)

Online Discussion Guidelines (Foresman)

Communication Rubric

Collaboration Rubric

Stage 3: Instructional Design

Design EACH activity for the unit.

Big Picture Learning

What will I learn?	Why will I learn this?	How will I know when I have learned it?
I will learn who the “mythic guy” is and how he differs from a *heros*, what constitutes a mystery religion, and how ideology relates to mythology.	I will learn about the different mythological concepts and their application to the modern world to not only understand my world better but also to create a well written and thought out comparison.	I can create a comparison of ancient and modern mythologies, in particular a comparison of the “mythic guy”.
Daily Learning Experiences		
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**
I will learn mythological terminology (“mythic guy,” *heros*, mystery religion, ideology).	In order to write/talk about mythology, I have to know the relevant terminology.	I can summarize the concepts of “mythic guy,” *heros*, mystery religion, and ideology.
The elements of the mythology of Ovid (in particular, *Metamorphoses* Books 5-8).	In order to write/talk about Classical mythology, I have to know the stories from Ovid.	I can discuss the important elements of the myths of Ovid.
The key stories of Demeter and her divine role.	In order to write/talk about Classical mythology, I have to know the chief Olympian gods and their roles in the pantheon.	I can summarize the stories of Demeter and discuss her divine roles.
The hero stories of Perseus and Theseus.	In order to write/talk about Classical mythology, I have to know the important heroes and their stories.	I can summarize the hero stories of Perseus and Theseus.
The roles of mythological characters in the modern world.	In order to discuss mythology and the themes of this course, I need to understand the role of mythological characters in the modern world.	I can draw connections between the stories and role of Demeter, Perseus, and Theseus to the modern world.
The roles of mythological themes (“mythic guy,” *heros*, mystery religion, ideology) in the modern world.	In order to discuss mythology and the themes of this course, I need to understand the role of mythological themes in the modern world.	I can draw connections between the roles of the “mythic guy” and *heros* in the mythic tradition, the events of a mystery religion, and the concept of ideology to the modern world.
Organizational structures for myths.	In order to talk about mythology, I need to understand the structures ofmyth and how they are determined by the intended audience.	I can compare the different structures of myths.
Audience dictates appropriate tone and style.	In order to talk about mythology, I need to understand the structures of myth and how they are determined by the intended audience.	I can apply the particular audience to the myth.

Appropriate writing formats based on task.	In order to write about mythology, I need to understand how to select the appropriate writing format for my intended audience.	I can choose the appropriate writing format for my intended audience.
Effective skills for reflecting, reinforcing, and improving communication skils.	In order to talk about mythology with my classmates, I need the appropriate interpersonal skills.	I can make adjustments and improvements in my communications with classmates based on reflection upon my skills.
Responsibility for individual tasks during group work.	In order to talk and explore mythology with my classmates, I need to be able work appropriately in a group setting.	I can produce high-quality individual work that connects to the work of others to improve the group's overall work.
A range of project management strategies.	In order to talk and explore mythology with my classmates, I need to be able to manage team progress on a project.	I can monitor individual and team progress by employing project management strategies (such as timelines, goal setting, and task allocation).

Resources Support varied student needs and learning styles and include a range of media and print materials.
Suggested Resources Module 6 Readings A Module 6 Readings B reading outlines / reading questions supplemental notes - Demeter, "Mythic Guy", Athenian myth module videos from Professor Travis Suggested Technology Integration Canvas discussion boards

Unit Overview	
Unit Title:	Unit 7 - What is Ovid doing to Humanism? Why is Rome such a bad place?
Teacher:	Foresman
Grade Level/Course:	Classical Mythology/ Grades 11-12
Length/Dates:	5 weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	This unit examines: ● The mythology of Ovid, in particular *Metamorphoses* Books 9-15. ● Important concepts in classical mythology, such as problematic masculinity, “musical masculinity,” romance deconstructed, *numina*, and the mythic response to national trauma. ● The hero stories of Heracles and Orpheus as well as Roman myth. ● The historical time period of the Roman civil war. ● The relation of classical mythology concepts (problematic masculinity, “musical masculinity,” romance deconstructed, *numina*, mythic response to national trauma) to the modern world.

Stage 1: Desired Results

Other Goal(s) List the Disciplinary Transfer Goals that this unit will address
1. Students can read closely and analytically to comprehend a range of increasingly complex literary and informational texts. (critical thinking) 2. Students can produce effective and well-grounded writing for a range of purposes and audiences.(communication) 3. Students can engage in research/inquiry to investigate topics, and to analyze, integrate, and present information.

Transfer Goals List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s). **Collaboration Transdisciplinary Goal:** Students flexibly and cooperatively work with others in physical and virtual environments and assume shared responsibility for completing a project or achieving a goal. **Communication Transdisciplinary Goal:** Students effectively communicate and use interpersonal skills in a range of formal and informal contexts.

Priority Standards for the Unit Grade Level/Subject Standard(s) List the Content Standards, Guiding Principles, or Cross-Curricular Skills this unit will address
What content standards will be assessed and drive your unit? RL/RI 1 11-12: Cite strong and thorough text evidence to support analysis of what the text says explicitly as

well as inferences drawn from the text **including determining where the text leaves things uncertain.**

W4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

SL 1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners by building on others' ideas, expressing their own clearly and persuasively, and addressing **alternative or opposing perspectives.**

Essential Question(s): These questions are related to the enduring understandings and provide relevance for the learning in the unit.	Students will keep considering... • What are problematic masculinity and "musical masculinity" and how do they appear in myths? • What is the romance deconstructed trope in mythology? • What is the mythic response to national trauma and why is it important? • Why is feedback important and how do I both solicit and provide constructive feedback? • How do I reflect upon my own collaboration skills in order to improve them?

Enduring Understanding(s): What are the big picture understandings that are transferable across contexts, places, and times?	Students will understand that… • Problematic masculinity and "musical masculinity" are both ways that myths try to address the truth-value of the endless opposition between men and women, especially in ancient Greece. • Roman mythology, especially the *Aeneid*, seeks to cast national trauma as part of an ongoing, mythic greatness. • Feedback advances the group's ability to produce high-quality work. • Proactively seeking and effectively providing feedback leads to improved collaboration. • Learning is the result of collaboration and reflection and self-critique aid in improving collaboration skills.

What will students know... Factual information, vocabulary and basic concepts related to each indicator	**What will students be able to do (skilled at)...** Skills, processes and/or knowledge that are related to each indicator and which students will be able to use in new contexts/with new material

Students will know:	Students will be able to:

• Relevant definitions and concepts:
  ○ problematic masculinity
  ○ “musical masculinity”
  ○ romance deconstructed
  ○ *numina*
  ○ mythic response to national trauma
• The relation of the above concepts to the modern world.
• Elements of the mythology of Ovid (in particular, *Metamorphoses* Books 9-15).
• The hero stories of Heracles and Orpheus.
• The roles of mythological characters in the modern world.
• Effective skills for providing & responding to feedback.
• A range of reflection techniques to improve collaboration skills.
	• Define
	  ○ problematic masculinity
	  ○ “musical masculinity”
	  ○ romance deconstructed
	  ○ *numina*
	  ○ mythic response to national trauma
	• Discuss the relation of the above concepts to the modern world.
	• Summarize Ovid’s myths (in particular, those from *Metamorphoses* Books 9-15).
	• Summarize the stories of Heracles & Orpheus.
	• Draw connections between the stories of Heracles and Orpheus to the the modern world.
	• Provide and respond to feedback as part of the collaboration process.
	• Reflect upon their collaboration skills to reinforce good habits and improve weaknesses.

Stage 2: Evidence of Student Learning

Performance Tasks

Assessment Evidence
What will the student produce?

- **Goal-** To analyze a myth of human action from modern culture
- **Role-** award show presenter
- **Audience-** Attendees at the 2023 *Mythos Awards*
- **Situation-** A person/character from modern culture has been awarded the “Human Action” Award (think lifetime achievement award) at the 2023 *Mythos Awards*. You are the presenter at the awards show who must summarize the highlights of their mythic career in terms of their outstanding human action.
- **Product/Performance/Purpose-** Lab report (“lifetime achievement” award form)
- **Standards and Criteria for Success-** Modern myth example (from 1940s or later); understanding of definition of myth (narrative expression of cultural truth-value); understanding of a myth of human action; references/comparison to Classical myth example; analyze modern & classical myths in terms of cultural truth-value; 500-750 word length (not including brief modern myth summary)

Resources
Any materials and resources related to the performance task that the teacher or student would need to be successful.

Lab Report Instructions (Foresman)

Lab Report Model - Module 7

graphic organizer / outline guide

Comments Frame this as any information that would be helpful for a new teacher or a teacher teaching this course for the first time.
The performance task, as outlined by Professor Roger Travis at UConn, is to write what he calls a "lab report" at the end of each module (unit). The format in his course is the same for all seven units, it is simply the topic that changes based on the unit theme(s). I have adapted the performance task to have a more specialized format (particularly the role, audience, & situation). This will hopefully provide the students with additional focus during their performance task but also allow them some creativity as they approach it.

Other Evidence

Assessment Evidence Include other assessment strategies such as tests, quizzes, exit tickets, and any other strategies you may use as information-recall.
● reading guides / reading questions ● reader response checks (open ended) ● vocabulary lists of important terms ● quizzes ● online discussions ● in class discussions

Resources Any materials and resources related to the assessment that the teacher or student would need to be successful.
Online Discussion Guidelines (from Professor Travis, UConn) Online Discussion Guidelines (Foresman) Communication Rubric Collaboration Rubric

Stage 3: Instructional Design

Design EACH activity for the unit.

Big Picture Learning		
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**
I will learn what constitutes romance deconstructed, how problematic & "musical" masculinity are related, and the importance of mythic responses to	I will learn about the different mythological concepts and their application to the modern world to not only understand my world better but also to create a well	I can create a comparison of ancient and modern mythologies, in particular a comparison of myths of human action.

national trauma.	written and thought out comparison.	
Daily Learning Experiences		
What will I learn?	**Why will I learn this?**	**How will I know when I have learned it?**
I will learn mythological terminology (problematic masculinity, “musical masculinity,” romance deconstructed, *numina*, mythic response to national trauma).	In order to write/talk about mythology, I have to know the relevant terminology.	I can summarize the concepts of problematic masculinity, “musical masculinity,” romance deconstructed, *numina*, and mythic response to national trauma.
The elements of the mythology of Ovid (in particular, *Metamorphoses* Books 9-15).	In order to write/talk about Classical mythology, I have to know the stories from Ovid.	I can discuss the important elements of the myths of Ovid.
The hero stories of Heracles and Orpheus.	In order to write/talk about Classical mythology, I have to know the important heroes and their stories.	I can summarize the hero stories of Heracles and Orpheus.
The roles of mythological characters in the modern world.	In order to discuss mythology and the themes of this course, I need to understand the role of mythological characters in the modern world.	I can draw connections between the stories of Heracles and Orpheus to the modern world.
Organizational structures for myths.	In order to talk about mythology, I need to understand the structures ofmyth and how they are determined by the intended audience.	I can compare the different structures of myths.
Audience dictates appropriate tone and style.	In order to talk about mythology, I need to understand the structures of myth and how they are determined by the intended audience.	I can apply the particular audience to the myth.
Appropriate writing formats based on task.	In order to write about mythology, I need to understand how to select the appropriate writing format for my intended audience.	I can choose the appropriate writing format for my intended audience.
Effective skills for providing feedback.	In order to talk about mythology with my classmates, I need appropriate interpersonal skills.	I can effectively and appropriately provide feedback to classmates’ work.
Effective skills for responding to feedback.	In order to talk about mythology with my classmates, I need appropriate interpersonal skills.	I can receive and act upon feedback from others in ways that advance both my own work and the work of others.
A range of reflection techniques	In order to talk and explore mythology with my classmates, I	I can make adjustments and improvements in my collaborations

to improve collaboration skills	need to be able to self-critique to improve my collaboration skills.	with classmates based on reflection upon my skills.

Resources Support varied student needs and learning styles and include a range of media and print materials.
Suggested Resources Module 7 Readings A Module 7 Readings B reading outlines / reading questions supplemental notes - Heracles, Orpheus, *Aeneid*, Roman myth module videos from Professor Travis Suggested Technology Integration Canvas discussion boards

Classical Mythology

UCONN Early College Experience Course (ECE) Humanities Credit~Writer: Alicen Foresman

Unit 1: What is classical Mythology?

Students will explore:

- The definition of "classical mythology" and "myth"
- How myth is still alive and well in our modern culture.
- The birth and origins of the Olympian gods and the important concepts of Homeric epic
- The stories of the Trojan War

Performance Task: As a time traveling mythographer, you must select an example of a modern myth (ie: a movie, pop song, or video game) that expresses a modern cultural truth-value and explain it to the citizens of the Classical world.

Unit 2: The Andra and the War

Students will explore:

- The Trojan War saga, (*Odyssey* Book 5-8)
- Important concepts in classical epic, such as the male/female double standard, wild vs. cultivated, and the *kleos* bargain
- The key stories of the Olympians, Hermes and Poseidon
- The relation of classical epic concepts to the modern world

Performance Task: A person/character from modern culture has been charged as a "trickster". As the prosecutor assigned to the case, you must demonstrate that they fit the definition of a trickster, as modeled by the classic examples of Odysseus and/or Hermes, and prove that they are guilty of being a trickster.

Unit 3: *Kleos* and *Nostos:* The Balancing Act

Students will explore:

- The Trojan War saga (*Odyssey* Book 9-12)
- Important concepts in classical epic, such as *kleos*, *nostos*, eschatology, and the hero-cult.
- The myth of Jason, Medea, and the Argonauts as well as the curse-myths of Mycenae and Thebes.
- The mythological geography of the afterlife.

Performance Task: A person/character from modern culture has been awarded a "Glory" (ie: Oscar, Emmy, etc.) and have chosen <u>you</u> to write their acceptance speech. In their speech, you must demonstrate an understanding of *kleos* (fame/glory) and how/why this person/character is deserving (or not deserving) of this award.

Unit 4: Odysseus, (anti)Hero of *Metis*

Students will explore:

- The Trojan War saga (*Odyssey* Books 13-24)
- Important concepts in classical epic, such as the warrior virgin, *homophrosune*, rite of passage, and masculine anxiety.
- The key stories of the Olympians, Athena, Artemis, and Aphrodite

Performance Task: As a writer for a gendered magazine, you have been asked to write a think-piece on changing gender-roles as demonstrated by a pi of modern culture of your choosing. The editors of the magazine are particularly interested in how this example of gender-role compares to ancient conceptions of gender.

Unit 5: Who Was Ovid & Why Did He Destroy Mythology?

Students will explore:

- The mythology of Ovid (*Metamorphoses* Books 1-4)
- Important concepts in classical mythology, such as anti-epic, exaltation, ecstasy, and tragedy.
- The key stories of the Olympians, Apollo and Dionysus
- The relation of classical mythology concepts to the modern world.

Performance Task: You have found an excellent example of mythic dismantling in modern culture and you want to make sure others in your local community understand and appreciate it. You write an opinion piece, hoping it will be published in your local newspaper, outlining the brilliance of this particular example of mythic dismantling.

Unit 6: Who is "Mythic Guy" and Why Isn't He a Hero?

Students will explore:

- The mythology of Ovid (*Metamorphoses* Books 5-8)
- Important concepts in classical mythology, such as "mythic guy," mystery religion, ideology, Minoan and Athenian empires
- The key stories of the Olympian, Demeter and her divine essence as a goddess of mystery
- The hero stories of Perseus and Theseus.

Performance Task:

- **Goal-** To analyze a "mythic guy" from modern culture
- **Role-** Modern mythographer
- **Audience-** Citizens of the Classical world (Greece and/or Rome)

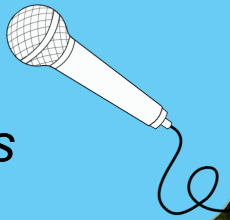
Unit 7: What is Ovid doing to Humanism? Why is Rome such a bad place?

Students will explore:

- The mythology of Ovid (*Metamorphoses* Books 9-15)
- Important concepts in classical mythology, such as problematic masculinity, “musical masculinity,” romance deconstructed, *numina*, and the mythic response to national trauma
- The hero stories of Heracles and Orpheus as well as Roman myth
- The historical time period of the Roman civil war.

Performance Task:

- **Goal-** To analyze a myth of human action from modern culture
- **Role-** Award Show Presenter
- **Audience-** Attendees at the 2023 *Mythos Awards*



BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ______________________ **Board Meeting Date** December 8, 2022

Decision Requested X **Agenda Code** 9 g.

AGENDA REPORTING FORM

Agenda Topic: SHS – General Chemistry Unit/Bundle 2: Bonding and Intermolecular Forces - Second Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed SHS – General Chemistry Unit/Bundle 2: Bonding and Intermolecular Forces

Background: ______________________

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Curriculum & Instruction Committee is bringing the SHS – General Chemistry Unit/Bundle 2: Bonding and Intermolecular Forces to the full Board for a Second Reading.

Titles of Attachments:

1. Course Proposal

Frank Pepe
Signature of Staff Member Submitting Report

Steve Madancy
Signature of Superintendent of Schools

Bundle 2: Bonding and Intermolecular Forces

Unit Overview	
Unit Title:	Bonding and Intermolecular Forces
Teacher:	Lisa Daigle
Grade Level/Course:	Accelerated General Chemistry (9-12)
Length/Dates:	8 Weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	Students will be presented with 3 different phenomena to describe throughout the unit. The phenomena are "Can and the Congo" (tin being a controversial resource in how it is harvested), water in space, and the formation of stalactites in caves. Students learn how to describe metallic, covalent, and ionic bonding as well as their properties and intermolecular forces by engaging in collaborative work, critical thinking, communicating, and thinking creatively throughout the unit.

Performance Expectations
HS-PS1-1. **Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.** [Clarification Statement: Examples of properties that could be predicted from patterns could include reactivity of metals, types of bonds formed, numbers of bonds formed, and reactions with oxygen.] [*Assessment Boundary: Assessment is limited to main group elements. Assessment does not include quantitative understanding of ionization energy beyond relative trends*.] HS-PS1-2. **Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.** [Clarification Statement: Examples of chemical reactions could include the reaction of sodium and chlorine, of carbon and oxygen, or of carbon and hydrogen.] [*Assessment Boundary: Assessment is limited to chemical reactions involving main group elements and combustion reactions*.] HS-PS1-3. **Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.** [Clarification Statement: Emphasis is on understanding the strengths of forces between particles, not on naming specific intermolecular forces (such as dipole-dipole). Examples of particles could include ions, atoms, molecules, and networked materials (such as graphite). Examples of bulk properties of substances could include the melting point and boiling point, vapor pressure, and surface tension.] [*Assessment Boundary: Assessment does not include Raoult's*

law calculations of vapor pressure.]

HS-PS2-6. **Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.*** [Clarification Statement: Emphasis is on the attractive and repulsive forces that determine the functioning of the material. Examples could include why electrically conductive materials are often made of metal, flexible but durable materials are made up of long chained molecules, and pharmaceuticals are designed to interact with specific receptors.] [*Assessment Boundary*: Assessment is limited to provided molecular structures of specific designed materials.]

*Integrates engineering design and science practices.

Transfer Goals (Vision of the Graduate)
List the long-term and/or school-wide independent student behaviors that this unit will address.

Collaboration Transdisciplinary Goal:

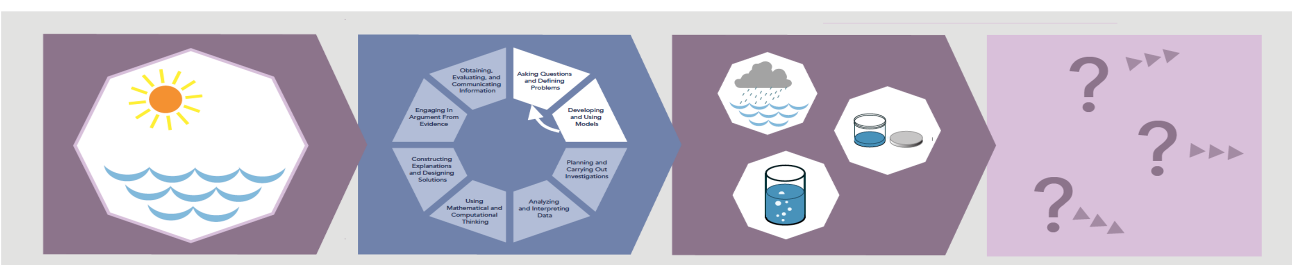
Students flexibly and cooperatively work with others in physical and virtual environments and assume shared responsibility for completing a project or achieving a goal.

SEP Implications	DCI Implications	CCC Implications
Developing and Using Models Modeling in 9–12 builds on K–8 and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds. • Use a model to predict the relationships between systems or between components of a system.	**PS1.A: Structure and Properties of Matter** • Each atom has a charged substructure consisting of a nucleus, which is made of protons and neutrons, surrounded by electrons. • The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. **PS1.A: Structure and Properties of Matter** • The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms.	**Patterns** • Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. **Structure and Function** • Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.

Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories. • Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, and peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. **Planning and Carrying Out Investigations** Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. • Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.	**PS1.A: Structure and Properties of Matter** • The periodic table orders elements horizontally by the number of protons in the atom's nucleus and places those with similar chemical properties in columns. The repeating patterns of this table reflect patterns of outer electron states. **PS1.B: Chemical Reactions** • The fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, can be used to describe and predict chemical reactions.	

Phenomenon

Explore Anchoring Phenomenon | Attempt to Make Sense | Identify Related Phenomena | Develop Questions & Next Steps



Explore Anchoring Phenomenon: **Can and the Congo**
Attempt to Make Sense: Annotate Can and the Congo reading and work through interactive slides to make sense of the controversy of mining rare minerals.

Develop Potential Student Questions

- Why doesn't tin rust?
- What other metals have similar properties?
- What holds the metals together?
- Is there something easier to mine than tin?

Possible Unit Level Phenomena: Students learn about an important issue in the world around them. Through the unit, they learn the structure and function of metallic bonding between the same elements and different elements (alloys). After learning about these, students can use their new knowledge to research what to replace tin with.

Sample Explanation of Anchoring Phenomenon: What's great about this unit is that there are different answers, but the answers have to make sense. Some common answers are zinc and aluminum. Students need to make sure the properties of the metal or alloy they choose are nontoxic, affordable, a metallic bond (two metals, so for example, students cannot choose a metal and a nonmetal or nonmetals), and do not have any controversies with mining. Students are encouraged to connect this to the real world and solve it like a real problem to solve.

Explore Anchoring Phenomenon: **Phenomenon: Water in Space** *Stop video at 2:35.*
Attempt to Make Sense: Students create a model of water in space. They may use terminology from biology, such as adhesion or cohesion. The model should be focused on how water molecules interact with each other and the paper towel and astronaut's hands.
Identify Related Phenomena: On Earth**: Water in mason jar** Swimmers

Develop Potential Student Questions (Sample student questions below- more on this Jamboard)

- Are the water molecules also attracted to water molecules that are already on the skin of man's hands?
- Do other liquids do the same thing as water?
- Is there an element in Space's atmosphere that is not on earth that causes the water to act this way?

Possible Unit Level Phenomena: Students should be able to use the periodic table and the shapes chart to help them determine the Lewis structure and the three dimensional structure of various covalently bonded molecules to compare to water molecules. Students will be able to determine the polarity of molecules to determine what intermolecular forces exist between molecules and figure out the relative properties such as evaporation rate, boiling point, and vapor pressure of a substance. Students will be able to use this information to determine how and why water creates a sphere in space.

Sample Explanation of Anchoring Phenomenon: Water consists of two hydrogen atoms and one oxygen atom. They form a covalent bond due to the number of electrons that need to be shared between each element. One oxygen has 6 valence electrons while hydrogen has 1. Hydrogen needs one more electron to fill its outermost shell while oxygen needs two so they can acquire the noble gas electron configuration to get stable. Oxygen will share one electron with each hydrogen while each hydrogen shares one electron with oxygen. This creates a very stable molecule because each shell for each atom in water is full. The water molecule is polar, meaning that the hydrogens are on the positive side of the molecule and oxygen is on the negative side of the molecule. The molecular geometry is important because the shape of the water molecule, bent, is due to the electrons/negative side on the oxygen side of the molecule pushing down the two hydrogens.

Because of cohesion, water sticks together and forms those spheres of water in space. The polarity of water and its shape plays a role with hydrogen bonding and the positive and negative ends of the water molecules stick together. Adhesion allows water to stick to, for example, the towel and hand of the astronaut in the video. Surface tension happens due to the intermolecular forces of the water molecules (hydrogen bonding). Weak IMFs don't allow this to happen, but stronger IMFs do.Water has strong IMFs compared to other substances.The strong surface tension of the water makes the water run along the surface of the paper towel when he squeezes the water out of the paper towel and the water is able to travel onto the astronaut's hand.

Water molecules have the same exact properties in both space and Earth. Water just "looks" different in space due to lack of gravity, but at the molecular level, behaves the same due to their intramolecular and intermolecular forces. In other words, the rules of water don't change throughout the universe! Gravity is just distorting the shape on Earth, but in space, there is no force to distort the shape of water.

To help students get to the explanation above, students can fill out this summary table to help them.

Explore Anchoring Phenomenon: Stalactite Formation
Attempt to Make Sense: Students create a model at the molecular level to show the process of the formation of a stalactite.

Develop Potential Student Questions: (Sample questions below- more on Jamboard)
- Are there certain types of rocks that can't form stalactites?
- How do they build up from the bottom?
- Can stalactites only form when there is limestone?

Possible Unit Level Phenomena: By the end of the unit, students should be able to use the periodic table and polyatomic ion sheet to form ionic bonds through Lewis structures and create the ionic formula. They should be able to apply this to the ionic bonds that dissolve/form/break apart to allow stalactites to form.

Sample Explanation of Anchoring Phenomenon: Carbonic acid (H_2CO_3) is dissolved in the rainwater and passes through the limestone cave. Calcite ($CaCO_3$) is picked up in the rainwater and is dissolved from the limestone. When exposed to air or in the right conditions carbon dioxide (CO_2) is released and the $CaCO_3$ precipitates out of the rainwater. The water drips down and eventually evaporates, leaving behind the $CaCO_3$ on the cave ceiling, forming a stalactite.

This is possible because $CaCO_3$ is an ionic compound, which means that it can dissolve in water due to the polarity of the water molecules and the negative CO_3^{2-} and positive Ca^{2+} ions that form. The strong positive (hydrogen) end of the water molecule attracts the polyatomic ion CO_3^{2-} and the negative end of the water molecule (oxygen) attracts the positive Ca^{2+} ions, allowing the molecules to dissolve in water. Since water is a liquid at room temperature and is covalently bonded, it has a much lower boiling point than the salt $CaCO_3$, so water will eventually evaporate and leave behind the $CaCO_3$ salt deposit on the cave ceiling. Over time, there is a build up of salt that will eventually form a stalactite.

General Resources:
- Driving Question Board
- Question Formulation Technique (QFT)
- KQL
- Talk Activities
- Summary Table
- Final Scientific Modeling
- Final Scientific Modeling
- CCC Discussion Cards
- 321 Strategy active viewing
- 60 Formative Assessment Ideas
- CER

Bundle 2: Bonding and Intermolecular Forces			
Learning Sequence 1: Metallic Bonding: Can and the Congo (4 class periods + CER)			
Driving Questions (Timing)	**Lesson Level Phenomena**	**Activity/Assessment**	**What Should Students Learn/Expected Outcome (Knowledge/Skills)**
ENGAGE *What can we replace tin with in cans?* *(1 class period)*	Can and the Congo	• Present the phenomenon 　○ Can and the congo reading 　○ Conflict in the congo interactive slides • What do we notice? 　○ Have students annotate the can and the congo reading, making comments in the margins and what they notice. Then, have students work through the interactive slides to get a better understanding about conflict minerals • Attempt to make sense: 　○ Jamboard Have students brainstorm their ideas and consider other materials to use on the can. • Identify related phenomena: 　○ Diamond mining • Develop questions and next steps: Have students ask questions. 　○ Jamboard 　○	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **Asking questions** by analyzing information from the Can and the Congo article, attempting to understand the **structure and function** of other metals to replace tin. **Learning Target** • I can ask questions by analyzing Can and the Congo information. ***What's next?*** *Students will be informed of the controversy of using tin cans and make them wonder what else can be used instead of tin.*

EXPLORE
How are cans made?
 	
(1 class period)
	Can and the Congo	• Getting to know the can
		  ○ Plating the can video for video 1
		  ○ Electroplating Demo activity
		
		Resources:
		• OpenStax
		  ○ 16.7 Electrolysis (focus on electroplating example in text)
			DCI/SEP/CCC: SWBAT…
			• **HS-PS1-1**
			• **HS-PS1-2**
			• **HS-PS1-3**
			• **Construct an explanation** on how tin cans are made and determine important physical and chemical properties that we would need in the new metal chosen for the can to replace tin by understanding the **structure and function** of metals and why they are used for plating.
			
			Learning Target
			• I can explain the physical and chemical properties of tin and its uses.
			
			What's next?
			Now that we know how tin cans are made, we can now go deeper and learn about metallic bonding to get a better understanding of how metals bond with each other.

EXPLAIN *How do metals behave at the molecular level?* *(2 class periods)*	Can and the Congo`	• Metallic Bonds Interactive Activity ○ Edited and created from this Interactive Notebook (PDF) Resources: • Metallic bond video • Openstax 10.5: Solid State of Matter	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **Constructing an explanation** for metallic bond formation by identifying **patterns** of other metallic bonds.

		• Britannica.com: Metallic Bond • Libretexts/Chemistry: Metallic Bonding	**Learning Target** • I can explain metallic bond formation. ***What's next?*** *We learned that metals are held together by a metallic bond, which is held together by delocalized electrons from the metal. What we need to know now is if metals can form metallic bonds with different metals, not just with itself. Electroplating would suggest this happens.*
ELABORATE *Can a metal bond with different types of metals, too?* *(1 class period)*	Aluminum and Mercury (Alloy)	• Optional: Experiment of Aluminum and Mercury Video • Alloys POGIL ○ Answers	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **Construct explanations** for the **structure and function** of alloys. **Learning Target** • I can explain an alloy and how they are made. ***What's next?*** *Now that students are familiar with alloys, they can now utilize this information to explore different alloys or pure metals and consider them for replacing tin.*
EVALUATE *Performance Task* *CER Assessment*	Can and the Congo	**LS3 Assessments: Can and the Congo CER (20 points- use CER rubric to grade).**	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **HS-PS2-6**

			• **Obtaining, evaluating, and communicating information** to replace tin plating on cans by describing the **structure and function** of the chosen metal/alloy.
Learning Sequence 2: Covalent Bonding and Intermolecular Forces in Covalent Bonds (18 periods)			
Driving Questions	**Lesson Level Phenomena**	**Activity/Assessment**	**What Should Students Learn/Expected Outcome (Knowledge/Skills)**
ENGAGE *How and why does water behave like this in space?* (1 class period)	Phenomenon: **Phenomenon: Water in Space**	• Present the Phenomenon: Water in Space video and stop it at 2:35. • What do we notice? Students should write down any observations that they have. It is recommended to play the video a second time for students to write down observations. • Students share their observations to create a class list of observations. Jamboard. • Attempt to make sense: **How and why does water behave like this in space?** Students should draw a model based on the question above. Focus on the molecular level interactions. • Identify related phenomena: ○ **Water in mason jar**	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **Ask questions** about the phenomenon and question the **cause and effect** as to why water behaves in such a way. **Learning Target** • I can ask questions about water's behavior in space at the particle level. ***What's next?*** *We need to know what the water molecule looks like and investigate bonding. Students are wondering how the atoms in water are held*

		■ Student recording sheet ■ Directions linked for teachers ○ Swimmers • Develop questions and next steps: Students will write down their questions on a Jamboard.	*together.*
EXPLORE *What kind of bonds hold the hydrogens and oxygen together?* *(1 class period)*	Water in Space	• Covalent Bonding Simulation ○ Students build molecules on the simulation, one of which is the water molecule. Students then analyze the molecules they built to answer analysis questions. • Naming Covalent Bonds Resources: OpenStax • 4.2 Covalent Bonding Water in Space Summary Table • Students can keep a digital copy and fill out as we go through this unit.	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **Develop a 3-D model** of molecules and begin to notice different **patterns** of molecules atoms are able to form. **Learning Target** • I can explain how covalent bonds form and what they look like in 3 dimensions. ***What's next?*** *Now that we know what water looks like in three dimensions, students will need to learn how water and other molecules are formed using the valence electron trend for main group elements.*
EXPLAIN *How do we illustrate covalent bonds?* *(3 class periods)*	Water in Space	• Lewis Structure simulation • Introduce Lewis Structures • for molecules • Practice Lewis Structures ○ For the second part of	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • Use the periodic table as a **model** and use the

		the worksheet, you can just have students identify the covalent bonds. • Silicon Based Life Article Practice: • 8-1 Practice Problems Resources: OpenStax • 4.4 Lewis Symbols and Structures Other Sources: • Single Covalent Bonds CK-12 Assignment • Multiple Covalent Bonds CK-12 Assignment	valence electron **pattern** for main group elements to construct a 2D Lewis structure of a molecule. **Learning Target** • I can illustrate covalent bonds using Lewis Structures. ***What's next?*** *We now know how to determine the Lewis Structure of molecules and one oxygen forms a single bond with each hydrogen. Next, we need to find out what the shape of water is and how that affects its properties.*

EXPLAIN
What is the shape of water?
 	
(2 class periods)
	Water in space	• Molecular Shapes Pear Deck
		  ○ Use the ball and stick model kits and model the molecules along with students.
		• Molecular Geometry POGIL
		• Molecular shapes simulation
		• Molecular shapes worksheet II
		  ○ Practice identifying molecular shapes with the shape chart.
		Resources:
			DCI/SEP/CCC: SWBAT…
			• **HS-PS1-1**
			• **HS-PS1-2**
			• **Draw a model** (Lewis Structure) of a molecule and analyze it to determine the 3D **structure** of the molecule using the molecular shape chart.
			
			Learning Target
			• I can name the molecular geometry of covalent bonds.
			
			What's next?
			The water molecule is a bent shape. Other molecules have different kinds of shapes, too. Now

		OpenStax • 4.6 Molecular Structure and Polarity Other sources: • Class Notes • Molecular Shape Chart • Molecular Shapes EdPuzzle • No Lone Pairs on Central Atom CK-12 Assignment • Lone Pairs on Central Atoms CK-12 Assignment •	*we need to figure out how the shape of water influences its properties.*
ASSESSMENT ***(1 class period)***	Water in Space	Lewis Structure and Molecular Shapes • You are welcome to change the molecules on your own copy. • Allow students to use the following: Periodic Table, Molecular Shapes Chart	Notice patterns between the 2D Lewis Structures to help determine the 3D molecular shape by developing the appropriate Lewis Structure to determine 3D molecular shape.
EXPLAIN *How does water behave compared to another substance?* *(1 class period)*	Water in Space Minor phenomenon: Water drops on penny	• Give students a penny and a dropper. See how many drops of water they can fit! Water and oil assignment • Have students fill out the Jamboard • Class discussion Teacher Resource • Bill Nye Demo with explanation	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **Conduct an experiment and ask questions** about the **structure and function** of oil and water's molecular interactions. **Learning Target** • I can conduct an experiment and ask questions about molecular interactions.

			What's next? *We need to know why the structure of water determines the properties of the molecule.*
EXPLAIN *Why do water molecules stick together to form a dome on the penny (or the sphere in space)?* *(2 class periods)*	Water in Space Minor Phenomenon: Water drops on penny	• Polarity Simulation • Symmetry Inquiry Activity • Polarity worksheet • Polarity Practice • How are stains Removed from your Clothing CK-12 Interactive ○ Student worksheet Resources: Openstax • 4.6 Molecular Structure and Polarity Other Sources: • Polarity Notes • Polar Molecules CK-12	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **Analyze and interpret** 3D molecular structure by understanding that the **structure relates to the function**, or polarity, of the molecule. **Learning Target** • I can analyze the molecular structure of covalent bonds and determine the polarity. ***What's next?*** *By looking at the Lewis Structure and determining the molecular shape of water, we now know water is a polar and bent molecule. The water's polarity is responsible for its cohesive forces. We need to know how polarity determines the water molecule's properties.*

ELABORATE
Do other polar or nonpolar liquids form droplets like water?
 	
(1 class period)
	Water in space
	Water drops on a penny
		• Dripping Droplets CK-12
		    ○ Student Worksheet
		    ○ First exposure to different IMFs through a
			DCI/SEP/CCC: SWBAT…
			• **HS-PS1-1**
			• **HS-PS1-2**
			• **HS-PS1-3**
			• **Carrying out an investigation** on a

		simulation and real world examples	simulation to determine the **cause (IMFs) based on the effects observed (different liquids on a penny)**. **Learning Target** • I can carry out an investigation and observe IMFs of different substances. ***What's next?*** *By running through a simulation, students explore the differences between the different strengths of the different IMFs and how water's polarity and structure plays a role in its strength. Not all covalent bonds act like water. Now we need to know how these differences affect the different properties of water and other liquids.*
ELABORATE *Can we determine different properties of substances based on what the molecule looks like?* *(3 class periods)*	Water in space	• IMF POGIL ○ With answers • Streak Test • Comparing Attractive Forces Simulation • IMF Card Sort Resources: OpenStax • 10.1 Intermolecular Forces • 10.2 Properties of Liquids • 10.3 Phase Transitions	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **Carry out investigations and interpreting and analyzing data to form conclusions** about different covalent compounds and their properties based on IMFs by **interpreting the structure and function of different covalent molecules**.

		○ Vapor pressure and boiling points only Other sources: ● PDF Notes Part 1 ● PDF Notes Part 2 ○ Note: Do not need to cover ionic lattices or metallic ● Intermolecular Forces Pear deck Just need to cover the Covalent Bonds portion ● Hydrogen bonding CK-12 ● Physical Properties and Intermolecular Forces CK-12	**Learning Target** ● I can determine a substance's intermolecular forces by analyzing the molecular's structure and shape. ***What's next?*** *Students learn the different properties of water are due to the molecule's strong hydrogen bonds. The different IMFs in the different molecules are responsible for the different properties seen with varying covalent substances. Next, we need to identify the different properties of water and explain them at the molecular level to be able to explain the behavior of water.*
EVALUATE PERFORMANCE TASK ASSESSMENT ***(2 class periods)***	Paper Chromatography	● Lab: Paper Chromatography ○ Students should be able to make the connection between IMFs and pen mixtures Resource: ● Chromatography Presentation Student ○ Chromatography Presentation Teacher Version	**DCI/SEP/CCC: SWBAT…** ● **HS-PS1-1** ● **HS-PS1-2** ● **HS-PS1-3** ● **Carry out an investigation** to perform a lab separation technique using IMFs to find **patterns** within the different pen mixtures. ***What's next?*** *Students make a connection between polarity and IMFs to determine why paper chromatography works.*

EVALUATE *How does water behave in space at the molecular level?* **PERFORMANCE GRADE FINAL MODEL (GROUP WORK)** ***(1 class period)***	Water in Space	**Final Model of Water in Space** • An open notes assignment where students look through the information and formulate through a model and explanation as to why water behaves the way it does. • See the explanation above in blue for what to look for. Students may or may not use the terms "cohesion, adhesion, surface tension, etc.but some may explain it in terms of attraction, repulsion, etc. • Group assignment	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **Develop a model and construct an explanation** about the phenomenon by providing an understanding of water's **structure and function**. ***What's next?*** *Students are able to put their information together to form a complete model about water including its shape, polarity, IMFs present, and how those IMFs determine its properties. Students may start to wonder about the other elements that do not form covalent bonds.*

EVALUATE
LS2 Assessments
- Covalent Bonding molecular shape, IMF Assessment
    - **HS-PS1-1**
    - **HS-PS1-2**
    - **HS-PS1-3**

Resources for review:
- Intermolecular Forces: The Force Behind Various Properties Review
    - More in depth look at IMFs
- IMF Review Google Form
- Big Idea Slide for Water in Space
- Study guide

Learning Sequence 3: Ionic Bonding and IMFs: How Do Stalactites Form?

Driving Questions	**Lesson Level Phenomena**	**Activity/Assessment**	**What Should Students Learn/Expected Outcome**

			(Knowledge/Skills)
ENGAGE *How are stalactites formed?* *(1 class period)*	Stalactites	• Present the Phenomenon: stalactites video. • What do we notice? Students should write down any observations that they have. Feel free to show it a second time. • Students should record any observations/facts that they know on the jamboard. • Attempt to make sense: Students create a model to show how stalactites are formed at the molecular level. This can be done independently or as a group. • Identify related phenomena: ○ Dissolve egg shells in vinegar - egg shells made of $CaCO_3$ ■ This needs to sit over a couple days ○ Teacher demo or lab for students ■ Lab handout ■ **Baking soda works better than salt** • While the experiment runs, have students explore the science behind Howe Caverns. ○ Continue to fill out observations on the jamboard. • Develop questions and next steps: Students will write down their questions on a jamboard.	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **Ask questions** about how stalactites form at the molecular level and infer the **structure and function** of this new type of bond. **Learning Target** • I can ask questions about stalactites at the particle level. ***What's next?*** *We know what kind of compound limestone is so that we can better understand what happens when rainwater passes through that limestone.*

EXPLORE
What are stalactites made of?
 	
(3 class periods)
	Stalactites	• Ions POGIL
		• Ionic Bonding Simulation
		• Constructing Ionic Compounds Group Work
		  ○ After group work questions
		  ○ Naming Ionic Compounds
		• Combining Ions Worksheet
		• Ionic Bonding Task Cards
		
		• Limestone Caves One-Pager
		  ○ Suggestion: Assign for homework
		
		OpenStax
		• 3.7 Ionic and Molecular Compounds
		• 4.1 Ionic Bonding
		• 4.3 Chemical Nomenclature
		
		Other Sources
		• Stalactites Summary Table
		• Bonding Notes
		• Ionic Bond notes Only
		• Ionic Bond CK-12f
			DCI/SEP/CCC: SWBAT…
			• **HS-PS1-1**
			• **HS-PS1-2**
			• **HS-PS1-3**
			• **Develop and use models** to interpret formulas of ionic bonds, understanding how different **structures of ions relate to their function** (how they bond).
			
			Learning Target
			• I can combine ions to illustrate and determine ionic bonds.
			
			What's next?
			We learned that stalactites are mostly composed of calcium carbonate, consisting of the calcium ion and the polyatomic ion carbonate and it is written as $CaCO_3$*. Now that we know that* $CaCO_3$ *is dissolving in the rainwater, we now need to know how it is possible that calcium carbonate dissolves in rainwater.*

NGSS Interim Assessment *(1 class period)*	N/A	• NGSS Interim Assessment ○ HS-PS1-2: Properties of Matter	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **Develop and use models** to interpret formulas of ionic bonds, understanding how different **structures of ions relate to their function** (how they bond).

EXPLAIN *Do ionic bonds form molecules like covalent bonds?* *(1 class period)*	Stalactites	• Ionic Lattice Structure EdPuzzle • Lattice Structure Playdough Activity OpenStax • 10.5 The Solid State of Matter • 10.6 Lattice Structures and Crystalline Structures	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **Develop and use a model** to create a lattice structure to understand the **structure** of an ionic bond. **Learning Target** • I can create a model to show my understanding of the lattice structure of ionic bonds. ***What's next?*** *We learned that the structure of ionic bonds is not the same as covalent bonds. In fact, ionic bonds create a crystal lattice structure. Now that we know this, we are now wondering how calcium carbonate dissolves in rainwater.*
ELABORATE *Does calcium carbonate (limestone) dissolve in water?* *Why does calcium carbonate (limestone) dissolve in rainwater?*	Stalactites	• Comparing and Contrasting Ionic and Covalent Compounds Lab ○ At the very end of the lab, you can demo or have students mix distilled water with $CaCO_3$. They will find that $CaCO_3$ does not dissolve in pure water easily, breaking the general rule that	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **Carry out an investigation and analyze and interpret data** to discover the similarities and differences between ionic and covalent bonds by understanding the **structure and function** of ionic bonds, understanding that

		ionic bonds dissolve in water.
		
		• Types of Bonds POGIL
		  ○ Compare/contrast metallic bonds from covalent and ionic
		  ○ Can skip the extension questions. Models 1-3 are good
		  ○ Answers
		
		Extension:
		
		Naming Inquiry Activity (coming soon)
			• **Analyze and interpret** that $CaCO_3$ is not soluble in pure water, but is soluble in an acidic substance like vinegar because of the **structure and function** of the ionic bond.
			
			Learning Target
			• I can compare and contrast ionic and covalent bonds.
			
			What's next?
			We have seen that like polar covalent compounds, ionic compounds dissolve in water because of the positive and negative ions being attracted to the opposite sides of the water molecule. We learned that $CaCO_3$ can dissolve in acids, meaning the rainwater must be acidic so that the $CaCO_3$ dissolves easily. Now we are probably wondering how the calcium carbonate gets left behind and leaves the rainwater.

ELABORATE *Why does the calcium carbonate get left behind?*	Stalactites	• Precipitates Lab ○ After the lab, you may want to take the time to discuss the chemical reactions that occur. Since students have not learned about chemical reactions	**DCI/SEP/CCC: SWBAT…** • **HS-PS1-1** • **HS-PS1-2** • **HS-PS1-3** • **Plan and carry out an investigation** to find **patterns** with mixing different substances to discover if a precipitate forms by analyzing and

		yet, it is important to give them the products and not have them predict them. Resources ● Chemical reactions that take place ● Precipitation Reactions Crash Course Video	interpreting data collected. **Learning Target** ● I can carry out an investigation and analyze precipitates forming. ***What's next?*** *We learned that a reaction takes place that forces the $CaCO_3$ to crash out of solution. This happens when the rainwater is exposed to air, the CO_2 forces the $CaCO_3$, to crash out of solution. We now need to summarize our findings and discuss how stalactites are formed.*
EVALUATE *How are stalactites formed?* **PERFORMANCE GRADE FINAL MODEL (GROUP WORK)** **Collaboration**	Stalactites	● Model: How do stalactites form? Final Model ○ Note that we are not looking for the chemical reactions here. ○ Open notes investigation ○ See explanation above in orange for a sample. ○ Group model	**DCI/SEP/CCC: SWBAT…** ● **HS-PS1-1** ● **HS-PS1-2** ● **HS-PS1-3** ● **Develop a model** and construct an explanation about the phenomenon by providing an understanding of the **structure and function** of ionic bonds and their behavior in regards to stalactite formation. ***What's next?*** *Organize the information to create a final model and explanation answering the question "how do stalactites form?"*
EVALUATE **LS2 Assessments**			

- Ionic Bond Assessment
    - Ionic bonding big idea slide (review/visual study guide)
    - **HS-PS1-1**
    - **HS-PS1-2**
    - **HS-PS1-3**

- UNIT: Performance Task - Materials in Smartphones
    - **HS-PS1-3**
    - **HS-PS2-6**

High School

Bundle 2: Bonding and Intermolecular Forces

Accelerated General Chemistry

How do atoms hold themselves together?

What kinds of bonds are out there and how do they influence the properties of compounds?

Lisa Daigle

Composed of 3 Learning Sequences

Can and the Congo

What can we replace tin with on our cans?

Focuses on metallic bonding and properties of metallic bonds.

Water in Space

How and why does water behave in such a way in space?

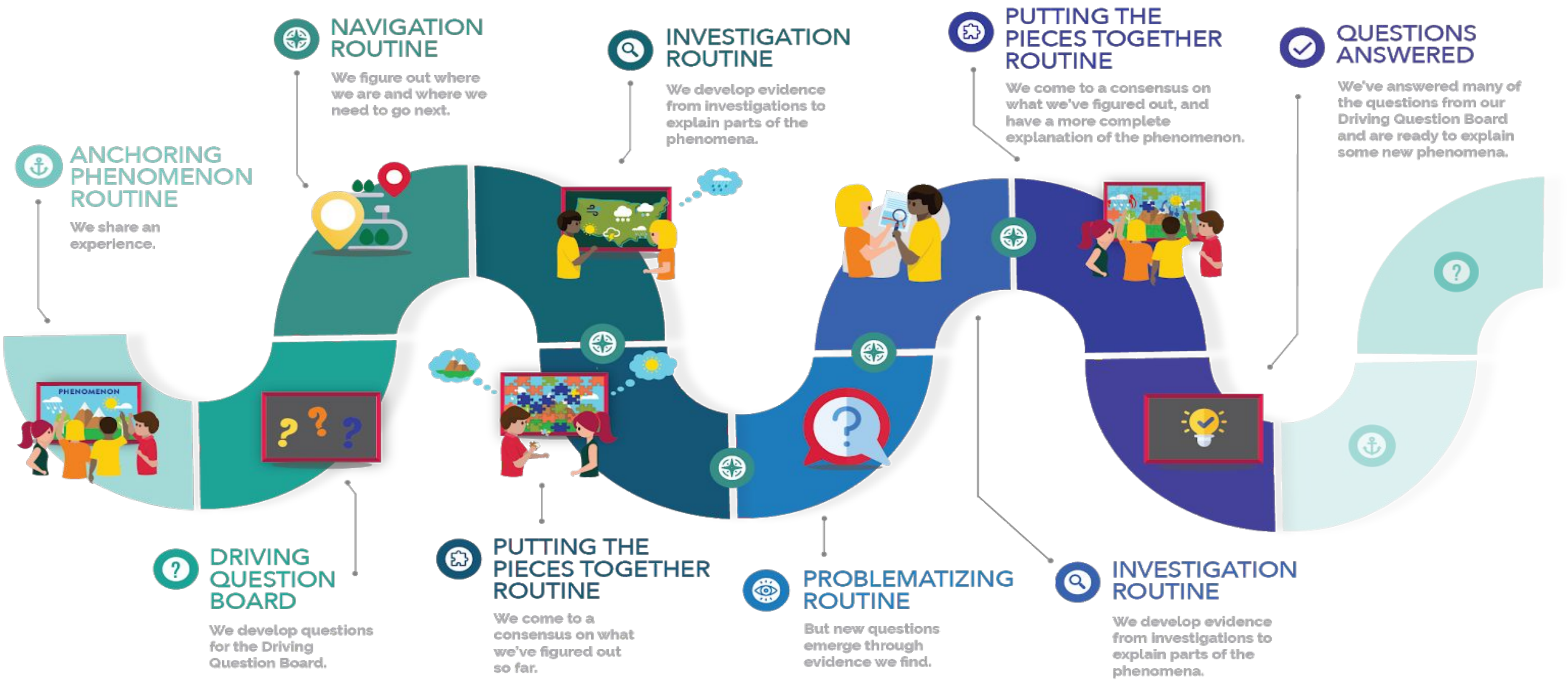
Focus on Lewis Structures, Covalent Bonds, polarity, and intermolecular forces.

Stalactites

How are stalactites formed?

Focus on ionic bonding and comparing and contrasting covalent bonds and ionic bonds.

Curricular Sequence



Learning Sequence 1

What can we replace tin with on cans?

First Steps

- What do we notice?
  - Annotate and write down observations in article
- Attempt to make sense
  - Use the periodic table to help determine what other metals we can investigate to replace tin
- Identify related phenomenon
  - Diamond mining
  - Cell phones
- Develop questions

Learning Sequence 2

How and why does water behave this way in space?

First Steps

- What do we notice?
    - Write down observations
- Attempt to make sense
    - Create an initial model at the molecular level
- Identify related phenomenon
    - Water and mason jar
    - Swimmers
- Develop questions

Learning Sequence 3

How do stalactites form?

First Steps

- What do we notice?
  - Write down observations
- Attempt to make sense
  - Create an initial model at the particle level
- Identify related phenomenon
  - Baking soda lab
- Develop questions

Final Bundle 2 Performance Task

Unit Performance Task: Materials in Smartphones

Collaboration activity where students are given a part of the smartphone and need to use their knowledge gained in bundle 2 to replace the component of the smartphone assigned.

Connects back to bundle 1 as well when students were introduced to the different elements and compounds that make up the of the smartphone.

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ______________________ **Board Meeting Date** December 8, 2022

Decision Requested X **Agenda Code** 9 h.

AGENDA REPORTING FORM

Agenda Topic: SHS – Accelerated Physics Unit 2: Forces and Motion - Second Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed SHS – Accelerated Physics Unit 2: Forces and Motion

Background: ____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Curriculum & Instruction Committee is bringing the SHS – Accelerated Physics Unit 2: Forces and Motion to the full Board for a Second Reading.

Titles of Attachments:

1. Course Proposal

Frank Pepe

Signature of Staff Member Submitting Report

Steve Madancy

Signature of Superintendent of Schools

UNIT 2: FORCES AND MOTION
Unit Documents: Unit Notes ; Unit DQB ; Summary Table ; TIPERs & Engagement Points ; Quiz 1, 2, 3 ; Summative

Unit Overview	
Unit Title:	Unit 2: Forces and Motion
Teacher:	Ouellette
Grade Level/Course:	11-12 (Accelerated Physics)
Length/Dates:	(~ 40) 45 minute instructional periods
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	Students learn the "why" behind motion topics (position, velocity, acceleration, and free fall) discussed in Unit 1. Students learn about Newton's three laws, which help describe how external forces acting on systems lead to constant velocity or changing velocity motion. Students also learn about the universal law of gravitation, which can be applied to any two interacting objects.

Standard Bundles

Performance Expectations
• HS-PS2-1 **Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.** [Clarification Statement: Examples of data could include tables or graphs of position or velocity as a function of time for objects subject to a net unbalanced force, such as a falling object, an object rolling down a ramp, or a moving object being pulled by a constant force.] [Assessment Boundary: Assessment is limited to one-dimensional motion and to macroscopic objects moving at non-relativistic speeds.] • HS-PS2-4 **Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.** [Clarification Statement: Emphasis is on both quantitative and conceptual descriptions of gravitational and electric fields.] [Assessment Boundary: Assessment is limited to systems with two objects. Coulomb's Law is not assessed in this unit]

SEP Implications	DCI Implications	CCC Implications
Analyzing and Interpreting Data Analyzing data in 9-12 builds on K-8 and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. ● Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. **Using Mathematics and Computational Thinking** Mathematical and computational thinking at the 9–12 level builds on K–8 and progresses to using algebraic thinking and analysis; a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms; and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions. ● Use mathematical representations of phenomena to describe explanations.	**PS2.A: Forces and Motion** ● Newton's Second Law accurately predicts changes in the motion of macroscopic objects. **PS2.B: Types of Interactions** ● Newton's Law of Universal Gravitation and Coulomb's Law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects.	**Patterns** ● Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. **Cause and Effect** ● Empirical evidence is required to differentiate between cause and correlation and makes claims about specific cause and effects ● Systems can be designed to cause a desired effect.

Transfer Goals (Vision of the Graduate) List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s).

Explore Anchoring Phenomenon: Where's the futbols?
Attempt to Make Sense: Interaction Station, Summary Table, Goalless Problem
Identify Related Phenomena: Picture Collage ; Universal Law of Gravitation
Develop Potential Student Questions:

- How does the kid climb up the wall?
- Why doesn't he slide back down?
- How much did he have to pull to overcome gravity?
- How hard is gravity pulling down on the soccer balls?
- How fast did he climb up the pole?
- How fast did he slide down the pole?
- How fast were the soccer balls going?

Preconceptions:

- Many students believe that only animated objects can exert forces. They don't believe that a table exerts an upward force on an object.
- Many students tend not to distinguish between force, inertia, energy, power, or even velocity.
- A majority of students believe in an impetus theory of motion. In throwing a ball, the hand imparts a "force of the throw" to the ball and this force travels with the ball
- Students tend to view forces from the perspective of the applier of force rather than from the perspective of the object experiencing forces.
- Students believe if there's no force on an object, the object is at rest or will immediately come to rest.
- Students believe that motion requires a force or, alternatively, force causes motion.
- Students do not believe Newton's third law
- Students have difficulties isolating systems from each other and from the environment
- Students often don't recognize that objects connected by an inextensible string must have accelerations of equal magnitude.

Sample Student Explanation:
Forces are pushes and pulls. The kid pulls and pushes himself up the pole using his muscles. "Gravity" pulls down on objects. Objects accelerate due to gravity's pull. The futbols are under the influence of gravity when they are thrown. There's a "force of the throw" that stays with the futbol. "Friction" is a force. Friction is acting on the kid when he slides down. Friction leads objects to heat up. How far the futbols go depends on how much force they throw it with.

The astronauts float because there is no gravity in space.

Forces and Motion Bundle				
WK	**Target Question(s)**	**Lesson-level phenomenon**	**Activities & Assessments**	**What Students Will Learn/Expected Outcome (Knowledge and Skills)**
1	• What is an interaction? • What is a system?	• Where's the futbols? • Interaction Stations	• Phenomenon Group Observations and Question Board • Interactions • Interaction Stations ○ Student handout • Summary Table • Teacher Notes	DCI: HS-PS2-1 **SEP: Asking questions and defining problems.** • SWBAT ask questions that arise from careful observation of phenomenon, or unexpected results, to clarify and/or seek additional information. • SWBAT evaluate a question to determine if it is testable and relevant. **CCC: Systems and System Models** • SWBAT investigate or analyze a system by defining its boundaries and initial conditions, as well as its inputs and outputs • SWBAT use models (e.g., physical, mathematical, computer models) to simulate the flow of energy, matter, and interactions within and between systems at different scales. • SWBAT use models and simulations to predict the behavior of a system, and recognize that these predictions have limited precision and reliability due to the assumptions and approximations inherent in the models. **Connection to Anchoring Phenomenon:** The kid interacts with many objects (Earth, pole, structure, soccer balls) throughout the video. Each interaction can be linked to a force. **What's next?** Students are familiar with how to identify and map out interactions. Interactions are a good way to think about forces. What are forces and how can we model them?

1-2	• What are forces? • How are forces related to interactions?		• Interaction and Free Body Diagrams • Forces Table GO • Summary Table • FBD Problem Set • F_{net} Problem Set • F_{net} and FBD Quiz • Teacher Notes	**DCI: HS-PS2-1** **SEP: Developing and Using Models** • SWBAT evaluate merits and limitations of two different models of the same proposed tool, process, mechanism or system in order to select or revise a model that best fits the evidence or design criteria. • SWBAT develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system. • SWBAT develop and/or use multiple types of models to provide mechanistic accounts and/or predict phenomena, and move flexibly between model types based on merits and limitations **CCC: Systems and System Models** • SWBAT investigate or analyze a system by defining its boundaries and initial conditions, as well as its inputs and outputs • SWBAT use models (e.g., physical, mathematical, computer models) to simulate the flow of energy, matter, and interactions within and between systems at different scales. • SWBAT use models and simulations to predict the behavior of a system, and recognize that these predictions have limited precision and reliability due to the assumptions and approximations inherent in the models. **Connection to Anchoring Phenomenon:** During this segment, students learn the names of the forces acting on the kid and the soccer balls. We can also use a free body diagram to model the forces (the magnitudes and directions) acting on objects in the video. **What's next?** We identify forces with different diagrams. Equations can be created from the diagrams. Forces are interactions. When objects interact, they place a force on each other. How can we think about that?
3	• Why do forces come in pairs?	Spring Scale Pull, Rubber band pull,	• N3L Investigation • N3L Reading	**DCI: HS-PS2-1**

		tug-o-war	• N3L Problem Set • Google Follow-up Form • Summary Table • N3L Quiz • Teacher Notes	**SEP: Planning and Carrying Out Investigations** • SWBAT plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time) • SWBAT select appropriate tools to collect, record, analyze, and evaluate data. • SWBAT make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated. **CCC: Patterns** • SWBAT observe different patterns at each of the scales a system is studied to and can provide evidence for causality in explanations of phenomena. • SWBAT use mathematical representations to identify a pattern. **Connection to Anchoring Phenomenon:** While N3L is happening throughout the video, one of the areas we will focus on is that for the kid to climb up the structure, he pushes off the structure in the negative downward direction. N3L states that a force of equal magnitude is placed on him from the structure, which prevents him from accelerating downward. **What's next?** Forces come in pairs, have the same magnitude, and act in opposite directions. You can identify N3L pairs on FBDs for the objects. One of the forces we talked about was "gravity". What is the pull of gravity all about?
4	• How should we describe the gravitational force? • Are mass and weight the same thing?	Freefall, weight and mass	• Earth's Gravitational Force Investigation • Mass and Weight Concept Builder • Summary Table • Teacher Notes	**DCI: HS-PS2-1** **SEP: Planning and Carrying Out Investigations** • SWBAT plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time) • SWBAT select appropriate tools to collect, record,

				analyze, and evaluate data. • SWBAT make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated. **CCC: Cause and Effect** • SWBAT use empirical evidence to differentiate between cause and correlation and make claims about specific causes and effects. **Connection to Anchoring Phenomenon:** We can mathematically solve for the gravitational force acting on the kid. In a balanced forces situation, that also tells us the normal force acting on the kid. We can use this alongside the FBDs and Fnet equations to start solving for things. **What's next?** Objects all around are pulled downward towards the center of Earth. The force due to gravity is associated with the attractive gravitational pull. This is commonly known as the weight of an object. Mass is a measurement of how much. It can be represented on a graph and mathematically.
5	• How should we describe friction? • What factors affect friction?	Friction Force Investigation	• Friction Force Investigation • Friction Force Problem Set • Summary Table • Friction Quiz • Teacher Notes	**DCI: HS-PS2-1** **SEP: Planning and Carrying Out Investigations** • SWBAT plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time) • SWBAT select appropriate tools to collect, record, analyze, and evaluate data. • SWBAT make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated. **CCC: Structure and Function** • SWBAT investigate or design new systems or structures that require a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.

				Connection to Anchoring Phenomenon: Friction acts on the kid throughout the video. We can look at the video and make assumptions on the type of materials that are interacting and use the normal force to calculate static and kinetic friction forces. **What's next?** The gravitational force and its properties can be represented as a field that stretches space and time. Field strengths depend on the mass of the celestial objects. Gravitational attraction between objects can be represented as N3L pairs and calculated. Another force we know about is friction. What is friction?
6	• What happens if the forces acting on an object/system are balanced? • What happens to the motion of such a system?	Hidden Balanced Forces Stations	• Hidden Balanced Forces Investigation ○ Student handout • N1L Problem Set • Teacher Notes	**DCI: HS-PS2-1** **SEP: Using Mathematics and Computational Thinking** • SWBAT create and/or revise a computational model or simulation of a phenomenon, designed device, process, or system. • SWBAT use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations. • SWBAT apply techniques of algebra and functions to represent and solve scientific and engineering problems. **CCC: Cause and Effect** • SWBAT use empirical evidence to differentiate between cause and correlation and make claims about specific causes and effects. **Connection to Anchoring Phenomenon:** Anytime the kid is moving with a constant velocity, a balanced net force is acting on them. **What's next?** Objects that experience a net force of 0 N maintain a constant velocity, including if it is at rest. Objects at rest are said to be in static equilibrium. Objects in motion are said to be in dynamic equilibrium. This is known as Newton's 1st Law (N1L). What happens if objects/systems experience net external forces that are not 0 N?

7	- What happens if the forces acting on an object/system are unbalanced? - What happens to the motion of such a system?	Partial Atwoods and pulleys	- Net Force and Acceleration Investigation - Summary Table - N2L Problem Set - N1L & N2L Study Guide - N1L & N2L Quiz - Teacher Notes	**DCI:** HS-PS2-1 **SEP: Analyzing and Interpreting Data** - SWBAT analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. - SWBAT apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. **CCC: Cause and Effect** - SWBAT use empirical evidence to differentiate between cause and correlation and make claims about specific causes and effects. **Connection to Anchoring Phenomenon:** Any time the student or ball accelerates, an unbalanced net force is acting on the object. **What's next?** Prepare for unit exam
8	Review and Unit Summative	Forces	- Goalless Problem - Or video analysis of anchor - Grudgeball - Unit Summative	**See Performance Statements** **What's next?** What about gravity at a larger scale?
9	- How can we describe the gravitational force? universally? - What's a field? - How do celestial objects orbit one another?	Universal Gravitational Force and astronauts floating	- Universal Law of Gravitation Phenomenon - Universal Gravitational Force Investigation - Why Doesn't the Moon Crash Into Earth? Article - ULG Problem Set - Summary Table - Teacher Notes	**DCI:** HS-PS2-4 **SEP: Using Mathematics and Computational Thinking** - SWBAT create and/or revise a computational model or simulation of a phenomenon, designed device, process, or system. - SWBAT use mathematical, computational, and/or algorithmic representations of phenomena or design solutions to describe and/or support claims and/or explanations. - SWBAT apply techniques of algebra and functions to represent and solve scientific and engineering problems.

				CCC: Scale, Proportion, Quantity ● SWBAT use algebraic thinking to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth) **Connection to Anchoring Phenomenon:** A gravitational force still acts on the astronauts when we consider the field model, so the astronauts are not in "zero gravity" **What's next?** Begin next unit
	Performance Assessment	Universal Gravitational Force	● ULG Summative	

Evaluative Criteria
Performance Statements (PS2-1, PS2-4)

Observable features of the student performance by the end of the course:		
1	Organizing data	
	a	Students organize data that represent the net force on a macroscopic object, its mass (which is held constant), and its acceleration (e.g., via tables, graphs, charts, vector drawings).
2	Identifying relationships	
	a	Students use tools, technologies, and/or models to analyze the data and identify relationships within the datasets, including:
		i. A more massive object experiencing the same net force as a less massive object has a smaller acceleration, and a larger net force on a given object produces a correspondingly larger acceleration; and
		ii. The result of gravitation is a constant acceleration on macroscopic objects as evidenced by the fact that the ratio of net force to mass remains constant.
3	Interpreting data	
	a	Students use the analyzed data as evidence to describe* that the relationship between the observed quantities is accurately modeled across the range of data by the formula $a = F_{net}/m$ (e.g., double force yields double acceleration, etc.).
	b	Students use the data as empirical evidence to distinguish between causal and correlational relationships linking force, mass, and acceleration.
	c	Students express the relationship $F_{net}=ma$ in terms of causality, namely that a net force on an object causes the object to accelerate.

Observable features of the student performance by the end of the course:		
1	Representation	
	a	Students clearly define the system of the interacting objects that is mathematically represented.
	b	Using the given mathematical representations, students identify and describe* the gravitational attraction between two objects as the product of their masses divided by the separation distance squared $\left(F_g = -G\frac{m_1 m_2}{d^2}\right)$, where a negative force is understood to be attractive.
	c	Using the given mathematical representations, students identify and describe* the electrostatic force between two objects as the product of their individual charges divided by the separation distance squared $\left(F_e = k\frac{q_1 q_2}{d^2}\right)$, where a negative force is understood to be attractive.
2	Mathematical modeling	
	a	Students correctly use the given mathematical formulas to predict the gravitational force between objects or predict the electrostatic force between charged objects.
3	Analysis	
	a	Based on the given mathematical models, students describe* that the ratio between gravitational and electric forces between objects with a given charge and mass is a pattern that is independent of distance.
	b	Students describe* that the mathematical representation of the gravitational field $\left(F_g = -G\frac{m_1 m_2}{d^2}\right)$ only predicts an attractive force because mass is always positive.
	c	Students describe* that the mathematical representation of the electric field $\left(F_e = k\frac{q_1 q_2}{d^2}\right)$ predicts both attraction and repulsion because electric charge can be either positive or negative.
	d	Students use the given formulas for the forces as evidence to describe* that the change in the energy of objects interacting through electric or gravitational forces depends on the distance between the objects.

Accelerated Physics:

Unit 2: Forces and Motion Unit

Unit Overview

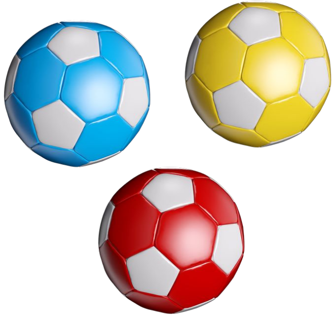
- Students will learn the “why” behind motion topics discussed in Unit 1 *(position, velocity, acceleration, and free fall)*
- Students will learn about Newton’s three laws, which help describe how external forces acting on systems lead to constant velocity or changing velocity motion.
- Students also learn about the universal law of gravitation, which can be applied to any two interacting objects.

Performance Expectations

Performance Expectations
• **HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.** [Clarification Statement: Examples of data could include tables or graphs of position or velocity as a function of time for objects subject to a net unbalanced force, such as a falling object, an object rolling down a ramp, or a moving object being pulled by a constant force.] [Assessment Boundary: Assessment is limited to one-dimensional motion and to macroscopic objects moving at non-relativistic speeds.] • **HS-PS2-4 Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.** [Clarification Statement: Emphasis is on both quantitative and conceptual descriptions of gravitational and electric fields.] [Assessment Boundary: Assessment is limited to systems with two objects. Coulomb's Law is not assessed in this unit]

Anchoring Phenomenon

Where's the Futbols



Culminating Performance Task

POTENTIAL CAPSTONE IDEA - CRITICAL THINKING

Name:____ **ULG Performance Task**

Your Task: Determine the gravitational force between you and another object and answer the prompts.

What to Submit: Please submit either a Google Doc or Google Slide that clearly shows and answers each prompt.

Part 1: Picking an object

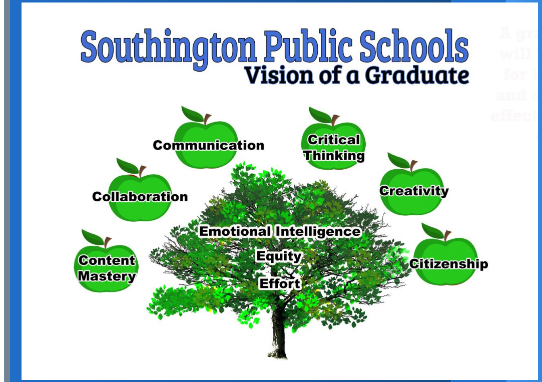
- Find an object (it could be anything) and take a selfie with it. Do not consider any combination we might have covered already in class - this should be new! There should be some distance between yourself and the object. This picture should be on your first slide

Part 2: Data Table

- Create a data table and populate it with the data you would need to calculate the gravitational force between you and the object.
- The mass of your object may or may not be known. If the mass is unverifiable (like a house, for example), please make an informed estimate (google how much a house weighs) and go from there

Part 3: Calculation

- Using Newton's Universal Law of Gravitation, calculate the gravitational force between you and the object ($G = 6.67 \times 10^{-11}$ $m^3/kg*s^2$)



BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ______________________ **Board Meeting Date** December 8, 2022

Decision Requested X **Agenda Code** 9 i.

AGENDA REPORTING FORM

Agenda Topic: SHS – Accelerated Biology Unit 1: The Chemistry of Life - Second Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed SHS – Accelerated Biology Unit 1: The Chemistry of Life

Background: ____

____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Curriculum & Instruction Committee is bringing the SHS – Accelerated Biology Unit 1: The Chemistry of Life to the full Board for a Second Reading.

Titles of Attachments:

1. Course Proposal

Frank Ripa
Signature of Staff Member Submitting Report

Steven Madancy
Signature of Superintendent of Schools

Unit Overview	
Unit Title:	Unit 1~What is Life: The Chemistry of Life
Teacher:	Sharon Kirsche and Keagan Radziwon
Grade Level/Course:	Accelerated Biology
Length/Dates:	5 weeks
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	Students will explore the phenomenon of how scientists may look for life on other planets using life on Earth as a model. They will learn about the characteristics of life, biochemical markers of life, and some of the chemical reactions involved in life processes. Throughout the unit, students will engage in hands-on laboratory activities that explore macromolecule testing, data gathering and citizen science, and enzymatic function.

Explanation
Select PEs that work together (bundle) to promote proficiency in using ideas expressed. Often a bundle will include PEs from a single NGSS topic or DCI, but a bundle could draw in PEs from other topics or DCIs.
PE(s) to be addressed (include assessment boundaries and clarification statements). **Unit 1: The Chemistry of Life** ● HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules . ● HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. ● Building towards HS- PS1-3, HS- PS2-6
Unpack DCI(s), SEPs, and CCCs coded to the PEs to identify implications for instruction.

Unit 1: The Chemistry of Life

SEP Implications	DCI Implications	CCC Implications
Constructing Explanations and Designing Solutions ● Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future ● Apply scientific principles and evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects.	**LS1.C: Organization for Matter and Energy Flow in Organisms** ● The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells. ● As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products **PS1.B: Chemical Reactions** ● Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and the rearrangements of atoms into new molecules, with consequent changes in the sum of all bond energies in the set of molecules that are matched by changes in kinetic energy. **LS1.A: Structure and Function** ● **Feedback mechanisms maintain a living system's internal conditions**	**Patterns** ● Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. **Energy and Matter** ● Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system.

	within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.	

Transfer Goals (Vision of the Graduate) List the long-term and/or school-wide independent student behaviors that this unit will address.
Critical Thinking Transdisciplinary Goal: Students inquire, identify, and ethically solve real-world problems through reasoning and a reflection on the challenges and benefits of the process and/or solution(s). **Communication Transdisciplinary Goal:** Students effectively communicate and use interpersonal skills in a range of formal and informal contexts.

TEACHER LEARNING PLAN (including Assessments)

***Starting**: First week of school*
***Ending**: 2nd week of Oct*

Unit 1- The Chemistry of Life

Anchoring Phenomenon:Extraplanetary Life?!?

MATERIALS NEEDED

Ant Picnic:

- Extra Virgin Olive Oil
- Amino Acids: Pure L-Glutamine powder in solution (20% solution)
- Sugar Water (20% solution)
- Salt Water (1% solution)
- Cotton balls (5 per group)
- Pecan Sandies cookies (or a similar shortbread cookie)
- Sandwich Ziploc bags (6 per group)

Water Lab:

- Dish soap
- Pennies
- Acetone
- Balloon
- Oil
- Salt

Macromolecules in Algae Lab:

- 1 dropper bottle for each of the following:
  - Water
  - Pepsin
  - Starch
  - Glucose
  - Iodine/Lugols
  - Vegetable oil
  - Benedict's solution
  - Biuret's solution
- 2 test tubes
- Test tube tongs
- 1 test tube rack
- Hot plate
- 1 250 ml beaker
- 3 toothpicks
- 1 well plate.

Enzyme LaB

- **maximum** per group for all experiments)
- "Yeasty" water
- Forceps
- thermometer
- plastic spoon
- 1 small beaker
- 3 medium beakers or cups
- 5 test tubes
- test tube rack
- graduated cylinder
- small squares or dots of felt (~7mm square)
- a supply of ice water (~0ºC)
- a supply of warm water (~40ºC)
- room temperature water (~20ºC)
- hot water (60-80ºC) can be made

Teacher Target Question	Activity/Assessment	Standards/Objectives	Students Will Know and Wonder
Anchoring Phenomenon Routine ***(1 period)***	• **Anchoring Phenomenon: Extraplanetary Life?!?** ○ Teacher Slides ○ Student Handout SUMMARY TABLE FOR UNIT	Engage in a QFT session to create a DQB based on the anchoring phenomenon. **Learning Target**: I will ask questions about how to recognize extraplanetary life.	Student questions should lead them to realize they need to have a better working definition of life. This will lead to Activity 1 and a sensemaking activity to develop a working definition of "life". Students will need to revisit their DQB to refine their questions after Activity 1.
EXPLORE/EXPLAIN *EQ: What does it mean to be living?* *(2 periods)*	• **Activity 1: Characteristics of Life Observations** ○ Teacher Slides ○ Student Handout	Construct an explanation using observed patterns in a variety of specimens to explain the criteria to determine if something is living. **Learning Target:** I will use patterns in a variety of specimens to construct an explanation of the criteria to determine if something is living.	**Know**: • Students will recognize the major characteristics of life and understand that there's a "gray area" for scientists. • Scientific definitions must be data driven. **Wonder/Next Steps**: • What are biomarkers and how can we use them to recognize life? • Why when looking for life on other planets do we focus on water? • How could we "test" for life and use data to communicate and inform scientific decisions?
EXPLAIN *EQ: What does it mean to be living?* *(2 periods)*	• **LAB: Life in Pond Water**	Construct an explanation of whether objects seen in pond water are living using patterns in their characteristics and comparing them to known characteristics of life.	**Know:** • Microscopes are a tool to help us see small objects and require specific steps to be successful. • Scientific drawings should be detailed and include color when necessary. • The characteristics of life can be

		Learning Target: I will construct an explanation using observed patterns that explains whether specimens in pond water are living or not using known criteria.	seen in a variety of living things. **Wonder/Next Steps:** ● Students see that a variety of life is found in water. This is also one of the biomarkers that students identify from the anchoring phenomenon question. We will move into our exploration of water as a life supporting material.
EXPLORE/EXPLAIN *EQ: How do we communicate with data in a scientific manner?* *(3-4 periods)* **NOTE- This activity is a data analysis activity that can be slotted into a lab period at any point in the first week or so of school.*	● **Activity 2: Ant Picnic Lab** ○ Data Collection Video to use prior to using CODAP Ant Picnic Data Analysis and CODAP - YouTube (show to class or provide a link) ○ Data Analysis sheet Slides presentation to help students tell stories from data (part 1.3) Data tell stories (show to class or provide a link) ○ Teacher Guide **Part 4 is uploading to the global site. This requires setting up pooled data from SHS**	Analyze and interpret data to communicate how patterns can lead us to evaluate and support explanations about real world phenomena. **Learning Target:** I will gather, analyze, and interpret data and use patterns in global data to communicate an explanation about the preferred food source of ants.	**Know**: ● Data collection can be messy- the real world does not often provide clear, concise data sets. ● In order to explore life on other planets, scientists must make sense of messy data. ● There are several steps that a scientist can take to "clean" and interpret messy data- from means, standard deviation, standard error, and best fit lines. ● Recognize the basic steps of the scientific method and how they relate to data collection and analysis. **Wonder**: ● Now that we understand a bit more about data collection and organization, what are some things that scientists might collect data on to look for life? **Next steps:** ● Students will collect data on the chemical properties of water to begin to understand why it plays such an important role in life as

			we know it.

EXPLAIN
EQ: Why is water so important to life?
(1 period)
	• **Activity 3: Water Property Stations Lab**
	  ○ Student Handout
	  ○ Lab Station Directions
	• **Supporting Activity:**
	  ○ Why is water essential reading
	  ○ Can Life Exist without Water?
		Conduct an investigation and analyze data to show how the structure of water leads to its unique functions and how these properties support organization in living things.
		
		Learning Target: I will conduct investigations to explore the unique properties of water and explain why they are important for life.
			Know:
			• Water has several unique properties including adhesion, cohesion, surface tension, and hydrogen bonding/polarity.
			Wonder:
			• How can water do this?
			• Why is it so essential for life?
			Next steps:
			• Students will explore the chemical properties of water that allow the phenomenon seen in this lab and recognize why they are important to life.

EXPLAIN *EQ: How does the chemical structure of water lead to its unique properties?* *(2-3 periods)*	**Activity 4: Water's Structure** **Supporting Activities:** • **Water One Pager** • **Bonding lessons with basic atomic structure** • **Water Crash course video**	Develop and use a model of water to describe patterns in the structure that relate to the various functions of water and how they connect to its role in restructuring matter and energy in living organisms. **Learning Target:** I will use a model of water to explain how the structure of water relates to its special properties.	**Know**: • Water is a polar molecule. • Water can split to form ions. These ions can lead to changes in homeostasis and/or become involved in re-arranging other molecules to assist in using materials for energy. **Wonder**: • If water can form ions when split, how does the body maintain pH homeostasis? • Extension: Are there substitutes for water? **Next steps:** • What other important molecules are needed for living things?

EXPLORE *EQ: What other chemicals besides water are found in living things?* *(1 period)*	**Activity 5: What's in our food?**	Collect and analyze data to look for patterns in the matter that we put into our bodies. **Learning Target:** I will collect and analyze data to look for patterns in my food intake and to identify the key materials we take into my body.	**Know**: • The major macromolecules found in our food are lipids, carbohydrates, and protein. **Wonder**: • How do these macromolecules contribute to the characteristics of life? **Next steps:** • Students will analyze text and data to identify patterns in the structure of biomolecules and how these relate to their functions.
EXPLAIN *EQ: How does the structure of macromolecules relate to their function?* *(2-3 periods)*	**Activity 6: Patterns in Macromolecules** • **Student Handout** • **Teacher Slides** • **Inquiry Cube Template** • **Pattern Matching Answers** **Macromolecule Jigsaw Notes** • **Student Directions** • **Student Note Sheet** **Supporting Activity:** • **Intro to Macromolecule Simulation**	Recognize patterns and engage in argument from evidence to show that matter in organisms is structured in predictable ways that contribute to their functions for living things. **Learning Target #1:** I will recognize patterns that exist in macromolecules and use this to make a claim about an unknown. **Learning Target #2:** I will construct an explanation about how the structure of macromolecules relate to their function in our bodies.	**Know**: • Structures of the four classes of biomolecules along with their functions. **Wonder**: • Are some biomolecules more "important" than others? • What biomolecules are in a healthy diet? **Next steps:** • Students will argue about the importance of various macromolecules in living things?
ELABORATE *EQ: Are some macromolecules more important than others?*	**Activity 7: Macromolecules in Algae Lab**	Carry out an investigation to explore the patterns of matter found in living things and construct an explanation on if algae could be	**Know**: • The functions of the various macromolecules. • The macromolecules found in

(3-4 period)	• 8 pts- ONLY #3 is graded using CER rubric. Other sections can be used as learning tasks at teacher's discretion. **Supporting Activities:** • **Macromolecule Campaign Poster??**	a viable food source. **Learning Target:** I will conduct an investigation to determine what macromolecules are found in algae in order to argue if algae could be a viable food source.	algae. **Wonder**: • Most of the molecules are involved in using energy. How do living things use these to generate usable energy? How are molecules broken down and built up? **Next steps:** • Students will explore enzyme function and understand how the structure relates to the function.
EXPLORE/ EXPLAIN *EQ: How are macromolecules built up and broken down? (What are enzymes and how do they help living things use energy?)* *(2 periods)*	**Activity 8: Chemical Reactions in Living Things** • **Student Handout** • **Teacher Slides**	Use models to show how chemical reactions are used to restructure matter and can use or generate energy. **Learning Target:** I will use molecular models to determine how molecules can be restructured to use or generate energy.	**Know**: • Hydrolysis → Break down of macro • Dehydration Synthesis → Build Up • Water is involved in the reactions above. **Wonder**: • How is it possible for all of these chemical reactions to happen quickly enough to sustain life? **Next steps:** • Students will explore the structure and function of enzymes and connect to the macromolecule group proteins.
EXPLORE/ EXPLAIN *What are enzymes and how do they help living things use energy?* *(1-2 days)*	**Enzyme Exploration** • **Protein Reading** • **Enzyme POGIL**	Use models to show how chemical reactions are affected by enzymes and that structure of enzymes is important to their function. **Learning Target:** I will use a	**Know**: • Enzymes are a driving force behind the biochemical reactions of life. • Enzyme structure dictates function.

		model of an enzyme to explain how they affect chemical reactions and why their structure is important for this.	**Wonder**: ● Do all enzymes work the same way? Why are their different enzymes? **Next steps:** ● Students will conduct lab activities to explore the factors that affect enzyme function.
ELABORATE *EQ: What factors affect enzyme function?* *(2 periods)*	**Activity 9: Enzyme Lab** ● 14 pts- ONLY Conclusions are Performance, Data Collection and Lab Planning sections may be used as learning	Plan and carry out an investigation to show how chemical reactions are affected by enzymes and that structure of enzymes can be affected by various environmental conditions which in turn affects their function. **Learning Target:** I will conduct an explanation to explain how enzyme function is affected by various environmental conditions	**Know**: ● Temperature, pH, substrate and enzyme concentrations, and inhibitors can all influence reaction rate. **Wonder**: ● How does compartmentalization improve enzyme efficiency? **Next steps:** ● Now that we understand all of the basics of biochemistry, we will explore how all of these components interact in the most basic unit of life- a cell.

Experience 1 Assessment (50 pts)

Other Performance Assessments from Unit

- Macromolecules in Algae Lab (question 3 only - 8 pts)
- Enzyme Lab Conclusion (14 pts- ONLY Conclusions are Performance, Data Collection and Lab Planning sections may be used as learning
- Teachers should aim to have roughly 100 Performance Points per Unit.
    - This unit has a total of 72 points for common assessments
    - Teachers have 20-30 points to use for their own performance tasks/quizzes/reading check-ins, etc

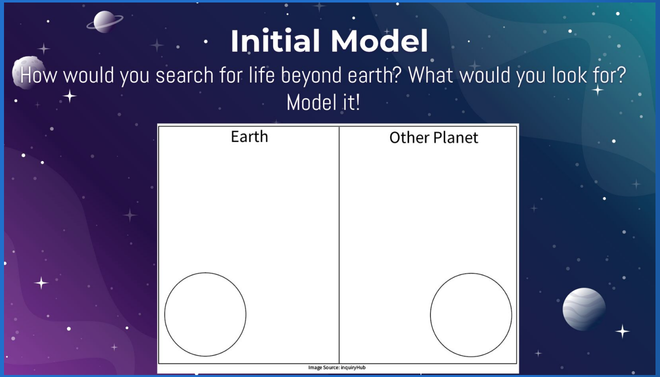
Accelerated Biology:

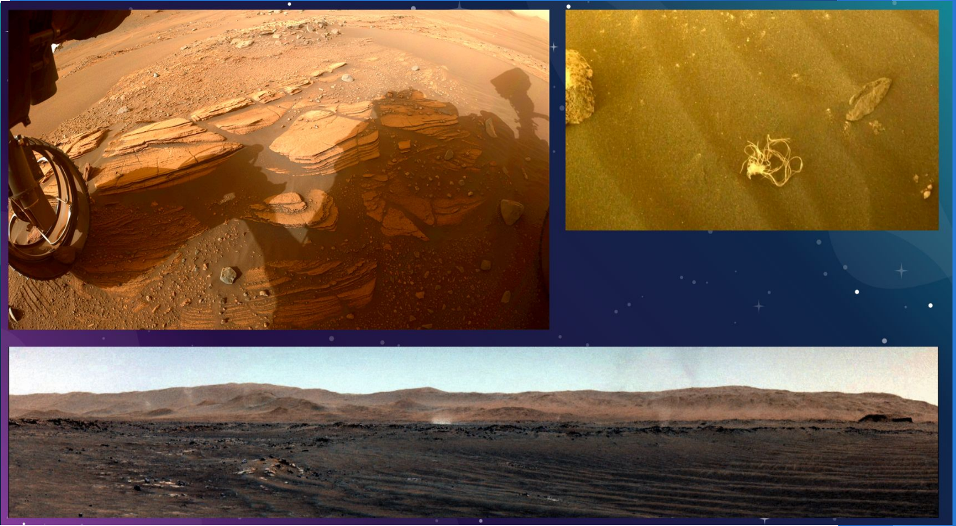
Unit 1: The Chemistry of Life

Unit Overview

- Students will explore the phenomenon of how scientists may look for life on other planets using life on Earth as a model.
- They will learn about the characteristics of life, biochemical markers of life, and some of the chemical reactions involved in life processes.
- Throughout the unit, students will engage in hands-on laboratory activities that explore macromolecule testing, data gathering and citizen science, and enzymatic function.

Anchoring Phenomenon





Driving Questions & Learning Sequence

What does it mean to be living?	How do we communicate with data in a scientific manner?	Why is water so important to life?	How does the chemical structure of water lead to its unique properties?	What other chemicals besides water are found in living things?
How does the structure of macromolecules relate to their function?	Are some macromolecules more important than others?	How are macromolecules built up and broken down?	What are enzymes and how do they help living things use energy?	What factors affect enzyme function?

Assessment Highlight: Lab Task

Your task

A number of different variables, such as the concentration of the hydrogen peroxide solution, or the temperature at which the reaction occurs, or pH, can affect the rate at which yeast breaks down hydrogen peroxide. You and your partner will design and conduct an experiment to explore the effect of **environmental conditions** on the rate of the breakdown of hydrogen peroxide by yeast.

During this activity you will work with a lab partner (or possibly two partners). You must keep your own individual lab notes because after you finish, you will work independently to write a CER style conclusion about your experiment.

Creativity Critical Thinking Collaboration Communication

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ______________________ **Board Meeting Date** December 8, 2022

Decision Requested X **Agenda Code** 9 j.

AGENDA REPORTING FORM

Agenda Topic: Science Grade 3 Unit 2: Grand Canyon Seashells - Second Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed Science Grade 3 Unit 2: Grand Canyon Seashells

Background: ____

____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Curriculum & Instruction Committee is bringing the Science Grade 3 Unit 2: Grand Canyon Seashells to the full Board for a Second Reading.

Titles of Attachments:

1. Course Proposal

Frank Ripa

Signature of Staff Member Submitting Report

Steve Madancy

Signature of Superintendent of Schools

Unit 2 - Grand Canyon Seashells
The students, as secret agents from the environmental archeology division, will make observations and ask questions about the seemingly odd marine fossils found in the Grand Canyon. Over the course of the unit, students will define how this odd phenomenon came to be. In sequence two, the students examine and identify a new mystery fossil (a trilobites fossil). They look at fossils that may be related as a means to compare extinct and closely evolved organisms and to make inferences as to the type of environment in which the fossils once lived. In the third learning sequence, students begin to understand that the environment in which an organism resides provides the living thing with what it needs to live and grow. The students understand that there are a variety of different types of environments and that the living things differ in each environment. The students go on a nature walk to observe the physical characteristics of their environment. Students research and compare different environments to see how certain organisms are more suited to one than another. Students come to understand that the current environment of the Grand Canyon is a desert. In the fourth learning sequence, students identify the different climate zones around the world to determine observable weather patterns. Students understand that both weather and climate can affect an environment. Students should also begin to understand that climate changes, not day-to-day weather events, are responsible for massive environmental changes. In the fifth learning sequence, students look at weather related hazards. Specifically, weather related hazards that are influenced by climate. These hazards can lead to environmental changes affecting an organism's ability to survive in a given habitat. Students examine information about weather related hazards noting how they impact living organisms and steps people can take to protect themselves and their property. Students design a solution to solve the problem caused by a severe weather event. In learning sequence 6, students tie different pieces of evidence along with new theories to explain how the marine fossils could have possibly been found in the Grand Canyon. In the culminating task students write a final report compiling all of the science and evidence they collected throughout the unit to identify the three most important pieces needed to solve the case of the misplaced fossils. To access the flowchart for this unit, click here.
Suggested Pacing: 15 - 16 hrs
Anchoring Phenomenon/Design Problem: Misplaced marine fossils in the Grand Canyon
Unit Driving Question: How did ocean creature fossils end up in the Grand Canyon?
Culminating Performance Task: Students write a final report to be published in the Grand Canyon National Park Newspaper that compiles all of the science and evidence they collected throughout the unit. They identify and describe the three most important pieces of evidence needed to solve the case of the misplaced fossils.
NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements) ● 3-LS4-1 Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. ○ [Clarification Statement: Examples of data could include type, size, and distribution of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] ○ [*Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.* ● 3-LS4-4 Make a claim about the merit of a solution to a problem caused when the environment

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changes and the types of plants and animals that live there may change.*
    - [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.]
    - [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]
- 3-ESS2-2 Obtain and combine information to describe climates in different regions of the world.
- 3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.*
    - [Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.]
- 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Three Dimensions that form the Foundation for these NGSS Performance Expectations:

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Analyzing and Interpreting Data • Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1) **Engaging in Argument from Evidence** • Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4) (3-ESS3-1) **Obtaining, Evaluating, and Communicating Information** • Obtain and combine information from books and other reliable media to explain phenomena.(3-ESS2-2) **Asking Questions and Defining Problems** • Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.(3-5-ETS1-1) **Constructing Explanations and Designing Solutions** • Generate and compare multiple solutions to a	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** • When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. *(secondary)* (3-LS4-4) **LS4.A: Evidence of Common Ancestry and Diversity** • Some kinds of plants and animals that once lived on Earth are no longer found anywhere. *(Note: moved from K-2) (3-LS4-1)* • Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1) **LS4.D: Biodiversity and Humans** • Populations live in a variety of habitats, and change in those habitats affects the organisms living there. **ESS2.D: Weather and Climate** • Climate describes a range	**Scale, Proportion, and Quantity** • Observable phenomena exist from very short to very long time periods. (3-LS4-1) **Systems and System Models** • A system can be described in terms of its components and their interactions. (3-LS4-4) **Patterns** • Patterns of change can be used to make predictions. (3-ESS2-2) **Cause and Effect** • Cause and effect relationships are routinely identified, tested, and used to explain change. (3-ESS3-1)

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problem based on how well they meet the criteria and constraints of the design problem.(3-5-ETS1-1)	of an area's typical weather conditions and the extent to which those conditions vary over the years. (3-ESS2-2) **ESS3.B: Natural Hazards** ● A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. *(Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2) (3-ESS3-1)* **ETS1.A: Defining and Delimiting Engineering Problems** ● Possible solutions to a problem are limited by the available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. **ETS1.B: Developing Possible Solutions** ● Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2) ● At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)	

Possible Common Core State Standards Connections:

ELA/Literacy —

- RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS4-1)(3-LS4-4)(3-ESS2-2)
- RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS4-1)(3-LS4-4)

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- RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS4-1)(3-LS4-4)
- RI.3.9 Compare and contrast the most important points and key details presented in two texts on the same topic. (3-ESS2-2)
- W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS4-1)(3-LS4-4)(3-ESS3-1)
- W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS4-1)(3-LS4-4)
- W.3.7 Conduct short research projects that build knowledge about a topic. (3-ESS3-1)
- W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-LS4-1)(3-ESS2-2)
- SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS4-4)

Mathematics —
- MP.2 Reason abstractly and quantitatively. (3-LS4-1)(3-LS4-4)(3-ESS2-2)(3-ESS3-1)(3-ETS1-1)(3-ETS1-2)
- MP.4 Model with mathematics. (3-LS4-1)(3-LS4-4)(3-ESS2-2)(3-ESS3-1)(3-ETS1-1) (3-ETS1-2)
- MP.5 Use appropriate tools strategically. (3-LS4-1)(3-ETS1-1)(3-ETS1-2)
- 3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS4-1)
- 3-5.OA Operations and Algebraic Thinking (3-ETS1-1)(3-ETS1-2)

PROGRESSION OF LEARNING

Learning Sequence 1
- **Learning Sequence Driving Question**
  - How did marine fossils end up in the Grand Canyon?
- Learning Sequence 1
- **Relationship to Anchoring Phenomena/Design Problem**
  - This learning sequence introduces the anchoring phenomena for the unit.
- **Student Expected Outcomes**
  - Students will make observations and generate questions about misplaced fossils and their odd location.
  - Students will use these observations and questions to leverage future learning.

Learning Sequence 2
- **Learning Sequence Driving Question**
  - What types of evidence do we look for to determine a fossil's story?
- Learning Sequence 2
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students sort fossils and determine the identity of the mystery fossil. They begin to explore the differences between an extinct animal and a closely evolved animal in order to collect evidence about their environments.
- **Student Expected Outcomes**
  - Students will analyze and interpret data in order to classify and sort a variety of fossils.
  - Students will identify patterns between various fossils to provide evidence of the organism and the environment in which it may have lived.

Learning Sequence 3
- **Learning Sequence Driving Question**
  - How might a change in the environment affect the organisms living in it?
- Learning Sequence 3
- **Relationship to Anchoring Phenomena/Design Problem**
  - Impacts of environmental changes on the organisms living there.
- **Student Expected Outcomes**

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- Students will obtain and combine information about the characteristics of different biomes.
- Students analyze and interpret data to determine how an environment's components and interactions impact its organisms and their ability to survive.
- Students will discuss a variety of events that change environments to decide if the changes occured over short or long periods of time.

Learning Sequence 4

- **Learning Sequence Driving Question**
  - How does a region's location impact its climate?
- Learning Sequence 4
- **Relationship to Anchoring Phenomena/Design Problem**
  - Regional climate changes impact organisms' survival over time.
- **Student Expected Outcomes**
  - Students will obtain and combine information about regional climates to describe the characteristics found in each of the six climate zones.
  - Students will identify any climate patterns that can help them predict weather in each zone.

Learning Sequence 5

- **Learning Sequence Driving Question**
  - How do severe weather events impact the environment and the organisms living there?
- Learning Sequence 5
- **Relationship to Anchoring Phenomena/Design Problem**
  - Weather related hazards can lead to environmental changes affecting an organism's ability to survive in a given habitat. Humans have the ability to change their environment while other animals do not.
- **Student Expected Outcomes**
  - Students will identify characteristics of severe weather events and how they impact the environment and the organisms living there.
  - Students will obtain, evaluate, and communicate information about a variety of weather related hazards that result from natural processes and their effects on living organisms.
  - Students will generate and evaluate design solutions that reduce the effects of weather-related hazards on humans and their environment.
  - Students will make a claim and support with evidence the merits of a human designed solution.

Learning Sequence 6

- **Learning Sequence Driving Question**
  - How could the Grand Canyon environment change so drastically over time?
- Learning Sequence 6
- **Relationship to Anchoring Phenomena/Design Problem**
  - In this learning sequence, students return to the Anchoring Phenomena. They gather the evidence they collected throughout the Unit and use it to explain how marine fossils were found in a desert (how the environment changed from a marine environment to a desert environment).
- **Student Expected Outcomes**
  - Students will compare maps of the Grand Canyon from millions of years ago and today to determine how the physical environment changed and how those changes impacted the organisms living there.
  - Students will write a final report supported with evidence to explain how marine fossils could have been found in the Grand Canyon.

Assessments:

- **Culminating Performance Task** (found at the end of Learning Sequence 6)
  - Students write a final report to be published in the Grand Canyon National Park Newspaper that compiles all of the science and evidence they collected throughout the unit. They identify and describe the three most important pieces of evidence needed to solve the case of the misplaced fossils to explain the misplaced fossils.
- Final Report
  NGSS Consortium Elementary Assessment Resource

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• Published Performance Expectation Rubrics - Grade 3 • Combined Assessment Task Document - Grade 3 • 2019-2020 - G3-G8 Interim Assessment Blocks (IABS) by CREC Bundle

Additional Resources:
• G3 Unit Materials List
  ○ Click on specific tab for unit-specific materials
• EPIC! Digital Library - G3 U4B List
  ○ Includes ebooks and videos
  ○ Must have an educator user account for free access

Learning Sequence 1		
Brief Description: This learning sequence introduces the anchoring phenomena for the unit. The students, as secret agents from the environmental archeology division, will make observations and ask questions about the seemingly misplaced fossils found in the Grand Canyon. Over the course of the unit, students will define how this odd phenomenon came to be.		
Suggested Pacing: 0.25 - 0.75hrs		
Lesson-Level Phenomenon/Design Problem: Misplaced marine fossils in the Grand Canyon		
Relationship to Anchoring Phenomena/Design Problem: This learning sequence introduces the anchoring phenomena for the unit.		
Learning Sequence Driving Question: How did marine fossils end up in the Grand Canyon?		
Student Expected Outcomes: ● Students will make observations and generate questions about misplaced fossils and their odd location. ● Students will use these observations and questions to leverage future learning.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Analyzing and Interpreting Data** ● Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1)	**Disciplinary Core Ideas:** **LS4.A: Evidence of Common Ancestry and Diversity** ● Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (Note: moved from K-2) (3-LS4-1) ● Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)	**Crosscutting Concepts:** **Scale, Proportion, and Quantity** ● Observable phenomena exist from very short to very long time periods. (3-LS4-1)
Related Performance Expectation(s) in this Unit: ● 3-LS4-1 Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. ○ [Clarification Statement: Examples of data could include type, size, and distribution of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] ○ [*Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.*]		
Possible Common Core State Standards Connections: ELA/Literacy — ● RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS4-1) (3-LS4-4) (3-ESS2-2) ● RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the		

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main idea. (3-LS4-1) (3-LS4-4)

- RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS4-1) (3-LS4-4)
- W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS4-1) (3-LS4-4) (3-ESS3-1)
- W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS4-1) (3-LS4-4)
- W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-LS4-1) (3-ESS2-2)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (3-LS4-1) (3-LS4-4) (3-ESS2-2) (3-ESS3-1) (3-ETS1-1) (3-ETS1-2)
- MP.4 Model with mathematics. (3-LS4-1) (3-LS4-4) (3-ESS2-2) (3-ESS3-1) (3-ETS1-1) (3-ETS1-2)
- MP.5 Use appropriate tools strategically. (3-LS4-1) (3-ETS1-1) (3-ETS1-2)
- 3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS4-1)
- 3-5.OA Operations and Algebraic Thinking (3-ETS1-1) (3-ETS1-2)

Prior Student Knowledge:

- n/a

Possible Preconceptions/Misconceptions:

- All fossils represent animals/ plants that are extinct.
- Plants are not able to become fossils - only animals.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Students view Slide #1 of the *LS1 Engage Slideshow* to be introduced to the phenomenon.
- The students are shown Slide #2 of the *Engage Slideshow* to see where the fossils were found.
    - Provide time for the students to make observations describing the type of environment they see.
    - Students predict what types of fossils they would expect to find in this type of environment.
- Students are shown images of the fossil specimens on Slides #3-5.
- Students make observations and ask questions on an *I Notice, I Wonder* sheet.
- Students share their observations and questions with the class.
    - Prompt students to share their ideas about the types of fossils found in the locations and their ideas as to whether or not these fossils belong in this location.
    - Prompt students to share their questions about the fossils and their locations. Help students to ask questions about the types of fossils, the location, environmental conditions, and the impact of climate on the environment.
- To help students track their learning throughout this unit, they will add to an *Evidence Log* after each learning activity/sequence. This will help the students generate their final explanation for this case.

Resources:

- LS1 Engage Slideshow
- Evidence Log

Suggested Instructional Strategies:

- I Notice, I Wonder sheet
- Talk Activities

Teacher Action(s):

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- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

Additional Resources:

- G3 Unit Materials List
  - Click on specific tab for unit-specific materials

Learning Sequence 2		
Brief Description: Students view a trilobite animation to discuss its traits and characteristics as a means of providing evidence to predict the environment they think it lived in. Students sort a variety of fossils based on their group's determination of important characteristics along with factual information provided. As a class, their fossil sort data are compiled into a table or graphical display. Students review the two different types of fossils (body and trace) and apply that information to the fossils shown, and they also predict which of the shown fossil(s) may be related to the trilobite. Students participate in an Agree-Disagree line to debate whether or not they believe the trilobites can live at the Grand Canyon today.		
Suggested Pacing: 2.5 - 3 hrs		
Lesson-Level Phenomenon/Design Problem: Trilobite characteristics		
Relationship to Anchoring Phenomena/Design Problem: Students sort fossils and determine the identity of the mystery fossil. They begin to explore the differences between an extinct animal and a closely evolved animal in order to collect evidence about their environments.		
Learning Sequence Driving Question: What types of evidence do we look for to determine a fossil's story?		
Student Expected Outcomes: ● Students will analyze and interpret data in order to classify and sort a variety of fossils. ● Students will identify patterns between various fossils to provide evidence of the organism and the environment in which it may have lived.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices:	**Disciplinary Core Ideas:**	**Crosscutting Concepts:**
Analyze and Interpret Data ● Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. (3-LS4-1) **Engaging in Argument from Evidence** ● Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.(3-LS4-4)(3-ESS3-1)	**LS4.A: Evidence of Common Ancestry and Diversity** ● Some kinds of plants and animals that once lived on Earth are no longer found anywhere. *(Note: moved from K-2) (3-LS4-1)* ● Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)	**Patterns** ● Patterns of change can be used to make predictions. (3-ESS2-2)
Related Performance Expectation(s) in this Unit: ● 3-LS4-1 Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. ○ [Clarification Statement: Examples of data could include type, size, and distribution of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.]		

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- [*Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.]*

Possible Common Core State Standards Connections:

ELA/Literacy —

- RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS4-1)
- RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS4-1)
- RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS4-1)
- W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS4-1)
- W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS4-1)
- W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-LS4-1)

Mathematics

- MP.2 Reason abstractly and quantitatively. (3-LS4-1)
- MP.4 Model with mathematics. (3-LS4-1)
- MP.5 Use appropriate tools strategically. (3-LS4-1)
- 3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS4-1)

Prior Student Knowledge:

- n/a

Possible Misconceptions:

- Fossilized organisms are extinct and have little relationship to living organisms.
- Fossils are found in the environment they lived in when they were alive.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Students watch a 10 second segment (without sound) from the video on Slide #2 of the *Mystery Fossil Slideshow.*
  - Teacher Note: Students may connect this organism to the fossil on Slide #4 from the slideshow in Learning Sequence 1.
- Students observe traits/characteristics of the mystery fossils and use evidence to predict the environment they think it lived in. Present Slides #3-#8 of the *Mystery Fossil Slideshow* with additional images of the mystery fossil.
  - Ask students to describe the environment they believe this organism once lived in and why they think this.
- As a class, students discuss: what characteristic features do the mystery fossils have, and what do those features tell you about where it lives? Please make sure that students provide reasoning with their responses.

Resources:

- Mystery Fossil Slideshow

Suggested Instructional Strategies:

- I Notice, I Wonder
- Talk Activities

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Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Students work in small groups to sort fossils.
    - Each group is given a handful of fossils from the kit and a copy of the *Fossil Sorting Guide*.
        - Teacher Note: If possible, provide each group at least one trilobite fossil in their collection.
    - Students identify patterns they observe from their fossils and create a sorting system (i.e. age, class, modern relatives, etc.).
    - Students sort their fossils according to the system they create and record their findings in a table or a graphical display.
    - Students must provide their reasoning behind their choices.
- As a class, discuss the reasoning and the results of the sorting.
    - Determine the criteria for a class data table or graphical display (i.e. age, class, modern relatives, etc.).
    - Populate the data for all the groups' fossils
- Students view the *Mystery Fossil Slideshow* again.
    - Ask the students to compare the pictures to their actual fossils.
        - Can they make any preliminary identifications?
        - Students use observational evidence to support their choice.

Resources:

- Fossil Sorting Kit
    - Fossil Sorting Guide from Educational Innovations (make copies of pages 1, 3 and 4)
- Mystery Fossil Slideshow

Suggested Instructional Strategies:

- Talk Activities

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

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- Students review the different fossil types as learned in Unit 2: Harper's Fossil Find.
    - Students watch the *Fossils 101 | National Geographic* video.
- Students look at the Explain Slideshow to determine if the fossils shown are Body or Trace fossils.
    - Teacher Note: The answers are in the Speaker Notes on Slide #2
- Students use Slide #3 as a prompt for deeper discussion as they:
    - Turn & talk with a partner and try to decide which of the pictured fossils are related to the mystery fossil (trilobite)
    - Optional: Reference *Trilobite* by Susan H. Gray on epic! Books for more information (high reading level)
    - **Teacher Information:** Since the trilobite in the fossil is an extinct organism the comparisons are only superficial but here are a few that can be noted. Trilobites are arthropods. They had an elliptical shape. Many types had tails. They are divided into three segments. The trilobite's thorax is divided into smaller segments allowing for a greater range of motion. There were many different types of trilobites. Some had legs, some had spikes on their legs, and some could curl their bodies. They lived in the ocean - some types lived in the deep ocean while others lived near the shoreline. Horseshoe crabs are also arthropods (not crabs). They have an elliptical shape. It has a tail. It differs from a trilobite in that a horseshoe crab has two segments. It has six pairs of appendages - 5 pairs are used for walking. It lives in the ocean. - mostly along the shoreline. The eyes of both the trilobite and the horseshoe crab are located similarly in the head shield.

Resources:
- Fossils 101 | National Geographic video
    - Additional information if needed: Fossils by Patrick Perish on epic! Books
- Explain Slideshow
- Trilobites by Susan H. Gray on epic! Books (high reading level)

Suggested Instructional Strategies:
- Talk Activities

Teacher Action(s):
- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):
- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: extinct, extinction, exist, existence, ecosystem, characteristic, habitat, time period, species

ELABORATE (Applications / Extensions)

Activity Description:
- Students discuss where the trilobite lived and if it is living now.
    - Discussion prompts:
        - If the fossil that looks like a horseshoe crab lives in an aquatic environment and it is closely related to our mystery fossil, what environment do you think our mystery fossil lives in?
        - Why do you think we haven't seen an organism that looks like the trilobite? (because it's extinct)
        - Why do you think the trilobite is now extinct? (because the environment has changed in such a way that the organism could not adapt and live)
            - They should reach the conclusion that the mystery fossil (trilobite) lived in the

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ocean (based on the fact that they're so closely related to horseshoe crabs that are marine animals) and are now possibly extinct.
        - Based on the class data from Explore, what other organisms can be found in the same time period?
        - Do you believe these organisms are alive today? Why?
- Students view the Grand Canyon images on Slide #1 from the *Elaborate Slideshow*.
- Students participate in an Agree-Disagree Line debating:
    - If trilobites were alive today, they COULD live in the Grand Canyon.
    - If trilobites were alive today, they COULD NOT live in the Grand Canyon.
        - Teacher Note: Make copies of slides of #2 and #3
- Students discuss with their like-minded peers why they selected the answer they did.
- As a class, students share their ideas and reasoning.
- If after the discussion they would like to move, they may.

Resources:
- Elaborate Slideshow
- Agree-Disagree Line

Suggested Instructional Strategies:
- CCC Discussion Cards
- STEM Teaching Tool #17: Beyond the written CER

Teacher Action(s):
- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):
- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s):
Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. Please note the following SEP, DCI and CCC need to be monitored throughout the learning sequence.
- **SEP:** *Analyzing and Interpreting Data; Engaging in Argument from Evidence*
- **DCI:** *LS4.A: Evidence of Common Ancestry and Diversity*
- **CCC:** *Patterns*

Summative Assessment Description(s):
- As the students work through each learning sequence, students track learned concepts and ideas on their *Evidence Logs*. These evidence logs will help students build a final explanatory piece that represents their complete understanding of how ocean creature fossils ended up in the Grand Canyon?

Resources:
- Evidence Log

Suggested Instructional Strategies:
- 60 Formative Assessment Ideas

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Additional Resources:

- G3 Unit Materials List
    - Click on specific tab for unit-specific materials

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Learning Sequence 3		
Brief Description: The class will go outside on a nature walk to observe the physical characteristics of their school environment. Student groups research one biome to create an explanatory model to identify their biome's defining characteristics. Each group shares their findings with the class, and all the researched data and information is combined to compile a class data table. Students discuss the environments looking specifically at the organisms and how they are suited for the environment in which they live. Students consider what might happen to the organisms in an environment if one or more characteristics are changed.		
Suggested Pacing: 3.5 - 4 hrs		
Lesson-Level Phenomenon/Design Problem: Nature walk looking at the physical characteristics of an environment		
Relationship to Anchoring Phenomena/Design Problem: Impacts of environmental changes on the organisms living there.		
Learning Sequence Driving Questions: How might a change in the environment affect the organisms living in it?		
Student Expected Outcomes: ● Students will obtain and combine information about the characteristics of different biomes. ● Students analyze and interpret data to determine how an environment's components and interactions impact its organisms and their ability to survive. ● Students will discuss a variety of events that change environments to decide if the changes occured over short or long periods of time.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices:	**Disciplinary Core Ideas:**	**Crosscutting Concepts:**
Analyzing and Interpreting Data ● Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1) **Obtaining, Evaluating, and Communicating Information** ● Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2)	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** ● When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. *(secondary)* (3-LS4-4) **LS4.D: Biodiversity and Humans** ● Populations live in a variety of habitats, and change in those habitats affects the organisms living there.	Scale, Proportion, and Quantity ● Observable phenomena exist from very short to very long time periods. (3-LS4-1) **Systems and System Models** ● A system can be described in terms of its components and their interactions. (3-LS4-4)
Related Performance Expectation(s) in this Unit:		

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- 3-LS4-4 Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.*
  - [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.]
  - [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]
- 3-ESS2-2 Obtain and combine information to describe climates in different regions of the world.*
  - *This PE is not fully accessible in LS3, but will be continued in LS4.

Possible Common Core State Standards Connections:

ELA/Literacy —

- RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS4-1) (3-LS4-4) (3-ESS2-2)
- RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS4-1) (3-LS4-4)
- RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS4-1) (3-LS4-4)
- W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS4-1) (3-LS4-4) (3-ESS3-1)
- W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS4-1) (3-LS4-4))
- SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS4-4)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (3-LS4-1) (3-LS4-4) (3-ESS2-2) (3-ESS3-1) (3-ETS1-1) (3-ETS1-2)
- MP.4 Model with mathematics. (3-LS4-1) (3-LS4-4) (3-ESS2-2) (3-ESS3-1) (3-ETS1-1) (3-ETS1-2)

Prior Student Knowledge:

3-LS4-4: K.ESS3.A ; K.ETS1.A ; 2.LS2.A ; 2.LS4.D

Possible Misconceptions:

- Environments do not change.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Students go outside in the area around the school making observations about the environment.
  - Students describe the natural physical characteristics of the environment (i.e., land features, water features, soil, vegetation, animals, temperature, and light).
  - Students describe the man-made physical characteristics (i.e., man-made ponds, buildings, public infrastructure such as roads and power lines, etc.).
- Students share their observations making a list of the characteristics/features for the class.

Suggested Instructional Strategies:

- I Notice, I Wonder
- Talk Activities

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:
- Students work in small groups to research one of the epic! Books listed below looking at the physical characteristics of that environment to complete the *Explanatory Model* (print on 11x17 paper).
  - The research could include:
    - What is the temperature range?
    - What are the physical land features?
    - Describe the soil.
    - How much rainfall happens here?
    - What types of plants live here?
    - What types of animals live here?
    - Other information, such as natural resources
  - Teacher Notes:
    - You do not need to include all of the books, just as many as groups you create.
    - This is a quick activity - not a deep dive into ecosystems.
    - This sequence is dependent upon the temperature and precipitation data collected for identified climates (i.e. temperate forest, arctic, tropical rainforest, tropical beach, desert, mountain, grassland, etc.)

Resources:
- Explanatory Model (print on 11x17 paper)
- epic! Books:
  - Life in a Grassland by Laura Hamilton Waxman
  - Life on a Mountain by Laura Hamilton Waxman
  - Life in a Tropical Rainforest by Kerri Schuetz
  - Life in a Tundra by Kerri Schuetz
  - Life in a Wetland by Laura Hamilton Waxman
  - Life in a Coral Reef by Kerri Schuetz
  - Life in a Desert by Kerri Schuetz
  - Life in a Forest by Laura Hamilton Waxman

- Additional Resources:
  - Study Jams - Biomes
  - Introduction to Biomes
  - Home Sweet Habitat: Crash Course Kids #21.1

Suggested Instructional Strategies:
- Talk Activities

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):
- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others

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- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Students present their environment explanatory models from Explore to the class.
  - This can be done as class presentations or a gallery walk.
- In a class discussion, students complete the *Environment Comparison Chart* looking at the different researched environments.
  - Students compare the different environments.
  - Students discuss the environments looking specifically at the organisms and how they are suited for the environment in which they live.
    - Discuss why some organisms can be found in more than one environment while others cannot (i.e., bees).
    - Offer further explanations if students do not come up with them themselves.
    - Teacher Information: Guide the discussion to make sure students understand that organisms only live in environments in which they are compatible. A palm tree does not exist in the polar region because it cannot tolerate the cold temperatures. A maple tree does not survive in a desert because of both the extended heat and lack of water. As a result, if the environment changes, some organisms will not survive. Consider a home aquarium. If the power goes out and the heater is not operating, some tropical fish will die.
- Students discuss what environment the Grand Canyon would be classified as and what organisms should be found there.

Resources:

- Environment Comparison Chart (Teacher Note: You can make a copy of the doc to eliminate any book not researched)

Suggested Instructional Strategies:

- Talk Activities

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: environment, precipitation, region, climate, temperature, vegetation, ecosystem, natural resource, land features, rainfall, range, latitude, longitude, population, organism, habitat

ELABORATE (Applications / Extensions)

Activity Description:

- Students Turn and Talk to discuss Slide #1 of the *Turn and Talk Slideshow*
- As a class, students discuss the images and questions on Slide #2 of the *Turn and Talk Slideshow.*
- As a class, students explore the following ideas:
  - Students consider how an environment might change.
  - Do the changes happen quickly or slowly?

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  - What happens when the temperature changes suddenly or if it doesn't rain?
  - How might the living things in the region be affected by the change?
  - They give examples of how such changes affect their own environment.
- Relate their ideas of the four pictures to the observations they made around the school yard in Engage.
- Students are asked:
  - Have things ever looked different?
  - What happened to make the school yard features look different?
    - Student ideas can include-drought, winter, rainfall, seasonal change, etc.

Resources:
- Turn and Talk Slideshow

Suggested Instructional Strategies:
- CCC Discussion Cards

Teacher Action(s):
- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):
- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

Elaborate Further:

Activity Description:
- Students read the *How Trees Survive and Thrive After A Fire article* noting important information on the *Guided Reading sheet*.
- Students share their findings and discuss the natural hazard, plant adaptations and human impact.

Resources:
- How Trees Survive and Thrive After A Fire article
- Guided Reading sheet

Suggested Instructional Strategies:
- Talk Activities
- CCC Discussion Cards

Teacher Action(s):
- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):
- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments

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- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s):
Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. Please note the following SEP, DCI and CCC need to be monitored throughout the learning sequence.

- **SEP:** *Analyzing and Interpreting Data; Obtaining, Evaluating, and Communicating Information*
- **DCI:** *LS2.C: Ecosystem Dynamics, Functioning, and Resilience; LS4.D: Biodiversity and Humans*
- **CCC:** *Scale, Proportion, and Quantity; Systems and System Models*

Summative Assessment Description(s):

- As the students work through each learning sequence, students track learned concepts and ideas on their *Evidence Logs*. These evidence logs will help students build a final explanatory piece that represents their complete understanding of how ocean creature fossils ended up in the Grand Canyon?

Resources:

- Evidence Log

Suggested Instructional Strategies:

- 60 Formative Assessment Ideas

Additional Resources:

- G3 Unit Materials List
    - Click on specific tab for unit-specific materials

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Learning Sequence 4		
Brief Description: In this learning sequence, students explore climate from different regions around the world. Students use a variety of resources to research one of the climate zones, and as a class identify patterns that can be noted among the zones. Students discuss how climates change and how those changes may impact the organisms living there.		
Suggested Pacing: 2.75 - 3.25 hrs		
Lesson-Level Phenomenon/Design Problem: Climate vs Weather		
Relationship to Anchoring Phenomena/Design Problem: Regional climate changes impact organisms' survival over time.		
Learning Sequence Driving Question: How does a region's location impact its climate?		
Student Expected Outcomes: ● Students will obtain and combine information about regional climates to describe the characteristics found in each of the six climate zones. ● Students will identify any climate patterns that can help them predict weather in each zone.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Obtaining, Evaluating, and Communicating Information** ● Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2)	**Disciplinary Core Ideas:** **ESS2.D: Weather and Climate** ● Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)	**Crosscutting Concepts:** **Patterns** ● Patterns of change can be used to make predictions. (3-ESS2-2)
Related Performance Expectation(s) in this Unit: ● 3-ESS2-2 Obtain and combine information to describe climates in different regions of the world.		
Possible Common Core State Standards Connections: ELA/Literacy — ● RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS4-1)(3-LS4-4)(3-ESS2-2) ● RI.3.9 Compare and contrast the most important points and key details presented in two texts on the same topic. (3-ESS2-2) ● W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-LS4-1)(3-ESS2-2) Mathematics — ● MP.2 Reason abstractly and quantitatively. (3-LS4-1)(3-LS4-4)(3-ESS2-2)(3-ESS3-1)(3-ETS1-1)(3-ETS1-2) ● MP.4 Model with mathematics. (3-LS4-1)(3-LS4-4)(3-ESS2-2)(3-ESS3-1)(3-ETS1-1)(3-ETS1-2)		
Prior Student Knowledge: 3-ESS2-2: n/a		

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Possible Misconceptions:

- The definition for climate and weather are the same.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Students view Slides #1-#3 of the *Engage Slideshow* to make comparisons of a weather map and a climate map of the United States.
- Students work in small groups to complete Slide #4 of the *Engage Slideshow* and then share what they already know about weather and climate, and what questions they have with the class.

Resources:

- Engage Slideshow

Suggested Instructional Strategies:

- Question Formulation Technique (QFT)

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- As a class, students read pages 4-9 of *Climate Maps* by Cynthia O'Brien on epic! Books.
- Students work in small groups to research ONE of the six climate zones (polar, temperate, desert, Mediterraean, tropical, mountain) and fill in their zone on the *Climate Zone Research Sheet*.
  - Teacher Note: Use the books listed in Resources, as well as utilize whatever tools and research subscriptions your school may have available.

Resources:

- Climate Maps by Cynthia O'Brien on epic! Books
- Climate Zones Research Sheet
- What is Climate? by Ellen Lawrence on epic! Books (Polar (Tundra), Temperate, Desert, Tropical)
- What is Climate? by Bobbie Kalman on epic! Books (Polar (tundra), tropical wet, tropical dry, mountain, dry desert, warm ocean currents)

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas

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- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Students create a class anchor chart as each group shares their research from Explore.
- As a class, students identify any patterns that they notice and discuss.
- Students watch the *Climate and Weather Video* on epic! Books
- Students complete the *Formative Assessment Probe-Climate vs. Weather*.
    - Based on the results of this assessment, the teacher reviews with the students any of the following (which was also covered in the Monarch Butterfly unit) that may not be clearly understood:
        - Many people often confuse climate and weather thinking they are the same. They are not. Weather is what we see outside each day. We dress for the weather on a daily basis. We may wear a coat, or bring an umbrella, or wear snow boots depending on the weather of the day. Data is collected in various ways to make predictions about upcoming weather. Climate, however, is noted in long term patterns of weather data that has been collected over time - generally 30 years or more. It gives information about seasons and planting zones.
- As a class, students discuss how climate (not day to day weather) is responsible for massive environmental changes.

Resources:

- Climate and Weather Video on epic! Books
- Formative Assessment Probe-Climate vs. Weather

Suggested Instructional Strategies:

- Talk Activities

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: climate, weather, prediction, precipitation, region, average, latitude, longitude, altitude, drought, freeze, atmosphere

ELABORATE (Applications / Extensions)

Activity Description:

- Students read page 31 from the *Using Climate Maps* by Rebecca E. Hirsch.
- Students complete the *Discussion Diamond Student Template* to brainstorm the question: How might climates changing over time be related to the Grand Canyon's misplaced fossils?
- As a class, discuss their ideas.
    - Teacher Note: Students may not have all the answers at this point, which is fine.

Resources:

- Using Climate Maps by Rebecca E. Hirsch on epic! Books
- Discussion Diamond Student Template
    - Discussion Diamond protocol

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Suggested Instructional Strategies:
- CCC Discussion Cards

Teacher Action(s):
- Expects students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think...?

Student Action(s):
- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. Please note the following SEP, DCI and CCC need to be monitored throughout the learning sequence.

- ❏ **SEP:** *Obtaining, Evaluating, and Communicating Information*
- ❏ **DCI:** *ESS2.D: Weather and Climate*
- ❏ **CCC:** *Patterns*

Summative Assessment Description(s):
- As the students work through each learning sequence, students track learned concepts and ideas on their *Evidence Logs*. These evidence logs will help students build a final explanatory piece that represents their complete understanding of how ocean creature fossils ended up in the Grand Canyon?

Resources:
- Evidence Log

Suggested Instructional Strategies:
- 60 Formative Assessment Ideas

Optional Elaborate Further / Reflect / Enrichment: Optional

Activity Description:
- Consider reading nonfiction texts about the Grand Canyon that describe the park's climate and typical weather conditions today.

Resources:
- EPIC Grand Canyon
- Weather and Climate information for the Grand Canyon

Additional Resources:
- G3 Unit Materials List
  - Click on specific tab for unit-specific materials

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Learning Sequence 5		
Brief Description: Weather related hazards are influenced by climate and can lead to environmental changes affecting an organism's ability to survive in a given habitat. Students examine information about weather related hazards noting how they impact living organisms and steps people can take to protect themselves and their property. Students design a solution to solve the problem of a severe weather event.		
Suggested Pacing: 4 - 4.5hrs		
Lesson-Level Phenomenon/Design Problem: Severe weather events		
Relationship to Anchoring Phenomena/Design Problem: Weather related hazards can lead to environmental changes affecting an organism's ability to survive in a given habitat. Humans have the ability to change their environment while other animals do not.		
Learning Sequence Driving Question: How do severe weather events impact the environment and the organisms living there?		
Student Expected Outcomes: • Students will identify characteristics of severe weather events and how they impact the environment and the organisms living there. • Students will obtain, evaluate, and communicate information about a variety of weather related hazards that result from natural processes and their effects on living organisms. • Students will generate and evaluate design solutions that reduce the effects of weather-related hazards on humans and their environment. • Students will make a claim and support with evidence the merits of a human designed solution.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Constructing Explanations and Designing Solutions** • Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-1) **Obtaining, Evaluating, and Communicating Information** • Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2) **Asking Questions and Defining Problems** • Define a simple design problem that can be solved through the	**Disciplinary Core Ideas:** **ESS3.B: Natural Hazards** • A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. *(Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.) (3-ESS3-1)* **ETS1.A: Defining and Delimiting Engineering Problems** • Possible solutions to a problem are limited by the available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be	**Crosscutting Concepts:** **Cause and Effect** • Cause and effect relationships are routinely identified, tested, and used to explain change. (3-ESS3-1)

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development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1) **Engaging in Argument from Evidence** ● Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4) (3-ESS3-1)	compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. **ETS1.B: Developing Possible Solutions** ● Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2) ● At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)	

Related Performance Expectation(s) in this Unit:

- 3-ESS3-1 Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.*
  - [Clarification Statement: Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lightning rods.]
- 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Possible Common Core State Standards Connections:

ELA/Literacy —

- W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS4-1)(3-LS4-4)(3-ESS3-1)
- W.3.7 Conduct short research projects that build knowledge about a topic. (3-ESS3-1)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (3-LS4-1)(3-LS4-4)(3-ESS2-2)(3-ESS3-1)(3-ETS1-1)(3-ETS1-2)
- MP.4 Model with mathematics. (3-LS4-1)(3-LS4-4)(3-ESS2-2)(3-ESS3-1)(3-ETS1-1)(3-ETS1-2)
- MP.5 Use appropriate tools strategically. (3-LS4-1)(3-ETS1-1)(3-ETS1-2)
- 3-5.OA Operations and Algebraic Thinking (3-ETS1-1)(3-ETS1-2)

Prior Student Knowledge:

3-ESS3-1:K.ESS3.B ; K.ETS1.A ; 4.ESS3.B ; 4.ETS1.A
3-5ETS1-1: K-2.ETS1.A
3-5ETS1-2: K-2.ETS1.A ; K-2.ETS1.B ; K-2.ETS1.C

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- In a class discussion, students share what they know about severe weather.

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- If necessary, show video clips of severe weather from *Science Kids Weather Videos*
- Students brainstorm types of events and respond to the following questions:
  - What dangers do these weather events pose?
  - What damage can they cause to plants, animals, humans, structures, etc?
  - What safety precautions should we take during these events?
  - Can these weather events change the landscape or the environment? If so, how?

- After eliciting student ideas, show the *Slideshow* showing damage from various weather events.
- Ask students to make note of how the landscape and living things were impacted by the weather event.
  - Were their initial ideas correct/validated?

Resources:

- Science Kids Weather Videos - 10 Weather Video Options
- Slideshow

Suggested Instructional Strategies:

- Initial Scientific Model
  - Small Group Models

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE #1 (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Based on the weather events discussed in Engage, students work in small groups to identify a problem a severe weather event can cause and design a solution to lessen the impact of it on their school grounds. The design can be part of the architectural design of a structure, an add-on structure or device, or something else.
  - Groups select a weather event.
  - As a class, students determine the constraints and criteria for their design solutions (i.e., materials, time, appearance, cost, and environmental impact)
  - Each group must identify the main characteristics of their weather event and the problems caused by such an event.
  - Each group designs a solution to help reduce the weather event's impact.
  - Students make a sketch or diagram of the design using the *Organizer.*
  - They must describe how this design solution is expected to work.
  - If needed, students may use a variety of resources to help with their designs.
    - Teacher Notes:
      - A lightning rod may be used as an example. The claim is that the lightning rod will provide a path for the energy of the lightning to use to get to the ground if struck. The path has low resistance so the lightning is more likely to hit that than the building on which it sits thereby avoiding damage to the building. The lightning rod is made of a conductive material. It is attached to a wire that runs from the rod and is attached to a conductive grid that is buried in the ground. If the lightning hits a structure (like a house) that is less conductive, it will result in severe heat damage to the structure.

Resources:

- Organizer
- Textual Resources: Unit 4B epic! Book Collection

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Suggested Instructional Strategies:
- Talk Activities

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):
- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN #1 (Concepts Explained / Vocabulary Defined)

Activity Description:
- Students share their design solutions in a gallery walk.
- As a class, students discuss their observations from the gallery walk, including their findings about the weather event, precautions, and the impact of the event on the environment (landforms and living things).
  - Help students to understand that a variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.
- As a class, students discuss how each design meets the given criteria and constraints, including how the designs increased benefits, decreased risks/costs, and met societal demands as appropriate.

Suggested Instructional Strategies:
- Talk Activities

Teacher Action(s):
- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):
- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: Natural process, tornado, flooding, severe weather, coastal erosion, landslide, avalanche, dams, levees, lightning, lightning rod, forecast, drought

EXPLORE #2 (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:
- Students build and test models of their designs from Explore #1.
- Students test each solution under a range of likely conditions and gather data to determine how well the solutions meet the criteria and constraints of the problem.

Teacher Action(s):

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- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):
- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN #2 (Concepts Explained / Vocabulary Defined)

Activity Description:
- Students share and discuss the results from their testing.
- Students use the collected data to compare solutions based on how well each solution meets the criteria and constraints of the problem.
- Based on class discussion, students brainstorm together ways they can improve their designs.

Suggested Instructional Strategies:
- Talk Activities

Teacher Action(s):
- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):
- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

ELABORATE (Applications / Extensions)

Activity Description:
- Students discuss drought as a severe weather event.
- Students read *Extreme Weather-Droughts* and *Amazing Structures-Dams*.
- Students view Slides #1 and #2 of the *Glen Canyon Slideshow* and discuss their observations.
- Students view Slide #3 and pick the claim that they believe best describes their views.
- Students work with a small group of their like-minded peers to find three pieces of evidence that supports their claims (Slide #4). The evidence can come from the pictures, class discussions, readings, and prior knowledge.

Resources:
- *Extreme Weather-Droughts* by Anne Wendorff on epic! Books
- *Amazing Structures-Dams* by Rebecca Pettiford on epic! Books (may have read in 2nd grade)
- Glen Canyon Slideshow

Suggested Instructional Strategies:
- Talk Activities
- CCC Discussion Cards

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Teacher Action(s):
- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):
- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s):

Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. Please note the following SEP, DCI and CCC need to be monitored throughout the learning sequence.

- ❑ **SEP:** *Engaging in Argument from Evidence; Obtaining, Evaluating, and Communicating Information; Asking Questions and Defining Problems; Constructing Explanations and Designing Solutions*
- ❑ **DCI:** *ESS3.B: Natural Hazards; ETS1.A: Defining and Delimiting Engineering Problems; ETS1.B: Developing Possible Solutions*
- ❑ **CCC:** *Cause and Effect*

Summative Assessment Description(s):
- As the students work through each learning sequence, students track learned concepts and ideas on their *Evidence Logs*. These evidence logs will help students build a final explanatory piece that represents their complete understanding of how ocean creature fossils ended up in the Grand Canyon?

Resources:
- Evidence Log

Suggested Instructional Strategies:
- 60 Formative Assessment Ideas

Additional Resources:
- G3 Unit Materials List
  - Click on specific tab for unit-specific materials

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Learning Sequence 6		
Brief Description: The students have been gathering information throughout the unit to try to explain how marine fossils were found in a desert. In this final Learning Sequence of the unit, students tie different pieces of evidence along with new theories to explain how the marine fossils could have possibly been found in the desert. In the culminating task students write a final report compiling all of the science and evidence they collected throughout the unit to identify the three most important pieces needed to solve the case of the misplaced fossils.		
Suggested Pacing: 1 - 1.5 hrs for the 5Es 0.75 - 1.25 hrs for the Culminating Performance Task		
Lesson-Level Phenomenon/Design Problem: Misplaced marine fossils in the Grand Canyon		
Relationship to Anchoring Phenomena/Design Problem: In this learning sequence, students return to the Anchoring Phenomena. They gather the evidence they collected throughout the Unit and use it to explain how marine fossils were found in a desert (how the environment changed from a marine environment to a desert environment).		
Learning Sequence Driving Questions: How could the Grand Canyon environment change so drastically over time?		
Student Expected Outcomes: ● Students will compare maps of the Grand Canyon from millions of years ago and today to determine how the physical environment changed and how those changes impacted the organisms living there. ● Students will write a final report supported with evidence to explain how marine fossils could have been found in the Grand Canyon.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices:	**Disciplinary Core Ideas:**	**Crosscutting Concepts:**
Obtaining, Evaluating, and Communicating Information ● Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2)	**LS2.C: Ecosystem Dynamics, Functioning, and Resilience** ● When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. *(secondary)* (3-LS4-4) **LS4.A: Evidence of Common Ancestry and Diversity** ● Some kinds of plants and animals that once lived on Earth are no longer found	**Cause and Effect** ● Cause and effect relationships are routinely identified, tested, and used to explain change. (3-ESS3-1) **Scale, Proportion, and Quantity** ● Observable phenomena exist from very short to very long time periods. (3-LS4-1)

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	anywhere. *(Note: moved from K-2) (3-LS4-1)* ● Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1) **LS4.D: Biodiversity and Humans** ● Populations live in a variety of habitats, and change in those habitats affects the organisms living there.	

Related Performance Expectation(s) in this Unit:

- 3-LS4-1 Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.
  - [Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.]
  - [*Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.*
- 3-LS4-4 Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.*
  - [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.]
  - [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]

Possible Common Core State Standards Connections:

ELA/Literacy —

- RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS4-1)(3-LS4-4)
- RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS4-1)(3-LS4-4)
- RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS4-1)(3-LS4-4)
- W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS4-1)(3-LS4-4)
- W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS4-1)(3-LS4-4)
- W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-LS4-1)
- SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS4-4)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (3-LS4-1)(3-LS4-4)
- MP.4 Model with mathematics. (3-LS4-1)(3-LS4-4)
- MP.5 Use appropriate tools strategically. (3-LS4-1)
- 3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. (3-LS4-1)

Prior Student Knowledge:

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3-LS4-1: 4.ESS1.C
3-LS4-4: K.ESS3.A ; K.ETS1.A ; 2.LS2.A ; 2.LS4.D ; 4.ESS3.B ; 4.ETS1.A

Possible Misconceptions:

- Environments do not change over time.

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Students revisit the *LS1 Engage Slideshow* of the marine fossils found in the Grand Canyon.
- If necessary, students review their *Evidence Logs*.
- Students share their updated understanding of the marine fossils and their location.
    - Prompt students to think about these things as they review their evidence logs.
        - What is the environment where the fossils were located? (Examined in LS 1.)
        - Can you compare fossils to possible living relatives to indicate the environment in which they once lived? (Examined in LS2). If this is the case, what type of fossils are these?
        - What are the physical characteristics of an environment? (Examined in LS 3.)
        - How can environments change? (Non-weather related examined in LS 4 and weather related examined in LS 5.)
        - Push students to ask questions about the locations of seas/oceans a long time ago. Working toward this understanding will help them to connect MULTIPLE pieces of the mystery .

Resources:

- LS1 Engage Slideshow
- Evidence Log

Suggested Instructional Strategies:

- Talk Activities

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Students examine the maps on Slide #1 of the *Map Comparison and WIS/WIM*.
- Students discuss what it shows and try to explain what may have caused the environment to change so drastically over time.
    - Teacher Notes:
        - This Fossil Museum link describes the Western Interior Seaway and geological history of the western US millions of years ago.
        - The students will complete a WIS/WIM organizer (Slide #2) as they look at the maps presented on the board.
            - For the WIS, students will point out what the differences are between the two maps. Having a larger version posted on the whiteboard will help students get a better visual.
            - After students record their differences, have the students complete the WIM,

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for each difference have the students identify what may have caused that change.
- Provide a forum for the students to share their ideas with the class.
- Do not create a caption just yet! This will be done in the Explain portion of the learning sequence.

Resources:
- Map Comparison and WIS/WIM
- Fossil Museum Link

Suggested Instructional Strategies:
- Talk Activities

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):
- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:
- Watch the short video: *Tectonic Plates Explained on epic! Books*. The video will highlight that the Earth is composed of moving plates and some of those plates come together to form mountains. As the students previewed the maps, they should have noticed that the mountains were in a different place and that the current mountains are now located where the Western Interior Seat once existed.
- Students use evidence from the video to revise their WIM and develop a caption for the images.
    - Teacher Note: Plate Tectonics is not intended to be taught in this grade, you do not need to get into the details of the theory or how the process works. Students need to understand that the landforms move and some motion creates changes. The changes that occurred here resulted in the environment changing from a sea to what it is currently.

Resources:
- Tectonic Plates Explained on epic! Books
- Images and WIS/WIM

Suggested Instructional Strategies:
- Talk Activities

Teacher Action(s):
- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):
- Explains possible solutions or answers to others

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- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: n/a

ELABORATE (Applications / Extensions)

Activity Description:

- Students add this new information about the changing landscape to their *Evidence Logs*.
- Students share their ideas about how this change in landscape would have affected the living things.
    - Would the same organisms be able to survive in these two different environments? Why or why not?

Resources:

- Evidence Log

Suggested Instructional Strategies:

- Talk Activities
- CCC Discussion Cards

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?"

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s):

Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. Please note the following SEP, DCI and CCC need to be monitored throughout the learning sequence.

- ❏ **SEP:** *Obtaining, Evaluating, and Communicating Information*
- ❏ **DCI:** *LS2.C: Ecosystem Dynamics, Functioning, and Resilience; LS4.A: Evidence of Common Ancestry and Diversity; LS4.D: Biodiversity and Humans*
- ❏ **CCC:** *Scale, Proportion, and Quantity; Cause and Effect*

Summative Assessment Description(s):

- As the students work through each learning sequence, students track learned concepts and ideas on their *Evidence Logs*. These evidence logs will help students build a final explanatory piece that represents their complete understanding of how ocean creature fossils ended up in the Grand Canyon?

Resources:

- Evidence Log

Suggested Instructional Strategies:

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• 60 Formative Assessment Ideas
• CER
    ○ CER Organizing Template
    ○ STEM Teaching Tool #17: Beyond the written CER

Culminating Performance Task • Students write a final report to be published in the Grand Canyon National Park Newspaper that compiles all of the science and evidence they collected throughout the unit. They identify and describe the three most important pieces of evidence needed to solve the case of the misplaced fossils to explain the misplaced fossils. **Resources:** • Final Report
Additional Resources: • G3 Unit Materials List   ○ Click on specific tab for unit-specific materials

Elementary Science

Grade 3: Grand Canyon Seashells
Grade 4: Energizing Everything
Grade 5: Spectacular Sights in the Sky

Curriculum and Instruction Committee Presentation

New to Grade 3- Grand Canyon Seashells

Unit Driving Question: How did ocean creature fossils end up in the Grand Canyon?

The students, as secret agents from the environmental archeology division, will make observations and ask questions about the seemingly odd marine fossils found in the Grand Canyon. Over the course of the unit, students will define how this odd phenomenon came to be.

G3 U2 - *Changes to Organisms' Environments:* Grand Canyon Seashells

LS1
Introduction to the anchor phenomenon

How did ocean creature fossils end up in the Grand Canyon?

LS2
Common ancestry and diversity

LS3
Biodiversity

Culminating Performance Task

Final report that compiles all scientific evidence collected to explain the misplaced fossils.

LS4
Weather and climate

LS5
Weather related hazards and engineering

LS6
Environmental changes

New to Grade 4- Energizing Everything

Unit Driving Question: What makes a chain reaction keep going?

In this unit, students explore energy. Students investigate how energy is stored, how it can make objects move, and how collisions transfer energy between objects. Students also construct devices that convert energy from one form into another, such as heat into motion and electricity into light.

Grade 4 Unit 3: *Energizing Everything*

Lesson 1
How is your body similar to a car?

Lesson 2
What makes roller coasters go so fast?

Lesson 3
Why is the first hill of a roller coaster always the highest?

Lesson 4
Could you knock down a building using only dominoes?

Lesson 5
Can you build a chain reaction machine?

Lesson 6
What if there were no electricity?

Lesson 7
How long did it take to travel across the country before cars and planes?

Lesson 8
Where does energy come from?

Culminating Task: students will design a Rube Goldberg machine that utilizes energy transfers and conversions to turn on a flashlight.

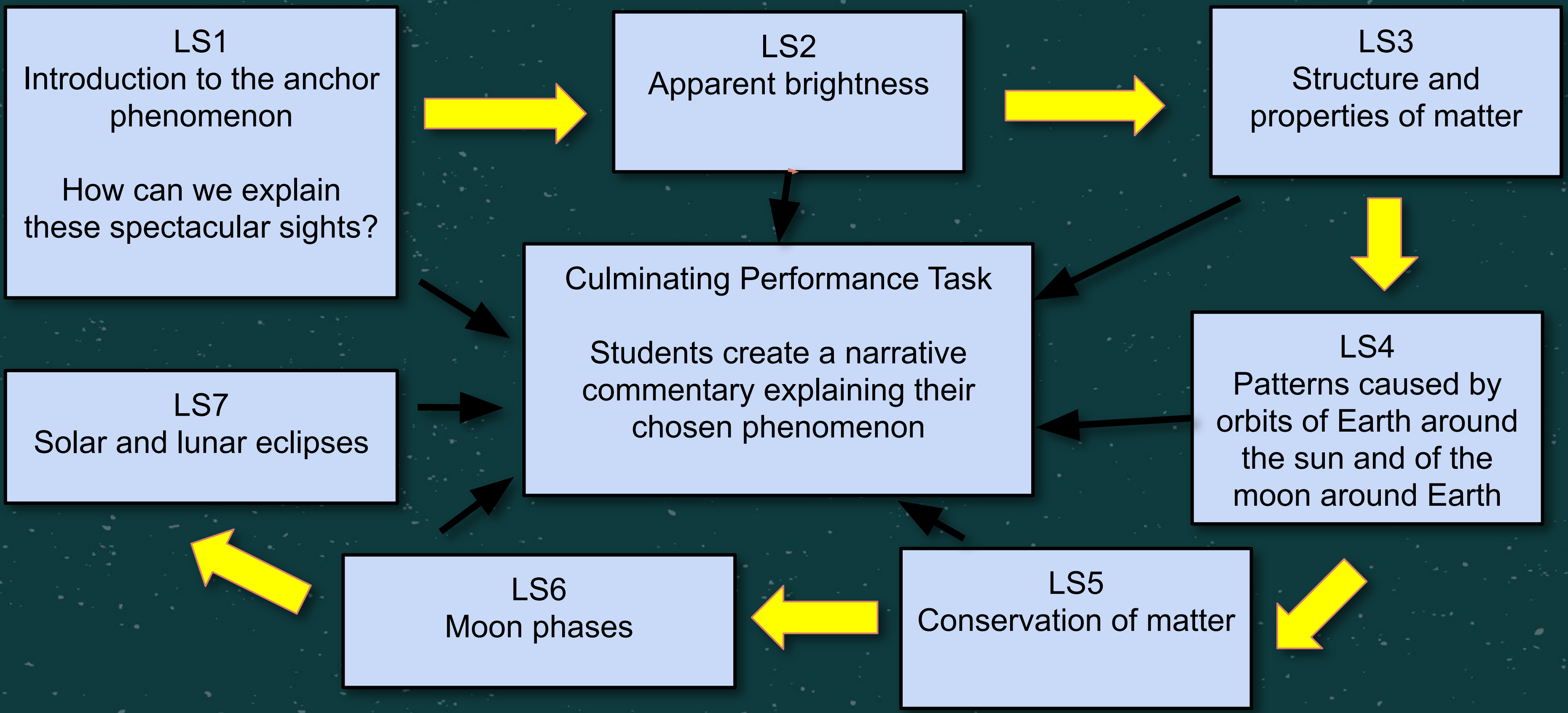
New to Grade 5- Spectacular Sights in the Sky

Unit Driving Question: How can we explain these spectacular sights?

Students are introduced to the phenomena of the Spectacular Sights in the Sky through a series of four videos. Students develop questions during this sequence that they will look to answer during the course of the unit. Students also develop a model of how they think one of the phenomena occurs. This model will be revised later in the unit.

Students explore the characteristics of stars and note the brightness of stars. Students will also explore the relationships between the Earth's tilt, the location of the Earth and its relation to the sun and the seasons.

G5 U1 - *Scale, Proportion, and Quantity:* Spectacular Sights in the Sky



BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ______________________ **Board Meeting Date** December 8, 2022

Decision Requested X **Agenda Code** 9 k.

AGENDA REPORTING FORM

Agenda Topic: Science Grade 4 Unit 3: Energizing Everything - Second Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed Science Grade 4 Unit 3: Energizing Everything

Background: ______________________

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Curriculum & Instruction Committee is bringing the Science Grade 4 Unit 3: Energizing Everything to the full Board for a Second Reading.

Titles of Attachments:

1. Course Proposal

Frank Pepe

Signature of Staff Member Submitting Report

Steven Madancy

Signature of Superintendent of Schools

Grade 4 Unit 3 – Energizing Everything
Unit Overview

In this unit, students explore various aspects of energy. Students investigate how energy is stored, how it can make objects move, and how collisions transfer energy between objects. Students also construct devices that convert energy from one form to another, such as heat into motion and electricity into light.

Suggested Pacing:
10-12 hours

Anchoring Phenomenon/Design Problem:
Students generate observations and questions about a Rube Goldberg machine and create an initial conceptual model to explain what is happening.

Unit Driving Question:
What makes a chain reaction keep going?

Culminating Performance Task:
Students will build a chain reaction machine that turns on a flashlight.

Three Dimensions that form the Foundation for these NGSS Performance Expectations:

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 4-PS3-1 Use evidence to construct an explanation relating the speed of the object to the energy of that object.
- 4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
- 4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide.
- 4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
- 4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
- 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- 3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Asking questions and defining problems in grades 3–5 builds	**PS3.A: Definitions of Energy** ● The faster a given object is moving, the	**Energy and Matter** ● Energy can be transferred in various

on grades K–2 experiences and progresses to specifying qualitative relationships. • Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. (4-PS3-3) **Planning and Carrying Out Investigations** Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. • Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (4-PS3-2) **Constructing Explanations and Designing Solutions** Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems. • Use evidence (e.g., measurements, observations, patterns) to construct an explanation. (4-PS3-1)	more energy it possesses. (4-PS3-1) • Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3) **PS3.B: Conservation of Energy and EnergyTransfer** • Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3) • Light also transfers energy from place to place. (4-PS3-2) • Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4-PS3-4) **PS3.C: Relationship Between Energy and Forces** • When objects collide, the contact forces transfer energy so as to change the	ways and between objects. (4-PS3-1),(4-PS3-2),(4-PS3-3),(4-PS3-4) **Connections to Engineering, Technology, and Applications of Science** **Influence of Engineering, Technology, and Science on Society and the Natural World** • Engineers improve existing technologies or develop new ones. (4-PS3-4) **Connections to Nature of Science** **Science is a Human Endeavor** • Most scientists and engineers work in teams. (4-PS3-4) • Science affects everyday life. (4-PS3-4)

Apply scientific ideas to solve design problems. (4-PS3-4)	objects' motions. (4-PS3-3) **PS3.D: Energy in Chemical Processes and Everyday Life** - The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4) **ETS1.A: Defining Engineering Problems** - Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. *(secondary to 4-PS3-4)* **ESS3.A: Natural Resources** - Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)	

Assessments:
- Lesson Assessments
- Unit Assessment
- Culminating Task

Lesson Level Phenomena

Brief Description:
The anchor phenomenon for this unit is an intricate Rube Goldberg machine. Students generate observations and questions about the phenomenon and create an initial conceptual model to explain what is happening.

Suggested Pacing:
1 hour

Lesson-Level Phenomenon/Design Problem:
Students are introduced to a Rube Goldberg machine and create a conceptual model to explain the phenomenon.

Relationship to Anchoring Phenomena/Design Problem:
This is the introduction to the anchoring phenomenon.

Learning Sequence Driving Question:
What causes a chain reaction to keep going?

Student Expected Outcomes:
- Students will make first hand observations to explain what they see, think and wonder about the Rube Goldberg machine.

Learning Sequence 1

Brief Description:
In this lesson, students learn that we use the energy from food to make our bodies move just like cars use the energy from gasoline to move. In the activity, Twist-o-matic Tester, students build paper models of an amusement park ride called the Twist-o-Matic. The ride stores energy in rubber bands and spins around when the energy is released. Students compare the speed of the spins when they use a thin rubber band versus a thick rubber band.

Suggested Pacing:
1.5 hours

Lesson-Level Phenomenon/Design Problem:
How can a car run without gas?

Relationship to Anchoring Phenomena/Design Problem:
Energy makes things move. There are many different ways to store energy (batteries, food, etc..) There are many places where energy is stored and released in a Rube Goldberg machine.

Learning Sequence Driving Question:
How is your body similar to a car?

Student Expected Outcomes:

- Students learn about stored energy and about the relationship between motion and energy. Students build models of an amusement park ride and discover how energy can be stored in materials. Stored energy can be converted to speed.

CONNECTIONS TO STANDARDS

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 4-PS3-1 Use evidence to construct an explanation relating the speed of the object to the energy of that object.
- 4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.

Assessment

- Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence.
- The teacher will choose 1 question to have students complete from the lesson assessment provided.
- Relate new learning to the lesson phenomenon. Can students answer any questions yet?

Learning Sequence 2

Brief Description:
In this lesson, students explore how energy can be stored as height. In the activity, Bumper Coasters (Part I), students build paper roller coasters. Students release marbles down the roller coaster track to understand height energy and energy transfer.

Suggested Pacing:
1.5 hours

Lesson-Level Phenomenon/Design Problem:
What makes roller coasters go fast?

Relationship to Anchoring Phenomena/Design Problem:

Heat gives energy. The higher the drop, the more energy a falling object will have. The more energy something has, the faster it will go.

Learning Sequence Driving Question:
How do roller coaster cars move if they don't have an engine? Where do they get their energy from?

Student Expected Outcomes:

- Students build a model of a roller coaster and carry out an investigation using marbles. Students learn that lifting an object up stores energy in the object. When the object falls, that stored energy is released. They realize that energy is transferred when objects collide.

CONNECTIONS TO STANDARDS

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 4-PS3-1 Use evidence to construct an explanation relating the speed of the object to the energy of that object.
- 4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide.

Assessment

- Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence.
- The teacher will choose 1 question to have students complete from the lesson assessment provided.
- Relate new learning to the lesson phenomenon. Can students answer any questions yet?

Learning Sequence 3

Brief Description:
In this lesson, students will explore how high the hills of a roller coaster can be. In the activity, Bumper Coasters (Part II), students add hills to the Bumper Coaster they built in Lesson 2 and experiment to build a deeper understanding of hills and energy.

Suggested Pacing:
1.5 hours

Lesson-Level Phenomenon/Design Problem:
How does the height of an object relate to the energy that's stored in the object?

Relationship to Anchoring Phenomena/Design Problem:

A falling object cannot get more energy than what it started with. When objects collide, some of the energy is transferred.

Learning Sequence Driving Question:
Why is the first hill of a roller coaster always the highest?

Student Expected Outcomes:

- Using a model roller coaster, students conduct an investigation to determine that a hill's height determines the amount of energy stored in a marble at the top of the hill. Students figure out that the greater the height of an object, the more energy it stores and the faster it will move when released or dropped.

CONNECTIONS TO STANDARDS

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide.

Assessment

- Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence.
- The teacher will choose 1 question to have students complete from the lesson assessment provided.
- Relate new learning to the lesson phenomenon. Can students answer any questions yet?

Learning Sequence 4

Brief Description:
In this lesson, students construct an explanation of how energy is stored, released, and transferred in chain reactions, such as falling dominoes. In the activity, Build a Chain Reaction (Part I), students are presented with an engineering design challenge to create their own chain reaction machine--a project they will continue in Lesson 5. Students experiment with a "Chain-Reaction Starter Kit." This kit includes a lever and a ramp, which serve as the first two steps of a chain-reaction machine.

Suggested Pacing:
1.5 hours

Lesson-Level Phenomenon/Design Problem:
Where is there stored energy? Where does the stored energy come from?

Relationship to Anchoring Phenomena/Design Problem:
Devices can convert stored energy into movement. Energy moves along a path and transfers to other objects.

Learning Sequence Driving Question:
Could you knock down a building using only dominoes?

Student Expected Outcomes:

- Students experiment with ways to store and release energy, creating the beginning of a chain reaction machine with a lever and a ramp. Students figure out that a domino standing on end is storing energy, only requiring a small amount of energy (a tiny push) to release the stored energy.

CONNECTIONS TO STANDARDS

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
- 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

Assessment

- Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence.
- The teacher will choose 1 question to have students complete from the lesson assessment provided.
- Relate new learning to the lesson phenomenon. Can students answer any questions yet?

Learning Sequence 5

Brief Description:
In this lesson, students learn about storing, releasing, and transferring energy. In the activity, Build a Chain Reaction (Part II), students complete the chain-reaction machine they started building in the previous lesson.

Suggested Pacing:
1.5 hours

Lesson-Level Phenomenon/Design Problem:
How is energy transferred in your Rube Goldberg machine?

Relationship to Anchoring Phenomena/Design Problem:

Energy moves along a path in the Rube Goldberg machine. Stored energy is released and becomes movement. Energy is transferred between objects along the path.

Learning Sequence Driving Question:
Can you build a chain reaction machine?

Student Expected Outcomes:

- Students continue to build a chain reaction machine — identifying a goal, brainstorming and testing multiple ideas, and determining an optimal solution. The chain reaction machine uses multiple components to transfer energy from one part to the next.

CONNECTIONS TO STANDARDS

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
- 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- 3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Assessment

- Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence.
- The teacher will choose 1 question to have students complete from the lesson assessment provided.
- Relate new learning to the lesson phenomenon. Can students answer any questions yet?

Learning Sequence 6

Brief Description:
In this lesson, students are introduced to electricity as a form of energy. In the activity, Build a Flashlight, students investigate how electrical energy requires a circuit and make their own mini flashlights from LEDs, button batteries, and strips of aluminum foil. Along the way, they'll learn about the anatomy of a battery, begin to see how circuits work, and discover how handy an on-off switch can be.

Suggested Pacing:
1.5 hours

Lesson-Level Phenomenon/Design Problem:
Where is energy transferred in the form of electricity in the Rube Goldberg machine?

Relationship to Anchoring Phenomena/Design Problem:

Electricity - the stuff from our outlets and batteries- is a form of energy that we use to produce movement, but also light, heat, and more. Just like the energy in a chain reaction machine, electricity moves along a path and so can be transferred from one place to another.
Learning Sequence Driving Question: What if there were no electricity?
Student Expected Outcomes: ● Students design a flashlight with an on/off switch, using batteries, lights and tin foil. Students figure out that electricity can be converted to other forms of energy, such as movement, light, and heat.
CONNECTIONS TO STANDARDS
NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements) ● 4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. ● 4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
Assessment ● Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. ● The teacher will choose 1 question to have students complete from the lesson assessment provided. ● Relate new learning to the lesson phenomenon. Can students answer any questions yet?

Learning Sequence 7
Brief Description: In this lesson, students explore how heat is another form of energy that can make things go. In the activity, Heat Spinner, students first make a paper Heat Spinner and observe how air can create movement. Then, students use their Heat Spinners to experiment with a heat source (an incandescent bulb) and discover how heat energy can make the spinner move in different ways.
Suggested Pacing: 1.5 hours
Lesson-Level Phenomenon/Design Problem: What other forms of energy do we use in our daily lives?
Relationship to Anchoring Phenomena/Design Problem: **Engines are chain reaction machines- heat is transferred through a device to create movement.**
Learning Sequence Driving Question:

How long did it take to travel across the country before cars and planes?
Student Expected Outcomes: • Students build a paper spinner and conduct an investigation to explain how heat makes things move. Students realize that heat energy can be turned into motion energy using a turbine.
CONNECTIONS TO STANDARDS
NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements) • 4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. • 4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
Assessment • Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence. • The teacher will choose 1 question to have students complete from the lesson assessment provided. • Relate new learning to the lesson phenomenon. Can students answer any questions yet?

Learning Sequence 8
Brief Description: In this lesson, students analyze the advantages and disadvantages of different sources of energy, including burnable fuels and alternative (renewable) energies. In the activity, Power this Town, students obtain and combine information about wind energy, solar energy, and water energy. They use this information to determine the best alternative energy sources for a town called Boulderville.
Suggested Pacing: 1.5 hours
Lesson-Level Phenomenon/Design Problem: Where can we get the energy we need without creating pollution?
Relationship to Anchoring Phenomena/Design Problem: **Some natural resources such as wood, coal, and natural gasses can be burned to release energy. This releases smoke and causes air pollution. Many scientists are exploring alternative natural sources of energy such as solar, wind and water. These natural resources don't require burning to release energy.**

Learning Sequence Driving Question:
Where does energy come from?

Student Expected Outcomes:

- Students evaluate the advantages and disadvantages of wind, water, and solar energy to power a town. Students obtain and evaluate information about the needs of each source of energy and analyze and interpret data about the town's resources.

CONNECTIONS TO STANDARDS

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

Assessment

- Formative monitoring will occur at various times (checks for understanding through questioning and discussion) throughout this learning sequence.
- Students will make a plan to provide energy to a town using wind, sun, water or a combination of both.
- Relate new learning to the lesson phenomenon. Have we answered all of our questions?

Culminating Task

Brief Description:
In this Task, students will design a Rube Goldberg machine that utilizes energy transfers and conversions to turn on a flashlight.

Suggested Pacing:
2 hours

Lesson-Level Phenomenon/Design Problem:
Can I build a Rube Goldberg machine that uses electricity?

Relationship to Anchoring Phenomena/Design Problem:
Students apply their understanding of what they learned to a new scenario.

Learning Sequence Driving Question:
Can you turn on a flashlight without touching it?

Student Expected Outcomes:

- Using a model, students will be able to explain how energy flows through the Rube Goldberg system. Then groups of students will create a Rube Goldberg machine that includes:
  - 6 steps
  - a blueprint

○ energy transfers ○ stored energy ○ released energy ○ collisions ○ height energy ● Students will also include a written explanation that explains how energy moves through the machine.
Assessment ● Optional Unit Assessment ● Culminating Task Rubric ● Conceptual Model

Elementary Science

Grade 3: Grand Canyon Seashells
Grade 4: Energizing Everything
Grade 5: Spectacular Sights in the Sky

Curriculum and Instruction Committee Presentation

New to Grade 3- Grand Canyon Seashells

Unit Driving Question: How did ocean creature fossils end up in the Grand Canyon?

The students, as secret agents from the environmental archeology division, will make observations and ask questions about the seemingly odd marine fossils found in the Grand Canyon. Over the course of the unit, students will define how this odd phenomenon came to be.

G3 U2 - *Changes to Organisms' Environments:* Grand Canyon Seashells

LS1
Introduction to the anchor phenomenon

How did ocean creature fossils end up in the Grand Canyon?

LS2
Common ancestry and diversity

LS3
Biodiversity

Culminating Performance Task

Final report that compiles all scientific evidence collected to explain the misplaced fossils.

LS4
Weather and climate

LS5
Weather related hazards and engineering

LS6
Environmental changes

New to Grade 4- Energizing Everything

Unit Driving Question: What makes a chain reaction keep going?

In this unit, students explore energy. Students investigate how energy is stored, how it can make objects move, and how collisions transfer energy between objects. Students also construct devices that convert energy from one form into another, such as heat into motion and electricity into light.

Grade 4 Unit 3: *Energizing Everything*

Lesson 1
How is your body similar to a car?

Lesson 2
What makes roller coasters go so fast?

Lesson 3
Why is the first hill of a roller coaster always the highest?

Lesson 4
Could you knock down a building using only dominoes?

Lesson 5
Can you build a chain reaction machine?

Lesson 6
What if there were no electricity?

Lesson 7
How long did it take to travel across the country before cars and planes?

Lesson 8
Where does energy come from?

Culminating Task: students will design a Rube Goldberg machine that utilizes energy transfers and conversions to turn on a flashlight.

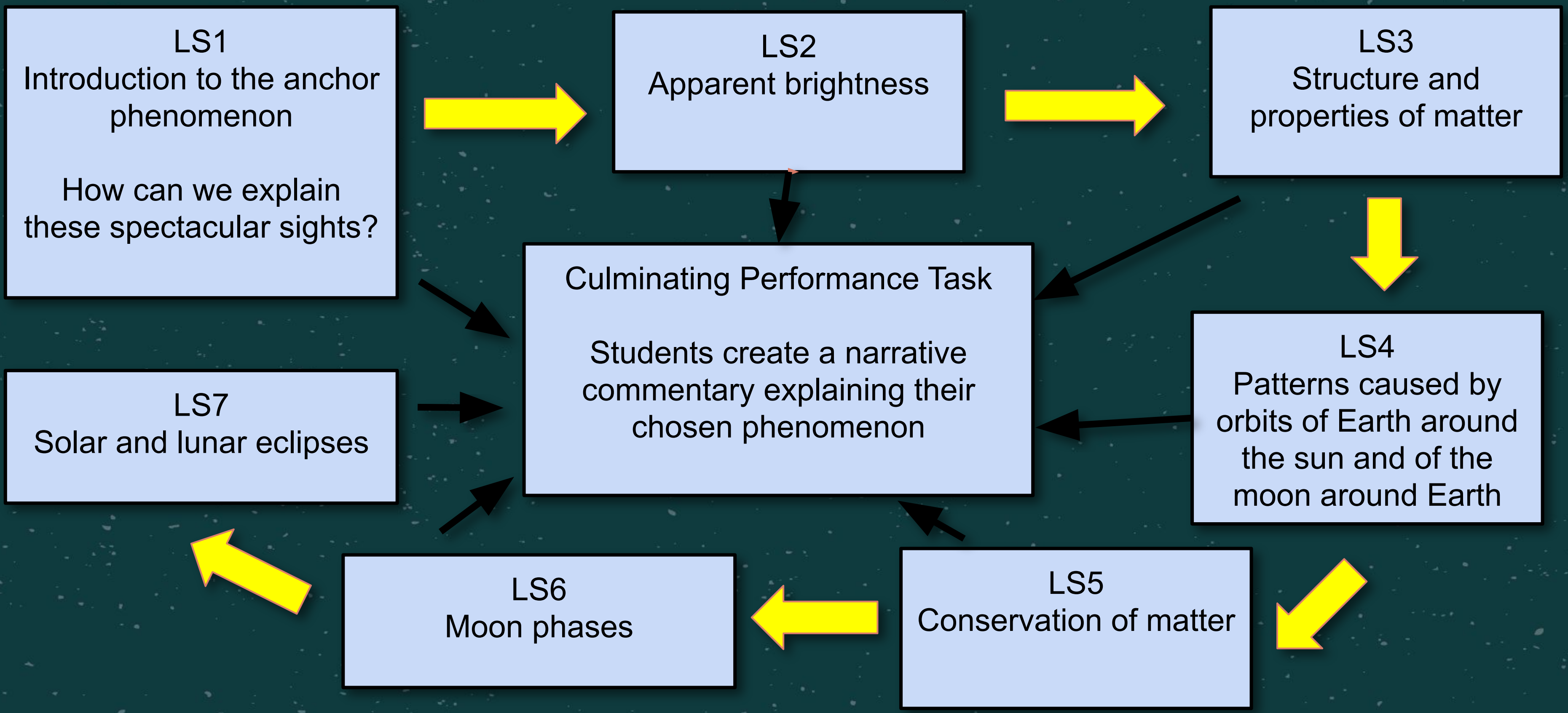
New to Grade 5- Spectacular Sights in the Sky

Unit Driving Question: How can we explain these spectacular sights?

Students are introduced to the phenomena of the Spectacular Sights in the Sky through a series of four videos. Students develop questions during this sequence that they will look to answer during the course of the unit. Students also develop a model of how they think one of the phenomena occurs. This model will be revised later in the unit.

Students explore the characteristics of stars and note the brightness of stars. Students will also explore the relationships between the Earth’s tilt, the location of the Earth and its relation to the sun and the seasons.

G5 U1 - *Scale, Proportion, and Quantity:* Spectacular Sights in the Sky



BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ______________________ **Board Meeting Date** December 8, 2022

Decision Requested X **Agenda Code** 9 l.

AGENDA REPORTING FORM

Agenda Topic: Science Grade 5 Unit 1A/1: Spectacular Sights in the Sky - Second Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed Science Grade 5 Unit 1A/1: Spectacular Sights in the Sky

Background: ____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Curriculum & Instruction Committee is bringing the Science Grade 5 Unit 1A/1: Spectacular Sights in the Sky to the full Board for a Second Reading.

Titles of Attachments:

1. Course Proposal

Frank Pepe
Signature of Staff Member Submitting Report

Steven Madancy
Signature of Superintendent of Schools

Unit 1 - Spectacular SIghts in the Sky
In the first learning sequence students are introduced to the phenomena of the Spectacular Sights in the Sky through a series of four videos. Students develop questions during this sequence that they will look to answer during the course of the unit. Students also develop a model of how they think one of the phenomena occurs. This model will be revised later in the unit. In the second learning sequence students will begin by viewing four photos of stars, one being the sun. Students will work in small groups to determine which of the four photos is the sun. Students will then explain their choice through small group discussion as well as individually in written form. Students will also explore the characteristics of stars through planning and creating a bar graph displaying their data. Students estimate the number of stars in a photograph explaining the system they used to make this estimation. They also note the differences in brightness among stars. Students examine a color photo of stars looking at the apparent colors and surmising the cause of the various colors. In the third learning sequence, students will view different states of matter and question the state of matter of a star and other celestial bodies. Students investigate states of matter and the organizational differences of the particles in those different states. Students apply an understanding of the organizational and particle differences to develop a model representing the three states of matter: solid, liquid, gas. Stars are composed of matter and are in a state called plasma. Students research this state and the arrangement of the particles and extend their three dimensional models to include representations and explanations for the particle arrangement of matter in a state of plasma. In learning sequence 4, students look at shooting stars, which are not stars but are meteors that enter the atmosphere and burn up creating the streak we see across the night sky. Despite the burning, the amount of matter in the meteor is conserved. This learning sequence helps students to understand that matter cannot disappear. Students will conduct experiments to determine that matter is conserved as it changes forms or is mixed. They will plan investigations, make and record observations throughout each exploration lab/activity. Students will measure and collect data to make graphical representations of their findings. At the conclusion, students will be formally assessed on their understanding that matter is conserved through a writing task related to the burning of a meteor as it enters Earth's atmosphere. In the fifth learning sequence students will be working to answer the question ,"Why is it warmer in the summer than in the winter?" Students will explore the relationships between the Earth's tilt, the location of the Earth in its relation to the sun, the angle of the sun's rays, the position of the sun in the sky, and the seasons. They will take a closer look at how the angle of the sun's rays cause seasons, and graph the data, and support their claims. Students will also examine sunsets and determine how the color changes based on the particles of matter and the angle of the sun. Students are given the opportunity to watch videos and read articles to help them to understand and process the phenomenon they are exploring. Lastly, students will revisit the initial question to design a model that demonstrates their conceptual understanding at the end of the unit. In the sixth sequence, students will draw an explanatory model of the positioning of the Earth, Sun, and Moon in our solar system. Students will do a gallery walk, commenting on each other's models. Students will then participate in a demonstration, illustrating the different moon phases. Using their moon journals, students will then graph quantities of the moon phases and explore patterns in the way the earth and moon orbit. Next, students will be creating a 3D model of the rotations and revolutions of the Earth, Moon and Sun. Students will read articles and watch videos to further their understanding of the moon phases, as well as the occurrence of both a blue moon and a super moon. Students will revisit and revise their models from the beginning of the sequence in order to demonstrate new learning. Lastly, students will add new learning to their summary table and make connections to the phenomenon. In the seventh learning sequence, students will begin by viewing two images, one of a lunar eclipse and one of a solar eclipse. Students will use a discussion diamond to begin exploring what causes an eclipse. Students will have an opportunity to build a model of the Earth, Sun, and Moon to manipulate both types of eclipses. They will also use technology to change parameters to determine why eclipses don't occur each month. Students will demonstrate their learning and understanding by creating a cause and effect chart for both a solar eclipse and lunar eclipse. After completing a gallery walk of charts, students will be able to modify charts if needed and write an explanation of solar and lunar eclipses. To end the sequence, students will return to the original phenomenon and follow a "write and pass" protocol explaining how and why the Super Blue Blood Moon occurred. At the end of the write and pass, students will refine their statements. Finally, students will update their summary table to include all learning.

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To access the flowchart for this unit, click here.

Suggested Time Frame:
30-35 hours

Anchoring Phenomenon/Design Problem:
Spectacular Sights in the Sky

Unit Driving Question:
How can we explain these spectacular sights?

Culminating Performance Task:
Students will create an explanatory commentary to narrate one of the four videos from the *Spectacular Sights in the Sky Slideshow* using their learning from the Unit.

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen.
  - [Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.]
  - [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]
- 5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.
  - [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.]
  - [Assessment Boundary: Assessment does not include distinguishing mass and weight.]
- 5-PS1-3. Make observations and measurements to identify materials based on their properties.
  - [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.]
  - [Assessment Boundary: Assessment does not include density or distinguishing mass and weight.]
- 5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances.
- 5-ESS1-1. Support an argument that the apparent brightness of the sun and stars is due to their relative distances from the Earth.
  - [Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).]
- 5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.
  - [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.]
  - [Assessment Boundary: Assessment does not include causes of seasons.]
- 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Three Dimensions that form the Foundation for these NGSS Performance Expectations:

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Developing and Using Models • Use models to describe phenomena. **Using Mathematics and Computational Thinking**	**PS1.A: Structure and Properties of Matter** • Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by	**Scale, Proportion, and Quantity** • Natural objects exist from the very small to the immensely large. • Standard units are used to measure and describe physical

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• Measure and graph quantities such as weight to address scientific and engineering questions and problems. **Planning and Carrying Out Investigations** • Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. • Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. • Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. **Engaging in Argument from Evidence** • Support an argument with evidence, data, or a model. **Analyzing and Interpreting Data** • Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.	other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. • The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. • Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) **PS1.B: Chemical Reactions** • No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) • When two or more different substances are mixed, a new substance with different properties may be formed. **ESS1.A: The Universe and its Stars** • The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. **ESS1.B: Earth and the Solar System** • The orbits of Earth around the sun and the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.	quantities such as weight, time, temperature, and volume. **Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change. **Patterns** • Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena.

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	ETS1.B: Developing Possible Solutions ● Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. . **ETS1.C: Optimizing the Design Solution** ● Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	

PROGRESSION OF LEARNING

Required Data Collection:

- Students will need to complete ONE FULL month of moon phase observations BEFORE Learning Sequence #6.
    - *Moon Phase Calendar* - Date, Time and Drawing of what they observed each day for one month

Resources:

- Moon Phase Calendar - Date, Time and Drawing of what they observed each day for one month

Learning Sequence 1:

- Learning Sequence Driving Question: What causes these spectacular sights?
- Learning Sequence 1
- Relationship to Anchoring Phenomena/Design Problem:
    - This is the introduction to the anchoring phenomenon - Super Blue Blood Moon and Other Spectacular Sights in the Sky.
- Student Expected Outcomes:
    - Students will develop an initial model of how they think the spectacular sights occur.

Learning Sequence 2:

- Learning Sequence Driving Question: Why do stars vary in brightness and color?
- Learning Sequence 2
- Relationship to Anchoring Phenomena/Design Problem:
    - Students learn about the sun's relative position to the Earth and moon as a building block to how that relates to the super blue blood moon.
- Student Expected Outcomes:
    - Students will create a model to describe how the Sun is a star based on its measurements of quantities such as weight, volume and temperature.
    - Students will use investigative data to serve as the basis for evidence that the Sun is a star based on standard units that describe its physical quantities such as weight, volume and temperature.

Learning Sequence 3:

- Learning Sequence Driving Question: What is matter?
- Learning Sequence 3
- Relationship to Anchoring Phenomena/Design Problem:
    - Students investigate states of matter and the organizational difference between the particles in those different states.

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- Student Expected Outcomes:
    - Students will develop a model to explain and represent the particle organization of the different states of matter.
    - Students will extend their understanding of particle arrangement to the arrangement of particles in a star/plasma state of matter.

Learning Sequence 4:
- Learning Sequence Driving Question: Why is it warmer in the summer than in the winter?
- Learning Sequence 4
- Relationship to Anchoring Phenomena/Design Problem:
    - Understanding the relative positions of the sun, Earth, and moon is necessary in order to understand the spectacular sights in the night sky.
- Student Expected Outcomes:
    - Students will represent data in a graph to compare the similarities and differences of patterns of stars in the night sky to the rotation of Earth on its axis and its orbit around the Sun.
    - Students will represent data in a graphical display to identify the patterns of similarities and differences related to the Earth's rotation (day and night).
    - Students will make observations of the patterns of the sky at sunset and sunrise to serve as the basis of evidence that matter still exists.

Learning Sequence 5:
- Learning Sequence Driving Question: Is matter lost or destroyed when a meteorite enters Earth's atmosphere?
- Learning Sequence 5
- Relationship to Anchoring Phenomena/Design Problem:
    - Shooting stars are not stars but are meteors that enter the atmosphere and burn up creating the streak we see across the night sky. Despite the burning, the amount of matter in the meteor is conserved.
- Student Expected Outcomes:
    - Students will plan and conduct investigations involving changing states of matter and mixing substances to show conservation of matter.
    - Students will make observations, collect and graph data using standard units of measurements to show cause and effect relationships.

Learning Sequence 6:
- Learning Sequence Driving Question: What causes the moon to appear to have different phases?
- Learning Sequence 6
- Relationship to Anchoring Phenomena/Design Problem:
    - There are several phases of the moon, one of the phases is a full moon. This phase is directly related to the super blue blood moon.
- Student Expected Outcomes:
    - Students will graph quantities of moon phases to explore similarities and differences and patterns of the way the earth and moon orbit.

Learning Sequence 7:
- Learning Sequence Driving Question: Why do the spectacular sights in the sky occur?
- Learning Sequence 7
- Relationship to Anchoring Phenomena/Design Problem:
    - The combination of a full moon and a lunar eclipse creates the phenomenon of the super blue blood moon.
- Student Expected Outcomes:
    - Students will develop a model to explain the cause and effect relationship between the positions of the Earth, Moon and Sun.
        - Students will support an argument based on evidence about solar and lunar eclipses.

Assessments:
- **Culminating Performance Task**

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- Students will create an explanatory commentary to narrate one of the four videos from the *Spectacular Sights in the Sky Slideshow,* using their learning from the Unit (referring to their now complete Summary Tables).
- Their narrative should include vocabulary, new ideas and explanations of all necessary/relevant information to explain their chosen phenomenon.

- **Grade 5 Sample Tasks and Rubrics**
- **2019-2020 - G3-G8 Interim Assessment Blocks (IABS) by CREC Bundle**

Additional Resources:

- G5 Unit Materials List 2020
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G5 U1A List
  - Includes ebooks and videos
  - Must have an educator user account for free access
- Teacher Resources
  - Total Lunar Eclipse Timelapse

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Learning Sequence 1		
Brief Description: Students are introduced to the phenomena of the Spectacular Sights in the Sky through a series of four videos. Students develop questions during this sequence that they will look to answer during the course of the unit. Students also develop a model of how they think one of the phenomena occurs. This model will be revised later in the unit.		
Suggested Timeframe: 1-1.5 hours		
Lesson-Level Phenomenon/Design Problem: The four spectacular sights videos		
Relationship to Anchoring Phenomena/Design Problem: This is the introduction to the anchoring phenomenon - Spectacular Sights in the Sky.		
Learning Sequence Driving Question: What causes these spectacular sights?		
Student Expected Outcomes: ● Students will develop an initial model of how they think the spectacular sights occur.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Developing and Using Models** ● Use models to describe phenomena.	**Disciplinary Core Ideas:** **ESS1.B: Earth and the Solar System** ● The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.	**Crosscutting Concepts:** **Patterns** ● Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena.
Related Performance Expectation(s) in this Unit: ● 5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. *This PE is not fully accessible. ○ [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.] ○ [Assessment Boundary: Assessment does not include causes of seasons.]		
Possible Common Core State Standards Connections: ELA/Literacy - ● SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS1-2) Mathematics - ● MP.2 Reason abstractly and quantitatively. (5-ESS1-2) ● MP.4 Model with mathematics. (5-ESS1-2)		

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- 5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5-ESS1-2)

Prior Student Knowledge:
1.ESS1.A ; 1.ESS1.B ; 3.PS2.A

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)
Activity Description:
- Show students the *Spectacular Sights in the Sky Slideshow* two times:
  - First viewing is for students to jot down their initial thoughts in their Science Journals.
  - Second viewing is to add any additional observations and questions that they now notice to their Science Journals.
- Students use the Question Formulation Technique to generate, record, improve and prioritize their questions.
- Groups share their priority questions with the class.

Resources:
- Spectacular Sights in the Sky Slideshow
  - Use discretion for the National Geographic video, because there are multiple "spectacular" sights shown, if you want to focus specifically on the aureau start at 1:20 and play for about 30 seconds.
  - Play the Solar Eclipse video at double speed (found in settings)
  - For the meteor - only show the first 15 seconds and show without sound
- Question Formulation Technique

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)
Activity Description:
- Students create an initial scientific model in small groups through drawing a representation of their current understanding of one of the phenomena shown in the Engage slideshow videos. Have them start with the *Scientific Modeling Handout*.
  - Have each group model one of 4 spectacular sights shown in the Engage slideshow so that at least one group is modeling each of the sights.
- Students share their drawings with peers and explain their thinking, through either using *Three Stay, One Stray Protocol* or Gallery Walk with the whole class sharing aloud.
- Each group writes a comment, recommendation and question for each of the models (can be done in a journal, post-its or designated chart paper depending on share out type).
- Groups have time to return back to their own model and review student feedback.

Resources:
- Scientific Modeling Handout
- Three Stay, One Stray Protocol

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher

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- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):
- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EVALUATE
- Students track their learning at the end of each Learning Sequence by adding any new information to a *Summary Table*.

Resources:
- Summary Table

Additional Resources:
- G5 Unit Materials List 2020
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G5 U1A List
  - Includes ebooks and videos
  - Must have an educator user account for free access
- Teacher Resources
  - Total Lunar Eclipse Timelapse

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Learning Sequence 2		
Brief Description: Students view four photos of stars, one being the sun. They work in small groups to determine which of the four photos is the sun. Students explain their choice through small group discussion as well as individually in written form. Students estimate the number of stars in a photograph creating a graph displaying their data. Students further their understanding of stars through research and note taking. Students analyze patterns of stars to identify similarities and differences to defend their position on whether or not all stars are like the sun. Lastly, students add new learning to their summary tables.		
Suggested Timeframe: 3-4 hours		
Lesson-Level Phenomenon/Design Problem: Identifying the Sun		
Relationship to Anchoring Phenomena/Design Problem: Students learn about the sun's relative position to the Earth and moon as a building block to how that relates to the super blue blood moon.		
Learning Sequence Driving Question: Why do stars vary in brightness and color?		
Student Expected Outcomes: ● Students will create a model to describe how the Sun is a star based on its measurements of quantities such as weight, volume and temperature. ● Students will use investigative data to serve as the basis for evidence that the Sun is a star based on standard units that describe its physical quantities such as weight, volume and temperature. ● Students will use investigative data to explain the similarities and differences of stars relative to their distance from Earth. ● Students will conduct an investigation collaboratively to show how light brightness and color changes with distance to represent that the Sun is larger and brighter because it's closer.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices:	**Disciplinary Core Ideas:**	**Crosscutting Concepts:**
Planning and Carrying Out Investigations ● Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. **Engaging in Argument from Evidence** ● Support an argument with evidence, data, or a model. **Using Mathematics and Computational Thinking** ● Measure and graph quantities such as weight to address scientific and engineering questions and problems.	**ESS1.A: The Universe and its Stars** ● The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. **ESS1.B: Earth and the Solar System** ● The orbits of Earth around the sun and the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the	**Scale, Proportion, and Quantity.** ● Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. ● Natural objects exist from the very small to the immensely large. **Patterns** ● Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. **Cause and Effect** ● Cause and effect relationships are routinely

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	sun, moon, and stars at different times of the day, month, and year.	identified and used to explain change.

Related Performance Expectation(s) in this Unit:
- 5-ESS1-1. Support an argument that the apparent brightness of the sun and stars is due to their relative distances from the Earth.
  - [Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).]
- 5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.
  - [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.]
  - [Assessment Boundary: Assessment does not include causes of seasons.]

Possible Common Core State Standards Connections:
ELA/Literacy -
- RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-ESS1-1)
- RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-ESS1-1)
- RI.5.8 Explain how an author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s). (5-ESS1-1)
- RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-ESS1-1)
- W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-ESS1-1)

Mathematics -
- MP.2 Reason abstractly and quantitatively. (5-ESS1-1)
- MP.4 Model with mathematics (5-ESS1-1)
- 5.NBT.A.2 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. (5-ESS1-1)

Prior Student Knowledge:
N/A

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:
- Students are given the *4 Star Photos* and asked the prompt question: Which photo is the Sun?
- Students work in groups of 4-5 and use the *Four Quadrants strategy* to help guide a whole-class discussion.
- Students write their individual ideas at the end of class in their Science Journals.

Resources:
- 4 Star Photos
- Four Quadrants Strategy

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

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- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Teacher asks students to share what they already know about stars.
- Students are divided into groups of 4 or 5 and given a *Photo of the Stars*.
- Students develop a plan for estimating the number of stars in the whole image without counting every star.
- As the groups work, the teacher circulates and asks about their strategies. They may come up with plans such as:
    - divide the image into squares (rectangles)
        - count the number of stars in one square
        - multiply by the number of squares
    - divide the image into squares (rectangles)
        - count the number of stars in a full square and an emptier one
        - find the average
        - multiply by the number of squares
- Each group is given an opportunity to share their strategies and their estimates.
- Teacher asks what differences students observed in the brightness of the individual stars.
- Students classify the stars in the photo as faint, medium, or bright and record data in *data frequency table and bar graph* to be inserted into their journals.
- In their journals, students record their data on a hand drawn bar graph with the number of stars along the vertical axis and the three categories of brightness along the horizontal axis. If necessary, model a bar graph for the group. Invite groups to share their results:
    - *Student Graph Example 1*
    - *Student Graph Example 2*
- The teacher then poses the following questions:
    - What brightness of stars is the most common?
    - Are there more bright stars or more faint stars?
    - What causes the differences in brightness?
- As a class, students discuss their answers and record them for future reference.

Resources:

- Photo of the Stars (photocopy in black and white)
- Data frequency table and bar graph
- Student Graph Example 1
- Student Graph Example 2

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

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Activity Description:
Part1:

- Before class, set up research centers around your classroom with resources for students to read/watch and take notes answering the question: What are the characteristics of a star? **Centers may need access to the internet or books pulled out from the library.**
  - Put students into small cooperative groups to rotate through the research centers.
  - Have students use the STAR web to take notes (using the resources below and other resources you have) to answer the question: What are the characteristics of a STAR? Have students rotate around the centers experiencing each one. Their STAR web must be complete by the end of class.
  - If centers require two class periods to complete, have students record their groups and their centers with a checklist to ensure they hit all of them by the end of the second day.

Part 1 Resources:

- Star web
- **Possible resources (Feel free to choose all or add in your own, as desired):**
  - *Stars* by Seymour Simon
  - *The Sun* by Seymour Simon
  - Science Learning Hub
  - Newsela, "The sun, an engine of nuclear energy"
  - National Geographic article *Stars*
  - CK-12 Resources: Stars, Sun
  - EPIC: The Solar System Through Infographics, The Stars (A journey through space)

Part 2:

- After the students complete their research, have them use the Think, Pair, Share strategy to work with a partner and come up with a list of characteristics of a star.
- Bring the class together and create a class chart of star characteristics from the research they conducted. Modify student responses to be scientifically accurate if needed. The list should include the following *Characteristics of a Star*. Feel free to create your own list and post up in the classroom for the rest of the unit. Students should be in agreement that all stars have these qualities. Ask students to summarize their characteristics list by creating a definition of a "star". Have students write and submit their definitions.

Part 2 Resources:

- Think, Pair, Share strategy
- Characteristics of a Star

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: telescope, visible, constellation, galaxy, immensity, relative, distance, star, apparent brightness, apparent magnitude

ELABORATE (Applications / Extensions)
Activity Description:

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- Ask the students, "Why does the sun appear larger and brighter than other stars?" Students, in small cooperative groups, will revisit their notes from the earlier lesson part to refresh on how distance affects the brightness of stars. Let students know that in this part of the lesson, they will use observations and inferences to make claims about the apparent brightness of stars.
- For this demonstration, prompt students to take notes in their Science Notebooks. Show students two identical flashlights that will represent stars.
    - Hold the two flashlights at an equal distance from the whiteboard. Turn them on and shine on the whiteboard. Have two students circle the light beams. As a class, students should record their observations and compare the brightness of light from each "star" . In this one, students should note that at the same distance, the flashlights produce the same amount of light.
    - Hold two identical flashlights at different distances from the whiteboard, Turn them on and shine on the whiteboard. Have two students circle the light beams. As a class, students should record their observations and compare the brightness of light from each "star". In this one, students should note that the flashlight closer produces more light than the one farther.
    - Repeat the experiment with both flashlights. Have one student hold the flashlight at the opposite side of the room. Before turning them on, have students predict the brightness of the light from this distant flashlight compared to the close one. Turn them on and have students record their observations.
    - For an in-depth look at this demonstration, review the source: BetterLesson: Investigating Star Brightness
- After the demonstration, ask students:
    - *What conclusions can we draw about two stars that are the same brightness?* Have students take 2 minutes to write their answer, then give 2 minutes for student-to-student discussion. After, call on students to share with the whole group. Record a class conclusion.
    - *What conclusions can we draw about a bright star and a dull star?* Repeat the write-pair-whole group process above. Have students take 2 minutes to write their answer, then give 2 minutes for student-to-student discussion.
    - After, call on students to share with the whole group. Record a class conclusion.
- If necessary, lead students in a discussion around, "The closer the star is to Earth, the brighter it appears" Explain the concept of apparent brightness to students, and that the apparent brightness is measured as apparent magnitude.
- As students develop an understanding of the brightness of stars, they should be able to apply this concept of brightness as evidence that the shooting star can not be an actual star. If a star was that close to earth the magnitude of the brightness would be brighter than the sun and would appear MUCH larger and brighter in the sky.
- At this point, students do not need to exactly articulate this point, but should be working toward it. Ask students, "think about how bright the Sun is in our sky. If other stars were that close, what would they look like?"
- Project the *Photo of the Stars* from the Explore activity and ask the students to apply their new information to explain what they are seeing.
- Lead a class dialogue to ensure that the students understand the DCI: *The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.* (Note: this learning sequence discusses stars more deeply than the standards require, this is due to the nature of the anchoring phenomenon. Students DO NOT need to know/memorize the life cycle of a star or types of stars.)
-

Resources:
- [BetterLesson: Investigating Star Brightness] (flashlight demonstration taken from this lesson)
- [Photo of the Stars]

Teacher Action(s):
- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):
- Applies new labels, definitions, explanations, and skills in new but similar situations

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- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ SEP: Use models to describe phenomena.
- ❏ SEP: Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.
- ❏ SEP: Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.
- ❏ DCI: The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.
- ❏ CCC: Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.
- ❏ CCC: Natural objects exist from the very small to the immensely large.
- ❏ CCC: Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena.

Summative Assessment Description(s):

- Students apply this new learning to the anchoring phenomenon by participating in the *Four Quadrants Strategy*
  - Remind students of the four videos from the *Spectacular Sights in the Sky Slideshow*
  - Ask students: How can you connect this new information to one of the four videos from the slideshow? Evidence of apparent brightness and relative distance is demonstrated in video ___ because ______.
    - Go to the corner of the room designated for your video selection choice, and discuss with peers that are there why you think the information applies to that video.
    - Teacher note: Students might be able to make an argument for Videos 1, 3 and 4 for this Learning Sequence.
- Students track their learning by adding any new information to the *Summary Table* and use information from the *Four Quadrants Strategy* to add ideas for revising the correlating initial model(s).
  - For example, for this Learning Sequence the group that created the initial model of the Aurora (Video 2) most likely will not have any ideas to add to the 4th column of their Summary Table.

Resources:

- Four Quadrants Strategy
- Spectacular Sights in the Sky Slideshow
- Summary Table

Elaborate Further / Reflect / Enrichment:

- Additional Optional Activity: Planet mass comparison

Additional Resources:

- G5 Unit Materials List 2020
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G5 U1A List
  - Includes ebooks and videos
  - Must have an educator user account for free access
- Teacher Resources
  - Total Lunar Eclipse Timelapse

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Learning Sequence 3		
Brief Description: Students investigate states of matter and the organizational difference between the particles in those different states. Students apply their understanding of the organizational and particle differences to develop a model representing the three states of matter: solid, liquid, gas. Stars are composed of matter and are in a state called plasma. Students research this state and the arrangement of the particles and extend their three dimensional models to include representations and explanations for the particle arrangement of matter in a state of plasma.		
Suggested Timeframe: 3-4 hours		
Lesson-Level Phenomenon/Design Problem: Demonstration-Burning Isopropyl Alcohol		
Relationship to Anchoring Phenomena/Design Problem: Students investigate states of matter and the organizational difference between the particles in those different states.		
Learning Sequence Driving Question: What is matter?		
Students Expected Outcomes: ● Students will develop a model to explain and represent the particle organization of the different states of matter. ● Students will extend their understanding of particle arrangement to the arrangement of particles in a star/plasma state of matter.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Developing and Using Models** ● Use models to describe phenomena.	**Disciplinary Core Ideas:** **PS1.A: Structure and Properties of Matter** ● Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.	**Crosscutting Concepts:** **Scale, Proportion, and Quantity** ● Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. ● Natural objects exist from the very small to the immensely large.

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	• Measurements of a variety of properties can be used to identify materials.	

Related Performance Expectation(s) in this Unit:

- 5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen.
    - [Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.]
    - [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]

Possible Common Core State Standards Connections:

ELA/Literacy -

- RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-PS1-1)

Mathematics -

- MP.2 Reason abstractly and quantitatively. (5-PS1-1)
- MP.4 Model with mathematics. (5-PS1-1)
- 5.NBT.A.1 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. (5-PS1-1)
- 5.NF.B.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. (5-PS1-1)
- 5.MD.C.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. (5-PS1-1)
- 5.MD.C.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. (5-PS1-1)

Prior Student Knowledge:

2.PS1.A

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

Option #1:

- To truly know the sun, it is important to know a star's composition. Students share their initial ideas about the composition of stars. (*Students may suggest fire.*)
- To get deeper into the conversation, the teacher asks the students what is burning on the sun, our closest star, to make it appear as fire? Have you ever seen a fire without something actually burning?
    - The teacher shows a log in a fire to get kids thinking.
- If possible, depending on the structure of the classroom and safety supplies, the teacher can put a few drops of rubbing alcohol on a glass plate and ignite it.
    - All should wear safety goggles to run the demonstration and students should remain at their seats as the demonstration is conducted.
    - Students may not touch alcohol or flame.
    - Students observe that the flame goes away as soon as the alcohol (substance being burned/fuel) is gone.
- As a second phase to the demonstration, add a few more drops of rubbing alcohol to the plate.
    - Hold the flame above the liquid and slowly lower toward the liquid.

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- The evaporated alcohol ignites the liquid before the flame reaches it. This should prompt the students to think about what ignited if it wasn't the fuel?
- This gets the students into a discussion about matter and phases of matter.

- The video below may be shown if doing the demonstration poses a safety hazard in any way.

Resources for Option #1:

- Safety Data Sheet (SDS): Isopropyl Alcohol
- Video: Igniting Rubbing alcohol without touching the alcohol

Option #2:

- Teacher opens a scented object with a strong smell (ie: an orange or lemon, freshly popped microwave popcorn, an air freshener, a can of tuna, etc.) in front of the class.
- The teacher asks students: Who can smell it?
- The teacher tells students to raise their hands as soon as they smell the scent.
- The teacher helps track the smell as it travels throughout the room by asking: Who smells it now?
- The teacher asks students: How did the smell get from point to point?
- To prompt student thinking, the teacher asks:
  - What is the scent made up of?
  - Can you see it?
  - Can you feel it?
  - Can you hear it?
  - Where is it coming from?
- The teacher states, "I can't see it but I know it's here…why?"
- Students Turn and Talk with their neighbors about their observations and explanations.
- The teacher asks:
  - Would we have the same effect if I placed an orange drink (liquid) in the center of the room?
  - Would we be able to track the scent through the classroom?
  - What if I have a frozen block (solid) of orange drink?
  - Why was the scent from peeling the orange/opening a bag of hot microwave popcorn (gas) able to travel through the classroom and other scents were not?
  - If you directly smell the orange drink or orange ice, you can smell it, but why doesn't the scent travel?
    - This gets the students into a discussion about matter and phases of matter.
- The teacher prompts students to think about stars and to share their initial ideas about the type of matter that stars are composed of.

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):

- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

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- Students explore how the particles of matter are packed together (far apart, loosely, tightly) in different states.
- Teacher distributes the *Experiment Handout* and materials to each pair/group.
    - Students use pencils, a pan of water, and a desk/table for the experiment.
        - Students use the pencil to move through the air and observe how easily the pencil moves through the air (gas).
        - Then students move the pencil through the water in the pan, and observe how easily the pencil moves through the water (liquid).
        - Lastly, students try to move the pencil through the table/desk and observe how easily the pencil moves through the table/desk.
- Students record their observations and then use them to create a 3D model of the concentration of particles in each situation using cotton balls glued onto construction paper to represent the particles of matter and the path of the straw.
    - Students are reminded that their models must be labeled so that observers can understand their thinking.
- When the models have been completed, all students display their models.
- The teacher monitors students as they do a Gallery Walk of the models.
- Students use post-it notes to leave a comment and/or question at each model.
- When the Gallery Walk is finished, students come back together as a class to answer the Post-It questions about their models.
- Students discuss particle organization.

Resources:
- Experiment Handout

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):
- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:
- Students are shown one of the videos listed in Resources about matter so they can see how particles move.
- To help students understand the organization of particles in solids, liquids and gases, the teacher provides students access to a variety of other resources.
- Students revise/add information to their 3D cotton ball models based on the new information they have learned.
- The teacher helps students relate the phases of matter to celestial bodies and stars using the *EPIC text-Science of Stars Exploring Matter*.

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- The teacher offers additional explanations, as needed.

Resources:

- Show one of the following videos:
    - Matter Matters - Crash Course Kids
    - Part(icles) of Your World: Crash Course Kids
    - Bill Nye Phases of Matter
- Free SuperTeachers article and handout
- CK-12: Various readings and interactives
- EPIC text: States of Matter
- EPIC text-Science of Stars Exploring Matter

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: solid, liquid, gas, states of matter, matter, particle

ELABORATE (Applications / Extensions)
Activity Description:

- Students read *Plasma Article*, and look at the *Plasma Slideshow.*
- Students discuss the article, video and graphic with their tablemates.
- Teacher reiterates:
- Our sun, and all the stars are made of plasma
- Fire (flames) are also plasmas.
- When we see shooting stars, what we are seeing is the flames as the meteor burns up as it comes into contact with Earth's atmosphere.
- Teacher asks students to think back to the demonstration with the burning alcohol:
    - What were the states of matter present?
    - What was being burned? How do you know?
    - What can we see in the demonstration?
    - What can we not see?
    - How is the demonstration similar and different from stars?
- Students create a 4th cotton ball model to explain initial states of matter.
    - This model must represent the state of matters found within stars, plasma.
    - Their models should include cotton ball particles, explanatory text, energy representations and how students think an object would move through the particles.

Resources:

- Plasma Article

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- Plasma Slideshow (Please note: there is a text bubble with 'WTF' pops up; no vulgar language is spelled out or spoken.)

Teacher Action(s):
- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):
- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE
Formative Monitoring Description(s) (Questioning / Discussion)
Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.
- ❏ SEP: Use models to describe phenomena.
- ❏ DCI: Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects.
- ❏ DCI: Measurements of a variety of properties can be used to identify materials.
- ❏ CCC: Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.
- ❏ CCC: Natural objects exist from the very small to the immensely large.

Summative Assessment Description(s):
- Students apply this new learning to the anchoring phenomenon by participating in the *Four Quadrants Strategy*
  - Remind students of the four videos from the *Spectacular Sights in the Sky Slideshow*
  - Ask students: How can you connect this new information to one of the four videos from the slideshow? Evidence of the states of matter is demonstrated in video ___ because ______.
    - Go to the corner of the room designated for your video selection choice, and discuss with peers that are there why you think the information applies to that video.
    - Teacher note: Students might be able to make an argument for Videos 2, 3 and 4 for this Learning Sequence.
- Students track their learning by adding any new information to the *Summary Table* and use information from the *Four Quadrants Strategy* to add ideas for revising the correlating initial model(s).
  - For example, for this Learning Sequence the group that created the initial model of the Super Blue Blood Moon (Video 1) most likely will not have any ideas to add to the 4th column of their Summary Table.

Resources:
- Four Quadrants Strategy

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- Spectacular Sights in the Sky Slideshow
- Summary Table

Optional - Elaborate Further / Reflect / Enrichment:

- Make oobleck and have students classify the properties they observe.

Additional Resources:

- G5 Unit Materials List 2020
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G5 U1A List
  - Includes ebooks and videos
  - Must have an educator user account for free access
- Teacher Resources
  - Total Lunar Eclipse Timelapse

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Learning Sequence 4		
Brief Description: In Learning Sequence 3, students will be working to answer the question ,"Everyone knows it is warmer in the summer than in the winter, but why is that?" Students will explore the relationships between the Earth's tilt, the location of the Earth in its relation to the sun, the angle of the sun's rays, the position of the sun in the sky, and the seasons. They will take a closer look at how the angle of the sun's rays cause seasons, and graph the data, and support their claims. Students will also examine sunsets and determine how the color changes based on the particles of matter and the angle of the sun. Students are given the opportunity to watch videos and read and discuss articles to help them to understand and process the phenomenon they are exploring. Lastly, students will revisit the initial question to design a model that demonstrates their conceptual understanding at the end of the unit.		
Suggested Timeframe: 6-7 hours		
Lesson-Level Phenomenon/Design Problem: Summer versus winter temperatures		
Relationship to Anchoring Phenomena/Design Problem: Understanding the relative positions of the sun, Earth, and moon is necessary in order to understand the spectacular sights in the sky.		
Learning Sequence Driving Question: Why is it warmer in the summer than in the winter?		
Student Expected Outcomes: ● Students will represent data in a graph to compare the similarities and differences of patterns of stars in the night sky to the rotation of Earth on its axis and its orbit around the Sun. ● Students will represent data in a graphical display to identify the patterns of similarities and differences related to the Earth's rotation (day and night). ● Students will make observations of the patterns of the sky at sunset and sunrise to serve as the basis of evidence that matter still exists.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Planning and Carrying Out Investigations** ● Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.	**Disciplinary Core Ideas:** **ESS1.B: Earth and the Solar System** ● The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.	**Crosscutting Concepts:** **Patterns** ● Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena.
Related Performance Expectation(s) in this Unit: ● 5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.		

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- [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.]
- [Assessment Boundary: Assessment does not include causes of seasons.]

Possible Common Core State Standards Connections:
ELA/Literacy -
- SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS1-2)

Mathematics -
- MP.2 Reason abstractly and quantitatively. (5-ESS1-2)
  MP.4 Model with mathematics (5-ESS1-2)
  5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5-ESS1-2)

Prior Student Knowledge:
1.ESS1.A ; **1.ESS1.B** ; **3.PS2.A**

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:
- Students are asked: Why is it warmer in the summer than in the winter?
- Students discuss in partnerships or small groups their ideas for answering the question.
- Independently, students complete Page #1 of the *Student Handout* to draw an initial model detailing their ideas. Be sure to use labels that explain their ideas.

Resources:
- Student Handout (Page 1)

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE #1 (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:
- Students work in pairs using the *Season simulator* and complete the *Simulator Handout.*
- An alternate version of this activity utilizing the *Seasons Interactive by McGraw Hill* (which requires Adobe Flash) is listed in the *Teacher Resources* at the bottom of this Learning Sequence.

Resources:
- Season simulator by Khan Academy
- Simulator Handout

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher

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- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN #1 (Concepts Explained / Vocabulary Defined)

Activity Description:

- Students watch ONE of the two videos listed in Resources and complete a *Video/Audio Response Sheet*.
- Using a jigsaw strategy, students work in small groups with each group reading ONE of the articles listed in Resources and completing a *Note Catcher handout.* Once they have gathered the information for their assigned article, each group creates a poster or Google slide to share with the class.
- Students share what they learned with the class.
- The teacher offers additional explanations or resources if needed to clarify student understanding (there are many good resources on epic! Books).

Resources:

- Videos (pick one):
  - Seasons and the Sun: Crash Course Kids video
  - Earth's Rotation & Revolution: Crash Course Kids video
- Video/Audio Response Sheet
- Note Catcher for Readings
- Articles:
  - The Science of the Seasons
  - Difference Between Earth's Rotation and Revolution
  - Newsela -On the first day of fall every place in the world gets 12 hours of sunlight
  - Newsela - Ever wondered why days get shorter in winter?

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: Earth's orbit, orbit, tilt, Earth's rotation, axis, annual, rotation, revolution

EXPLORE #2 (Lesson Description / Materials Needed / Probing or Clarifying Questions)

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Activity Description:

- Students investigate how the angle of the Sun impacts the temperature on Earth, which impacts our seasons. Students complete the *Science Experiment: Angle of the Sun and the Seasons activity*.
    - Students need to think about what type of data table they need.
    - They then use the data to help them explain the phenomena of the impact the Earth's tilt and the Sun's rays have on the seasons.

Resources:

- Science Experiment: Angle of the Sun and the Seasons activity (a desk lamp might be a better idea than the flashlight)

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN #2 (Concepts Explained / Vocabulary Defined)

Activity Description:

- The discussion should focus on questions 1-4 in the Conclusion section of the *Science Experiment: Angle of the Sun and the Seasons* website.
    1. Which "Sun" angle produced the higher temperature?
    2. Where on Earth do the Sun's rays hit the most directly year round?
    3. Where on Earth do the Sun's rays hit at an angle?
    4. Why do some areas of Earth receive direct rays and others angled rays?
    5. What would happen if the Earth were not tilted?

Resources:

- Science Experiment: Angle of the Sun and the Seasons activity

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

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EXPLORE #3 (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

- Students work in small groups to explore why the sky is red and orange at sunrise and sunset and connect this to what they have learned about the sun's angle and the tilt of Earth.
  - This will also start to connect their understanding that there are particles that are too small to be seen.
- Students are shown or given a copy of the *Directions* from the *Why is the Sky Blue?* website to perform this activity.
  - (Do NOT give the students the direct link to the experiment - it reveals too much information.)
- Students complete the *Explore #3 Activity Sheet* while performing the activity.

Resources:

- Directions
- Teacher Reference: Why Is the Sky Blue? (Do NOT give students the direct link to the experiment, as it reveals too much information)
- Explore #3 Activity Sheet

Teacher Action(s):

- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN #3 (Concepts Explained / Vocabulary Defined)

Activity Description:

- Students share their observations from the Explore #3 with each other.
- The teacher makes a class chart of what students noticed at each step of the experiment.
  - *Teacher Note: Use the information at the end of the Why Is the Sky Blue? experiment to help build an explanation of what happened during the experiment and how it connects to Earth's atmosphere and the Sun. You are emphasizing that the atmosphere has particles that are too small to be seen and how those particles change how we see light from the Sun.*
- Students view ONE of the *Explanation Videos Options* listed in Resources and complete a *Note Catcher Handout*
- Students read the *Why is the Sunset Red? Article* and complete a *Note Catcher Handout.*
  - *Teacher Note: This reading explains each part of why the sky is red at sunrise and sunset, including light, sun's angle and particles in the atmosphere. It may need teacher support to read or students can work in groups to pull out the information that they feel is most important to building their understanding.*

Resources:

- Teacher Information: Why Is the Sky Blue?
- Explanation Video Options:
  - Why does the sun appear red while rising and setting? (more grade appropriate)
  - Crash Course on Particles (this was shown in LS3, but may need to be revisited here to make connection)

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  - Why Is The Sunset Red? (very high level explanation)
- Why is the Sunset Red? Article (teacher may want to take digestible information from this article that suits students level of understanding)
- Note Catcher Handout

Teacher Action(s):
- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):
- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

ELABORATE

Activity Description:
- Students revisit the question from the Engage activity: Why is it warmer in the summer than in the winter?
- Independently, students complete Page #2 of the *Student Handout* to draw a labeled model detailing their ideas.
  - Students should think about all that they have learned. They can use their notes as a reminder. Remind them to think about temperature and the relative position of the sun and Earth during different seasons.
- Students complete a *Claim, Evidence, Reasoning (CER) Form* to build their explanation of WHY summers are warmer than winters.

Resources:
- Student Handout (Page 2)
- Claim, Evidence, Reasoning (CER) Form

Teacher Action(s):
- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):
- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

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Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ SEP: Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.
- ❏ DCI: The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.
- ❏ CCC: Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena.

Summative Assessment Description(s):

- Students' revised models from Elaborate.
- Students' CER from Elaborate.
- Students apply this new learning to the anchoring phenomenon by participating in the *Four Quadrants Strategy*
  - Remind students of the four videos from the *Spectacular Sights in the Sky Slideshow*
  - Ask students: How can you connect this new information to one of the four videos from the slideshow? Evidence of understanding the relative position of the sun, Earth and moon is demonstrated in video _____ because ______.
    - Go to the corner of the room designated for your video selection choice, and discuss with peers that are there why you think the information applies to that video.
    - Teacher note: Students might be able to make an argument for Videos 1 and 2 for this Learning Sequence.
- Students track their learning by adding any new information to the *Summary Table* and use information from the *Four Quadrants Strategy* to add ideas for revising the correlating initial model(s).
  - For example, for this Learning Sequence the group that created the initial model of the Videos 3 and 4 most likely will not have any ideas to add to the 4th column of their Summary Table.

Resources:

- Student Handout (Page 2)
- Claim, Evidence, Reasoning (CER) Form
- Four Quadrants Strategy
- Spectacular Sights in the Sky Slideshow
- Summary Table

Additional Resources:

- G5 Unit Materials List 2020
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G5 U1A List
  - Includes ebooks and videos
  - Must have an educator user account for free access
- Teacher Resources
  - Total Lunar Eclipse Timelapse
  - Seasons Interactive Activity by McGraw Hill
    - Students work in pairs using the *Seasons Interactive* website to complete the *Activity Sheet*.
    - Students record their observations.
    - Students discuss what they notice with their partners.
      - Sunlight angle
      - Position of Sun in the sky in the side box with house.
      - Locate the X on the Earth
      - Look at the tilt of Earth in relation to the Sun.
      - Point out the temperature.
        - *Teacher Note: An example of a student response of a pattern between the sun and the Earth and how it relates to the seasonal changes may*

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include : It makes sense that the season is winter because the Sun is in the right, the Sun is low, near the horizon, the temperature is halfway between cool and mild, and the sunlight angle is low.

Resources:

- Seasons Interactive by McGraw Hill
- Activity Sheet

Learning Sequence 5		
Brief Description: Students look at shooting stars, which are not stars but are meteors that enter the atmosphere and burn up creating the streak we see across the night sky. Despite the burning, the amount of matter in the meteor is conserved. This learning sequence helps students to understand that matter cannot disappear. Students will conduct experiments to determine that matter is conserved as it changes forms or is mixed. They will plan investigations, and make and record observations throughout each exploration lab/activity. Students will measure and collect data to make graphical representations of their findings. At the conclusion, students will be formally assessed on their understanding that matter is conserved through a writing task related to the burning of a meteor as it enters Earth's atmosphere.		
Suggested Timeframe: 5-6 hours		
Lesson-Level Phenomenon/Design Problem: Meteorites		
Relationship to Anchoring Phenomena/Design Problem: Shooting stars are not stars but are meteors that enter the atmosphere and burn up creating the streak we see across the night sky. Despite the burning, the amount of matter in the meteor is conserved.		
Learning Sequence Driving Question: Is matter lost or destroyed when a meteorite enters Earth's atmosphere?		
Student Expected Outcomes: ● Students will plan and conduct investigations involving changing states of matter and mixing substances to show conservation of matter. ● Students will make observations, collect and graph data using standard units of measurements to show cause and effect relationships.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Using Mathematics and Computational Thinking** ● Measure and graph quantities such as weight to address scientific and engineering questions and problems. **Planning and Carrying Out Investigations** ● Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. ● Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair	**Disciplinary Core Ideas:** **PS1.A: Structure and Properties of Matter** ● The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. ● Measurements of a variety of properties can be used to identify materials. **PS1.B: Chemical Reactions** ● No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.)	**Crosscutting Concepts:** **Scale, Proportion, and Quantity** ● Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. **Cause and Effect** ● Cause and effect relationships are routinely identified and used to explain change.

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tests in which variables are controlled and the number of trials considered. **Analyzing and Interpreting Data** ● Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships	● When two or more different substances are mixed, a new substance with different properties may be formed.	

Related Performance Expectation(s) in this Unit:

- 5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs
  when heating, cooling, or mixing substances, the total weight of matter is conserved.
  - [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances.]
  - [Assessment Boundary: Assessment does not include distinguishing mass and weight.]
- 5-PS1-3. Make observations and measurements to identify materials based on their properties.
  - [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.]
  - [Assessment Boundary: Assessment does not include density or distinguishing mass and weight.]
- 5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new
  substances.

Possible Common Core State Standards Connections:

ELA/Literacy -
- W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (5-PS1-2) (5-PS1-3) (5-PS1-4) (3-5-ETS1-3)
- W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (5-PS1-2) (5-PS1-3) (5-PS1-4) (5-ESS1-1) (3-5-ETS1-3)
- W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (5-PS1-2) (5-PS1-3) (5-PS1-4) (5-ESS1-1) (3-5-ETS1-3)

Mathematics -
- MP.2 Reason abstractly and quantitatively. (5-PS1-1) (5-PS1-2) (5-PS1-3) (5-ESS1-1) (5-ESS1-2) (3-5-ETS1-3)
- MP.4 Model with mathematics. (5-PS1-1) (5-PS1-2) (5-PS1-3) (5-ESS1-1) (5-ESS1-2) (3-5-ETS1-3)
- MP.5 Use appropriate tools strategically. (5-PS1-2) (5-PS1-3) (3-5-ETS1-3)

Prior Student Knowledge:

2.PS1.A ; **2.PS1.B**

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:
- Students watch the *Meteor flashes across the sky in Michigan – video (play on mute)*
- In their Science Journals, students create an initial model sketch to record their observations and thoughts on the following question:
  - What do you think just happened?
  - The teacher prompts students to sketch an initial model in their science journals showing what they think happens as it travels toward Earth or in Earth's atmosphere.
  - Students should consider elements of size, compositions, etc.

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- Students share their ideas with each other and class.
- The video is shown again and students can add to their initial model sketches.

Resources:
- Meteor flashes across the sky in Michigan – video (play on mute) video

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Teacher Note: Below are a variety of explorations to represent that matter can change and is defined by its physical or chemical properties. These activities can be introduced at separate times or combined into a station activity. If students run any of these activities they must be wearing safety goggles.

Activity #1: Lab - Fun with Phase Changes (Melting and Mass Activity)
- Teachers allow students to explore the idea that mass of ice doesn't change when it melts into a liquid (using water as the example).
- Students make observations and collect data (measurements of mass) in science journals.

Activity #2: Lab - Exploring Mixtures vs Solutions: What happens when you mix substances together?
- Students mix various solids and liquids together to form mixtures (can be separated into original parts) and solutions (can not be separated into original parts)
  - Mixtures: water and sand, trail mix
  - Solutions: milk and water, water and salt
- Students weigh objects before mixing and after mixing to demonstrate conservation.
- Students question whether or not the items mixed could be separated and if so how?
- Students represent their weight data in a graphical display (pie chart/bar graph/pictograph).
- Optional: Students record data over time of the salt/water solution

Activity #3: Chemical Reaction Demo - Magic Inflating Balloons:
- *Magic Inflating Balloons Demonstration Procedure* (if unable to use latex balloons - show video of experiment or use non-latex glove and wide mouth jar with a rubber band to seal))
- Weigh all material before beginning the experiment
- Weigh material after the experiment to show conservation of matter
  - *Teacher Note: Explain that the gas is contained in the balloon; therefore we could measure the mass; however if we didn't have the balloon, the gas would combine with the air*
- Students represent their weight data in a graphical display (pie chart/bar graph/pictograph).

Activity #4: Chemical Reaction Demo - Elephant Toothpaste:
- *Students should not do this as an experiment - Demonstration Only.*
- Weigh all materials before beginning the experiment
- Students record observations during the experiment in science journal
- Weigh material after the experiment to show the conservation of matter
- Students use their observations, data, and prior knowledge to explain any discrepancies in the difference of weight

Resources:
- Magic Inflating Balloons Demonstration Procedure

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- Elephant Toothpaste Demonstration

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):
- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)
Activity Description:
- Students complete a *Claim Pass Activity* with the claim being:
  - Matter can be conserved
  - In order to provide evidence for their claim, students research on CK-12, Epic Books, or any other teacher approved media resource.
- The teacher makes copies of the groups' claims with evidence for students to use when individually writing their own responses for an assessment.
- As a class discuss their evidence. Be sure that they have included:
  - the amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish.
  - No matter what reaction or change in properties occurs, the total weight of the substances does not change.
  - Measurements of a variety of properties can be used to identify materials.
  - When two or more different substances are mixed, a new substance with different properties may be formed.

Resources:
- Claim Pass Activity
- epic! Books Collection (To access this collection - be sure to sign in to epic! before clicking on the link)
  - This is a wide assortment of topics for this unit, the teacher may choose relevant books to use for research

Teacher Action(s):
- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):
- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

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Vocabulary: weight, substance, matter, temperature, mixing, phase change, dissolving, properties, reaction, gas, solid, liquid, change of state, absorbency, evaporate, vapor, conservation of matter, dissolve, product, substance, particles, mass, volume, density, mixture, solution, gram(s), physical change, chemical change

ELABORATE (Applications / Extensions)

Activity Description:

Activity #1:

- Teacher tells students: You were carrying some different bags of materials when you accidentally dropped the bags and the contents spilled all over the ground. The materials got all mixed together, but you need them separated.
- In small groups, students devise a plan for separating out the materials.
  - Students are given
    - a weighted sample of the mixture of gravel, salt, sand, and iron filings
    - a toolbox that contains: goggles, sifter, tweezers, magnifying glass, eye dropper,and a magnet.
- Groups carry out their plans to separate the materials into smaller containers.
- Students record observations and record a weight for each material.
  - Students are prompted to represent the weight data in a graphical display (pie chart/bar graph/pictograph).
- As a class, students reflect on their investigative plans to determine failure points or difficulties, which suggest the elements of the plan design that need to be improved and make then revise their plans to determine which plan will solve the problem.

Activity #2:

- Show the *Meteor flashes across the sky in Michigan – video (play on mute) video* from Engage once again.
- Ask students how the information discovered in this sequence can now be applied to the meteor.
  - Does the amount of mass change as it enters the Earth's atmosphere?
    - If necessary, quickly explain the difference between a meteoroid, meteor and meteorite. The following video may help:
      - *What's the Difference Between a Meteoroid, a Meteor, and a Meteorite?*
  - Help students to understand that the size of the meteor may change as it travels to Earth, but the pieces that burned off are still present in the atmosphere or even make it to Earth's surface.
  - If we were able to observe a meteor traveling to Earth and collect all of the gases and fragments, the mass at the start and end would be the same. Meteors have unique physical properties that can be used to help identify it from an Earth rock.
  - Matter is conserved and does not disappear. It just changes its shape or form. Just as the matter in the Elaborate challenge.

Resources:

- Meteor flashes across the sky in Michigan – video (play on mute) video
- What's the Difference Between a Meteoroid, a Meteor, and a Meteorite?

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence

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- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)
Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ SEP: Measure and graph quantities such as weight to address scientific and engineering questions and problems.
- ❏ SEP: Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.
- ❏ SEP: Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.
- ❏ SEP: Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships
- ❏ DCI: The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish.
- ❏ DCI: No matter what reaction or change in properties occurs, the total weight of the substances does not change.
- ❏ DCI: Measurements of a variety of properties can be used to identify materials.
- ❏ DCI: When two or more different substances are mixed, a new substance with different properties may be formed.
- ❏ CCC: Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.
- ❏ CCC: Cause and effect relationships are routinely identified and used to explain change.

Summative Assessment Description(s)

- Students apply this new learning to the anchoring phenomenon by participating in the *Four Quadrants Strategy*
  - Remind students of the four videos from the *Spectacular Sights in the Sky Slideshow*
  - Ask students: How can you connect this new information to one of the four videos from the slideshow? Evidence of conservation of matter and properties of matter is demonstrated in video ___ because ______.
    - Go to the corner of the room designated for your video selection choice, and discuss with peers that are there why you think the information applies to that video.
    - Teacher note: Students might be able to make an argument for Video 4 for this Learning Sequence.
- Students track their learning by adding any new information to the *Summary Table* and use information from the *Four Quadrants Strategy* to add ideas for revising the correlating initial model(s).
  - For example, for this Learning Sequence the group that created the initial model of the Super Blue Blood Moon, Aurora and Solar Eclipse (Videos 1, 2, and 3) most likely will not have any ideas to add to the 4th column of their Summary Table.
  - Students are asked to add specific details about the matter and the amount of matter from start to finish of a meteorite/shooting star. Specifically, students are asked to include the crosscutting concepts-Scale, proportion, and quantity and cause and effect in their explanations.)

Resources:

- Four Quadrants Strategy
- Spectacular Sights in the Sky Slideshow
- Summary Table

Additional Resources:

- G5 Unit Materials List 2020
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G5 U1A List
  - Includes ebooks and videos

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- Must have an educator user account for free access
- Teacher Resources
  - Total Lunar Eclipse Timelapse

Learning Sequence 6		
Brief Description: In this sequence, students will draw an explanatory model of the positioning of the Earth, sun, and moon in our solar system. Students will do a gallery walk, commenting on each other's models. Students will then participate in a demonstration, illustrating the different moon phases. Using their moon journals, students will then graph quantities of the moon phases and explore patterns in the way the earth and moon orbit. Next, students will be creating a 3D model of the rotations and revolutions of the Earth, Moon and Sun. Students will read articles and watch videos to further their understanding of the moon phases, as well as the occurrence of both a blue moon and a super moon. Students will revisit and revise their models from the beginning of the sequence in order to demonstrate new learning. Lastly, students will add new learning to their summary tables and make connections to the phenomenon.		
Suggested Timeframe: 3-4 hours		
Lesson-Level Phenomenon/Design Problem: What causes the phases of the moon?		
Relationship to Anchoring Phenomena/Design Problem: There are several phases of the moon. The full moon phase is directly related to the super blue blood moon.		
Learning Sequence Driving Question: What causes the moon to appear to have different phases?		
Student Expected Outcomes: • Students will graph quantities of moon phases to explore similarities and differences and patterns of the way the Earth and Moon orbit.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Planning and Carrying Out Investigations** • Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. **Analyzing and Interpreting Data** • Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. **Developing and Using Models** • Use models to describe phenomena.	**Disciplinary Core Ideas:** **ESS1.B: Earth and the Solar System** • The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2) **ETS1.B: Developing Possible Solutions** • Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. **ETS1.C: Optimizing the Design Solution**	**Crosscutting Concepts:** **Patterns** • Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena. **Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change.

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	● Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	

Related Performance Expectation(s) in this Unit:

- 5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.
  - [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.]
  - [Assessment Boundary: Assessment does not include causes of seasons.]
- 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to
  identify aspects of a model or prototype that can be improved.

Possible Common Core State Standards Connections:

ELA/Literacy -

- SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS1-2)
- W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (3-5-ETS1-3)
- W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (3-5-ETS1-3)
  W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (3-5-ETS1-3)

Mathematics -

- MP.2 Reason abstractly and quantitatively. (5-ESS1-2; 5-ESS1-3)
- MP.4 Model with mathematics (5-ESS1-2; 5-ESS1-3)
- MP.5 Use appropriate tools strategically. (3-5-ETS1-3)
- 5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5-ESS1-2)

Prior Student Knowledge:

5-ESS1-2: 1.ESS1.A; 1.ESS1.B; 3.PS2.A
3-5-ETS1-3: K-2.ETS1.A; K-2.ETS1.C

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description:

- Students draw an initial explanatory model using the Earth, Moon and Sun to represent their positioning in the solar system. Students make a "gotta have it" checklist in order to determine what information should be included in their model.
  - *Teacher Note: This activity should be purely student driven as students will be revising their models as they obtain more information throughout the lesson sequence.*
- Students participate in a Gallery Walk showcasing their initial explanatory models.
- Each student writes a comment or recommendation and question for each model on the *I Notice, I Wonder*.
- Students review their feedback.
  - Students are reminded not to make changes to their models as they will have an opportunity to revise it in later lessons.

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Resources:
- I Notice, I Wonder

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, "Why did this happen?" "What do I already know about this?" "What can I find out about this?"
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

Activity #1: Moon Phase Demonstration
- Select a dark room for this activity and move desks and other objects out of the way so that students can move around the room freely. Place the lamp in the middle of the room.
- Use the *Moon Phases Demonstration* as a guide.
    - Each student pokes a pencil into their 5 cm white styrofoam sphere. Students will hold the pencil in one hand - it should look like a big lollipop.
    - The teacher explains to students that the bulb is the Sun, each of their spheres is the Moon and each student is Earth.
    - Students rotate around the room for each of the phases described in the *Moon Phases Demonstration.*
        - Students are reminded that what they are doing in 30 minutes takes the Moon about 30 days to do: complete one full circle around Earth.

Activity #2: Moon phase journal
- Students use the *Moon Phase Journal* they created prior to the learning sequence with the phase of the moon from each day. If students are missing information or could not see the moon they can fill in missing information using the *Moon Phase Calculator*.
- Students label each drawing with the appropriate phase name that they learned during the activity.
- Students use the log to graph the number of occurrences for each phase for the month with a partner - they may use the *Google Doc Graph Template* or create their own.
    - *Teacher Note: To use the template, make a copy and then click on the link in the upper right hand corner of the blue box. You may need to click "update" Select, "open source" and input data).*
    - *You can also make your own chart in a spreadsheet.*
- Students combine two partner groups to form a larger group. The group discusses patterns that they observe, similarities and differences in their graphs, what data repeats, how long each of the phases lasts, the order phases occur, etc.
    - Based on their group discussions, students:
- Students record their thinking in their science journal as they will subsequently apply their learning in order to revise their models.

Resources:
- Moon Phases Demonstration
- Moon Phase Journal
- Moon Phase Calculator
- Google Doc Graph Template

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher

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- Observes and listens to the students as they interact
- Asks probing questions to redirect the students' investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):

- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

- Using the template provided (*Moon, Sun and Earth- 3D Model template*), students create a 3D model of the rotations and revolutions of the Earth, moon and sun.
    - They color the pieces before cutting and putting together the parts with the brads.
- Once all models are made, the teacher asks how the students think the different parts move.
- Students are given a few minutes to use the model to help them answer the question.
- Students are given time to watch the video (*Moon Phases- Crash Course Video*) and complete the readings (listed below) to help clear up misconceptions and help them to explain their thinking.
- Students take notes in their science journals or use the *Note Catcher Document*.
    - *Teacher Note: It is important that students know what both a Super Moon and Blue Moon are to understand the phenomenon of a super blue blood moon but they do not need to go in depth.*
- Students use their findings to re-examine the question and use their models to demonstrate their understanding of revolution and rotation.
- Students share what they learned in a class discussion and the teacher offers further explanations as needed.
- Students revisit their initial models from Engage, and discuss how this new learning applies. If time allows (and the teacher feels it's relevant) students can revise those initial models to include new learning.

Resources:

- Moon, Sun and Earth- 3D Model template from Better Lesson
- Moon Phases- Crash Course Video
- Readings:
    - Moon Phases Quick Read and Answer (lower level reading)
    - What is a Blue Moon?
    - Moon Distance -Students can determine days of "blue moons"
    - What is a Super Moon?
- Note Catcher Document

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations
- Questions others' explanations

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- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: moon's phases, rotation, revolution, axis, solar system, orbit

ELABORATE (Applications / Extensions)

Activity Description:

- Students use a second Moon Phase Calendar, and the teacher uses the calculator to give students the current phase and how long the moon has been in that phase. Students then fill out the next month's calendar in order to predict when the next round of each phase will begin.
- Class uses the *Pattern Crosscutting Concept Car*d to identify and discuss patterns they observe.

Resources:

- Moon Phase Calendar
- Moon Phase Journal
- Crosscutting Concept (CCC) Cards

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

Elaborate Further / Reflect / Enrichment

Activity Description:

- Thinking back to meteors, show students the meteor shower or shooting star data.
- Allow the students to engage with the data independently and then in small groups. Have students create "I notice" statements from the data.
  - Allow the students to share their observations with small groups or the class.
  - After listening and engaging in the conversations, ask the students to respond to the questions below the data table.
  - Prompt the students to identify if shooting stars have a predictable pattern, much like seasons, day and night, and moon phases.
  - Provide a forum for students to share their responses. The focus of the conversation should be on the patterns related to shooting stars.
  - Students should correctly identify that shooting stars occur around the same place and time annually, and that they can be predicted on a calendar.
- After the discussion, introduce the concepts of meteors and meteor showers. If time, Provide some additional reading opportunities on the topic. CK-12: Meteors

Resources:

- Shooting Star Data
- CK-12: Meteors
- Additional Teacher Resources:

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- Predicting Meteor Showers,
- National Geographic Video

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

- ❏ SEP: Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.
- ❏ SEP: Represent data in graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.
- ❏ DCI: The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.
- ❏ DCI: Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.
- ❏ DCI: Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.
- ❏ CCC: Similarities and differences in patterns can be used to sort, classify, communicate and analyze simple rates of change for natural phenomena.

Summative Assessment Description(s)

- Students apply this new learning to the anchoring phenomenon by participating in the *Four Quadrants Strategy*
    - Remind students of the four videos from the *Spectacular Sights in the Sky Slideshow*
    - Ask students: How can you connect this new information to one of the four videos from the slideshow? Evidence of moon phases is demonstrated in video ___ because ______.
        - Go to the corner of the room designated for your video selection choice, and discuss with peers that are there why you think the information applies to that video.
        - Teacher note: Students might be able to make an argument for Videos 1 and maybe even 3 if they only look at positional information of the sun, Earth and moon for this Learning Sequence.
- Students track their learning by adding any new information to the *Summary Table* and use information from the *Four Quadrants Strategy* to add ideas for revising the correlating initial model(s).
    - For example, for this Learning Sequence the group that created the initial model of the Aurora and meteorite (Videos 2 and 4) most likely will not have any ideas to add to the 4th column of their Summary Table.

Resources:

- Four Quadrants Strategy
- Spectacular Sights in the Sky Slideshow
- Summary Table

Additional Resources:

- G5 Unit Materials List 2020
    - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G5 U1A List
    - Includes ebooks and videos
    - Must have an educator user account for free access
- Teacher Resources
    - Total Lunar Eclipse Timelapse

Learning Sequence 7		
Brief Description: In this learning sequence, students begin by viewing two images, one of a lunar eclipse and one of a solar eclipse. Students use a discussion diamond to begin exploring what causes an eclipse. Students have an opportunity to build a model of the Earth, sun, and moon to manipulate both types of eclipses. Students demonstrate their learning and understanding by creating a cause and effect chart for both a solar eclipse and lunar eclipse. After completing a gallery walk of charts, students are able to modify charts if needed and write an explanation of solar and lunar eclipses. To end the sequence, students return to the original phenomenon and follow a "write and pass" protocol explaining how and why one of the spectacular sights from Learning Sequence 1's Engage slideshow occurred. At the end of the write and pass, students refine their statements. Finally, students update their summary table to include all learning.		
Suggested Timeframe: 5-6 hours for 5E 3-4 hours for Culminating Performance Task		
Lesson-Level Phenomenon/Design Problem: Solar and Lunar Eclipses		
Relationship to Anchoring Phenomena/Design Problem: The combination of a full moon and a lunar eclipse creates the phenomenon of the super blue blood moon.		
Learning Sequence Driving Question: Why does the super blue blood moon occur?		
Student Expected Outcomes: ● Students will develop a model to explain the cause and effect relationship between the positions of the Earth, Moon and Sun. ● Students will support an argument based on evidence about solar and lunar eclipses.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **Planning and Carrying Out Investigations** ● Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. **Engaging in Argument from Evidence** ● Support an argument with evidence, data, or a model. **Developing and Using Models** ● Use models to describe phenomena.	**Disciplinary Core Ideas:** **ESS1.B: Earth and the Solar System** ● The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2) **ETS1.B: Developing Possible Solutions**	**Crosscutting Concepts:** **Scale, Proportion, and Quantity** ● Natural objects exist from the very small to the immensely large. ● Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. **Cause and Effect** ● Cause and effect relationships are routinely identified and used to explain change. **Patterns** ● Similarities and differences in patterns can be used to sort, classify, communicate and analyze

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	• Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. **ETS1.C: Optimizing the Design Solution** • Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.	simple rates of change for natural phenomena.

Related Performance Expectation(s) in this Unit:

- 5-ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.
    - [Clarification Statement: Examples of patterns could include the position and motion of Earth with respect to the sun and selected stars that are visible only in particular months.]
    - [Assessment Boundary: Assessment does not include causes of seasons.]
- 3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to
  identify aspects of a model or prototype that can be improved.

Possible Common Core State Standards Connections:

ELA/Literacy -

- SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-ESS1-2)
- W.5.7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (3-5-ETS1-3)
- W.5.8 Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (3-5-ETS1-3)
- W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (3-5-ETS1-3)

Mathematics -

- MP.2 Reason abstractly and quantitatively. (5-ESS1-2; 5-ESS1-3)
- MP.4 Model with mathematics (5-ESS1-2; 5-ESS1-3)
- MP.5 Use appropriate tools strategically. (3-5-ETS1-3)
- 5.G.A.2 Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation. (5-ESS1-2)

Prior Student Knowledge:
5-ESS1-2: 1.ESS1.A; 1.ESS1.B; 3.PS2.A
3-5-ETS1-3: K-2.ETS1.A; K-2.ETS1.C

LESSON PLAN – 5-E Model

ENGAGE (Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions)

Activity Description

- Students view a split image.
- Students are organized into groups of 4-5 students with an *I Notice, I Wonder* sheet.

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- Teacher gives students a few minutes to observe the pictures and poses the question: What are you seeing?
- Class discusses their ideas.

Resources:
- Split Image
- I Notice, I Wonder

Teacher Action(s):
- Creates interest
- Generates curiosity
- Raises questions
- Elicits responses that uncover what the students know or think about the concept

Student Action(s):
- Asks questions such as, “Why did this happen?” “What do I already know about this?” “What can I find out about this?”
- Shows interest in the topic

EXPLORE (Lesson Description / Materials Needed / Probing or Clarifying Questions)

Activity Description:

Day #1 Activity:
- Students build a model of the sun, Earth, and moon that allows them to manipulate and demonstrate an eclipse following the *Eclipses in the Classroom* portion of the *Creating Eclipses in the Classroom - Model lesson*.

Day #2 Activity:
- Students complete the *Using The Models* portion of the *Creating Eclipses in the Classroom - Model Lesson* to demonstrate how solar and lunar eclipses occur.
- They experiment and discover resulting phenomena based on the positioning of the sun, moon, and Earth.
- Students are given the opportunity to share out with other groups to explain findings.
    - If students are unable to determine the correct positioning, the teacher guides them to an accurate depiction of both the solar and lunar eclipse.

Resources:
- Creating Eclipses in the Classroom - Model lesson

Teacher Action(s):
- Encourages the students to work together without direct instruction from the teacher
- Observes and listens to the students as they interact
- Asks probing questions to redirect the students’ investigations when necessary
- Provides time for the students to puzzle through problems
- Acts as a consultant for students

Student Action(s):
- Thinks freely, within the limits of the activity
- Test predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others
- Records observations and ideas
- Suspends judgement

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EXPLAIN (Concepts Explained / Vocabulary Defined)

Activity Description:

Activity #1:

- Students read a selection of articles (teacher discretion) and watch a short video to develop some background knowledge about eclipses (Students may use the below links OR other informational text provided by the teacher)
- Teacher uses a jigsaw strategy (if preferred) and has each group read one article and share out to the class.
- Students complete a *Note Catcher Document* as they read, view the video, and hear information from other groups.

Activity #2:

- Students build on knowledge from their exploration of solar and lunar eclipses. Based on the information gathered in their non-fiction reading, hands-on lab, and interactive activity, students complete a cause and effect chart in order to demonstrate their understanding of eclipses.
- Students complete a *Cause and Effect graphic organizer* (one for solar and one for lunar).
    - If this template is not preferable, then they can create their own version.
- Students set up their cause and effect organizers on desks/tables for a silent gallery walk.
    - *Teacher Information:*
        - *Solar eclipse*
            - *Cause: Sun, Moon, Earth align, new moon phase*
            - *Effect: Moon blocks sunlight/Earth moves into the moon's shadow, ring of fire (corona) appears*
        - *Lunar eclipse*
            - *Cause: sun, Earth, moon align, full moon phase*
            - *Effect: Earth* blocks sunlight/moon moves into Earth's shadow, moon turns red

Activity #3:

- Students make modifications to their Cause and Effect organizer based on comments/suggestions given during the gallery walk.
- Students take their Cause and Effect organizer and complete a short written response (*Eclipse Cause and Effect Written Response*) explaining solar and lunar eclipses.
    - Students may use the *Cause and Effect Transition Word List* to help with writing fluency

Resources:

- Eclipse Resources:
    - What's the difference between a solar and lunar eclipse?
    - What is an eclipse?
    - Lunar and Solar Eclipses
    - NASA - Lunar Eclipses and Solar Eclipses
    - Video - Crash Course - Eclipses
- Note Catcher Document
- Cause and Effect graphic organizer
- Eclipse Cause and Effect Written Response
- Cause and Effect Transition Word List

Teacher Action(s):

- Encourages the students to explain concepts and definitions in their own words
- Asks for justification (evidence) and clarification from students
- Formally provides definitions, explanations, and new labels
- Uses students' previous experiences as the basis for explaining concepts

Student Action(s):

- Explains possible solutions or answers to others
- Listens critically to others' explanations

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- Questions others' explanations
- Listens to and tries to comprehend explanations the teacher offers
- Refers to previous activities
- Uses recorded observations in explanations

Vocabulary: atmosphere, moon phases, Earth's orbit, orbit, moon's orbit, phase, solar, lunar, tilted, lunar phase, rotation, revolution

ELABORATE (Applications / Extensions)

Activity Description:

- Students watch the original Video #1 from the *Spectacular Sights in the Sky Slideshow*
- Students watch the video a second time and complete a *Write and Pass activity*.
- Students have the option to rewrite a statement, making it sharper and clearer.
- Students share their information with the class.

Resources:

- Spectacular Sights in the Sky Slideshow (video #1)
- Write & Pass Activity

Teacher Action(s):

- Expects the students to use formal labels, definitions, and explanations provided previously
- Encourages the students to apply or extend the concepts and skills in new situations
- Reminds the students of alternate explanations
- Refers the students to existing data and evidence and asks "What do you already know?", Why do you think…?

Student Action(s):

- Applies new labels, definitions, explanations, and skills in new but similar situations
- Uses previous information to ask questions, propose solutions, make decisions, and design experiments
- Draw reasonable conclusions from evidence
- Records observations and explanations
- Checks for understanding among peers

EVALUATE

Formative Monitoring Description(s) (Questioning / Discussion)

Formative monitoring will occur at various times throughout this learning sequence. Please note the following SEP, DCI and CCC needs to be monitored throughout the learning sequence.

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- ❏ SEP: Support an argument with evidence, data, or a model.
- ❏ DCI: The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year.
- ❏ DCI: Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.
- ❏ DCI: Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.
- ❏ CCC: Cause and effect relationships are routinely identified and used to explain change.

Summative Assessment Description(s)

- Students apply this new learning to the anchoring phenomenon by participating in the *Four Quadrants Strategy*
  - Remind students of the four videos from the *Spectacular Sights in the Sky Slideshow*
    - Ask students: How can you connect this new information to one of the four videos from the slideshow? Evidence explaining the differences between lunar and solar eclipses is demonstrated in video ___ because ______.
      - Go to the corner of the room designated for your video selection choice, and discuss with peers that are there why you think the information applies to that video.
      - Teacher note: Students might be able to make an argument for Video 3 for this Learning Sequence.
  - Students track their learning by adding any new information to the *Summary Table* and use information from the *Four Quadrants Strategy* to add ideas for revising the correlating initial model(s).
    - For example, for this Learning Sequence the group that created the initial model of the Aurora, blue blood moon, or meteorite (Videos 1, 2, or 4) most likely will not have any ideas to add to the 4th column of their Summary Table.

Resources:
- Four Quadrants Strategy
- Spectacular Sights in the Sky Slideshow
- Summary Table

Culminating Performance Task:
- Students will create an explanatory commentary to narrate one of the four videos (does not need to be the entire video) from the *Spectacular Sights in the Sky Slideshow*, using their learning from the Unit (referring to their now complete Summary Tables).
- Their narrative should include vocabulary, new ideas and explanations of all necessary/relevant information to explain their chosen phenomenon.
  - *Teacher Note:*
    - *If the school has access to audio recorder it can be done using this application*
    - *If the school does not have access to an audio recorder, students can read orally as the video plays or write their narrative to be shared with the class.*

Resources:
- Spectacular Sights in the Sky Slideshow

Additional Resources:
- G5 Unit Materials List 2020
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G5 U1A List
  - Includes ebooks and videos
  - Must have an educator user account for free access
- Teacher Resources
  - Total Lunar Eclipse Timelapse

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Elementary Science

Grade 3: Grand Canyon Seashells
Grade 4: Energizing Everything
Grade 5: Spectacular Sights in the Sky

Curriculum and Instruction Committee Presentation

New to Grade 3- Grand Canyon Seashells

Unit Driving Question: How did ocean creature fossils end up in the Grand Canyon?

The students, as secret agents from the environmental archeology division, will make observations and ask questions about the seemingly odd marine fossils found in the Grand Canyon. Over the course of the unit, students will define how this odd phenomenon came to be.

G3 U2 - *Changes to Organisms' Environments:* Grand Canyon Seashells

LS1
Introduction to the anchor phenomenon

How did ocean creature fossils end up in the Grand Canyon?

LS2
Common ancestry and diversity

LS3
Biodiversity

Culminating Performance Task

Final report that compiles all scientific evidence collected to explain the misplaced fossils.

LS4
Weather and climate

LS5
Weather related hazards and engineering

LS6
Environmental changes

New to Grade 4- Energizing Everything

Unit Driving Question: What makes a chain reaction keep going?

In this unit, students explore energy. Students investigate how energy is stored, how it can make objects move, and how collisions transfer energy between objects. Students also construct devices that convert energy from one form into another, such as heat into motion and electricity into light.

Grade 4 Unit 3: *Energizing Everything*

Lesson 1
How is your body similar to a car?

Lesson 2
What makes roller coasters go so fast?

Lesson 3
Why is the first hill of a roller coaster always the highest?

Lesson 4
Could you knock down a building using only dominoes?

Lesson 5
Can you build a chain reaction machine?

Lesson 6
What if there were no electricity?

Lesson 7
How long did it take to travel across the country before cars and planes?

Lesson 8
Where does energy come from?

Culminating Task: students will design a Rube Goldberg machine that utilizes energy transfers and conversions to turn on a flashlight.

New to Grade 5- Spectacular Sights in the Sky

Unit Driving Question: How can we explain these spectacular sights?

Students are introduced to the phenomena of the Spectacular Sights in the Sky through a series of four videos. Students develop questions during this sequence that they will look to answer during the course of the unit. Students also develop a model of how they think one of the phenomena occurs. This model will be revised later in the unit.

Students explore the characteristics of stars and note the brightness of stars. Students will also explore the relationships between the Earth's tilt, the location of the Earth and its relation to the sun and the seasons.

G5 U1 - *Scale, Proportion, and Quantity:* Spectacular Sights in the Sky

LS1
Introduction to the anchor phenomenon

How can we explain these spectacular sights?

LS2
Apparent brightness

LS3
Structure and properties of matter

Culminating Performance Task

Students create a narrative commentary explaining their chosen phenomenon

LS4
Patterns caused by orbits of Earth around the sun and of the moon around Earth

LS5
Conservation of matter

LS6
Moon phases

LS7
Solar and lunar eclipses

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ______________________ **Board Meeting Date** **December 8, 2022**

Decision Requested X **Agenda Code** 9 m.

AGENDA REPORTING FORM

Agenda Topic: Science Grade 7 Unit 3: Ecosystem Dynamics - Second Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed Science Grade 7 Unit 3: Ecosystem Dynamics

Background: ____

____

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: The Board of Education Curriculum & Instruction Committee is bringing the Science Grade 7 Unit 3: Ecosystem Dynamics to the full Board for a Second Reading.

Titles of Attachments:

1. Course Proposal

Frank Pepe

Signature of Staff Member Submitting Report

Steven Madancy

Signature of Superintendent of Schools

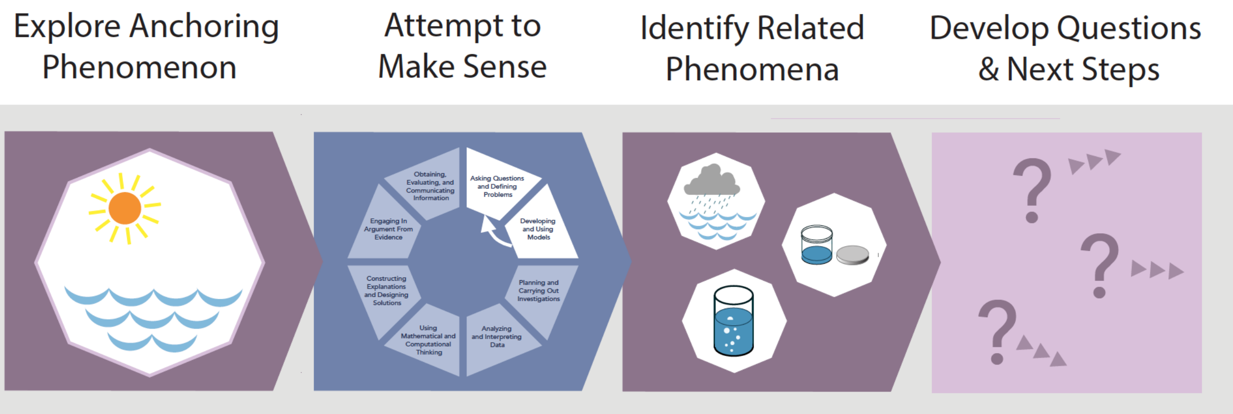
Unit Overview	
Unit Title:	Ecosystem Dynamics
Author(s):	Brett Wojtkowski & Monica Costa
Grade Level/Course:	Grade 7/Science
Length/Dates:	9 weeks, approximately timeline is for April - June
Unit Summary: 2-4 sentences describing the main ideas, content and skills of the unit.	This unit on ecosystem dynamics and biodiversity begins with students reading headlines that claim that the future of orangutans is in peril and that the purchasing of chocolate may be the cause. Students then examine the ingredients in popular chocolate candies and learn that one of these ingredients--palm oil--is grown on farms near the rainforest where orangutans live. They will figure out that palm oil is derived from the oil palm trees that grow near the equator, and that these trees are both land-efficient and provide stable income for farmers, factors that make finding a solution to the palm oil problem more challenging. Students work to design an oil palm farm that simultaneously supports orangutan populations and the income of farmers and community members.

Performance Expectations
MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. MS-LS2-4: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. MS-LS2-5: Evaluate competing design solutions for maintaining biodiversity and ecosystem services. MS-ESS3-3: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

SEP Implications (Science and Engineering Practices)	**DCI Implications (Disciplinary Core Ideas)**	**CCC Implications (Cross Cutting Concepts)**
Asking Questions and Defining Problems ● A practice of science is to ask and refine questions that lead to descriptions and	**LS2.A Interdependent Relationships in Ecosystems** ● Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. ● In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited	**Cause and Effect** ● Events have causes, sometimes simple, sometimes multifaceted.

explanations of how the natural and designed world works and which can be empirically tested. **Mathematics and Computational Thinking** • In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; statistically analyzing data; and recognizing, expressing, and applying quantitative relationships. **Constructing Explanations and Designing Solutions** • The products of science are explanations and the products of engineering are solutions.	resources, access to which consequently constrains their growth and reproduction. • Growth of organisms and population increases are limited by access to resources. • Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and non-living, are shared. **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** • Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. • Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. **LS4.D: Biodiversity and Humans** • Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. **ESS3.C: Human Impacts on Earth Systems** • Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. **ETS1.A: Defining and Delimiting Engineering Problems** • The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. Students use criteria and constraints, based on the science and engineering ideas developed in the unit, with a particular attention to what land-use strategies work for different stakeholders and the limits of their application.	Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering. **System and System Models** • A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems. **Stability and Change** • For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand. **Patterns** • Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.

Phenomenon



Explore Anchoring Phenomenon: We read headlines that claim that our candy-buying habits could affect orangutan populations in the wild.

Attempt to Make Sense: We examine candy ingredients and realize that one ingredient, palm oil, is produced in the same location in which orangutans live

Identify Related Phenomena: Students think about other examples where changing one component in an ecosystem affected the living things in the ecosystem

Develop Potential Student Questions (See Jamboard)

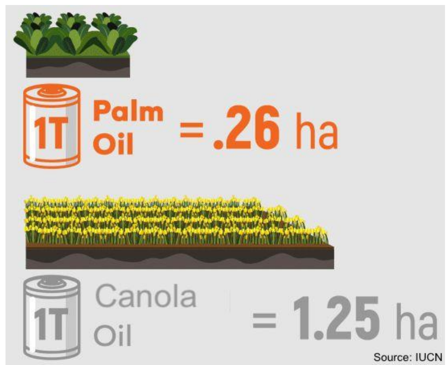
Sample Explanation:

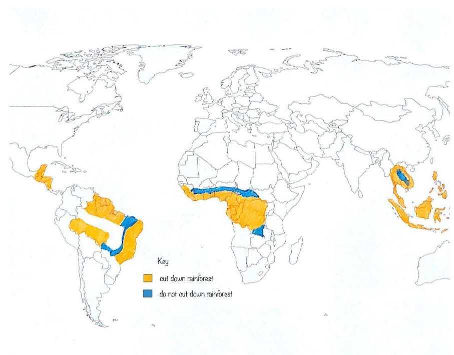
- By the end of the first lesson set (Lessons 1-5), students will be able to investigate their initial questions associated with the related phenomena, “How could buying candy affect orangutan populations in the wild?” Students will realize that the problem is more complicated than it initially appears.
- By the end of the second lesson set (Lessons 6-10), students will be able to define the problem and criteria and constraints for solutions, one of which is to maintain orangutan populations. This motivates a series of lessons to explore the connection between resource availability and population size.
- By the end of the third lesson set, (Lessons 11-13), students explore resource availability but in the context of systems, namely the rainforest system and oil palm system. Students consider how disruptions to key resources in these systems (i.e.,

fruit trees, oil palm) impact other populations in the system and develop ideas about biodiversity, disruptions, and monocrop agriculture.
- By the end of the fourth lesson set, (Lessons 14-19), students investigate better ways to grow food that support both farmers and other living things. They apply these ideas to develop and evaluate palm oil farm designs. Lessons 19 is a pathway that extends the unit to communicate about the problem to one's community.

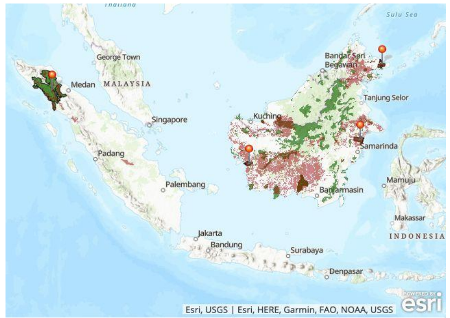
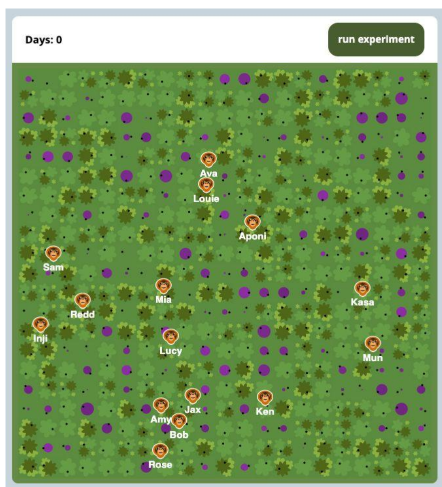
Resources:
- Driving Question Board
- Question Formulation Technique (QFT)
- KQL
- Talk Activities
- Summary Table
- Final Scientific Modeling
- Final Scientific Modeling
- CCC Discussion Cards
- 321 Strategy active viewing
- 60 Formative Assessment Ideas
- CER

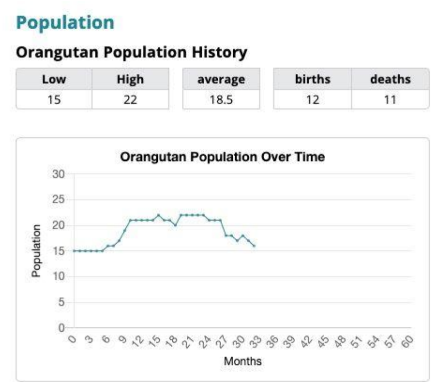
Driving Questions	Lesson Level Phenomena	Activity	What Should They Learn/Expected Outcome
Learning Sequence 1 (Lessons 1-5):			
Lesson 1: How could buying candy affect orangutan populations in the wild? OpenSciEd Lessons 1-19 (Live Teacher Folder)	Phenomenon  Buying candy in the United States could lead to the death of orangutans in Indonesia.	• Introduce headlines that claim that our candy-buying habits could affect orangutan populations in the wild. • Read about tropical rainforests in Indonesia that are being cut down. • Develop questions using the Question Formulation Technique (QFT) to create a Driving Question Board (DQB) to drive further investigations. • Develop shared classroom norms (if not developed in previous units), which will be reviewed throughout the unit. • Develop an initial model to answer the question, "How could buying candy with palm oil affect orangutan populations and other populations in the wild?"	**SWBAT (Include DCI/SEP/CCC)…** Develop an initial system model to describe a phenomenon in which changes to one living component of an ecosystem (cause) affect the other living parts of the ecosystem (effect). **1.B** Ask questions that arise from initial observations of populations in an ecosystem to help seek additional information about the parts of the ecosystem and how they interact. ***What's next?*** *In the next lesson, we will read and examine data about soybean and canola oil as possible substitutes for palm oil. We will figure out that all three oils require clearing land for farming, which harms animals, and that palm oil is more efficient at producing oil per area of land. This makes us wonder if there is somewhere else we can grow palm oil so we don't*

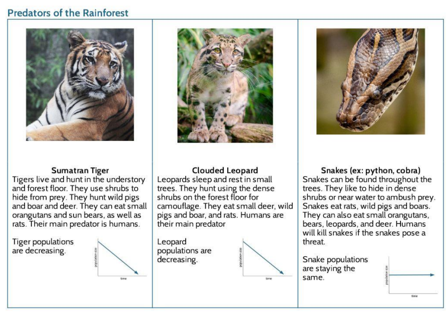
		• Develop a class consensus model. • Develop a list of related phenomena (things that students are reminded of when thinking about how changing one living thing in an ecosystem can have an effect on other living things in the same area). • Develop questions/ideas for future investigations.	*harm orangutans.*
Lesson 2: Can we replace palm oil with something else? [OpenSciEd Lessons 1-19 (Live Teacher Folder)]()	 *Vegetable oils require land and produce different yields of oil.*	• Discuss prior knowledge about ingredients from plants and make sense of palm oil as a product and oil palm as a plant. • Watch video - *Palm Oil—From Tree to Table* video. • Read to investigate soybean oil and canola oil as possible substitutes of palm oil. • Discuss how oil palms are more efficient than other oil sources. • Record what we have figured out about possible palm oil substitutes in our individual Progress Tracker. • Revisit the DQB and navigate the class toward the Lesson 3 question: "Can we grow oil palm trees somewhere else so we're not cutting down tropical rainforests?"	**SWBAT (Include DCI/SEP/CCC)…** Define a pattern of design problems for systems that provide food resources that humans need (cause) but transform the land and the biosphere once occupied by native plants and animals (effect). ***What's next?*** *We will identify places around the world that have suitable non living conditions for growing oil palm plants. We will compare those locations to that of tropical rainforests. We will figure out that both kinds of plants share the same nonliving factor requirements and compete for the same space. This will make us wonder more about how farmers harm the ecosystems in these areas that were there first.*

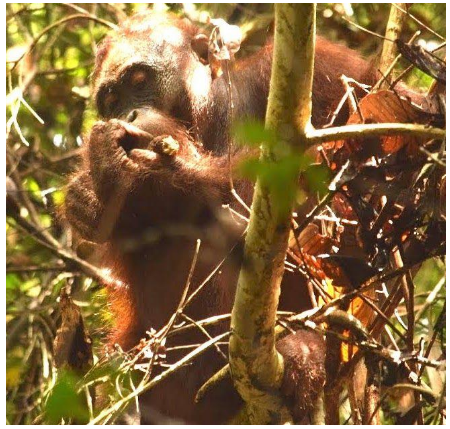
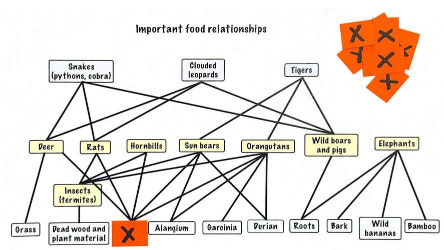
Lesson 3: Can we grow oil palm trees somewhere else so that we're not cutting down tropical rainforests? [OpenSciEd Lessons 1-19 (Live Teacher Folder)]()	 *Oil palm grows best in equatorial regions because of the non living conditions suitable for plant growth, which is the same reason that tropical rainforests are found in these locations.*	• Discuss and develop a list of plant needs. • Locate places to grow oil palm plants - engage in analyzing and overlaying pre-colored solar radiation, precipitation, and temperature maps showing locations that meet the conditions required by the oil palm plant. • Color only locations on the map suitable for growing oil palm plants. Compare to tropical rainforest locations to see overlapping areas. • Add to individual progress tracker - what we have figured out about the conditions needed to grow oil palm plants and the locations that meet the growing conditions of oil palm plants compared to tropical rainforest locations.	**SWBAT (Include DCI/SEP/CCC)…** Define a problem in which oil palm is dependent upon the same environmental interactions with non living factors as other tropical rainforest plants (pattern). ***What's next?*** *We will hear from people who farm oil palms to learn the reasons why they cut down tropical rainforests, even though it is bad for the animals that live there. We will learn that many of these farmers are struggling to make ends meet and that the tropical rainforest is often the only resource from which they can make money. This will lead us to consider why people have changed the land where we live and how that has impacted the living things around us.*
Lesson 4: Why do people cut down tropical rainforests when they know it is harmful to the animals that live there? [OpenSciEd Lessons 1-19 (Live Teacher Folder)]()	 *Interviews with people who work to grow oil palms in developing countries reveal that this practice, though harmful to animals like orangutans, provides them with a way to make money to support themselves, their families, and their communities.*	• Construct list of ideas of why people would harm ecosystems to grow crops. • [Watch a video interview]() of oil palm farmers in Indonesia who explain their reasons for oil palm farming and how they use the income from farming. • Display and discuss data about the lack of financial opportunities for people living in places like rural Indonesia. • Facilitate a discussion about why people in these places have to use tropical rainforests for resources to support themselves. • Students sketch murals/models to show how living and non living factors in this neighborhood have changed over time.	**SWBAT (Include DCI/SEP/CCC)…** Define a new criterion for a solution to more sustainably grow oil palm in ways that protect the tropical rainforest ecosystem but that also recognize the needs of local farmers, who are part of the palm oil production system. ***What's next?*** *We figured out that many farmers make a living off of farming and do not necessarily want to hurt animals. We wonder if people where we live have changed the land over time and how this might be impacting living things in our area.*

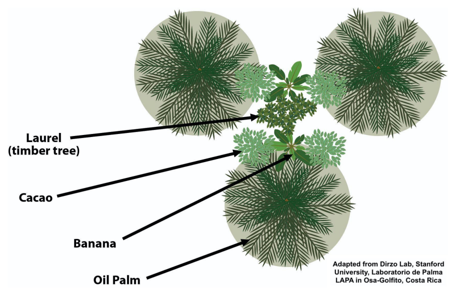
Lesson 5: How have changes in our community affected what lives here? [OpenSciEd Lessons 1-19 (Live Teacher Folder)](#)	 *Some plants and animals seem to be doing OK, even with changes humans have made in our community, but others are missing altogether.*	• Share murals of what students predict their communities looked like over time. • Make observations of plant and animal life around the school to look for evidence of human-made changes. • Share observations of the outdoors and engage in perspective taking to imagine how different organisms view the changes made by humans. • Compare local changes to the palm oil case and add to the DQB.	**SWBAT (Include DCI/SEP/CCC)…** Ask questions to clarify and/or refine a model for explaining how (patterns in) human activities have altered the biosphere and changed habitats locally and in Indonesia. ***What's next?*** *We figured out that changes in our own community also affect the living things. Given that human communities and agriculture are not going away and are still expanding, we wonder how humans can use the land in better ways that benefit both humans and other organisms.*
Learning Sequence 2 (Lessons 6-10):			
Lesson 6: If palm oil is not going away, how can we design oil palm farms to support orangutans and farmers? [OpenSciEd Lessons 1-19 (Live Teacher Folder)](#)	 *Palm farms that grow a single crop do not function well for tropical rainforest animals, leading to declines in these populations.*	• Discuss the problem and any new things that we have learned about it - what do we know that is making it more difficult to solve? • Overview of criteria and constraints. • Identify goal, criteria and constraints of a better oil palm farm. • Revisit and add questions to DQB that will help with our design challenge to build a better oil palm farm.	**SWBAT (Include DCI/SEP/CCC)…** Define a problem that can be solved through designing a palm farm that will maintain the stability of orangutan populations and support farmers who depend on the farms for their livelihoods (criteria). ***What's next?*** *We are motivated to design better systems, starting with a better palm farm. We want a palm farm in which orangutans can live, but we are not sure about what orangutans need to* *live and how many we can support in our new system.*

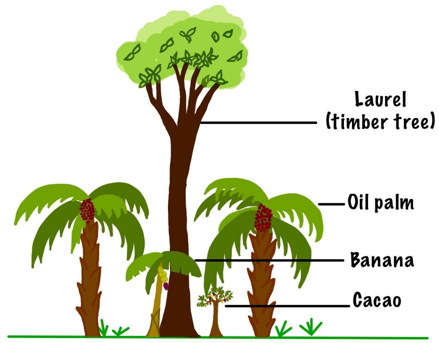
Lesson 7: How many orangutans typically live in the tropical rainforest? [OpenSciEd Lessons 1-19 (Live Teacher Folder)]	 *Orangutans at different times in 4 different protected areas show stable populations, with about 1-3 orangutans per 1 km2.*	• Watch a video and explore a StoryMap to find out how many orangutans are in different protected areas in Borneo and Sumatra. • Share observations and patterns about orangutan populations in four different protected areas. • Calculate how many orangutans are in 1 km^2 in each park. • Use the Identify and Interpret sensemaking strategy to analyze and interpret the range of orangutans per area across different years at four different parks. • Students generate ideas about why orangutans need so much tropical rainforest area and how to test these ideas in a simulation.	**SWBAT (Include DCI/SEP/CCC)…** Apply mathematical concepts (ratio) to find patterns in numerical relationships about the number of orangutans that can live in a 1 km^2 or 100 hectare area. ***What's next?*** *We figure out that only 1-3 orangutans can live in 1 km^2, which is a lot of space. We have some ideas about why and are wondering if it's because orangutans need a lot of space to find food. We consider what we would need in a simulation to test this food idea.*
Lesson 8: Why do orangutans need so much forest space? [OpenSciEd Lessons 1-19 (Live Teacher Folder)]	 *Orangutans compete for food resources in three different environmental conditions.*	• Students compare a simulation of orangutans to a real ecosystem and consider how the simulation will be useful in helping us make sense of what is happening in a real ecosystem and what the limitations might be. • Utilize the simulation to test the question: "What happens to the orangutans if there are fewer/more fruit trees?" • Make sense of patterns in the data to draw conclusions about why orangutans need so much space to survive.	**SWBAT (Include DCI/SEP/CCC)…** Carry out a series of investigations using a simplified computer simulation (system model) to produce data about how individual orangutans compete with each other for food resources in three different environmental conditions to answer a question about forest space. Analyze measures of central tendency and range in class-constructed histograms to make claims about how populations of orangutans responded to three different environmental conditions and the ways in which the environmental conditions contributed to the stability of the population or changes in the population. ***What's next?***

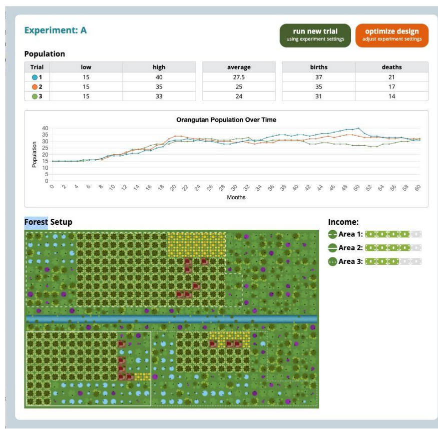
			We figured out that orangutans eat mostly fruits because they get energy from these food sources. They compete with other orangutans for this food, and slight changes in the amount of fruit can have large impacts on orangutan competition and survival. We wonder if all we need is more fruit trees to have a healthy orangutan population.
Lesson 9: Would planting more rainforest fruit trees help the orangutan population increase? [OpenSciEd Lessons 1-19 (Live Teacher Folder)]()	 *Orangutan population sizes increase when resources are plentiful and decrease when resources are limited.*	● Revisit the design goal and consider ways to increase orangutan populations. ● Orient to updates in simulation - we can now see births and deaths with increasing or decreasing energy levels. ● Conduct experiments 1-3 in partners - would planting more fruit trees help the orangutan population increase? What is the smallest percentage of fruit trees that could support an orangutan population? ● Connect findings to the ecosystems that were investigated in Lesson 7 - make sense of why each ecosystem supported a slightly different number of orangutans. ● Update progress trackers to summarize what was figured out.	**SWBAT (Include DCI/SEP/CCC)…** Collect data from an investigation to draw conclusions about how stable populations of orangutans fluctuate over time based on resource availability. Use mathematical representations to draw conclusions about trends in orangutan population sizes over time, depending upon resource availability. ***What's next?*** *We figured out that when there are more or fewer food resources available, it affects the orangutans' population size. We think we can plant more food resources in the oil palm farms to support a healthy population. We are wondering if our model can explain how other populations change over time.*
Lesson 10: How do changes in the amount of resources affect populations? [OpenSciEd Lessons 1-19 (Live Teacher Folder)]()		● Read and analyze case studies of how different populations changed when there was a change in the amount of available resources. ● Share findings and look for patterns across different case studies. ● Students use patterns across case studies to come to a consensus about how the amount of available resources	**SWBAT (Include DCI/SEP/CCC)…** Analyze and interpret data to draw conclusions about how changes in resource availability affect populations in the short and long term. ***What's next?*** *We feel like we understand how the population of orangutans changes when more oil palms are planted in place of rainforest trees. We are curious if a change in resources also explains what we observed with other*

	The loss of short and tallgrass prairies to soybean oil production in the Midwest of the United States has caused declines in local monarch butterfly populations.	affects populations of organisms.	*populations like tigers, rats, snakes, and pigs.*
LS1 & LS2 Assessment [Monarch Butterflies on the Shortgrass Prairie]()			
Learning Sequence 3 (Lessons 11-13):			
Lesson 11: How does planting oil palm affect other populations? [OpenSciEd Lessons 1-19 (Live Teacher Folder)]()	 *Rat and snake populations are exploding in the oil palm system, but those populations are not exploding in the rainforest system.*	• Construct models of the oil palm farm to explain how both predator and prey populations could increase at the same time. • Construct models of rainforest ecosystems to explain why those populations don't increase like they do in the oil palm farm. • Engage in a Consensus Discussion about the two system models (oil palm ecosystem model and rainforest ecosystem model) to identify different kinds of interactions between populations and patterns of interactions across the systems that keep populations stable. • Students turn and talk about what they think could happen if orangutans go extinct.	**SWBAT (Include DCI/SEP/CCC)…** Develop a system model for a palm farm to explain why both snake (predator) and rat (prey) populations are increasing at the same time. Develop a system model to explain how populations in a complex rainforest ecosystem interact to keep populations stable, compared to interactions in an agricultural system where some of the same populations are increasing. ***What's next?*** *We figured out that the rainforest system has more components and interactions compared with the oil palm system. We think this is why the tropical rainforest supports so many living things. We are wondering how to make the oil palm farm have more components and interactions, like the tropical rainforest, so that it can support more animal populations.*

Lesson 12: What would happen if orangutans go extinct? [OpenSciEd Lessons 1-19 (Live Teacher Folder)]	 *Many seeds from fruit trees are found in spit and fecal samples of orangutans. These seeds germinate better compared to control seeds.*	• Share initial ideas of what may happen if orangutans go extinct. • Read about Dr. Blackburn's research on the orangutans' role in the tropical rainforest. • Students create claims in small groups and present evidence from the research in the readings for support. • Predict what would happen to the tropical rainforest if fruit tree populations change - brainstorm how to test these ideas.	**SWBAT (Include DCI/SEP/CCC)…** Gather information from text, images, and data tables to clarify claims that a change in the orangutan population could affect fruit trees because there is a mutually beneficial relationship between the two. ***What's next?*** *We figure out that fruit tree populations depend on orangutans to disperse seeds. If orangutans go extinct, there could be several effects throughout the tropical rainforest. We wonder if something were to happen to other populations, what kinds of changes we would see.*
Lesson 13: How does an ecosystem change when the plants change? [OpenSciEd Lessons 1-19 (Live Teacher Folder)]	 *Disruptions, like drought, fire, disease, or loss of a seed disperser, cause shifts in populations in an ecosystem.*	• Brainstorm ways ecosystems can experience disruptions and how the tropical rainforest would respond if a disruption affected the fruit trees in the system. • Students identify real-world scenarios that could disrupt the fruit tree populations in the tropical rainforest; then use their models to predict how the system would be impacted in each scenario. • Facilitate a Building Understandings Discussion to compare disruptions in oil palm farms to the tropical rainforest. • Students compare biodiverse plant communities to single plant communities.	**SWBAT (Include DCI/SEP/CCC)…** Use a model to make predictions and test ideas about how disruptions, or changes, to one part of the system affect populations throughout the system. Construct an argument supported by empirical evidence that releasing the tamarisk beetle (change) affects the willow flycatcher population when there are fewer nesting tree types available. ***What's next?*** *We figure out that biodiverse ecosystems can withstand some disruption, but oil palm farms cannot because everything relies on the oil palm. We wonder if there are better ways to farm for both people and other living things.*
LS3 Assessment [Southwestern Willow Flycatcher]			
Learning Sequence 4 (Lessons 14-19):			

Lesson 14: Are there ways people can grow food without harming the tropical rainforest? [OpenSciEd Lessons 1-19 (Live Teacher Folder)]	 *Farmers and other community members in Indonesia and Costa Rica observe positive impacts on plant and animal populations when growing food using different approaches from large-scale monocrop farms.*	• Review students' ideas about ways to grow food that won't harm living things. Motivate a need to learn more about approaches that people actually use in the real world. • Students individually read about one way to grow food that supports populations in ecosystems. • Students come together to discuss/compare different approaches from readings. • Update individual progress trackers with information from one of the approaches to growing food.	**SWBAT (Include DCI/SEP/CCC)…** Critically read scientific texts to obtain information about how different ways to grow food (cause) can have a positive impact on populations in ecosystems (effect). ***What's next?*** *We figured out that there are approaches people use to grow food that seem to not harm living things. We wonder if and how people benefit from each of these approaches.*
Lesson 15: How can people benefit from growing food in ways that support plants and animals in the natural ecosystem? [OpenSciEd Lessons 1-19 (Live Teacher Folder)]	 *Farmers gain ecosystem services (food, water, soil health, protection from crop disease, and the like) when they grow food differently from large-scale monocrop farming.*	• Review the three different approaches to growing food that differ from monocropping. • In groups, students explore one of three [StoryMaps] that include text and video interviews with people who explain how they benefit from growing food in ways that differ from monocropping. • Students share what they learned from the interviews. Discuss which approaches are best for people to motivate a discussion into which approach is best for everyone (people, animals, and plants).	**SWBAT (Include DCI/SEP/CCC)…** Critically read text and listen to interviews to obtain information about how people receive ecosystem services from farming practices that also maintain and promote stability in natural systems. ***What's next?*** *We figured out that people can also benefit from approaches to grow food that differ from monocropping. We wonder which approach works best for people, plants, and animals in a natural ecosystem.*

Lesson 16: What approach to growing food works for everyone and why? OpenSciEd Lessons 1-19 (Live Teacher Folder)	 *People can use many approaches to growing food, and there are trade-offs to using them that have consequences for plants, animals, and humans in nearby ecosystems.*	• Review that we need to figure out which approaches work best for plants, animals and humans. • As a class, add monocrop farms to the summary tables from Lesson 15 as a comparison to other approaches to growing food. • Students jigsaw what was learned in Lessons 14 and 15 to compare and contrast the different approaches to growing food. • Facilitate a consensus discussion about the different approaches to growing food and which may be the best and why. • Add new ideas to individual Progress Trackers. • Introduce farm design simulation and surface claims to test in final farm designs.	**SWBAT (Include DCI/SEP/CCC)…** Integrate qualitative information obtained from written text and media to clarify claims about farming practices that reduce risk to disruptions and that maintain and promote stability of populations in natural systems. ***What's next?*** *We figured out that there are some approaches to growing food that will work better for plants and animals, and other approaches work better for humans. We want to test our ideas in a simulation by designing a farm for both orangutans and people.*
Lesson 17: How can we redesign the way land is used in Indonesia to support orangutans and people at the same time? OpenSciEd Lessons 1-19 (Live Teacher Folder)	 *Students redesign and optimize the way land is used to support orangutans and people.*	• Lead a navigation discussion to brainstorm which ways of growing food might work best for redesigning the way land is used in Indonesia to support orangutans and people at the same time. • Compare/contrast the real-life region of Padu Banjar with a land re-design simulation that is based on the region. • Review and revise the redesign goal, criteria, and constraints to more specifically define the design task. • Using a land-redesign simulation, gather baseline data to determine the maximum number of orangutans that could live in the area, the maximum income people could	**SWBAT (Include DCI/SEP/CCC)…** Refine criteria and constraints for designing a way to use the land to increase precision and to take into account the potential impacts and the ways in which potential solutions are limited by the natural environment. Apply ideas about ways of growing food to design a better way to use the land to minimize human impact on orangutan populations. ***What's next?*** *We figured out that we can diversify oil palm farms and set aside areas of rainforest trees to improve orangutan populations and to support people. We optimized our design solutions, and we are ready to share them with our class to try to identify the best solution.*

		earn, and the default orangutan population size and income for people. ● Individually plan a redesign for the assigned area of the land, then test and optimize the design in small groups. ● Evaluate draft solutions from at least two other groups and review feedback given by other groups. Revisit design solution to make edits to optimize results. ● Write an individual explanation describing the best redesign and how it supports both people and orangutans.	
Lesson 18: How do our designs work for orangutans and people in Indonesia? [OpenSciEd Lessons 1-19 (Live Teacher Folder)](#)	 *The design solutions with mixed land use and some intact forests worked best for people and orangutans.*	● Have each group present their design and answer clarifying questions about their design. ● Students make claims about what they observed worked well, the trade-offs made in the designs, and how these designs would work in the real world. ● Students make a recommendation for land use (claim) that they support with evidence and scientific reasoning. ● Have students share what made arguments more or less convincing. ● Revisit the DQB with the whole class and take stock of all of the questions we've now answered.	**SWBAT (Include DCI/SEP/CCC)…** Evaluate competing design solutions for supporting and/or increasing a stable orangutan population and meeting people's income needs. Construct an argument grounded in evidence and scientific reasoning to recommend a design solution that will support a stable orangutan population and protect the needs of people (effect). Ask questions about and define problems that arise when humans design land-use systems that have positive and negative effects on biodiversity and ecosystem services. ***What's next?*** *We end the unit by returning to the DQB and celebrating our learning on graffiti boards, or we navigate to one of two extension opportunities.*

Lesson 19: How can we inform others in our community about the palm oil problem and convince them to take action? [OpenSciEd Lessons 1-19 (Live Teacher Folder)]()	 *Public service announcements (PSAs) inform people and communities about issues like the palm oil problem and encourage them to take actions to help preserve natural systems.*	• Introduce Public Service Announcements (PSAs) as a way to communicate to people about a problem. • View examples of PSAs and discuss in which ways they are effective. • Individually brainstorm ideas that PSAs should contain - brainstorm together as a class to formulate a "checklist" for an effective PSA. • Using the criteria and checklist created, students work in small groups to make a PSA to inform others in the community about the palm oil problem and convince them to take action. • Students present final products to the group.	**SWBAT (Include DCI/SEP/CCC)…** Communicate information in writing, drawing, and oral presentation about how even small changes in people's habits or behaviors, like buying different brands of products at the store, can have large impacts on the preservation of natural systems, like the tropical rainforests where orangutans live, over time. ***What's next?*** *We figured out how to craft PSAs to communicate key messages about addressing the palm oil problem to stakeholder groups. We are now ready to look back at our DQB and celebrate what we have accomplished to end the unit.*

LS4 Assessments
[How can we redesign the way land is used in Indonesia to support orangutans and people at the same time?]()
[Argument for the Best Redesign of Land]()

Grade 7 Science

Unit 3: Ecosystem Dynamics

Writers: Brett Wojtkowski & Monica Costa

Unit Overview

- This unit on ecosystem dynamics and biodiversity begins with students reading headlines that claim that the future of orangutans is in peril and that the purchasing of chocolate may be the cause.

- Students then examine the ingredients in popular chocolate candies and learn that one of these ingredients--palm oil--is grown on farms near the rainforest where orangutans live.

- Students will figure out that palm oil is derived from the oil palm trees that grow near the equator, and that these trees are both land-efficient and provide stable income for farmers, factors that make finding a solution to the palm oil problem more challenging.

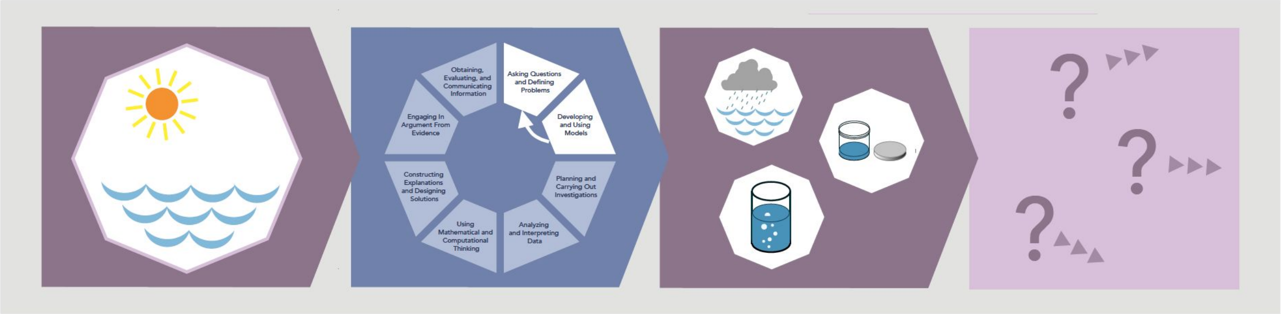
- Students work to design an oil palm farm that simultaneously supports orangutan populations and the income of farmers and community members.

Performance Expectations

MS-LS2-1: *Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.*
MS-LS2-4: *Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.*
MS-LS2-2: *Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.*
MS-LS2-5: *Evaluate competing design solutions for maintaining biodiversity and ecosystem services.*
MS-ESS3-3: *Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*
MS-ETS1-1: *Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.*

Unit Design

Explore Anchoring Phenomenon	Attempt to Make Sense	Identify Related Phenomena	Develop Questions & Next Steps



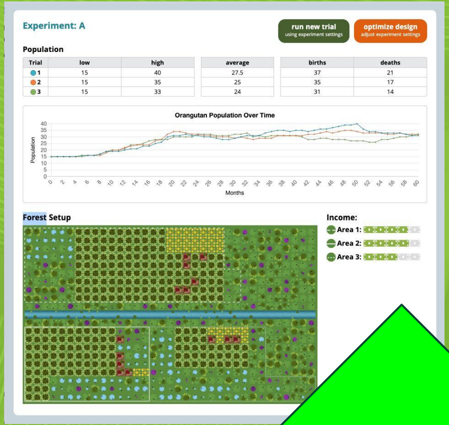
Unpacking the Unit Phenomenon

- **Explore Anchoring Phenomenon:** We read headlines that claim that our candy-buying habits could affect orangutan populations in the wild.

- **Attempt to Make Sense:** We examine candy ingredients and realize that one ingredient, palm oil, is produced in the same location in which orangutans live

- **Identify Related Phenomena:** Students think about other examples where changing one component in an ecosystem affected the living things in the ecosystem

Assessment



Public Service Announcements

Save the Orangutans!

Orangutans are intelligent and creative, like humans - in fact, they are some of our closest relatives. However, humans have been taking away their home and food source to plant a certain ingredient that is used in products like candy and shampoo. **This ingredient is palm oil.**

In order to grow oil palm farms, you need space and people get this space by cutting or burning the forest that orangutans live in. When they burn the forest, orangutans' food source and habitat are destroyed. This means fewer orangutans can live there and their population goes down over time.

You might wonder, *Why can't we just stop using palm oil?* But many products depend on it and in some countries many people work on oil palm farms to make money to support their families. So, getting rid of palm oil won't work.

However, there is a way to solve this. That way is by using sustainable oil palm farming. Sustainable oil palm farms are where:

- The workers are treated humanely.
- Different trees are mixed in with the crop to make it more like rainforest
- The companies and care protect popula

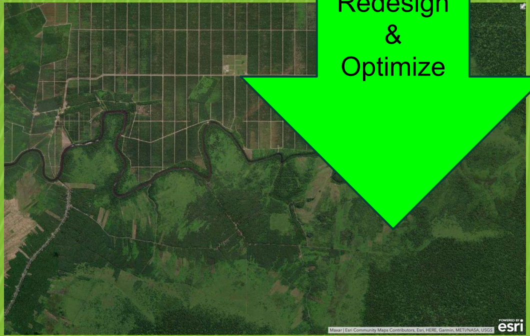
You can help the orangutans by...

- Buying less products that contain palm oil
- When you buy products with palm oil, look for products that have a sustainable palm oil sticker (like the one above).
- Donating money (if you can) to organizations that support orangutans.
- Tell others about this problem and what they can do to help.

Here are some places you can donate money:

- Save the Orangutan
- Orangutan Foundation International

Students Redesign & Optimize



Argument for the Best Redesign of La

1. Make a claim to answer the question, ***If you could make one recommendation to redesign the Indonesia to support people and orangutans, what would you recommend and why?***

If I could make one recommendation to redesign the land in Indonesia to support people and orangutans, my recommendation would be...

-

Claim
Evidence
Reason
Response

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ____________________ **Board Meeting Date** December 8, 2022

Decision Requested X **Agenda Code** 10 a.

AGENDA REPORTING FORM

Agenda Topic: Out of State: Approval of Out of State/Overnight Field Trips

Summary of Issue: The Board of Education must give approval for field trips that are over 200 miles in distance from Southington, trips to foreign countries, or overnight field trips. Presented here are the following trips:

- SHS – Wrestling Team – Lowell High School – Lowell, MA
  - 12/27/22 – 12/28/22
- SHS – Wrestling Team – Timberlane High School – Plaistow, NH
  - 1/21/23 – 1/22/23

Background: N/A

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** ____________________

Beginning Date of Program or Project: N/A

Ending Date of Program or Project: N/A

Recommendation or Comment: Move that the Board of Education approve the field trip request as presented by the administration.

Titles of Attachments:
1. Field Trip Applications

Frank Ripa

Signature of Staff Member Submitting Report

Steven Madancy

Signature of Superintendent of Schools

Southington High School
Wrestling Team

Lowell High School
Lowell, MA

(12/27/22 – 12/28/22)

R-6153

Southington Public Schools
Southington, Connecticut

Application for Out-of-State/In-State/Overnight Field Trip

Submit to Assistant Superintendent

Date: 11/16/2022
Out of State: Yes ☒ No ☐
Overnight: Yes ☒ No ☐
Miles Round Trip: 260

SOUTHINGTON	WRESTLING TEAM	TUE 12/27 - WED 12-28
School	high school Class/Group	Date of Trip

Name and Address of Destination LOWELL, MA ; 50 Father Morissette Blvd.

Reasons for Field Trip INCREASED COMPETITION AND EXPERIENCE FOR WRESTLING TEAM

Itinerary (attach if needed)

Departure Date/Time (DEC) 12/27/22 @ 5AM **Return Date/Time** (DEC) 12/28/22 @ 10PM

# of Students ~~15~~ 46 **# of Teacher/Chaperones** ~~4~~ 5 **# of Buses** 1

Have definite arrangements been made at the field trip destination? ☒ Yes ☐ No

☒ **Have met with nurse to address student health needs.**
Nurse's Signature *Date*

☒ **Have NOT met with the nurse. Will meet with the nurse to address student health needs when the student roster is complete. This meeting will take place approximately one-month prior to the scheduled trip.**

Destination is handicap accessible: Yes ☒ No ☐ **Lift Van Needed?** Yes ☐ No ☒

****

COST AND FINANCING

Source of Funds	Totals	Additional Notes
TOTAL Anticipated Cost of Trip	$3100	BOOSTER CLUB WILL COVER COSTS
Board of Education Contribution	$	
Other	$	ENTRANCE FEE PAID BY SAA
Fundraising Activity	($600)	COST OF BUS PAID BY PARENTS
BALANCE	$	
Student Contribution		
Transportation	$	Students @ $
Entrance Fees, Room & Board	$2200	~~15~~ Students @ $150
TOTAL Cost of Trip to Each Student	$150	

SIGNATURES

Teacher **Date**
Dept. Head **Date** 11/18/22
Principal **Date**
Comments

Assistant Superintendent **Date** 11/29/22 Approved ☒ Not Approved ☐

Board of Education Approval* ** YES ☐ NO ☐ **Date**

Southington High School
Wrestling Team

Timberlane High School
Plaistow, NH

(1/21/23 – 1/22/23)

Southington Public Schools
Southington, Connecticut

Application for Out-of-State/In-State/Overnight Field Trip

Submit to Assistant Superintendent

Date: 11/16/2022

Out of State: Yes ☒ No ☐

Overnight: Yes ☒ No ☐

Miles Round Trip: 280

SOUTHINGTON (School) — WRESTLING TEAM (Class/Group) — JAN 21, 23-JAN 22,23 (Date of Trip)

Name and Address of Destination TIMBERLANE HS, PLAISTOW NH 03865 36 Greenough Rd

Reasons for Field Trip INCREASED COMPETITION AND EXPERIENCE FOR WRESTLING TEAM

Itinerary (attach if needed)

Departure Date/Time JAN 21 @ 5AM **Return Date/Time** JAN 22 @ 10PM

# of Students 15 **# of Teacher/Chaperones** 4 **# of Buses** 1

Have definite arrangements been made at the field trip destination? ☒ Yes ☐ No

☐ **Have met with nurse to address student health needs.**
Nurse's Signature ______ *Date* ______

☒ **Have NOT met with the nurse. Will meet with the nurse to address student health needs when the student roster is complete. This meeting will take place approximately one-month prior to the scheduled trip.**

Destination is handicap accessible: Yes ☒ No ☐ **Lift Van Needed?** Yes ☐ No ☒

****

COST AND FINANCING

Source of Funds	Totals	Additional Notes
TOTAL Anticipated Cost of Trip	$3100	BOOSTER CLUB WILL COVER COSTS
Board of Education Contribution	$	
Other	$	ENTRANCE FEE PAID BY SAA
Fundraising Activity	($600)	COST OF BUS PAID BY PARENTS
BALANCE	$	
Student Contribution		
Transportation	$	Students @ $
Entrance Fees, Room & Board	$2250	15 Students @ $150
TOTAL Cost of Trip to Each Student	$150	

SIGNATURES

Teacher ______ **Date** ______

Dept. Head ______, AD **Date** 11/18/22

Principal ______ **Date** ______

Comments

Assistant Superintendent ______ **Date** 11/29/22 **Approved** ☒ **Not Approved** ☐

Board of Education Approval*** YES☐ NO☐ **Date** ______

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only x

Board Meeting Date December 8, 2022

Decision Requested

Agenda Code 10 b.

AGENDA REPORTING FORM

Agenda Topic: **Proposed 2023-2024 School Calendar ~ First Reading**

Summary of Issue: The attached school calendar is provided to the Board for their comments and recommendations.

Background: The calendar will be brought back to the Board for approval at the January 12, 2023 Board meeting.

Alternative Strategies: 1) Modify starting date; 2) Modify recess periods;

Cost (if applicable): N/A

Funding Source: N/A

Beginning Date of Program or Project: ____________________

Ending Date of Program or Project: ______________________

Recommendation or Comment: Board members may wish to comment on the Proposed School Calendar for the 2023-2024 School Year.

Steve Madancy

Signature of Superintendent of Schools

Title of Attachment

1. Proposed School Calendar for the 2023-2024 School Year

SOUTHINGTON PUBLIC SCHOOLS

2023-2024 CALENDAR

Draft: 12-1-2022

August –1 Days

M	T	W	Th	F
	1	2	3	4
7	8	9	10	11
14	15	16	17	18
21	22	23	24	25
PD	PD	PD	**31**	

September – 20 Days

M	T	W	Th	F
				1
(4)	5	6	7	8
11	12	13	14	15
18	19	20	21	22
25	26	27	28	29

October – 21 Days

M	T	W	Th	F
2	3	4	5	6
(9)	10	-11-	12	13
16	17	18	19	20
23	24	25	26	27
30	31			

November – 17 Days

M	T	W	Th	F
		1	2	3
6	PD	8	9	(10)
-13-	-14-	-15-	16	17
-20-	21	(22)	(23)	(24)
27	28	29	30	

December – 16 Days

M	T	W	Th	F
				1
4	5	6	7	8
11	12	13	14	15
18	19	20	21	22
(25)	(26)	(27)	(28)	(29)

January – 21 Days

M	T	W	Th	F
(1)	2	3	4	5
8	9	10	11	12
(15)	16	17	18	19
22	23	24	25	26
29	30	31		

February – 19 Days

M	T	W	Th	F
			1	2
5	6	7	8	9
12	13	14	15	16
(19)	PD	21	22	23
26	27	28	29	

March – 20 Days

M	T	W	Th	F
				1
4	5	6	7	8
--11-	-12-	13	14	15
18	19	20	21	22
25	26	27	28	(29)

April – 17 Days

M	T	W	Th	F
1	2	3	4	5
(8)	(9)	(10)	(11)	(12)
15	16	17	18	19
22	23	24	25	26
29	30			

May – 22 Days

M	T	W	Th	F
		1	2	3
6	7	8	9	10
13	14	15	16	17
20	21	22	23	24
(27)	28	29	30	31

June – 7 Days

M	T	W	Th	F
3	4	5	6	7
10	11	12	13	14
17	18	19	20	21
24	25	26	27	28

181 Instructional Days

(186 Staff Days)

KEY	
	Early Dismissal - **ALL SCHOOLS**
- -	Early Dismissal - Listed Schools
( )	Holiday/Vacation – **No School**
PD	Workday/PD – **No School for Students**

8/31/2023 - **First Day of School for Students**

8/28/2023, 8/29/2023, 8/30/3023, 11/7/2023, 2/20/2024 – Staff Workdays/PD – No School for Students

Any unexpected school closings will be made up following the scheduled last day of school up to June 28, 2024. If additional weather-related days are needed beyond these days, we will begin with April 12, 2024 and move backward.

Early Dismissal All Schools /	Early Dismissal – Listed Schools - -	*NO SCHOOL ( )*	
9/19/2023	**Southington High School**	9/4/2023	**Labor Day**
10/17/2023	10/11/2023 – SHS PSAT Admin.	10/9/2023	**Columbus Day**
12/5/2023	11/15/2023 – SHS Conferences	11/10/2023	**Veterans Day**
12/22/2023		11/22/2023-11/24 2023	**Thanksgiving Recess**
1/23/2024	**JAD & JFK Middle Schools**	12/25/2023-1/1/2024	**Holiday/Winter Recess**
2/6/2024	11/20/2023 – MS Conferences	1/15/2024	**Martin Luther King Day**
3/5/2024		2/19/2024-2/20/2024	**President's Day Recess**
4/23/2024	**Elementary Schools**	3/29/2024	**Good Friday**
5/14/2024	11/13-14, 2023- Elementary Conf.	4/8/2024–4/12/2024	**Spring Break**
6/11/2024-Tent. Last Day	3/11-12, 2024– Elementary Conf.	5/27/2024	**Memorial Day**

Facility/School	Phone	Hours	Address
Board of Education	860-628-3202	7:30-4:30	200 N. Main St.
Southington High School	860-628-3229	7:37-2:15	720 Pleasant St.
Karen Smith Academy	860-628-3379	7:40 – 1:10	242 Main Street
Stellar Program	860-628-3200	8:00 – 2:00	51 North Main St.
J. A. DePaolo Middle School	860-628-3260	8:05-2:40	385 Pleasant St.
J. F. Kennedy Middle School	860-628-3275	8:05-2:40	1071 South Main St.
Derynoski Elementary School	860-628-3286	8:55-3:25	240 Main St.
Flanders Elementary School	860-628-3372	8:35-3:05	100 Victoria Dr.
Hatton Elementary School	860-628-3377	8:35-3:05	50 Spring Lake Rd
Kelley Elementary School	860-628-3310	8:55-3:25	501 Ridgewood Rd
Oshana Elementary School	860-628-3450	8:35-3:05	70 Church St.
South End Elementary School	860-628-3320	8:35-3:05	Maxwell Noble Dr.
Strong Elementary School	860-628-3314	8:55-3:25	820 Marion Ave.
Thalberg Elementary School	860-628-3370	8:35-3:05	145 Dunham St.

Special Observation Days	
9/16-9/17*	**Rosh Hashanah**
9/25/23*	**Yom Kippur**
9/30-10/1*	**Sukkot**
11/12/23	**Diwali**
1/6/24	**Three Kings Day**
3/11-4/9*	**Ramadan**
3/25/24	**Holi**
4/23-24*	**Passover**
5/6/24	**Bright Monday**

*Holiday begins at sundown on the evening before the date specified.

Southington BOE Policy 5113 considers observance of a religious holiday an excused absence, and Faculty will make appropriate accommodations for students affected by these and other special observation days.

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only x

Board Meeting Date December 8, 2022

Decision Requested

Agenda Code 10 c.

AGENDA REPORTING FORM

Agenda Topic: **2021-2022 School Resource Officer Annual Report**

Summary of Issue: The School Resource Officer program has been in operation at Southington High School since the fall of 1997. Lieutenant Brian Leppard has prepared the attached report that summarizes the program for the 2021-2022 school year.

Background: The School Resource Officer has proven to be a valuable staffing resource at Southington High School.

Alternative Strategies: N/A

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: 1997

Ending Date of Program or Project: N/A

Recommendation or Comment: Board members may wish to comment on the report.

Title of Attachment

1. 2021-2022 Report

Steve Madancy

Signature of Superintendent of Schools

Department of Police Services

Town of Southington, Connecticut

Lieutenant Brian Leppard, 236
Administrative Section
69 Lazy Lane
Southington, CT 06489
p: 860.378.1600, ext: 2236
f: 860.378.1699
e: Bleppard@SouthingtonPolice.org

Chief of Police
John F. Daly

Annual Report, SY 2021 - 2022

The School Resource Officer's (SRO) assignment has multiple roles within the community and school environment, including, but not limited to: encouraging compliance with federal, state and local laws, as well as enforcing those laws when applicable; providing a safe environment for students, staff, parents, and visitors; and investigating allegations of criminal activity or complaints. The SRO can make referrals to the court system, the STEPS Program and/or Juvenile Review Board, by way of enforcement or referral. Attend meetings, events, and anything else requested by the school or district. This includes football games, proms, and special event related activities at the school. The SRO assists in educating staff and students in safety, justice programs, decision making and drug awareness. The SRO also provides support in the areas of conflict resolution, intervention, mentoring, mediation and problem solving.

I believe that the most important role the School Resource Officer serves is to build positive lasting relationships, while providing a safe environment for everyone. SROs take great pride in what they do and what they have accomplished over the years, while building the program within our community.

Duties and Responsibilities:

1. Provide Law Enforcement services within Southington High School.
2. Act as an informational resource to school personnel, students, parents and visitors.
3. Act as a liaison between the Southington School System (guidance counselors, psychologists, crisis support workers, principals, superintendent) youth agencies, youth organizations, town departments and justice programs to maintain effective communication within these groups.
4. Present training classes in the school system as requested or developed and approved by the Chief of Police or his designee.
5. Serve as a mentor to students, faculty and staff.
6. Perform other duties and/or tasks as assigned.

During the School Year of 2021-2022 the Resource Officer conducted and facilitated Lock-Down Drills, Fire Drills, and Active Aggressor Training, which has become a growing concern in every community around the country. Our School Resource Officers, supported by their support staff within the police department and Southington School System, continuously meet to problem solve, educate, and/or reevaluate the best safety practices in the high school and around the district.

Statistics for 2021-2022

Alcohol Issues: 0
Tobacco Complaints: 1
Vaping Tobacco Complaints: 7
Cannabis Related Complaints: 9
Harassment Complaints: 1
Medical Related Issues: 18
Motor Vehicle Accidents: 9
Sexual Assault: 0
Thefts: 0
Trouble with Juvenile/Person Complaints: 24
Suspicious Person/MV Complaints: 5

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only X

Board Meeting Date December 8, 2022

Decision Requested

Agenda Code 10e

AGENDA REPORTING FORM

Agenda Topic: Capital Improvement Plan 2023-24 to 2027-28 First Reading

Summary of Issue: The proposed Capital Improvement Plan calls for $164,931,174 in 2023-24 and $26,713,009 over the next four years for a total of $191,644,183

Background: The Board prepares an updated five-year Capital Improvement Plan each year. Our requests are then combined with the town into a long-term Capital Improvement Plan presentation.

Alternative Strategies: Modify plan as proposed.

Cost (if applicable):

Funding Source: Capital Budget

Beginning Date of Program or Project: July 1, 2023

Ending Date of Program or Project: June 30, 2024

Recommendation or Comment: This is a first reading. The plan will be on the January agenda as an action item.

Jennifer Mellott

Signature of Staff Member Submitting Report

Steve Madancy

Signature of Superintendent of Schools

Titles of Attachment:

1. Capital Improvement Plan

SOUTHINGTON PUBLIC SCHOOLS

Capital Improvement Plan
Five-Year Projection
2023/24 to 2027/28

Southington Board of Education
Proposed Capital Improvement Projects
Five Year Plan - By Project

Site	Project Type / Description	Year of Request	2023/24	2024/25	2025/26	2026/27	2027/28	Total Request - Five Years
Air Conditioning- 5 Elementary Schools								
	HVAC Improvements to Hatton, Oshana, South End, Strong and Thalberg	2022/23				15,734,400		15,734,400
	Subtotal					**15,734,400**	**-**	**15,734,400**
Boiler Project								
SHS	Replace Boiler	2022/23		115,500				115,500
HES	Replace Boiler	2022/23					185,000	185,000
	Subtotal		**-**	**115,500**	**-**	**-**	**185,000**	**300,500**
Paving Projects								
SHS	Main Bus Loop	2022/23	95,000					95,000
	Rear Parking Lots and Driveways Excluding Ag Sci Area, rev 21-22	2017/18	174,300					174,300
HES	Reconstruct Paved Playground for Parking	2008/09				141,094		141,094
	Subtotal		**269,300**	**-**	**-**	**141,094**	**-**	**410,394**
Roofing Projects								
HES	Replace 1996 Roofing, 27,000SF; 203 Roofing, 45,000SF	2017/18		2,446,606				2,446,606
SES	Replace 1993 Roofing, 26,500 SF; 2003 Roofing, 28,870SF	2021/22		2,058,103				2,058,103
TES	Replace 2002 Roofing, 62,068 SF	2021/22		2,307,067				2,307,067
	Subtotal			**6,811,776**	**-**	**-**	**-**	**6,811,776**
School Safety Improvement Projects								
SYS	Elementary Security Camera System Upgrades	2018/19		**TBD**				**TBD**
SYS	Redesign Elementary and High School Entryways	2018/19		**TBD**				**TBD**
	Subtotal		**-**		**-**	**-**	**-**	**-**
Sound Attenuation Project								
JFK	Sound Attenuation Phase 2	2022/23	61,874					61,874
	Subtotal		**61,874**	**-**	**-**	**-**	**-**	**61,874**
SHS Athletic Facility Improvement Projects								
SHS	Varsity Softball Lighting, Revised 22-23	2021/22		685,000				685,000
SHS	Athletic Facility Improvements, Revised 22-23	2021/22		706,663	1,511,276	822,300		3,040,239
	Subtotal		**-**	**1,391,663**	**1,511,276**	**822,300**	**-**	**3,725,239**
	Subtotal Board of Education Capital Improvement Plan		**331,174**	**8,318,939**	**1,511,276**	**16,697,794**	**185,000**	**27,044,183**
School Construction Projects								
SYS	Phase III Elementary Projects- Revised 22-23	2018/19	148,700,000					148,700,000
KSA	Karen Smith Academy- Revised 22-23	2021/22	15,900,000					15,900,000
	Subtotal Phase III: Derynoski, Flanders & Kelley Building Projects		**164,600,000**	**-**	**-**	**-**	**-**	**164,600,000**
Grand Total Board of Education Capital Improvement Plan			**164,931,174**	**8,318,939**	**1,511,276**	**16,697,794**	**185,000**	**191,644,183**

TOWN OF SOUTHINGTON
CAPITAL IMPROVEMENT PLAN
FISCAL YEAR 2023/24 THROUGH FISCAL YEAR 2027/28

DEPARTMENT:	**BOARD OF EDUCATION**	**PROJECT TITLE:**	**AIR CONDITIONING - ELEMENTARY SCHOOLS**
		FISCAL YEAR PROPOSED:	**2026/27**

DESCRIPTION:
The Administration requested pricing to improve the HVAC systems at five elementary schools. The schools and the approximate cost to improve the HVAC systems are listed below.

SCHOOL	PROBABLE CONSTRUCTION COST	
Hatton Elementary	$	3,822,500
Oshana Elementary (A)	$	1,213,500
South End Elementary	$	1,760,000
Strong Elementary	$	3,287,500
Thalberg Elementary	$	3,220,500
TOTAL	$	13,304,000
Estimated Architectural costs	$	1,000,000
Subtotal	$	14,304,000
Add 10% contingency	$	1,430,400
Total Estimate for all schools	$	15,734,400

PROJECT COST: 15,734,000

TOWN OF SOUTHINGTON
CAPITAL IMPROVEMENT PLAN
FISCAL YEAR 2023/24 THROUGH FISCAL YEAR 2027/28

DEPARTMENT:	**BOARD OF EDUCATION**	**PROJECT TITLE:**	**BOILER PROJECT**
		FISCAL YEAR PROPOSED:	**2024/25; 2027/28**

DESCRIPTION:

2024/25

SHS - This project would replace two (2) boilers for the Auditorium, DECA and CLP wings of the high school. The gas boilers are 600,000 BTUs each and supply hot water for the heat pumps in the those wings. The boilers were installed in 1998 and are in fair condition. SPS has been repairing sections on the boilers in the past five years because they are leaking.

$115,500

2027/28

This Project would replace two (2) boilers at Hatton Elementary School, in accordance with the replacement schedule as advised by the Administration

$185,000

PROJECT COST: 300,500

TOWN OF SOUTHINGTON
CAPITAL IMPROVEMENT PLAN
FISCAL YEAR 2023/24 THROUGH FISCAL YEAR 2027/28

DEPARTMENT:	**BOARD OF EDUCATION**	**PROJECT TITLE:**	**PAVING PROJECTS**
		FISCAL YEAR PROPOSED:	**2023/24; 2026/27**

DESCRIPTION:

2023/24
SHS - This project would replace the asphalt paving in the rear of the high school (excluding the Ag-Science Building) from Pleasant Street through the back lot.
$174,300
(updated quote received October 2021)
SHS- This project would pulverize and replace the main bus loop in front of the high school.
$95,000

2026/27
HES - Reconstruct paved playground for parking off the east wing and driveway access to existing visitors parking lot and drop off area.
$141,094

PROJECT COST: 410,394

TOWN OF SOUTHINGTON
CAPITAL IMPROVEMENT PLAN
FISCAL YEAR 2023/24 THROUGH FISCAL YEAR 2027/28

DEPARTMENT:	**BOARD OF EDUCATION**	**PROJECT TITLE:**	**ROOFING PROJECTS**
		FISCAL YEAR PROPOSED:	**2024/25**

DESCRIPTION:

2024/25
HES - This project would replace the 1996 roofing, 27,000 SF and the 2003 roofing, 45000 SF.
$2,446,606
SES - This project would replace the 1993 roofing, 26,500 SF and the 2003 roofing, 28,870 SF.
$2,058,103
TES - This project would replace the 2002 roofing, 62,068 SF.
$2,307,067

PROJECT COST: **6,811,776**

TOWN OF SOUTHINGTON
CAPITAL IMPROVEMENT PLAN
FISCAL YEAR 2023/24 THROUGH FISCAL YEAR 2027/28

DEPARTMENT:	**BOARD OF EDUCATION**	**PROJECT TITLE:**	**SCHOOL SAFETY IMPROVEMENT PROJECTS**
		FISCAL YEAR PROPOSED:	**TBD**

DESCRIPTION:

Elementary Security Camera System Upgrades

The BOE Administrators are developing a plan to improve the security camera systems at all Elementary Schools. The pricing and scope of this project are TBD.

Redesign Elementary Schools and High School Entryways

The BOE Administrators are developing a plan to redesign the school entryways for improved school security. RFP 2023-04 has recently been posted and the scope and pricing are being developed. The timing of obtaining the price is TBD.

PROJECT COST: **TBD**

TOWN OF SOUTHINGTON
CAPITAL IMPROVEMENT PLAN
FISCAL YEAR 2023/24 THROUGH FISCAL YEAR 2027/28

DEPARTMENT:	**BOARD OF EDUCATION**	**PROJECT TITLE:**	**SOUND ATTENUATION PHASE 2**
		FISCAL YEAR PROPOSED:	**2023/24**

DESCRIPTION:

2023/24
Phase 2- JFK

The Board of Education approved Phase 1 of a Sound Attenuation Plan for the chiller at JFK Middle School. This project represents the second phase if further sound attenuation is necessary.
$61,874

PROJECT COST: **61,874**

TOWN OF SOUTHINGTON
CAPITAL IMPROVEMENT PLAN
FISCAL YEAR 2023/24 THROUGH FISCAL YEAR 2027/28

DEPARTMENT:	**BOARD OF EDUCATION**	**PROJECT TITLE:**	**High School Athletic Facility Master Plan based on Kaestle Boos Study from December 2020 Revised December 2022**
		FISCAL YEAR PROPOSED:	**2024/25-2026/27**

DESCRIPTION:
2024/25, 2025/26 and 2026/27
Athletic Facility Master Plan Improvements

Various Improvements to the Athletic Fields as outlined in the December 2020 Kaestle Boos Study in December 2020, revised in December 2022. This includes a 5% contingency for the entire project and add alternates.

Project		Cost	Proposed Year of Funding
Lighting on the Varsity Softball Field	$	685,000	2024/25
Replacement of Track, fencing and walkways	$	706,663	2024/25
Tennis Court Replacement	$	1,511,276	2025/26
Replace Stadium bleachers and Press Box	$	822,300	2026/27

PROJECT COST: 3,725,239

TOWN OF SOUTHINGTON
CAPITAL IMPROVEMENT PLAN
FISCAL YEAR 2023/24 THROUGH FISCAL YEAR 2027/28

DEPARTMENT:	**BOARD OF EDUCATION**	**PROJECT TITLE:**	**SCHOOL CONSTRUCTION PROJECTS**
		FISCAL YEAR PROPOSED:	**2023/24**

DESCRIPTION:

2023/24
Phase III Elementary Projects

As part of the phase III renovations, there are three elementary schools remaining to been renovated. The Board of Education is working with Colliers on a plan to construct two new elementary schools. The estimate was updated in November 2022. The individual estimates are $71,700,000 and $77,000,000.
$148,700,000

Karen Smith Academy
The Board of Education is developing a plan for constructing a new building for the Karen Smith Academy. The estimate was updated November 2022.
$15,900,000

PROJECT COST: 164,600,000

SOUTHINGTON PUBLIC SCHOOL DISTRICT

Office of the Superintendent
Steven G. Madancy
SGM

To: Board of Education Members

Date: October 27, 2022

Re: Superintendent's Goals 2022-23

Within, you will find the superintendent's goals and their alignment with Board of Education Policy 2131 **(adopted May 2013)** and accompanying regulations.

In this version, I will identify the key priorities and responsibilities and attempt to tag each to the specific area identified in **Policy 2131** which may include one or more of the following:

- Implementation of Board Policies and Procedures (A1)
- Administration of the Southington Public Schools (A2)
- Ongoing Improvement of the Southington Public Schools (A3)
- Relationship with Board of Education (A4)
- Community Relations (A5)
- Fiscal Management (A6)
- Personal Qualities (A7)
- Staff and Personal Relationships (A8)
- Plant Management (A9)
- Instructional Leadership (A10)

The goals presented within are a combination of work relative to some of last year's focus and priorities as well as new efforts to move the district forward.

Areas identified are meant to bring about organizational progress and improved student achievement, while intentionally focusing on the "whole child" beyond test scores and academic indicators.

1. **The superintendent of schools, in collaboration with the administration, teaching staff and the Board of Education, will continue to work towards actualizing assured experiences for students relative to our Vision of a Graduate. (A2, A3, A8, A10)**

   a. Work collaboratively with the Assistant Superintendent, and administrators within the Office of Curriculum and Instruction, to summarize student performance as outlined within District Performance Indicators.

      i. Present 'State of Student Achievement' data presentation to the full Board at public meeting.

ii. Work with building administrators to summarize building level student data and identify target areas for growth.

b. Continued work with in-line building administrators through ongoing professional development, as well as frequent and continuous building visits, to calibrate observed teaching and learning in classrooms and grow administrative proficiency in providing meaningful, specific, and actionable feedback to staff.

c. Work collaboratively with the Assistant Superintendent and instructional leadership, at the secondary level, to identify opportunities for students to demonstrate understanding of the key 21st century skills of collaboration, communication, critical thinking, creativity, and citizenship as identified within our Vision of a Graduate through the development of a student led portfolio process and review within an established Capstone project.

2. **The superintendent of schools, in collaboration with the administration, Board of Education, and town officials, will work to establish a budget that recognizes the financial challenges associated with the current fiscal situation at the town and state level yet meets the needs of students in the district. (A2, A3, A4, A5, A6)**

   a. Continue to utilize ARP ESSER funds to provide mental health and support services to SPS students to the maximum extent possible while balancing against needs and uses previously identified including teacher salaries for 22-23 and 23-24.
   b. Work closely with the Board of Education, town manager, and elected officials of the Board of Finance and Town Council to promote a shared understanding of the needs and strategies of the district in finalizing the budget.
   c. Seek alternate ways to provide meaningful and relevant data aimed at increased awareness of student needs and district funding against previous years and funding levels of comparative surrounding districts.

   d. Develop a forecasted budget scenario that looks ahead to next 3 years of anticipated budget obligations associated with contractual salary increases and purchased services.

3. **The superintendent of schools, in collaboration with the administration, Board of Education, town officials, staff, and community members will work to improve district facilities including elementary buildings and athletic facilities. (A3, A5, A6, A8, A9)**

   a. Meet with various community stakeholder groups to raise awareness of needs associated with the SHS athletic complex.

   b. Engage the media in raising public awareness of November 2022 Athletic Complex referendum.

c. Create and display marketing materials including signage across HS athletic complex, within middle schools, at Apple Harvest, and around town parks to raise awareness of HS Athletic Complex Improvement Project.

d. Work to bring an elementary building project to referendum in November 2023 that meets the needs of 21st century learners at the remaining schools to be renovated, while simultaneously working with the community and Board of Education to understand and plan for shifts in enrollment areas that will result from the project completion.

4. **The superintendent of schools, in collaboration with the administration, Board of Education, staff and community partners will work to monitor the effectiveness of behavioral, social, and emotional needs of students, and identify strengths and opportunities for improvement. (A2, A3, A5)**

   a. The superintendent will continue to partner with and support STEPS, as a leading statewide model supporting the behavioral, social, and emotional needs of students.

   b. The superintendent will support the development of Student Truancy Interventions as required by Public Act 22-47 sections 16 & 21 as well as building level Behavioral Health Interventions as recently required within Public Act 22-47 section 19.

   c. The superintendent will continue to explore partnerships with community agencies that can assist with the mental, social, and emotional support of students and families.

   d. Establish a Community Mentoring Program for students aimed at providing adult role model, support, and mentoring for students.

5. **The superintendent of schools will engage in community partnerships that raise awareness and improve the district's profile within the community of the work and outcomes associated with excellence in the district. (A4, A5, A8, A10)**

   a. Develop community support and engagement for district efforts and initiatives including facilities projects, budget, and student events and committees.

      i. Regular attendance at Rotary meetings

      ii. Regular attendance at YMCA Board of Directors and Southington Education Foundation Meetings

      iii. Regular attendance at Greater Foundation of New Britain Community Initiatives Committee Meetings

      iv. Engagement with School PTO's

      v. Attendance and engagement with the Southington Business Leaders Networking Group aimed at increasing participation and partnerships with business leaders that result in:

- Job's Board for students at SHS
- Capstone experiential learning opportunities
- Career Days

6. **The superintendent, in collaboration with members of the district Interagency Safety Committee will explore improvement and enhancement to student safety across buildings including but not limited to (A2, A3 and A9) :**

   a. Continued drills and training for staff in safety procedures and protocols

   b. Increase in surveillance equipment across schools

   c. Increase in safety and/or security staff within buildings

   d. Improvement to facility entrances aimed at enhancing safety and security within buildings

7. **The superintendent will continue to work collaboratively with Board of Education members, with a focus on improved regular communication between the Superintendent and Board members, through delivery of a weekly update to Board members. (A4)**

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only ____________ Board Meeting Date December 8, 2022

Decision Requested X Agenda Code 10 f.

AGENDA REPORTING FORM

Agenda Topic: Superintendent's Proposed Goals 2022-2023

Summary of Issue: Goals are submitted to the Board of Education every year for the Board's Review.

Background: The Superintendent's Goals are presented for Board approval for the 2022-2023 school year.

Alternative Strategies: The Superintendent's goals to be modified.

Cost (if applicable): N/A **Funding Source:** N/A

Beginning Date of Program or Project: 2022-2023 School Year

Ending Date of Program or Project: June 2023

Recommendation or Comment: To approve the Superintendent's Goals for the 2022-2023 school year.

Title of Attachment(s)

1. Superintendent's Proposed Goals 2022-2023 under separate cover

Steve Madancy

Signature of Superintendent of Schools