Southington Board of Education Meeting

Thursday, January 13, 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. Negotiation Update NIPSEU
   b. Student Matters
3. Reconvene Meeting
4. Pledge of Allegiance - Moment of Silence
5. Approval of Minutes - December 9, 2021
6. Public Communications
   a. Communications from Student Board Representatives
   b. Communications from Public
   c. Communications from Board of Education
   d. Communications from Administration
7. Committee Reports
   a. Curriculum & Instruction Committee Meeting - December 9, 2021
   b. Policy & Personnel Committee Meeting - January 5, 2022
8. Superintendent's Report
   a. Personnel Report
9. Old Business
   a. Town Government Communications
   b. Elementary Facilities Project Update
   c. Proposed 2022-2023 School Calendar - Second Reading
   d. Policy 9325 - Methods of Operation - Meeting Conduct - Second Reading
   e. SHS - GPA and Weighting Proposal - Second Reading
   f. Appointment of UPSEU Negotiating Committee
10. New Business
    a. 2022-2023 Proposed Operating Budget Presentation
    b. SHS World Language New Course Proposal - Classical Mythology ECE - First Reading
    c. SHS English Course Proposal - English IV - First Reading
    d. Science Grade 3 Unit - Migrating Monarchs - First Reading
    e. Science Grade 4 Unit - Mimicking the Natural World - First Reading
    f. SHS Textbook Proposal - AP Biology - First Reading
    g. Policy 4118.8 Alcohol and Drug Use - Policy Revision - First Reading

h. Policy 5131.6 Drugs, Alcohol, Tobacco - Policy Revision - First Reading
i. Policy 6146.1 Grade Reporting - Policy Revision - First Reading
j. Policy 9321 Time, Place, Notification of Meetings - Policy Revision - First Reading

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

DECEMBER 9, 2021

The regular meeting of the Southington Board of Education (Committee of the Whole - Operations) was held on Thursday, December 9, 2021, 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 6:34 p.m.

Board members present were Mrs. Dawn Anastasio, Mr. Joseph Baczewski, Mrs. Terri Carmody, Mr. James Chrzanowski, Mrs. Colleen Clark, Mr. David Derynoski, and Mr. Jasper Williams. Absent were Mr. Sean Carson and Mr. Zaya Oshana.

Cabinet administrators present were Mr. Steven Madancy, Superintendent of Schools, and Mr. Frank Pepe, Assistant Superintendent.

2. EXECUTIVE SESSION – STUDENT MATTERS

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

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

Motion carried unanimously by voice vote.

Mrs. Carmody ended Executive Session at 6:39 p.m.

The Regular Board Meeting was reconvened at 7:00 p.m.

3. RECONVENE MEETING – REGULAR SESSION

Board members present were Mrs. Dawn Anastasio, Mr. Joseph Baczewski, Mrs. Terri Carmody, Mr. Sean Carson, Mr. James Chrzanowski, Mrs. Colleen Clark, Mr. David Derynoski, and Mr. Jasper Williams. Absent was Mr. Zaya Oshana.

Cabinet administrators present were Mr. Steven Madancy, Superintendent of Schools; Mr. Frank Pepe, Assistant Superintendent; Mrs. Jennifer Mellitt, Director of Business & Finance.

Student Representatives present were Jhalissa Vincent, Ethan Solury, and Angelina Micacci.

4. PLEDGE OF ALLEGIANCE – MOMENT OF SILENCE

The student representatives led in reciting of the Pledge of Allegiance.

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

- Paul Baillargeon who passed away on November 20, 2021. Mr. Baillargeon was the Principal at Thalberg Elementary School from 1967 until his retirement in 1996.
- Daniel Murawski who passed away on November 24, 2021. Mr. Murawski was a former Southington High School history teacher, boys' soccer coach and girls' tennis coach from 1969 until his retirement in 2007.

5. APPROVAL OF MINUTES – NOVEMBER 18, 2021

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

"Move to approve the Regular Board of Education minutes of November 18, 2021, as submitted."

Motion carried unanimously by voice vote.

6. APPROVAL OF MINUTES – NOVEMBER 20, 2021

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

"Move to approve the Special Board of Education minutes of November 20, 2021, as submitted."

Motion carried unanimously by voice vote.

7. PUBLIC COMMUNICATIONS

a. Communications from Student Board Representatives

Angelina Micacci reported on the following:

- SHS Drama Club performed their last show of The Last Gasp. The auditions for the spring musical The Little Mermaid will take place on Monday with the show taking place on March 4 and 5, 2021.
- The Winter Concerts for the band ensemble, orchestra, and concert choir take place December 16 and 20, 2021.
- South End School celebrated their November Charter Champions. Students are nominated by their peers for best living their classroom charter. South End participated in a Food Drive and Hat/Mitten Drive to help support Southington Community Services.

Ethan Solury reported on the following:

- At the Monday, December 6, SHS Key Club meeting the American Legion visited the Key Club to honor them for helping the American Legion at the Apple Harvest Festival in October. On Tuesday, they helped decorate the hallways for the holidays.
- The Key Club inducted the new members for the 2021-2022 school year the evening of Tuesday, December 7.
- The American Legion honored the SHS Band for their Veteran's Day Concert on Tuesday, December 7. The SHS Band is preparing for their Holiday Ensemble where they will continue the tradition of marching through the hallways playing Christmas music on the days leading up to Christmas break.
- Over the course of the last few weeks there was a lot of misinformation because of the current world events that are having an effect on students nationwide. When threats affect schools in nearby towns such as Farmington, it begins to hit too close to home. Students discussed with Mr. Michael Crocco, Principal of SHS, ways to improve communication. Mr. Crocco addressed everything that goes into investigating threats and handling school discipline. It was a productive conversation, and the students appreciated the difficult work administrators have. He noted that Mr. Crocco was very visible in the school, his door is always open for students, and that he is responsive and receptive to feedback.

Jhalissa Vincent reported on the following:

- The SHS fall athletic season ended with the Blue Knights Football team defeating Cheshire High School 17-10 to win the Apple Valley Classic Trophy Award and annual Thanksgiving Day game. The team qualified for the CIAC Class LL playoffs playing New Canaan High School in the state quarterfinals and lost to Rham.
- SHS winter sports competitions start Tuesday, December 14. She reported the on the first competition dates for Girls Basketball, Wrestling, and Boys Basketball.
- On December 8, Kennedy Middle School PTO sponsored their first entertainment assembly in years "Virtual Music Technology with Brett Daniels". Students got a virtual look into a recording studio and interacted with Brett.
- Kennedy Middle School was in the process of purchasing flags of 17 nations to be displayed in the front lobby. The flags represent some of the nations where current students were born.
- DePaolo Middle School music students will be performing holiday winter concerts prior to the winter break. The Orchestra Concert is Monday, December 13, Chorus Concert on Thursday, December 16, and the Band Concert on Tuesday, December 21.
- Students in the Leadership Program at DePaolo volunteered their time last week to do bell ringing for the Salvation Army at Southington Walmart and raised over $850.

b. Communications from Public

There were a number of residents *(Attachment #1)* who came to the podium to voice their comments, opinions, recommendations, requests, complaints, and concerns regarding the following: mask mandates, history full of bad laws, Board members pushing back against mask mandates, ventilation in classrooms, Critical Race Theory (CRT), policy that CRT is not allowed to be taught in Southington, student mental health crisis, uploading curriculum online,

implementing a policy to require 72-hours' notice to be given to parents before school sanctioned events, policy on reciprocal student punishment, not BOE job to mold student morals, gender identity, or political affiliations but to "stay in your lane" and teach reading, writing and arithmetic to improve test scores, Covid rules and mask mandates that students are forced to comply with that cause mental health issues, student choice to wear mask, COVID strategies and quarantining, thanking Mr. Madancy for allowing elementary students to spend more time outdoors, 40 adverse conditions due to long-term mask wearing, denial of mask exemptions, request that BOE take action on ventilation, send formal letter to Governor Lamont, DPH and State Dept. of Education requesting local Board of Education control school district's policies, asking BOE members to attend DPH and State BOE virtual Health & Safety meetings on Tuesdays from 8am-9am, Superintendent or Board provide a monthly summary at the BOE meeting of the COVID-related mitigation inquiries raised and received from the DPH and State, outdated HVAC ventilation systems, ventilated indoor air quality improves performance, other states purchasing portable HEPA Air Filtration Systems for their classrooms, BOE members speaking to all Southington residents and not just parents, all sub-committee meetings held in person and not virtually, BOE and administration reached out to student who spoke about how he was made to feel in a classroom that addressed diversity, social justice, and equity and student satisfied how it was being investigated, only nine (9) states have mask mandates in place for students and 27 states do not have mask mandates in place in their school systems, push back at the state level to have Connecticut not be part of the National Education Association (NEA), no longer yielding public speakers time and having time for speakers increased from three minutes to five minutes, not having vaccine clinics in schools.

Please see the YouTube video link of the meeting and public communication below that also can be found on both the Town of Southington and Southington Board of Education websites: https://www.youtube.com/channel/

c. Communications from Board Members

Mr. Baczewski thanked the Southington residents for speaking and voicing their concerns that the Board will work on to remedy. He agreed with parents concerns on air ventilation and was willing to spearhead looking into re-usable machines depending on the costs. He addressed mask mandates and social justice in response to the public communication.

Mr. Chrzanowski congratulated the SHS Blue Knights Football Team for beating Cheshire High School at the annual Thanksgiving football game.

Mrs. Clark attended a CABE Conference on Wednesday, December 8 and had a folder containing the highlights of what was discussed for any Board member who would like to peruse it. Discussed was the role of the Board of Education, effective Board meetings, the state of public education in Connecticut, Board leadership in these times including the role and responsibilities of the Board and the Superintendent. Her take away from the conference was about building relationships within the community and within the state to get things done and for the Board to "stay in their lane". The Board does policies, and the Superintendent does the regulations.

d. Communications from Administration

Administration reported on the following:

1. STEPS, Youth Development Award: Mr. Madancy announced that the YMCA is recognizing the STEPS Program and Asset Building Classroom (ABC) for the Youth Development Award this year, which will be presented at the annual YMCA Awards Celebration in February. It is bestowed upon an individual or group who has worked to nurture the potential of youth in their teens in the Southington community. The Asset Building Classroom is being awarded for helping to instill 40 developmental assets in children and teens in Southington. Southington's Asset Building Classroom is a model program used across the state.

2. Connectivity Fund Grant: Mr. Madancy announced that the district received this optional grant that Tyler Savage, Technology Network Manager, worked on to procure $710,000 in grant money to replace 2,000 Chromebooks and a savings on 310 MacBooks. This puts the device renewal and replacement plan on track for 1:1 instruction.

3. Lisa Inc. Program at Karen Smith Academy: Mr. Madancy attended a program at the Karen Smith Academy offered by Lisa Inc. for seniors through a grant received from the Main Street Foundation. The program was for seniors who participated in workshops focused on improving their communication and employment skills for interviews.

4. Health Department Child Vaccine Clinic: Mr. Madancy announced that the town plans to offer a child vaccine clinic hosted by the Regional Plainville-Southington Health Department at the Calendar House on a Saturday in January 2022. Vaccine clinics will not be in held in the schools.

5. Town Board of Finance: Mr. Madancy, Mrs. Mellitt and some Board members attended the Town Board of Finance meeting on Wednesday, December 8, to discuss goals for this budget season and looking three years out given the potential for a fiscal cliff and the understanding that the grant funds will end. It was a strong and collaborative start with the Board of Finance.

8. COMMITTEE REPORTS

a. Policy & Personnel Committee Meeting – December 6, 2021

Mr. Williams, Policy & Personnel Committee Chair, reported that the committee discussed Policy 9325-Methods of Operations, which contains revisions. The committee discussed Robert's Rules of Order, meeting conduct, increasing public input time from three to five minutes that could be modified by the chairperson, previous sign-in process for public speaking, and a revision which codifies that a member of the public should be a Southington resident to participate during public comment.

Mrs. Clark stated that the current sign-in sheet has the name, address, and topic for public speakers to complete during Public Communication. Mr. Derynoski stated that in year's past, there was a bound, sign-in book that Southington residents, who wanted to speak during Public Communications, signed as they entered the meeting, and the book would then be handed to the Board Chairperson who would call the names (in the order that they signed) for people to come up to speak at the podium. Anyone who came in late was asked if they wished to speak. It would give the chair the option to adjust the three or five-minute time limit depending on the number of speakers. Mr. Baczewski questioned about an out-of-town student attending Southington schools, such as a Hartford Choice student or Agriculture-Science student, and if the parent would be able to speak at a BOE meeting. It was agreed that the language would be codified for the second reading to include any Southington resident and parent of any student enrolled in the Southington Public Schools could speak at the BOE meeting.

b. Finance Committee Meeting – December 2, 2021

1. Bid Award #2022-06, Varsity Softball Field Improvements

Mr. Chrzanowski, Finance Committee Chair, reported that the committee discussed a bid award for various improvements on the varsity softball field at the high school. He reported on the scope of the project and there were two bids. The committee recommended that the lowest bidder, US Pitchcare, be awarded the bid in the amount of $179,200.

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

"Move to award Bid #2022-06 for Varsity Softball Improvements to US Pitchcare, as presented.

Motion carried unanimously by voice vote.

2. Bid Award #2022-113, Varsity Baseball Field Improvements

Mr. Chrzanowski reported that the committee discussed a bid award for various improvements on the varsity baseball field at the high school. He reported on the scope of the project with two bids received and that the committee recommends that the lowest bidder, US Pitchcare of Northford, Connecticut, be awarded the bid. The bid was for $17,900.

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

"Move to award Bid #2022-113, for Varsity Baseball Improvements to U.S. Pitchcare, as presented.

Motion carried unanimously by voice vote.

3. Transfer of Funds

Mr. Chrzanowski stated that the Transfer of funds was an accounting adjustment.

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

"Move to approve the Transfer of Funds from the High School Library Account to the School-based Software Account, as presented.

Motion carried unanimously by voice vote.

9. 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.

10. OLD BUSINESS

a. Town Government Communications

Mrs. Clark reported that she, Mr. Williams, and Mr. Chrzanowski attended the Town Board of Finance meeting on December 8, 2021 in Town Hall to discuss the 2022-2023 school year budget process and praised Mrs. Mellitt and Mr. Madancy for their work. She was encouraged after hearing Mr. John Leary of the Town Board of Finance comments. Mrs. Clark noted that Reverend Vicky Triano, Town Council Chair, will be implementing the "Committee of the Chairs" again with the meeting date to be announced.

b. Capital Improvement Plan 2022-2023 to 2026-2027 – Second Reading

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

"Move to approve the Capital Improvement Plan, as presented.

Motion carried unanimously by voice vote.

11. NEW BUSINESS

a. Proposed 2022-2023 School Calendar – First Reading

Mr. Derynoski questioned if the calendar would be sent to the school PTOs for comment as in the past. Mr. Madancy explained that after he receives any questions/comments from the Board the proposed calendar would be sent to the schools. Mrs. Clark stated that she liked the new change and color coding to the layout of the calendar and that it included the schools, addresses, administrators, telephone numbers and hours all on one page. Mr. Madancy credited his Executive Assistant, Mrs. Colegrove, for the more user-friendly format.

b. Superintendent's Annual Report 2020-2021

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

"Move to approve the Superintendent's 2020-2021 Annual Report, as presented."

Mrs. Carmody was proud of all the things the school system had accomplished in 2020-2021 and asked that the Annual Report be made public. Mr. Madancy explained that it was a requirement of the Town Charter. Mrs. Carmody pointed out to the public that the ELA/Social Studies report included a new unit of study in social studies for grade 5 called, "Reading in the Content Areas: How Key Events Shape Nations" with a focus on the Civil Rights Movement and the continuing fight for equality. The unit explores the struggle for freedom, equality, and social justice by studying the Civil Rights Movement. She thought that when history is taught it needed to be inclusive of what happened in the past. Mrs. Clark thanked all the administrators for their work on this excellent report.

Motion carried unanimously by voice vote.

c. Policy 9325 – Methods of Operation – Meeting Conduct – First Reading

Mrs. Clark asked that if Board members had any questions regarding this policy to contact Mr. Williams. Mr. Williams stated that the committee would make the recommended changes that were discussed earlier in the meeting.

d. SHS – GPA and Weighting Proposal – First Reading

Mr. Pepe explained that this presentation was given to the Curriculum & Instruction Committee in October with the request that it be presented to the full Board. He introduced the presenters Ms. Jennifer Discenza, SHS Director of School Counseling, Ms. Ana Napolitano and Ms. Beth Viens, School Counselors, with Ms. Viens joining the presentation virtually. The presentation was on Grade Point Average (GPA) and Academic Levels at Southington High School. The presentation included a history of the SHS current GPA system, which in 2010 was changed, after a visit from NEASC, from four levels to the current three levels: 1) College and Career Preparatory-CP, weighted at 1.0; 2) Competitive College Preparatory-CCP, weighted at 1.10; and 3) Honors and Advanced Placement both weighted at 1.20. NEASC visited in 2020 and recommended changing the leveling practices and GPA weighting system.

The school counselors gave a lengthy and detailed presentation that included the following:

- The SHS Class of 2021 had a high GPA Range with 89% of SHS students having a GPA of a "B" or above, which can lead to students not understanding that their GPA (after recalculation by colleges/universities) may be lower than what is on their transcript, especially for students who take mostly CCP courses.
- The SHS counseling staff has had numerous conversations with college representatives over Southington's top heavy GPA range with most colleges recalculating Southington's GPA System during the application process.
- The Class of 2020 GPA Range with 87% of SHS students having a GPA of a "B" or above, which had resulted in negative feedback from students and parents when colleges recalculated.
- The challenges of the current GPA System including realigning with colleges and students missing out on Merit Scholarships.
- Post-secondary data of 2020 students' top choice of colleges/universities.
- Couple of years ago, class rank had been removed from the official student transcript; however, it is tracked internally at the high school. Colleges are looking at students holistically and not by a number due to different school size/senior classes depending on the school district.
- Area high schools in Southington's DRG (District Reference Group) were researched on how they calculated their GPA, which resulted in moving away from Southington's current 100+ and moving to a weighted 4.0 system.
- Recommendations to revise the GPA System for 2022-2023, renaming all the levels for 2022-2023 and phased collapse of levels until 2023-2024 for Southington students to have a fair admissions process.
- The school counselors proposed three different levels that would be weighted differently: 1) Academic Level (Actual grade); Accelerated Level (add .50 to GPA conversion); and College Level/Credit Courses (add 1.0 to GPA conversion). These would align with many college/university recalculation guidelines.
- Ms. Viens explained the proposed new grading system of converting the numerical grade to an alphabetical grade and the new leveling, which is similar to what the

colleges use to calculate GPA and would be a more accurate representation of what they could expect regarding college admission and scholarships.
- Significant changes would be made to CCP level courses.

Mr. Carson questioned if there was a standard recalculation formula used by colleges for a baseline or if each college admissions office used their own formula. The school counselors replied that colleges use their own formula, but they are all very similar, and Southington was trying to align with what would be most beneficial for students. Mr. Carson questioned if UConn or an Ivy League college was the baseline that Southington was trying to align with for recalculation. The school counselors tried to align to the top 10 colleges that Southington students have applied to and were accepted, which included UConn. Mr. Carson questioned how it would affect the top tier and bottom tier students and was concerned how changing the GPA profile would better position Southington students to get into better institutions. Mr. Carson questioned how colleges look at Advanced Placement (AP) courses versus Honors courses and why they are ranked the same. Ms. Discenza stated that they are currently ranked the same and that the proposal is to change and rank them separately.

Mrs. Clark gave an example of her eldest son applying to five different colleges, being accepted at all five colleges with all five colleges changing his GPA and looking at him differently.

Mrs. Carmody added that she received phone calls from parents who could not believe the recent large number of students on the honor roll in grades 9-12 that were listed in the newspaper. She asked if the proposed changes would affect this. Mr. Madancy pointed out that this phenomenon started with the opening of the Parent Portal in PowerSchool when families log on every time a grade was posted and emailed the teacher that they were not meeting their child's needs and constantly attacking the teacher resulting in grade inflation due to pushback, which is a national trend and not unique to Southington. Everyone receives a trophy mindset. Mr. Carson questioned if there was one or two model school districts in the state who have researched the data and statistics that show their model to be successful on going to the next level of colleges/universities compared to Southington. Mr. Madancy stated that colleges/universities were looking at many factors besides Grade Point Average (GPA) such as well-roundedness, extra-curricular, civic service, and SAT scores, etc.

Mr. Derynoski thought that this change was long overdue and would be a culture shock to many parents and students. Mr. Pepe added that this proposal was a first read and that if anyone had any further questions to contact him. This agenda item would eventually be going back to Policy & Personnel Committee to develop a policy on grading and weighting. The Board thanked the counselors for all their hard work.

e. Appointment of UPSEU Negotiating Committee

Mrs. Clark requested that if any Board members were interested in volunteering to serve on the UPSEU Paraprofessional / ABA Therapists Union Negotiating Committee to contact her. Mr. Madancy stated that administration would provide the Board members with the dates and times for the start of negotiations.

f. Resolution for Department of Mental Health and Addiction Services (DMHAS)

Mr. Madancy explained that the school district received a grant in the spring with Mrs. Christina Simms, former Youth Services Director, as the signatory. This resolution would transfer the signing to Mrs. Megan Albanese who oversees the STEPS grant, and that this was just a procedural motion.

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

"Move to approve the Department of Mental Health and Addiction Services Resolution, as presented.

Motion carried unanimously by voice vote.

12. ADJOURNMENT

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

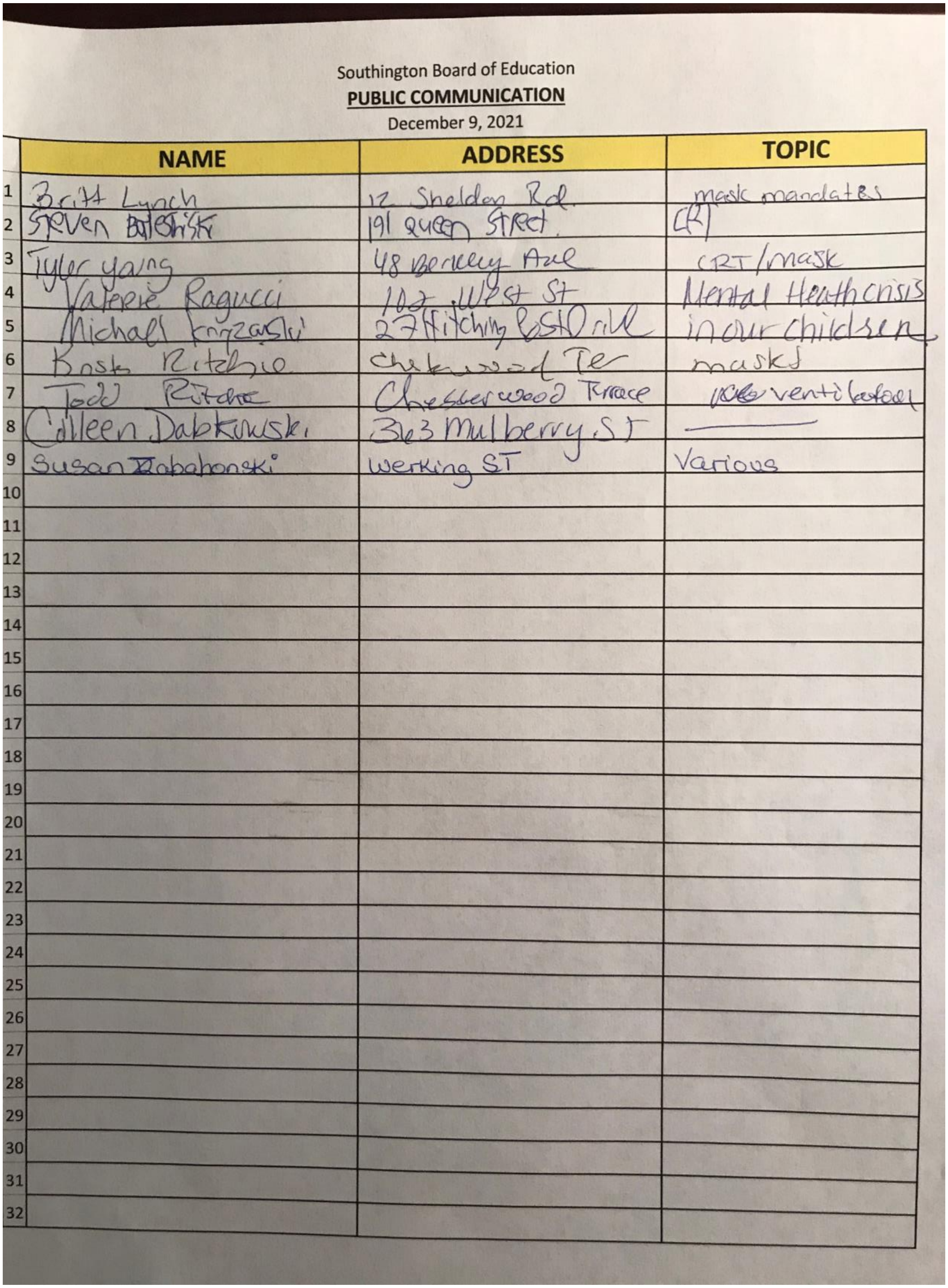
"Move to adjourn."

Motion carried unanimously by voice vote.

The meeting adjourned at 8:55 p.m.

Respectfully submitted,
Linda Blanchard
Recording Secretary

ATTACHMENT #1 – PUBLIC COMMUNICATIONS - SPEAKERS



Southington Board of Education
PUBLIC COMMUNICATION
December 9, 2021

	NAME	ADDRESS	TOPIC
1	Britt Lynch	12 Sheldon Rd.	mask mandates
2	Steven Batoshiski	191 Queen Street	CRT
3	Tyler Young	48 Berkeley Ave	CRT/mask
4	Valerie Ragucci	102 West St	Mental Health crisis
5	Michael Krzanski	27 Hitching Post Hill	in our children
6	Krista Ritchie	Chestnutwood Ter	masks
7	Todd Ritchie	Chesterwood Terrace	ventilation
8	Colleen Dabkowski	363 Mulberry St	———
9	Susan Zabohonski	Werking ST	Various
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Board of Education

Administrative Report

January 13, 2022

1. UCONN ECE Top 10
2. STEPS (Survey and recent funding award)
3. Business Department attendance at December Chamber Meeting

STEVEN G. MADANCY
SUPERINTENDENT OF SCHOOLS

FRANK M. PEPE
ASSISTANT SUPERINTENDENT OF SCHOOLS

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ZAYA G. OSHANA

JASPER P. WILLIAMS

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SOUTHINGTON PUBLIC SCHOOLS

Board of Education
Southington, Connecticut

Curriculum & Instruction Committee Meeting Minutes
Thursday, December 9, 2021 - 1:00 p.m.
Superintendent's Conference Room

Members Present: Committee Chair Joseph Baczewski, Dawn Anastasio, Jasper Williams, Absent: Terri Carmody

Administration Present: Assistant Superintendent Frank Pepe, Curriculum and Instruction Coordinator Dianne Holst-Grubbe, District Math and Science Coordinator Amy Zappone

School Staff Present: Tina Riccio World Language Department Leader, Rebecca Migliaro English Department Leader, Nicole Raccio Science Department Leader, Melissa O'Neil K-5 Science Leader, Alicen Foresman Latin Teacher

Town Staff Present: Megan Albanese STEPS Coalition Prevention Coordinator, Deputy Chief William Palmieri

Meeting called to order at 1:00pm

Mrs. Riccio described ongoing teacher professional development, specifically an alignment of seventh grade curriculum. She is strategically bringing the teachers from both middle schools together to isolate enduring understandings and the essential questions within both French and Spanish language instruction. Mrs. Riccio and Mrs. Foresman also proposed a new course titled Classical Mythology ECE. The course provides students a Humanities credit while exploring the mythology of the ancient Greek and Roman World.

Mrs. Migliaro proposed English IV to replace the current required courses, British Literature and Grammar and Composition. The current courses are not aligned with the English progression from grades nine, ten and eleven. English IV focuses on skills that reflect mastery of both the Common Core State Standards and the 4Cs. English IV serves as a comprehensive English course addressing reading, writing, speaking, and listening.

Mrs. Zappone and Mrs. O'Neil reviewed a plan which vertically aligns K-5 science instruction with comprehensive coverage of standards (NGSS) while supporting the Vision of the Graduate. Two such units were presented. The first being The Case of the Missing Monarchs in which students develop a model that explains the reasons for which the monarch butterfly population in North America is changing. Students engage in arguments from evidence, construct explanations, use patterns to make predictions and identify cause and effect.

Southington Public Schools

Steven G. Madancy
Superintendent of Schools

Frank M. Pepe
Assistant Superintendent of Schools

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The second unit is Mimicking the Natural World. Students discover biomimicry; how humans mimic the natural world in their innovations and designs. This bundle compares and contrasts energy transfer in the natural and designed worlds focusing on how electric currents, light and sound are received and perceived by both. As a result of observing those interactions in nature, much of human innovation and design can be directly attributed to how organisms survive all manner of energy inputs.

Mrs. Raccio presented a new textbook for AP Biology. Every 10 years College Board requires a new text. Southington High School's two AP Biology teachers whittled the 14 recommended texts down to three. The decision for Campbell Biology in Focus, 3rd Edition was made because of the real-world connections throughout the text as well as the enhanced graphs and tables. An "E" license is also part of the associated cost.

Megan Albanese and Deputy Chief Palmieri updated the committee on the progress between the ongoing partnership of STEPS and Southington PD. Specifically, the latest collaborative effort developing a curriculum to replace DARE. The new program focuses on prevention over the course of six weeks. The topics are 1. Trusted Adults, 2. Protective and Risk Factors, 3. Risk Taking Behaviors, 4. Youth Substance Use and the Developing Brain, 5. Internet Safety and 6. Mental Health and Inclusivity. 8-10 officers will be trained by the end of January and scheduling will be handled by Officer Laporte. Mrs. Albanese will communicate with families prior to the start of the lessons which this year are isolated to fifth grade.

Meeting was adjourned at 1:57 PM.

Respectfully Submitted,

Frank Pepe

STEVEN G. MADANCY
SUPERINTENDENT OF SCHOOLS

FRANK M. PEPE
ASSISTANT SUPERINTENDENT OF SCHOOLS

BOARD OF EDUCATION

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JASPER P. WILLIAMS

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SOUTHINGTON PUBLIC SCHOOLS

Board of Education
Southington, Connecticut

Policy & Personnel Committee
Wednesday, January 5, 2022 - 5:30pm
Superintendent's Conference Room

Members in attendance: Chairman Jasper Williams, Dawn Anastasio, David Derynoski, Zaya Oshana

The meeting was called to order by Chairman Jasper Williams at 5:35 PM.

Proposed revisions for Policy 6146.1 Grade Reporting were presented by Director of School Counseling, Jennifer Discenza. Ms. Discenza described a phase in plan over the course of the next four years, beginning with incoming freshmen. Based on conversation from the last Board of Education Meeting, Mr. Pepe reviewed planned changes for:

R-6146.1(3). Although changes to regulations do not require BOE approval, the proposal addresses concerns expressed by BOE members regarding the vast numbers of students who historically qualify for Honors and High Honors.

Proposed revisions for Policy 4118.8 Alcohol and Drug Use align with new legislation which extends the prohibition on smoking to any area of a school building/grounds and now includes electronic nicotine and or cannabis delivery systems.

Proposed revisions for Policy 5131.6 Drugs, Alcohol, Tobacco align with new legislation which prohibits greater student discipline for the use, sale or possession of cannabis compared to the associated student discipline for the use, sale or possession of alcohol. This proposal reflects the changes offered in Policy 4118.8 as well.

Proposed revisions for Policy 9321 Time, Place, Notification of Meetings include a minor grammatical edit and the reorganization of public comment.

Policy 4215 Evaluation and Supervision for Classified Personnel did not contain a proposed revision but rather served as an informational item per the associated regulations. The influx of technology has brought the need for an appropriate evaluation system for Technology Analysts and

Southington Public Schools

Steven G. Madancy
Superintendent of Schools

Frank M. Pepe
Assistant Superintendent of Schools

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Technology Assistants. The new regulations meet this need and contain the cyclical feedback loop and self-evaluation. Discussion ensued within the subcommittee around the importance of self-evaluation and the benefits of employing a five point versus a four-point scale.

All members were in favor of bringing the aforementioned policies forward for a first read at the January 13, 2022 BOE meeting.

Possible dates for future Policy & Personnel Committee Meetings were discussed.

The meeting was adjourned at 6:05 PM.

Respectfully Submitted,

Frank Pepe

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only _____ Board Meeting Date January 13, 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 2021-2022 school year. This report includes activity for the month of December 2021.

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

Peter Madaras
Signature of Superintendent

Included:
Personnel Report

Personnel Report
December 2021

APPOINTMENTS

	NAME	POSITION	SCHOOL	FTE	EFFECTIVE	DEGREE	SALARY
CLASS	Anastos, Sally	Paraeducator	FES	1.0	12-20-2021	N/A	$17.67
CLASS	Carroll, Jared	Paraeducator	STELLAR	.88	11-29-2021	N/A	$17.67
CERT	Harmon, Katie	Special Education	JAD	1.0	12-6-2021	MA	$85,501
CLASS	Martone, Eduardo	Custodian	SHS	.50	12-17-2021	N/A	$15.63
CERT	McAloon, Jill	Special Education	SHS	1.0	12-10-2021	MA	$56,033
CLASS	Pare, Natalie	Paraeducator	SHS	.88	12-2-2021	N/A	$17.67
CERT	Puebla, Heather	Speech Language Pathologist	JFK	1.0	12-13-2021	MA+30	$68,330
CLASS	Ramsdell, Allison	Paraeducator	DES	.88	12-20-2021	N/A	$17.67
CLASS	Santiago, Dyana	Paraeducator	JAD	1.0	12-20-2021	N/A	$17.67
CLASS	Tramontanis, Brittany	Literacy & Math tutor	DES	1.0	12-20-2021	N/A	$21.35
CLASS	Whalen, Marybeth	Paraeducator	SHS	.88	12-20-2021	N/A	$17.67
CLASS	Ziegler, Katelyn	Physical Therapist	District	1.0	12-13-2021	MA	$76,696

RESIGNATIONS/RETIREMENTS

	NAME	POSITION	SCHOOL	EFFECTIVE	YRS	RET/RES
CLASS	Allko, Eliana	Paraeducator	HES	12-23-2021	4 mos.	RESIGN
CLASS	Fehrs, Benjamin	Paraeducator	SHS	12-31-2021	2	RESIGN
CLASS	Levensaler, Patricia	Asst Food Service Mgr	SHS	12-31-2021	38	RETIRE
CLASS	Mazzone, Christopher	Custodian, PT	CO	12-18-2021	1	RESIGN
CLASS	Nichols, Lara	Exec Sec to Asst Super	CO	12-3-2021	10 mo.	RESIGN
CLASS	O'Keefe, Stephanie	Paraeducator	SEES	12-24-2021	3 mos.	RESIGN
CLASS	Pratte, Brenna	Paraeducator	FES	12-24-2021	1 mo.	RESIGN
CERT	Rosario, Myrna	World Language Spanish	JAD	12-31-2021	10	RETIRE
CLASS	Terricciano, Patricia	Paraeducator	JFK	12-31-2021	17	RETIRE
CLASS	Volpe, Maria	Paraeducator	JFK	12-31-2021	11	RETIRE

ASSIGNMENT CHANGE

	FROM (PREVIOUS ASSIGN)		TO (NEW ASSIGN)		
NAME	POSITION/SCHOOL	FTE	POSITION/SCHOOL	FTE	EFFECTIVE
Colucci, Jillian	Paraeducator, DES	.88	Paraeducator, FES	1.0	12-1-2021
Rizzo, Lisa	Secretary, Operations	1.0	Exec Asst to Asst Super	1.0	12-27-2021
Valentine, Heather	Special Education, JAD	1.0	English/Lang Arts, JAD	1.0	12-6-2021

Personnel Report
December 2021

TRANSFERS

	FROM (PREVIOUS ASSIGN)		TO (NEW ASSIGN)		
CERT NAME	**POSITION/SCHOOL**	**FTE**	**POSITION/SCHOOL**	**FTE**	**EFFECTIVE**

None to report

COACHING / STIPENDS

Coaching Stipends

Dachelet, Daniel	Outdoor Girls' Track Head Coach	SHS	STIPEND
Froebel, Craig	Freshman Baseball Coach	SHS	RESIGN
Queen, William	Asst Girls' Basketball Coach	SHS	STIPEND

Other Stipends

DeStefano, David	Director of Summer School	SHS	RESIGN

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only _____ Board Meeting Date January 13, 2022

Decision Requested X Agenda Code 9 c.

AGENDA REPORTING FORM

Agenda Topic: **Proposed 2022-2023 School Calendar ~ Second Reading**

Summary of Issue: The attached school calendar is provided to the Board for their comments and recommendations.

Background: The calendar was discussed at the December 9, 2021 Board of Education 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: The administration is prepared to discuss and encourages the Board of Education to take action on the recommendation for the 2022-2023 School Calendar.

Steven Madaras

Signature of Superintendent of Schools

Title of Attachment

1. Proposed School Calendar for the 2022-2023 School Year

SOUTHINGTON PUBLIC SCHOOLS

2022-2023 CALENDAR

BOE Adopted: Date

DRAFT 1-10-2022

August –0 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	PD
PD	PD	PD		

September – 21 Days				
M	T	W	Th	F
			1	2
5	6	7	8	9
12	13	14	15	16
19	20	21	22	23
26	27	28	29	30

October – 20 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
31				

November – 17 Days				
M	T	W	Th	F
	1	2	3	4
7	PD	9	10	11
14	15	16	17	18
21	22	23	24	25
28	29	30		

December – 17 Days				
M	T	W	Th	F
			1	2
5	6	7	8	9
12	13	14	15	16
19	20	21	22	23
26	27	28	29	30

January – 20 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			

February – 18 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			

March – 23 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

April – 14 Days				
M	T	W	Th	F
				7
3	4	5	6	
10	11	12	13	14
17	18	19	20	21
24	25	26	27	28

May – 22 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		

June – 9 Days				
M	T	W	Th	F
			1	2
5	6	7	8	9
12	13	14	15	16
19	20	21	22	23
26	27	28	29	30

181 Instructional Days
(186 Staff Days)

KEY

- Early Dismissal for Listed School(s)
- Early Dismissal – **All** Schools
- Holiday/Vacation – **No School**
- PD Workday/PD – **No School**

Any unexpected school closings will be made up following the scheduled last day of school up to June 30th. If additional weather-related days are needed beyond these days, we will begin with April 14th and move backward.

8/26-8/31	Staff Workdays/Professional Dev.-No School
9/1	**First Day of School**
9/5	Labor Day – No School
9/20	Professional Dev. – Early Dismissal
10/10	Columbus Day– No School
10/12	**SHS- PSAT Administration** – Early Dismissal
10/18	**Professional Dev.** - Early Dismissal
11/8	Election Day - Workday/PD – No School
11/11	Veterans Day – No School
11/14-11/15	**Elementary Conferences** – Early Dismissal
11/16	**SHS Conferences** – Early Dismissal
11/21	**Middle School Conferences** – Early Dismissal
11/23-25	Thanksgiving Recess – No School
12/6	Professional Dev. – Early Dismissal
12/23	Early Dismissal
12/26-1/2	Holiday/Winter Recess – No School
1/16	Martin Luther King Day – No School
1/24	Professional Dev. – Early Dismissal
2/7	Professional Dev. – Early Dismissal
2/20-2/21	President's Day Recess – No School
3/7	Professional Dev. – Early Dismissal
3/13-3/14	**Elementary Conferences** – Early Dismissal
4/7	Good Friday – No School
4/10 – 4/14	Spring Break – No School
4/25	Professional Dev. – Early Dismissal
5/16	Professional Dev. – Early Dismissal
5/29	Memorial Day – No School
6/13	**Tentative Last Day of School** – Early Dismissal

FACILITY	ADDRESS	PHONE	HOURS	ADMINISTRATOR
Board of Education	200 N. Main Street	860-628-3202	7:30-4:30	Steven G. Madancy, Superintendent
Board of Education	200 N. Main Street	860-628-3204	7:30-4:30	Frank M. Pepe, Asst. Superintendent
Southington High School	720 Pleasant Street	860-628-3229	7:37-2:15	Michael Crocco, Principal
Karen Smith Academy	242 Main Street	860-628-3379	7:40 – 1:10	Jess Levin, Director
Stellar Program	51 North Main Street	860-628-3200	8:00 – 2:00	Amy Aresco, Special Ed. Coord.
J. A. DePaolo Middle School	385 Pleasant Street	860-628-3260	8:05-2:40	Christopher Palmieri, Principal
J. F. Kennedy Middle School	1071 South Main Street	860-404-4790	8:05-2:40	Richard Terino, Principal
Derynoski Elementary School	240 Main Street	860-628-3286	8:55-3:25	Jan Verderame, Principal
Flanders Elementary School	100 Victoria Drive	860-628-3372	8:35-3:05	Katie Guerrette, Principal
Hatton Elementary School	50 Spring Lake Road	860-628-3377	8:35-3:05	Robert Garry, Principal
Kelley Elementary School	501 Ridgewood Road	860-628-3310	8:55-3:25	Marilyn Kahl, Principal
Oshana Elementary School	70 Church Street	860-628-3450	8:35-3:05	Josephine Rogala, Principal
South End Elementary School	Maxwell Noble Drive	860-628-3320	8:35-3:05	Erin Nattrass, Principal
Strong Elementary School	820 Marion Avenue	860-628-3314	8:55-3:25	Melissa Barbuto, Principal
Thalberg Elementary School	145 Dunham Street	860-628-3370	8:35-3:05	Katie Reeves, Principal

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only _____ **Board Meeting Date** **January 13, 2022**

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

AGENDA REPORTING FORM

Agenda Topic: Policy 9325 – Methods of Operation - Meeting Conduct – Second Reading

Summary of Issue: The Policy & Personnel Committee has reviewed Policy 9325– Methods of Operation - Meeting Conduct.

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 9325 to the full Board for a Second Reading.

Titles of Attachments:

1. DRAFT Policy 9325

Signature of Staff Member Submitting Report

Signature of Superintendent of Schools

Policy 9325

Methods of Operation - Meeting Conduct

Draft

Series 9000: Bylaws of the Board

Methods of Operation

Meeting Conduct Meetings of the Board of Education (the "Board") shall be conducted by the Chairperson in a manner consistent with the bylaws of the Board and the provisions of law, including the Freedom of Information Act.

All Board meetings shall commence at the stated time and shall be guided by an agenda, which has been prepared and delivered in advance, to all Board members and other designated persons and made available to the public in accordance with the Freedom of Information Act.

Robert's Rules of Order shall govern the proceedings of the Board except as otherwise provided by these bylaws.

After April 30, 2022, Board member participation in meetings by means of electronic equipment shall be governed by all applicable laws, rules, regulations, and guidance, as appropriate, in effect at the time of such participation.

The conduct of meetings shall, to the fullest possible extent, enable members of the Board to (1) consider problems to be solved, weigh evidence related thereto, and make wise decisions intended to solve the problems, and (2) receive, consider, and take any needed action with respect to reports of accomplishment both as to students and to school system operations.

Provision for permitting any individual or group to address the Board concerning any subject that lies within its jurisdiction shall be as follows:

1. ~~Three~~ Five minutes may be allotted to each speaker. The Board may modify these limitations at the beginning of a meeting if the number of persons wishing to speak makes it advisable to do so.

2. A Board member shall be appointed by the Chairperson prior to the meeting to act as timekeeper for the meeting, if deemed necessary by the Chairperson.

3. No boisterous conduct shall be permitted at any Board of Education meeting. Persistence in boisterous conduct shall be grounds for summary termination, by the Chair, of that person's privilege of address. If necessary, the Chairperson may direct those who are acting in a boisterous manner to leave the premises.

4. No oral presentation shall include charges or complaints against any employee of the Board of Education, regardless of whether or not the employee is identified in the presentation by name or by another reference that tends to identify an individual. All charges or complaints against employees shall be submitted to the Board of Education under provision of Board of Education policy.

5. All speakers must identify themselves by name and address. Speakers must be either a Southington resident or parent/guardian of a Southington Public School student.

Series 9000: Bylaws of the Board

Methods of Operation

In the event that a Board meeting is interrupted by any person or group of persons so as to render the orderly conduct of such meeting unfeasible and order cannot be restored by the removal of individuals who are willfully interrupting the meetings, the Chairperson may order the room cleared and continue in session.

The Board of Education may adjourn any regular or special meeting to a specified time and place. If all members of the Board are absent, the clerk may adjourn the meeting. A copy of the notice of adjournment shall be conspicuously displayed near the meeting room door within twenty-four (24) hours of adjournment.

Actions by the Board

No action will be taken unless the subject acted upon was listed in the agenda published for that meeting, except that an item of business not included on the agenda of a regular meeting may be considered and acted upon after a two-thirds vote of the members present and voting to add such business to the agenda.

All actions taken by the Board shall be identified clearly in minutes of the Board meeting as provided the Bylaw 9326, Minutes.

(cf. 1120 – Board of Education Meetings to public participation)
(cf. 1312 - Public Complaints)
(cf. 9321 – Time, Place, Notification of Meetings)
(cf. 9322 – Public and Executive Sessions)
(cf. 9323 – Construction/Posting of Agenda)

Legal Reference:
Connecticut General Statutes

- 1-200 Definitions.
- 1-206 Denial of access of public records or meetings. Notice. Appeal.
- 1-210 Access to public records.
- 1-225 Meetings of government agencies to be public.
- 1-226 Recording, broadcasting or photographing meetings.
- 19a-342 Smoking prohibited in certain places. Sign required. Penalty.
- 1-231 Executive sessions.
- 1-232 Conduct of meetings (re disturbances).
- 10-224 Duties of the Secretary.

Bylaw adopted by the Board: January 1990
Bylaw reviewed by the Board: April 2003
Bylaw reviewed by the Board: February 2009
Bylaw updated and recoded: June 22, 2017
Bylaw updated Dec 6, 2021

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only _____ Board Meeting Date **January 13, 2022**

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

AGENDA REPORTING FORM

Agenda Topic: SHS GPA and Weighting Proposal – Second Reading

Summary of Issue: The Board of Education Curriculum & Instruction Committee reviewed the SHS GPA and Weighting Proposal and is bringing the presentation to the full Board

Background: _____

Alternative Strategies: _____

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 GPA and Weighting Proposal to the full Board for a second reading.

Titles of Attachments:
1. GPA and Academic Levels Presentation

Frank Ryan
Signature of Staff Member Submitting Report

Stan Madansky
Signature of Superintendent of Schools

GPA and Academic Levels

Southington High School
Student Support Center

SHS Current GPA System

After the NEASC visit in 2010- SHS collapsed down from four levels to three. The three levels:

I. **College and Career Preparatory- CP, weighted at 1.0**

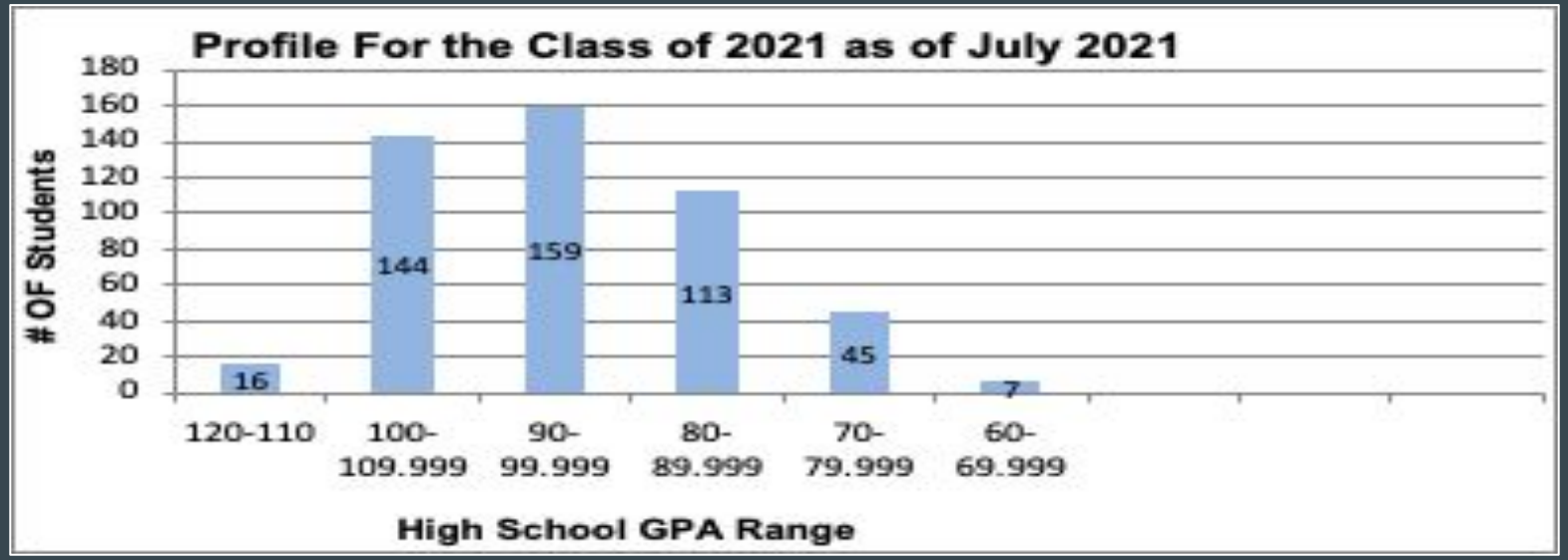
II. **Competitive College Preparatory - CCP, weighted at 1.10**

III. **Honors and Advanced Placement, both weighted at 1.20**

NEASC recommendations from 2020- Research, review, and revise the leveling practices to ensure that all students have access to challenging academic experience and that courses throughout the curriculum are populated with learners reflecting the diversity of the study body. As leveling practices are being analyzed we need to concurrently look at the GPA weight system.

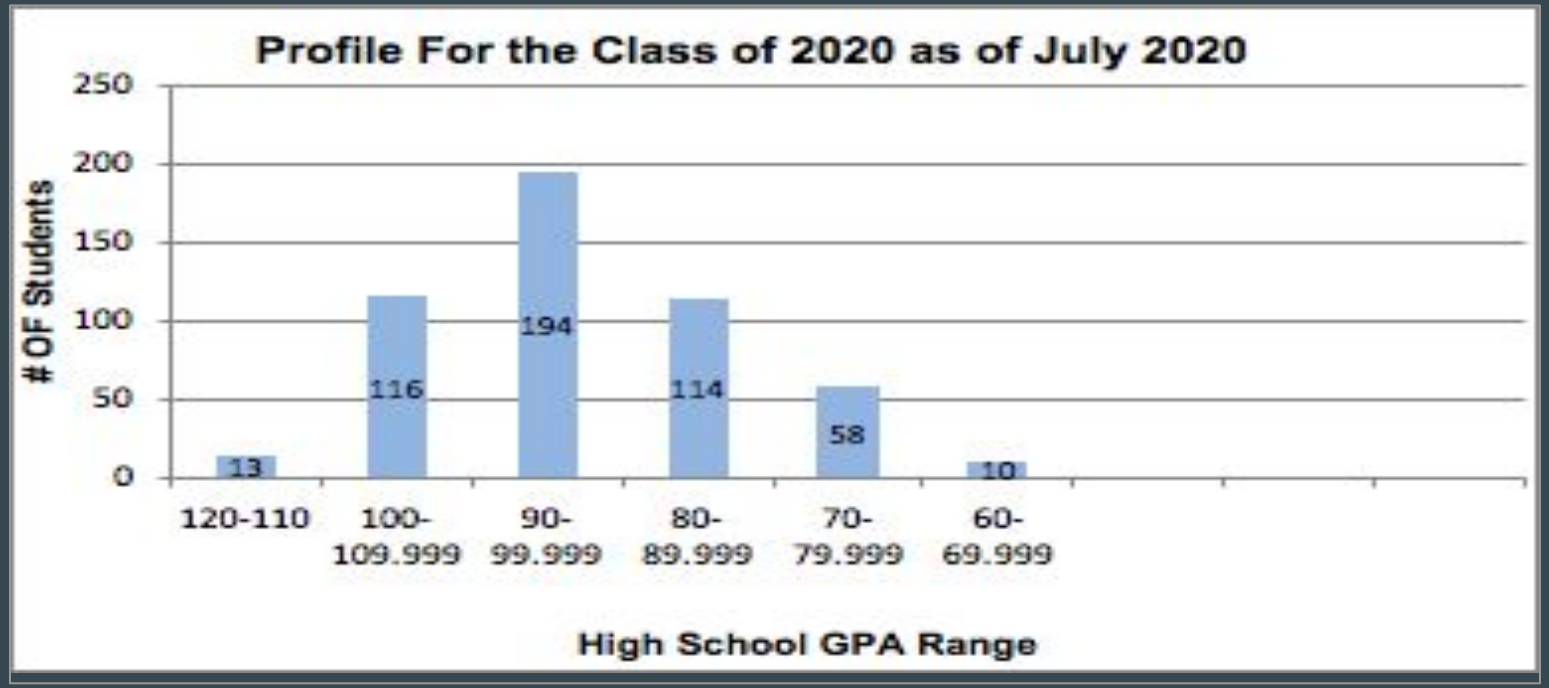
Class of 2021 GPA Range

- 89% of SHS students have a GPA of a “B” or above.
- This can lead at times to students not understanding that their GPA after recalculation by the college may be quite lower than what is on their transcript, especially for students who take primarily CCP courses.



Class of 2020 GPA Range

- 87% of SHS students have a GPA of a “B” or above.



The Challenges Of The Current GPA System

* High School weighted GPAs are almost always recalculated by colleges and universities in an attempt to fairly compare students from different high school and grading systems.

1. There is a significant disparity between the reported SHS weighted GPA and the newly recalculated GPA determined by each college.
2. The new GPA system would benefit our students during the college search process.
3. College representatives have asked us to change our current system because there is a large disparity and it doesn’t accurately reflect SHS students abilities.

Post-Secondary Data- 2020 Student Top Choice Schools

School	GPA	Comments
CCSU	4.0	Recalculates core academics and world language (including gr.12.) Weighs H/AP more heavily.
ECSU	4.0	They plan to recalculate soon if we don't change things. They will take 97% of our current GPA.
UCONN	4.0	Recalculates core academics and gives weighting to CCP, Honors and AP on a three-tiered weighting system.
URI	4.0	Uses only core academic courses 9-11 and provides additional weight to honors and AP courses.
UMASS	4.0	Removes all weights, allows one eletitive per year in GPA. Adds weight back for Honors (.5) and AP/ECE (1.0.)
University of Vermont	4.0	Uses only core academics.

Secondary School data

Secondary school data

Recommendations

*Revise the GPA system for 22-23

*Rename all the levels for 22-23

*Phased collapse of levels until 23-24

Academic Level	Actual grade
Accelerated Level	Add .50 to GPA conversion
College Level/Credit Courses	Add 1.0 to GPA conversion

- ➔ The new scale is in line with many college and university recalculation guidelines.
- ➔ SHS has already begun collapsing CP and CCP courses in science and social studies.
- ➔ Phased collapse. In 22-23 Biology and World History will be collapsed to the newly named Academic Level.

	Academic Level	Honors	AP/ECE
A+ (97-100)	4.33	4.83	5.33
A (93-96)	4.0	4.5	5.0
A- (90-92)	3.67	4.17	4.67
B+ (87-89)	3.33	3.83	4.33
B (83-86)	3.0	3.5	4.0
B- (80-82)	2.67	3.17	3.67
C+ (77-79)	2.33	2.83	3.33
C (73-76)	2.0	2.5	3.0
C- (70-72)	1.67	2.17	2.67
D+ (67-69)	1.33	1.83	2.33
D (63-66)	1.0	1.5	2.0
D- (60-62)	.67	1.17	1.67
F (Less than 60)	0	0	0

What would this look like within the range of student GPAs?

Top 15	Old GPA: Internal Rank	New GPA: Internal Rank
A	115.300: 1	4.71: 1
B	114.500: 2	4.62: 2
C	114.100: 3	4.62: 2
D	113.483: 4	4.57: 4
E	113.314: 5	4.51: 5
F	112.662: 6	4.42: 7
G	112.300: 7	4.39: 10
H	112.242: 8	4.44: 6
I	112.042: 9	4.42: 7
J	111.542: 10	4.39: 10
K	110.908: 11	4.42: 7
L	110.468: 12	4.27: 13
M	110.354: 13	4.27: 13
N	110.229: 14	4.27: 13
O	110.167: 15	4.35: 12

Middle Students	Old GPA	New GPA
240	94.271	3.17
241	94.250	3.16
242	94.242	3.16
243	94.221	3.34
244	94.208	3.06

Bottom 1/3	Old GPA	New GPA
340	86.980	2.83
341	86.943	2.6
342	86.883	2.46
343	86.833	2.61

Bottom 10%	Old GPA	New GPA
471	70.100	1.43
472	70.083	1.17

Questions

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only _____ **Board Meeting Date** January 13, 2022

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

AGENDA REPORTING FORM

Agenda Topic: **Appointment of UPSEU Negotiating Committee**

Summary of Issue: The Board of Education will enter into contract negotiations with the UPSEU bargaining unit.

Background: During the December 9, 2021 Board of Education meeting, the Board of Education Chair requested that any BOE member interested in participating in contract negotiations for the UPSEU should contact her.

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 Chair appoint the following BOE members to the negotiating committee: Colleen Clark, Dawn Anastasio, Zaya Oshana, Jasper Williams

Steven Madaras

Signature of Superintendent of Schools

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only X Board Meeting Date January 13, 2022

Decision Requested Agenda Code 10 a.

AGENDA REPORTING FORM

Agenda Topic: 2022-2023 Proposed Operating Budget Presentation

Summary of Issue: The Superintendent of Schools will present his proposed 2022-2023 Operating Budget to the Board of Education and the public for the first time.

Background: Discussion regarding the Superintendent's Proposed 2022-2023 Operating Budget will begin at the first workshop on Tuesday, January 18, 2022.

Alternative Strategies: N/A

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

Beginning Date of Program or Project: July 1, 2022

Ending Date of Program or Project: June 30, 2023

Recommendation or Comment: Informational

Jennifer Mellott

Signature of Staff Member Submitting Report

Signature of Superintendent of Schools

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only X **Board Meeting Date** January 13, 2022

Decision Requested _____ **Agenda Code** 10 b.

AGENDA REPORTING FORM

Agenda Topic: SHS World Language New Course Proposal - Classical Mythology – ECE – First Reading

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

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 World Language New Course Proposal – Classical Mythology - ECE to the full Board for a First Reading.

Titles of Attachments:

1. New Course Proposal

Frank Ryan
Signature of Staff Member Submitting Report

Peter Madaras
Signature of Superintendent of Schools

PROPOSED COURSE/PROGRAM CHANGE FORM

Southington Public Schools
Southington, Connecticut

School: **Southington High School**

Department: **Humanities**

Please check appropriate item:

New Course: ☒

Revised Course: ☐

Course Title: **Classical Mythology ECE**

1. **Proposed Change – Please give a brief description of proposed new course or revision to existing course.**

Classical Mythology (CAMS 1103 - UConn ECE) looks at the origin, nature, and function of myth in the literature and art of Greece and Rome and explores the re-interpretation of classical myth in modern art forms.

2. **Rationale – What is the purpose of the proposed new course or course change? To what extent will it benefit the students?**

Classical Mythology ECE will provide students with an opportunity to receive a Humanities credit while exploring the mythology of the ancient Greek and Roman world. The course examines some of the greatest stories ever told in ancient Greece and Rome and asks students to track their continued influence in today's world. The course highlights the importance of mythic "truth values" and how those values influence, shape, and define a culture - whether ancient or modern. Additionally students will benefit from the college credits they can earn from this ECE course.

3. **Target Population – Which group of students will be directly affected (grade level, academic level)?**

Any junior or senior student who is interested in this course and has successfully completed sophomore year English. (The course is reading & writing heavy.)

PROPOSED COURSE/PROGRAM CHANGE FORM

4. **Evaluation – How do you plan to assess the implementation of the proposed new course or the course change?**

This course will have a course evaluation and will monitor students' engagement with and interpretation of classical myths and their use in both ancient and modern contexts.

Additionally the syllabus and overall course design require approval from Professor Roger Travis at UConn.

5. **Cost – What are the anticipated costs for staff, textbooks, materials, other?**

There is no cost to this additional class. All required readings are open-source and will be made available by the teacher. Our current staff is sufficient to accommodate this new course offering.

	YEAR		
	I	II	III
Staff	$	$	$
Textbooks	$	$	$
Materials	$	$	$
Other	$	$	$
TOTAL	**$**	**$**	**$**

Comments: _____

Principal: Approved ☑ Denied ☐

Signature 

mp\Curriculum\Proposed Course Change Form, 2010.doc

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only X **Board Meeting Date** January 13, 2022

Decision Requested _____ **Agenda Code** 10 c.

AGENDA REPORTING FORM

Agenda Topic: SHS English Course Proposal – English IV - First Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed SHS English Course Proposal – English IV

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 English Course Proposal – English IV to the full Board for a First Reading.

Titles of Attachments:

1. Course Proposal

Signature of Staff Member Submitting Report

Signature of Superintendent of Schools

PROPOSED COURSE/PROGRAM CHANGE FORM

Southington Public Schools
Southington, Connecticut

School: **Southington High School**

Department: **English**

Please check appropriate item:

New Course: ☒

Revised Course: ☐

Course Title: **English IV**

1. **Proposed Change – Please give a brief description of proposed new course or revision to existing course.**

The Southington English Department will create an English IV course to replace the current required courses-British Literature and Grammar and Composition.

2. **Rationale – What is the purpose of the proposed new course or course change? To what extent will it benefit the students?**

Having two distinct courses with different focuses for grade 12 is not in line with the construction of the English courses in Grades 9, 10 and 11. Grade 12 students in the CCP and CP levels have disparate experiences when the experience should be much more aligned as it is in the prior grades. As the final required English course, English IV should focus on the skills that reflect mastery of both the Common Core State Standards and the 4 Cs. Moreover, English IV will incorporate more diverse content, reflective of the needs of our current students. Instead of focusing solely on early British literature or solely on writing skills, English IV will be a comprehensive English course that addresses reading, writing, speaking, and listening skills using a range of diverse texts. Incorporating both fiction and nonfiction texts from a range of writers from diverse backgrounds and cultures will provide students with a richer understanding of others and themselves. It will provide an opportunity for students both to see themselves in the texts they read and to develop their awareness of people different from them, leading to a greater understanding of humanity and empathy.

3. **Target Population – Which group of students will be directly affected (grade level, academic level)?**

PROPOSED COURSE/PROGRAM CHANGE FORM

Grade 12 students in the CCP and CP levels

4. **Evaluation – How do you plan to assess the implementation of the proposed new course or the course change?**

Teachers will create common assessments and calibrate scoring to ensure that students are mastering the CCSS skills. They will also seek feedback from the students through course reflections.

5. **Cost – What are the anticipated costs for staff, textbooks, materials, other?**

200 copies - A Woman is No Man - $3300
200 copies - Aristotle and Dante Discover the Secrets of the Universe - $2400

	YEAR I	II	III
Staff	$ N/A	$ N/A	$ N/A
Textbooks	$ 5700	$ N/A	$ N/A
Materials	$ N/A	$ N/A	$ N/A
Other	$ N/A	$ N/A	$ N/A
TOTAL	$ 5700	$	$

Comments: _____

Principal: Approved ☑ Denied ☐

PROPOSED COURSE/PROGRAM CHANGE FORM

Frank Pepe, Original Signature on File
Signature

mp\Curriculum\Proposed Course Change Form, 2010.doc

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only X **Board Meeting Date** January 13, 2022

Decision Requested _____ **Agenda Code** 10 d.

AGENDA REPORTING FORM

Agenda Topic: Science Grade 3 Unit – Migrating Monarchs– First Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed Science Grade 3 Unit – Migrating Monarchs

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 – Migrating Monarchs to the full Board for a First Reading.

Titles of Attachments:

1. Science Grade 3 Unit

Signature of Staff Member Submitting Report

Signature of Superintendent of Schools

Unit 3 - Case of the Missing Monarchs
Students explore the causes and effects behind the declining monarch butterfly population. The monarch butterfly has an immense habitat range. Unlike most species, the habitat range of the monarch changes significantly with the seasons. As the climate changes, the cues for triggering monarch's migration are off. Monarchs use both temperature and precipitation cues to determine when migration begins. As the students analyze weather and climate data, they begin to realize that the cues are occurring too early in the spring and too late in the fall putting the monarch at risk. Through data analysis students come to realize that the climate in North America is shifting and changing. Students observe characteristic variations and predict reasons for these differences found between males and females of the same species and note patterns seen across multiple species. Students learn that the majority of these differences help the organism to survive, find a mate, or reproduce. They then identify the importance of characteristic variations for the male and female monarch butterflies. The final sequence helps students to understand that survival is not only related to the characteristic variations and adaptations but also behavior. Group behaviors help species survive in a difficult situation. Monarch butterflies roost at night to help maintain body temperature and to achieve safety in numbers. *Optional:* Consider growing and releasing monarchs in conjunction with this unit (this would then build upon 3-LS1-1 from Unit 2) or planning and developing a butterfly garden to provide additional hands-on learning opportunities. To view the flowchart for this unit, click here.
Suggested Pacing: 14 - 16 hrs
Anchoring Phenomenon/Design Problem: Monarch butterfly disappearance
Unit Driving Question(s): ● Why are the monarch butterflies disappearing? ● What are the monarch butterflies' survival secrets?
Culminating Performance Task: Students develop a model to explain the reasons for which the monarch butterfly population and behaviors in North America are changing. The model will also represent the ways the monarch is able to overcome some of these challenges.

Back to Top of Page

NGSS Performance Expectation(s): (Hyperlinks will bring reader to NGSS Evidence Statements)

- 3-LS2-1 Construct an argument that some animals form groups that help members survive.
- 3-LS4-2 Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.
  - [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]
- 3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
  - [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]
- 3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
  - [Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.]
  - [Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.]

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

Science & Engineering Practices:

Engaging in Argument from Evidence

- Construct an argument with evidence, data, and/or a model.(3-LS2-1)
- Construct an argument with evidence. (3-LS4-3)

Constructing Explanations and Designing Solutions

- Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2)

Analyzing and Interpreting Data

- Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. (3-ESS2-1)

Disciplinary Core Ideas:

LS4.B: Natural Selection

- Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)

LS2.D: Social Interactions and Group Behavior

- Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (Note: Moved from K–2). (3-LS2-1)

LS4.C: Adaptation

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

ESS2.D: Weather and Climate

- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)

Crosscutting Concepts:

Patterns

- Patterns of change can be used to make predictions. (3-ESS2-1)

Cause and Effect

- Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1, 3-LS4-2, 3-LS4-3)

Back to Top of Page

Possible Common Core State Standards Connections:

ELA-

- 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-LS4-2), (3-LS4-3), (3-LS4-4) (3-LS2-1)
- 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), (3-LS4-2), (3-LS4-3), (3-LS4-4) (3-LS2-1)
- 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), (3-LS4-2), (3-LS4-3), (3-LS4-4)
- RI.3.7 Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (3-LS1-1)
- W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.(3-LS4-1), (3-LS4-3), (3-LS4-4) (3-LS2-1)
- W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.(3-LS4-1), (3-LS4-2), (3-LS4-3), (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-LS4-2), (3-LS4-3), (3-LS4-4)
- SL.3.5 Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. (3-LS1-1)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (3-ESS2-1), (3-LS4-3)
- MP.4 Model with mathematics. (3-ESS2-1), (3-LS4-3), (3-LS4-4), (3-LS2-1)
- MP.5 Use appropriate tools strategically. (3-ESS2-1) (3-LS4-3)
- 3.NBT Number and Operations in Base Ten. (3-LS2-1)
- 3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (3-ESS2-1)
- 3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in bar graphs. (3-ESS2-1) (3-LS4-3)

PROGRESSION OF LEARNING

Learning Sequence 1

- **Learning Sequence Driving Questions**
  - How has the monarch population changed?
  - What factors influence this change?
  - What features do the monarch's have to promote survival?
- Learning Sequence 1
- **Relationship to Anchoring Phenomena/Design Problem**
  - This sequence introduces the case of the missing monarchs to the students.
- **Student Expected Outcome**
  - Students will generate, categorize, and prioritize questions about the decline in population and survival needs of the monarch butterfly.

Learning Sequence 2

- **Learning Sequence Driving Question**
  - Why does the monarch butterfly migrate? Is migration necessary for survival?
- Learning Sequence 2

Back to Top of Page

- Relationship to Anchoring Phenomena/Design Problem
  - The monarch butterfly has an immense habitat range. Students investigate the importance of the migration and the necessary habitat components that foster survival.
- Student Expected Outcomes
  - Students will analyze data representing monarch butterfly migration.
  - Students will use data to explain what environmental features support the monarch's ability to survive, and what environmental features interfere with the monarch's survival.

Learning Sequence 3

- Learning Sequence Driving Question
  - What are the seasonal climate patterns in the different regions of North America?
  - If the climate patterns change, how will the monarch butterflies be affected?
- Learning Sequence 3
- Relationship to Anchoring Phenomena/Design Problem
  - As the climate changes, the cues for triggering monarch migrations are off. Monarchs use both temperature and precipitation cues to determine when to begin their migration. Through data analysis students come to realize that the climate in North America is shifting and changing, and this puts the monarchs at risk.
- Student Expected Outcomes
  - Students will analyze the weather data collected throughout the year, recognizing the variations and ranges of weather over time.
  - Students will represent data in tables and various graphical displays in order to draw conclusions, identify patterns and make predictions about the weather.

Learning Sequence 4

- Learning Sequence Driving Questions
  - How do characteristic variations help an organism survive, find a mate and/or reproduce?
  - Does this connect to the monarch butterfly population decline?
- Learning Sequence 4
- Relationship to Anchoring Phenomena/Design Problem
  - Characteristic variations help an organism survive, find a mate, or reproduce.
- Student Expected Outcomes
  - Students will use evidence to explain why some organisms have specific characteristics and behaviors that give them advantages to survive.
  - Students will construct an argument with evidence about the significance of the characteristic variations seen in monarch butterflies.

Learning Sequence 5

- Learning Sequence Driving Question
  - Why do some animals live in groups?
- Learning Sequence 5
- Relationship to Anchoring Phenomena/Design Problem
  - Monarch butterflies roost at night to help maintain body temperature and to achieve safety in numbers.
- Student Expected Outcomes
  - Students will design an investigation to collect data about huddle dynamics.
  - Students will construct an argument with evidence that being part of a group helps monarchs survive.

Assessments:

- Culminating Performance Task
  - Students use their Evidence Logs to develop a model that explains the reasons for which the monarch butterfly population in North America is changing.

Back to Top of Page

- The model should also include ways the monarch butterfly is able to overcome some of these challenges.
- Once complete, students should share their products with the class through a gallery walk.

- Elementary Assessment Resources
- Grade 3 Performance Expectation Rubrics
- Grade 3 Assessment Tasks and Rubrics
- 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 U3 List
  - Includes ebooks and videos
  - Must have an educator user account for free access

Back to Top of Page

Learning Sequence 1

Brief Description:
This sequence introduces the case of the missing monarchs to the students. The students preview texts and the Monarch Butterfly Population Data to generate questions about the monarch's survival needs and recent population decline.

Suggested Pacing:
0.5 - 1 hr

Lesson-Level Phenomenon/Design Problem:
Monarch butterfly population decline

Relationship to Anchoring Phenomena/Design Problem:
This sequence introduces the case of the missing monarchs to the students.

Learning Sequence Driving Question:
How has the monarch population changed? What factors influence this change? What features do the monarch's have to promote survival?

Student Expected Outcome:
- Students will generate, categorize, and prioritize questions about the decline in population and survival needs of the monarch butterfly.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Analyzing and Interpreting Data ● Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. 3-ESS2-1	**LS4.C: Adaptation** ● For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. 3-LS4-3	Patterns ● Patterns of change can be used to make predictions. 3-LS1-1, 3-ESS2-1

Related Performance Expectation(s) in this Unit:
- 3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
  - [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]

Possible Common Core State Standards Connections:
ELA-
- 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-LS4-2),(3-LS4-3),(3-LS4-4)(3-LS2-1)
- 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),(3-LS4-2),(3-LS4-3),(3-LS4-4)(3-LS2-1)
- 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),(3-LS4-2),(3-LS4-3),(3-LS4-4)
- W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.(3-LS4-1),(3-LS4-3),(3-LS4-4)(3-LS2-1)
- W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.(3-LS4-1),(3-LS4-2),(3-LS4-3),(3-LS4-4)
- SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and

Back to Top of Page

relevant, descriptive details, speaking clearly at an understandable pace. (3-LS4-2),(3-LS4-3),(3-LS4-4)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (3-ESS2-1),(3-LS4-3),(3-LS4-4)
- MP.4 Model with mathematics. (3-ESS2-1),(3-LS4-3),(3-LS4-4),(3-LS2-1),(3-LS1-1)
- MP.5 Use appropriate tools strategically. (3-ESS2-1)(3-LS4-3),(3-LS4-4)
- 3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in bar graphs. (3-ESS2-1)(3-LS4-3),(3-LS4-4)

Prior Student Knowledge:

- 3-LS4-3: (K.ESS3.A) ;(2.LS2.A) ; (2.LS4.D)

LESSON PLAN – 5-E Model

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

Activity Description:

- Students watch the video on Slide #1 of the *Monarch Butterfly Slideshow* about the decline of the butterfly population.
- Tell the students, as secret agents, their new case is to investigate the case of the missing monarch butterflies.

Resources:

- Monarch Butterfly Slideshow

Suggested Instructional Strategies:

- Initial Scientific Model
  - Small Group Models
- 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:

- Show students Slide #2 of the *Monarch Butterfly Slideshow.*
  - Students should notice the overall declining trend as well as predict what will happen in 2020.
  - Teacher Note: Slide #6 has the data source (at the time of publishing, the 2020 data is not available). You can check here for the 2020 data after November 2020.
- Read *Traveling Butterflies* by Susumu Shingu (linked from epic! Books on Slide #3)
  - Optional: Read the text: *Monarch Butterfly of Aster Way* by Elizabeth Ring
- In small cooperative groups, prompt the students to generate questions using the *Question Formulation Technique* (Slide #4).
  - Let students know that the questions generated should be about the monarch butterfly and its change in population.
  - Students need to develop questions that they can investigate to solve the case of the monarch's decline and to understand the survival needs of the species.
  - Once the questions have been formulated, have the students share their most pressing

Back to Top of Page

questions.
    - Create a Driving Question Board (Slide #5) from these questions on a classroom wall, anchor chart, www.padlet.com, or Google Slides.
    - Once all of the questions are visible, help the students to sort the questions into themes. The themes should align to the sequences in the unit.

Resources:
- Monarch Butterfly Slideshow
- *Traveling Butterflies* by Susumu Shingu on epic! books
- Optional:
    - *Mr. McGinty's Monarchs* by Linda Vander Heyden on epic! Books
    - *Monarch Butterfly of Aster Way* by Elizabeth Ring
- Question Formulation Technique
    - Sample padlet

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

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:** *Analyzing and Interpreting Data*
- ❑ **DCI:** *LS4.C: Adaptation*
- ❑ **CCC:** *Patterns*

Summative Assessment Description(s):

- As the students work through each learning sequence, have them 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 the monarch butterfly, its survival adaptations and its recent decrease in population.

Resources:
- Evidence Logs

Suggested Instructional Strategies:
- Driving Question Board (for first learning sequence only)
- Question Formulation Technique (QFT)
- Talk Activities

Additional Resources:
- G3 Unit Materials List

Back to Top of Page

- Click on specific tab for unit-specific materials

Learning Sequence 2

Brief Description:
Students learn that the monarch butterfly has an immense habitat range. Through their interaction with maps and texts, students understand the importance of the migration and the necessary habitat components that foster survival. Students make a final claim linking climate and migrations to the survival of the species.

Suggested Pacing:
2.75 - 3.25 hrs

Lesson-Level Phenomenon/Design Problem:
Monarch butterfly migration map

Relationship to Anchoring Phenomena/Design Problem:
The monarch butterfly has an immense habitat range. Students investigate the importance of the migration and the necessary habitat components that foster survival.

Learning Sequence Driving Question:
Why does the monarch butterfly migrate? Is migration necessary for survival?

Student Expected Outcomes:
- Students will analyze data representing monarch butterfly migration.
- Students will use data to explain what environmental features support the monarch's ability to survive, and what environmental features interfere with the monarch's survival.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Analyzing and Interpreting Data ● Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. 3-ESS2-1 **Engaging in Argument from Evidence** ● Construct an argument with evidence.	**LS4.C: Adaptation** ● For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. 3-LS4-3 **ESS2.D: Weather and Climate** ● Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.3-ESS2-1	**Patterns** ● Patterns of change can be used to make predictions. 3-LS1-1, 3-ESS2-1 **Cause and Effect** ● Cause and effect relationships are routinely identified and used to explain change. 3-LS2-1, 3-LS4-2, 3-LS4-3

Related Performance Expectation(s) in this Unit:
- 3-LS4-3 Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
  - [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]

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-LS4-3)

Back to Top of Page

- RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. (3-LS4-3)
- 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-LS4-3)
- W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS4-3)
- W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (3-LS4-3)
- 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-LS4-3)

Mathematics —

- MP.2 Reason abstractly and quantitatively. (3-LS4-3)
- 3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. (3-LS4-3)

Prior Student Knowledge:

K.ESS3.A ; 2.LS2.A ; 2.LS4.D

Possible Misconceptions:

- All living things can survive in the same environment.
- Weather and climate mean the same thing.

LESSON PLAN – 5-E Model

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

Activity Description:

- Show students the *Journey North Adult Monarch First Sightings 2019*.
  - The 2019 animation of migration nicely shows the population migration by month.
  - You can view a full season of monarch migration (northward). It is recommended to spend time with the maps prior to showing students.

Resources:

- Journey North Adult Monarch First Sightings 2019 **(Click "play" to see the map populate.)**
- Journey North Monarch Maps (main site with additional animal tracking)

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:

- Allow students to engage with the Journey North Migration Maps.
  - If student groups have devices accessible, have students engage with the 2019 animated map after explaining how to use the site.

Back to Top of Page

        - Monarch type (egg, larva, adult, etc.) can be changed by the toggle on the right side of the map as well as the year.
    - As the students explore the animation, ask the students to complete an *I Notice, I Wonder* sheet as they interact with the map.
    - If devices are not available to student groups, provide a forum in which the teachers showcase the movement of the monarch species on the smart board/screen.
    - Students use the Stability and Change, Cause and Effect, and Patterns *CCC Discussion Cards* to help expand their observations through multiple perspectives.
    - Students share their observations and questions with the class.
        - Teacher Note: You can project the appropriate *CCC Discussion Cards* on the Smart Board to help the students deepen their questions.

Resources:

- Journey North Adult Monarch First Sightings 2019
- I Notice, I Wonder sheet
- CCC Discussion Cards

Suggested Instructional Strategies:

- Question Formulation Technique (QFT)

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:

- Ask students to share their predictions about why the monarch butterfly migrates.
    - As you prompt students you may need to link the idea of migration to geese, a migratory species well-known to the region.
        - Why do geese fly south in the winter?
        - Why do they come back in the spring?
- After eliciting initial ideas, read *National Geographic Readers: Great Migrations Butterflies* By Laura Marsh on epic! Books or *Monarch and Milkweed* by Helen Frost.
    - As the teacher reads the text, the students complete a *Give Me Five Template* with their ideas for why the monarch migrates.
    - Students Turn and Talk with a neighbor about their templates to get five ideas to then share with the class.
    - Generate a class anchor chart or google slide to track student ideas, a sample anchor chart is on Slide #1 of the *Explain Slideshow*.
- Ask the students to define the term Habitat. Be sure their definition includes the following:
    - A habitat is a zone in which the living thing lives and grows.
        - Not all living things can live and grow in the same habitat.
        - In the case of the monarch butterfly, the habitat range changes with the season.
- Show Slide #2 from the *Explain Slideshow* to remind them of what was seen in the book.
    - Students work individually or with a partner to complete the maps on Slides #3-6 in the *Explain Slideshow.*

Back to Top of Page

        - Students are asked to color the different climate zones found within North America and then to label the most likely location to find a monarch during certain months of its migration (spring and fall).
- Students discuss the following questions:
    - What is the habitat in the different seasons or months?
    - Why are some regions no longer a part of the range?
    - How does temperature play a role in the monarch's migration patterns?
    - How does the amount of daylight play a role in the monarch's migration patterns?
    - Teacher Notes:
        - Linking temperature, season, and amounts of daylight maps with the content developed on the slideshow may help students understand that the monarch butterfly requires specific temperatures and that the different seasons change the temperatures and amounts of daylight significantly enough that the butterfly can no longer survive or access its needs, requiring it to move to a different region by extending its habitat.
        - In order to help the students understand monarch migration and each of the climate zones according to season you may need to pull in additional texts or activities. Potential readings through epic! books include:
            - *Monarch Butterfly Migration by Rebecca Hirsh*
            - *Climate Maps by Cynthia O'Brien,*
            - *Using Climate Maps by Rebecca Hirsch*

Resources:

- Give Me Five Template
- National Geographic Readers: Great Migrations Butterflies by Laura Marsh on epic! Books
- *Monarch and Milkweed* by Helen Frost (YouTube reading)
- Explain Slideshow
- Monarch Butterfly Migration by Rebecca Hirsh on epic! Books
- Climate Maps by Cynthia O'Brien on epic! Books
- Using Climate Maps by Rebecca Hirsch on epic! Books

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: habitat, health, species, population, region, resource, behavior, growth, characteristics, mate, trait, migration, climate, latitude, longitude

ELABORATE (Applications / Extensions)

Activity Description:

Students complete a Claim, Evidence Reasoning (CER) to address: How does the monarch's migration pattern help the species survive?

Back to Top of Page

- Using the Agree-Disagree Line Instructional Strategy on Slide #1 of the *Elaborate Slideshow,* ask students to identify a claim that best represents their ideas about the monarch's migration. Post the following claims (Slides #2 and #3) on opposite sides of the room:
  - The monarch butterfly's migration pattern is necessary for the species' survival.
  - The monarch butterfly's migration pattern is NOT necessary for the species' survival.
- Students discuss with their like-minded peers why they picked the claim that they did and then each claim group shares their reasoning with the class.
  - Allow students to move about the room if they hear other ideas that may provide better evidence for a claim.
- After completing the Agree-Disagree line, ask students to generate a *CER (Claim, Evidence, Reasoning)*. You can keep the claims from the previous activity posted.
  - Students can use those claims or modify the posted claim to suit their ideas.
  - Students will complete the CER Template on Slide #4 in the *Elaborate Slideshow*.
- Class discusses the question on Slide #6

Resources:
- Elaborate Slideshow

Suggested Instructional Strategies:
- Talk Activities
- CCC Discussion Cards
- CER Organizing Template
  - STEM Teaching Tool #17: Beyond the written CER
  - CER Rubric Example

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:** *Analyzing and Interpreting Data; Engaging in Argument from Evidence*
- ❑ **DCI:** *LS4.C: Adaptation; ESS2.D: Weather and Climate*
- ❑ **CCC:** *Patterns; Cause and Effect*

Summative Assessment Description(s):
- Student responses from the Elaborate CER template.
- As the students work through each learning sequence, have them 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 the monarch butterfly, its survival adaptations and its changes in population.

Resources:
- Evidence Logs

Back to Top of Page

Elaborate Further / Reflect / Enrichment

Activity Description:

- Class goes outside to participate in the *Monarch Migration Game.*
    - Teacher Note: Do not have students drinking from cups of juice with straws. Instead use cups of water and a finger to pretend to have a proboscis.

Resources:

- Monarch Migration Game

Additional Resources:

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

Back to Top of Page

Learning Sequence 3

Brief Description:
As the climate changes, the cues for triggering monarch butterfly migrations are off. Monarchs use both temperature and precipitation cues to determine when migration begins. As the students engage with weather and climate data, they will realize that the cues are occurring too early in the spring and too late in the fall to trigger successful migration timing which puts the monarch at risk. If it leaves the Northern region too late, their survival may be impacted by a lack of food or low temperatures. If the temperatures in Mexico get too warm too quickly in the spring, the monarchs may leave the region only to move to a region with no food supply and temperatures that are too cold. Through data analysis students come to realize that the climate in North America is shifting and changing.

Suggested Pacing:
2.5 - 3 hrs

Lesson-Level Phenomenon/Design Problem:
Newsela Headline: Missing monarchs in Mexico-Late start might make flight south tricky

Relationship to Anchoring Phenomena/Design Problem:
As the climate changes, the cues for triggering monarch migrations are off. Monarchs use both temperature and precipitation cues to determine when to begin their migration. Through data analysis students come to realize that the climate in North America is shifting and changing, and this puts the monarchs at risk.

Learning Sequence Driving Question:
What are the seasonal climate patterns in the different regions of North America? If the climate patterns change, how will the monarch butterflies be affected?

Student Expected Outcomes

- Students will analyze the weather data collected throughout the year, recognizing the variations and ranges of weather over time.
- Students will represent data in tables and various graphical displays in order to draw conclusions, identify patterns and make predictions about the weather.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Analyzing and Interpreting Data • Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. (3-ESS2-1) **Constructing Explanations and Designing Solutions** • Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2)	**LS4.C: Adaptation** • For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3) **ESS2.D: Weather and Climate** • Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)	**Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1, 3-LS4-2, 3-LS4-3)

Related Performance Expectation(s) in this Unit:

- 3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

Back to Top of Page

- [Clarification Statement: Examples of data could include average temperature, precipitation, and wind direction.]
- [Assessment Boundary: Assessment of graphical displays is limited to pictographs and bar graphs. Assessment does not include climate change.]

Possible Common Core State Standards Connections:

Mathematics —

- MP.2 Reason abstractly and quantitatively. (3-ESS2-1),(3-LS4-3),(3-LS4-4)
- MP.4 Model with mathematics. (3-ESS2-1),(3-LS4-3),(3-LS4-4),(3-LS2-1),(3-LS1-1)
- MP.5 Use appropriate tools strategically. (3-ESS2-1)(3-LS4-3),(3-LS4-4)
- 3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (3-ESS2-1)
- 3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in bar graphs. (3-ESS2-1)(3-LS4-3),(3-LS4-4)

Prior Student Knowledge:

K.ESS2.D

LESSON PLAN – 5-E Model

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

Activity Description:

- Show students Slide #1from the *Learning Sequence #3 Slideshow* and tell them the news article was recently published with the title: Missing Monarchs in Mexico: Late Start Might Make Flight South Tricky.
- Students view Slide #2 and brainstorm why the monarch butterfly did not not leave the northern region on time.
  - Teacher Note: Monarchs typically start their migration in August, but this particular butterfly did not start migrating until October.
- Break students into Precipitation (Slides #7 and #8) and Temperature (Slides #4 and #5) groups.
  - Students should review the tables and make a prediction as to whether or not temperature and/or precipitation conditions could help explain why the butterfly started its migration so late.
  - Students share their ideas/rationales related to their data with the class.

Resources:

- Learning Sequence #3 Slideshow

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 read the Newsela article about monarch butterflies and their late start in 2017. As students read they should identify predictions/reasons for the monarch's late start in October of 2017 and record these ideas on post-it notes.

Back to Top of Page

- Students share and discuss their findings.
- Students discuss their ideas about the difference between weather and climate (Slide #9).
    - Students may not understand the differences between weather and climate, but will learn about it in Explain. This is a formative assessment geared toward gauging their initial understanding of the two concepts.
- Students participate in the Card Sort Activity on Slides #10-13.
    - Each card is a statement taken from the Newsela article.
    - Students sort each statement card by using their best guess to decide if Weather or Climate would be responsible for each statement and placing the card under the correct heading.
        - Students will have the opportunity to revise their sort table in Explain.
            - Teacher Note: In the text the term "global warming" appears. Please do not use this term with students...it should be climate change. This is because some regions have had a cooling effect whereas others a warming effect. It is important not to give students this misconception that the whole world is warming.

Resources:

- Newsela article
- Learning Sequence #3 Slideshow

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 #1: Weather vs Climate

- Students watch Crash Course video on *Weather vs. Climate*.
- Students identify the differences between climate and weather and make a class anchor chart.
    - Teacher Information:
        - If more resources are needed, epic! Books has a variety of texts about both weather and climate listed in Resources.
        - These resources can be used to help students identify that climate looks at weather patterns over time and that weather is on the short-term. Climate can be used to help people make predictions about weather in a region.
        - The "Weather and Climate through Infographics" used in conjunction with "Climate Maps" shows how weather conditions relate to the climate maps.
        - Students should be able to identify that climate maps are best used for generating general predictions about a region's seasonal conditions.

Resources Activity #1:

- Weather vs. Climate Crash Course video
- Learning Sequence #3 Slideshow
- Books on epic! Books:
    - *Climate Maps* by Cynthia O'Brien
    - *Weather and Climate through Infographics* by Rebecca Rowell (pages 6 & 7)
    - *Using Climate Maps* by Rebecca Hirsch (chapter 1)

Back to Top of Page

Activity #2: Does climate change?
Climate represents an average of conditions over time.

- Students are asked:
  - In general, what is the climate in Connecticut in March? In September?
  - In general, what is the climate in Texas in March? In September?
    - Compare and contrast the two states' climates.
  - Can climate change over time?
  - If we mapped average weather conditions for a region, would they be exactly the same every year?
  - Would they be close?
- Students analyze temperature graphs (Slides #1-6) of the *Climate Data Slideshow* over time for March (a colder month) and September (a warmer month) and identify the ways in which climate has changed in Connecticut and Texas.
  - Teacher Note:
    - Use the purple trend lines to help with this.
    - If you want to change the state or data series, use NOAA Climate at a glance app.
- Discuss if the graphs provide evidence of climate change.
  - Ask students:
    - What patterns do you notice in the data?
    - Does that pattern show evidence of climate change?
    - How is the climate changing?
- Students work in four groups and are given one of the Slides #8-11 to predict future temperatures.
  - Give each group a ruler and one slide to graph their prediction of the temperature trend for the next 40 years. They should use the trend line already provided.
- Each group shares their predictions and reasoning with the class.

Resources:

- Climate Data Slideshow
- NOAA Climate at a glance app
- Additional information if students are curious about the "why" behind climate change
  - NASA page
  - Birds and Climate Change - NASA

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: weather, pattern, climate, temperature, precipitation, climate zone, Celsius, Fahrenheit, season, average

ELABORATE (Applications / Extensions)

Activity Description: How does climate change impact monarchs?

- Show the student the *Elaborate Slideshow* Slide #2.

Back to Top of Page

- Prompt student thinking: Are monarchs affected by climate change? Provide time for the students to turn and talk. Collect student ideas before progressing.
- Go through the remaining slides regarding the ways monarchs are affected by climate change.
    - With each slide elicit student ideas and provide time for them to talk about the details on the slide prior to progressing.
    - Students complete the *Cause and Effect Organizer* (Slide #11).
        - Alternative option to Slide #11 and #12: Students use the new information and data to construct a causal explanation (Slide # 14) for the Monarch's late timing in 2017.
    - Students turn and talk about the question on Slide #12 and support their answer with evidence.
        - They may be able to expand these ideas with information from the monarch research they have done throughout the Unit.
    - Groups share their ideas with the class.
    - Teacher Note: More detailed teacher information can be found on the *WWF Climate Change Series*.

Resources:

- Elaborate Slideshow
- WWF Climate Change Series

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) (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:** *Constructing Explanations and Designing Solutions; Analyzing and Interpreting Data*
- ❏ **DCI:** *LS4.C: Adaptation; ESS2.D: Weather and Climate*
- ❏ **CCC:** *Cause and Effect*

Summative Assessment Description(s):

- Students' cause and effect explanations for the delayed monarch migration from Elaborate.
- As the students work through each learning sequence, have them 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 the monarch butterfly, its survival adaptations and its changes in population.

Resources:

- Evidence Logs

Back to Top of Page

Suggested Instructional Strategies: ● 60 Formative Assessment Ideas
Additional Resources: ● G3 Unit Materials List ○ Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 4

Brief Description:
In this sequence, the students observe characteristic variations and predict reasons for these differences found between males and females of the same species. Students learn that the majority of these differences help the organism to survive, find a mate, and/or reproduce. By the end of the sequence, the students analyze the differences between the male and female monarch butterfly and rationalize a purpose for the difference(s). Students then construct an argument using evidence to explain if the identified characteristic variation helps the monarch to survive, find a mate, or reproduce.

Suggested Pacing:
3 - 3.5 hrs

Lesson-Level Phenomenon/Design Problem:
Male and female characteristic variations

Relationship to Anchoring Phenomena/Design Problem:
Characteristic variations help an organism survive, find a mate, or reproduce.

Learning Sequence Driving Question:
How do characteristic variations help an organism survive, find a mate and/or reproduce? Does this connect to the monarch butterfly population decline?

Student Expected Outcomes:
- Students will use evidence to explain why some organisms have specific characteristics and behaviors that give them advantages to survive.
- Students will construct an argument with evidence about the significance of the characteristic variations seen in monarch butterflies.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Engaging in Argument from Evidence ● Construct an argument with evidence, data, and/or a model. (3-LS2-1) **Constructing Explanations and Designing Solutions** ● Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2) ● Construct an argument with evidence. (3-LS4-3)	**LS4.B: Natural Selection** ● Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)	**Cause and Effect** ● Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1, 3-LS4-2, 3-LS4-3) Patterns ● Patterns of change can be used to make predictions. (3-ESS2-1)

Related Performance Expectation(s) in this Unit:
- 3-LS4-2 Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.
  - [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]

Back to Top of Page

Possible Common Core State Standards Connections:

ELA-

- 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-LS4-2),(3-LS4-3),(3-LS4-4)(3-LS2-1)
- 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),(3-LS4-2),(3-LS4-3),(3-LS4-4)(3-LS2-1)
- 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),(3-LS4-2),(3-LS4-3),(3-LS4-4)
- W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.(3-LS4-1),(3-LS4-3),(3-LS4-4)(3-LS2-1)
- W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.(3-LS4-1),(3-LS4-2),(3-LS4-3),(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-LS4-2),(3-LS4-3),(3-LS4-4)

Prior Student Knowledge:

3-LS4-2

Possible Misconceptions:

- Organisms' physical features are not linked to function or meeting a survival need.

LESSON PLAN – 5-E Model

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

Activity Description: Why do these two cardinals look so different?

- Show the students the images of the male and female cardinal on Slide #1 of the *Learning Sequence #4 Slideshow.*
- Tell the students that these two animals are of the same species.
    - Teacher Notes:
        - You may have to define species to help students understand the concept. A species represents animals of the same type that are able to mate and reproduce. Dogs are a species because two dogs can have puppies. Cats and Dogs are not the same species because they can not have baby cat-dogs!
        - If organisms cannot produce offspring (living offspring with reproductive capability) then the animals are not of the same species. This is not important for third graders to know at this point.
- Ask the students to identify the differences between the two cardinals.
- Turn and Talk: Ask the students to discuss their ideas about why the two organisms from the same species might look so different. You can share with the students that these animals are cardinals. The red cardinal is the male/boy, and the green cardinal is the female/girl. After students turn and talk, allow them to share the key concepts they discussed with the whole group.
- Record student thinking on an anchor chart.

Resources:

- Learning Sequence #4 Slideshow

Suggested Instructional Strategies:

- Initial Scientific Model
    - Small Group Models
- Talk Activities

Teacher Action(s):

- Creates interest
- Generates curiosity
- Raises questions

Back to Top of Page

- 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: Characteristic Variations in the Animal World

- Students work in pairs or small groups to complete the observation and prediction sheets on Slide #3-4 in the *Learning Sequence #4 Slideshow.*
- Students view Slide #5-11.
    - These slides can be posted for the whole class to see at once, or you can print out color cards for each student group.
    - Ask students to predict and record their ideas as to why each difference occurs in animals of the same species.
- As a class, students share their ideas about how these differences help the animal.
    - As students share, record their thinking on the board.
        - Students may come up with ideas like survival, finding a mate, reproduction, safety, camouflage, protecting young, etc.
        - Teacher Notes:
            - Actual reasons for characteristic variations are listed under each of the animal slides in the speaker note section of the slideshow.
            - Do not share any information about the monarch butterflies at this time.
    - Students identify patterns that are the same for multiple species (i.e., Males are brightly colored to attract a female; females are more camouflaged to protect the young, males are often bigger, etc)

Resources:

- Learning Sequence #4 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: Animal Characteristic Variations

- Provide time for students to research other concepts/adaptations such as: (1) antlers, (2) camouflage, (3) colorful male birds (article linked below), (4) color warning (poison).
    - Students work in groups to explore one of these characteristic variations using text and online resources such as the *San Diego Zoo Student Resource Page* or epic! Books.

Back to Top of Page

        - There are VERY few age appropriate resources that identify the characteristic variations between males and females of the same species.
    - Potential prompts for kids as you engage in research or discussion:
        - Why is the male so colorful? Why aren't the females?
        - Do the females/male take care of the offspring?
        - Does the female/male have special structures to defend itself from predators?
- After student groups share out their research, have the students apply some of these concepts to the different species represented in the Explore section of the *Learning Sequence #4 Slideshow*.
    - Help students to understand that there are three potential reasons for variation between males and females: (1) finding a mate, (2) survival, (3) reproducing. Ask students to connect their initial ideas from the engage and explore activities to these themes.
    - Do not share any information about the monarch butterflies at this time.

Resources:

- San Diego Zoo Student Resource Page
- Possible epic! Books:
    - Horns and Antlers by Yanitzia Canetti (more in this series as well)
    - Hide-And-Seek Science: Animal Camouflage by Emma Stevenson
    - Animal Colors by: J. Clark Sawyer
    - other books on animal adaptation
- SciShow Kids: Camouflage: Animal Hide & Seek video
- Learning Sequence #4 Slideshow

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: individual differences, characteristics, variation, traits, population, inherit, predator, prey, reproduce, advantage, camouflage, plumage

ELABORATE (Applications / Extensions)

Activity Description: Monarch Characteristic Variations

- Students look at Slide #13 in the *Learning Sequence #4 Slideshow to* identify the differences between the male and female monarch.
- Using Slide #13, students select a characteristic variation and identify a potential purpose for that variation.
    - The differences between a male and female monarch are subtle (1) Males have a black dot on each of the hind wings. (2) Females have thicker veins. There is further information in the Speaker Notes on Slide #15.
    - Ask the students to identify one of the differences and to construct a hypothesis as to why this difference helps the monarch:
        - mating
        - reproduction

Back to Top of Page

        - survival
    - Students must provide scientific reasoning to back up their ideas. Reasoning should include application of ideas learned in the explain section.
        - Teacher Notes:
            - The occurrence of these differences are not entirely understood by scientists. Scientists have used their understanding of other characteristic differences in other species to apply those ideas to the monarch butterfly.
            - Current scientists hypothesize that the black dot may emit pheromones to attract a female and the wider banding on the female helps the butterflies distinguish one another from afar. Butterflies use both pheromones and eyesight to communicate and understand their surroundings.
- Student groups construct an argument with evidence about the significance of the characteristic variations seen in monarch butterflies and present their arguments to the class.
- Class discusses: Does this connect to the monarch butterfly population decline?

Resources:

- Learning Sequence #4 Slideshow

Suggested Instructional Strategies:

- Talk Activities
- CCC Discussion Cards
- CER Organizing Template
    - STEM Teaching Tool #17: Beyond the written CER
    - CER Rubric Example

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:** *Engaging in Argument from Evidence; Constructing Explanations and Designing Solutions*
- ❏ **DCI:** *LS4.B: Natural Selection*
- ❏ **CCC:** *Patterns; Cause and Effect*

Summative Assessment Description(s):

- Monarch characteristic variation responses from Elaborate.
- As the students work through each learning sequence, have them 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 the monarch butterfly, its survival adaptations and its changes in population.

Resources:

- Evidence Logs

Back to Top of Page

Suggested Instructional Strategies: ● 60 Formative Assessment Ideas
Additional Resources: ● G3 Unit Materials List ○ Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 5

Brief Description:
The final sequence helps students to understand that survival is not only related to the characteristic variations and adaptations but also behavior. Group behaviors help species survive in difficult situations. Monarch butterflies roost at night to help maintain body temperature and to achieve safety in numbers.

Suggested Pacing:
2.5 - 3 hrs for the 5Es
1.75 - 2.25 hrs for the Culminating Performance Task

Lesson-Level Phenomenon/Design Problem:
Penguin huddle

Relationship to Anchoring Phenomena/Design Problem:
Monarch butterflies roost at night to help maintain body temperature and to achieve safety in numbers.

Learning Sequence Driving Question:
Why do some animals live in groups?

Student Expected Outcomes:
- Students will design an investigation to collect data about huddle dynamics.
- Students will construct an argument with evidence that being part of a group helps monarchs survive.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Engaging in Argument from Evidence ● Construct an argument with evidence, data, and/or a model. 3-LS2-1 **Constructing Explanations and Designing Solutions** ● Use evidence (e.g., observations, patterns) to construct an explanation. 3-LS4-2	**LS2.D: Social Interactions and Group Behavior** ● Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (Note: Moved from K–2). 3-LS2-1	**Patterns** ● Patterns of change can be used to make predictions. 3-LS1-1, 3-ESS2-1 **Cause and Effect** ● Cause and effect relationships are routinely identified and used to explain change. 3-LS2-1, 3-LS4-2, 3-LS4-3

Related Performance Expectation(s) in this Unit:
- 3-LS2-1 Construct an argument that some animals form groups that help members survive.

Possible Common Core State Standards Connections:
ELA-
- 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-LS4-2),(3-LS4-3),(3-LS4-4)(3-LS2-1)
- 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),(3-LS4-2),(3-LS4-3),(3-LS4-4)(3-LS2-1)
- W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.(3-LS4-1),(3-LS4-3),(3-LS4-4)(3-LS2-1)

Mathematics —
- MP.4 Model with mathematics. (3-ESS2-1),(3-LS4-3),(3-LS4-4),(3-LS2-1),(3-LS1-1)
- MP.5 Use appropriate tools strategically. (3-ESS2-1)(3-LS4-3),(3-LS4-4)

Back to Top of Page

- 3.NBT Number and Operations in Base Ten. (3-LS2-1)(3-LS1-1)

Prior Student Knowledge:
3-LS2-1: 1.LS1.B

LESSON PLAN – 5-E Model

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

Activity Description:

- Show students Slide #1 from the *Learning Sequence #5 Slideshow.*
- Students complete the Share-Trade activity on Slide #2.

Resources:

- Learning Sequence #5 Slideshow
  - Slide #1 adapted from: Science Kids Fun Facts About the Antarctic

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 share their final responses from the Engage Share-Trade activity.
  - If not included in their shared Engage responses, ask students to consider how animals might have to work together to survive in this harsh environment.
  - Students explore the *Antarctic Animals List* and fill in Slide #3 of the *Learning Sequence #5 Slideshow* as they share their ideas with one another.
    - They can initially discuss their ideas in a Turn and Talk, and then share their big ideas with the whole class.
- Record their big ideas on an anchor chart or smart notebook.
- After the students share their ideas, go back to the facts on Slide #1 and make connections between the animals' characteristics and the environmental conditions of Antarctica, paying attention to the special adaptations they notice.

Resources:

- Learning Sequence #5 Slideshow
- Antarctic Animals List

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

Back to Top of Page

- 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 view the BBC Article and Video.
    - The article is not Grade 3 friendly, you may have to read aloud and preview the video clip together.
    - After seeing the video, help students to understand that group dynamics are essential to the survival of the penguins.
        - Adaptations can be special body parts and they also can be behaviors.
        - The grouping behaviors of penguins are also considered special adaptations that help the species survive the extreme cold temperatures.
- Ask the students to design an investigation to measure how huddling helps the penguins in Antarctica to survive and stay warm.
    - Students look at Slide #4 of the *Learning Sequence #5 Slideshow.*
    - Ask the students to collaborate to come up with ways they can collect data using the tools supplied.
        - Students determine their huddle formation. They can research how penguins huddle and move to keep warm. This should help them design their class huddle and non-huddle formations.
        - Students determine how long they will need to stay in huddle formation to collect good data and at what intervals students will record temperatures.
    - Teacher Notes:
        - Do not set up the investigation for the students. They must design their own investigations to collect independent data.
        - Remind the students that there has to be specific constants in order for their data to be reliable.
        - Students should collect temperatures from non-huddle situations, as well as huddled situations and compare the results.
        - The room's temperature should be the same during each of the data collection periods.
        - You can scaffold the discussion to get the kids to an investigation such as this-each student can have a thermometer taped to their clothing and enter the huddle, at different time intervals/locations in the huddle they should record the temperature on their thermometers, repeat the same data collection practices when students are not in a huddle formation.
- Students share their data, using the class data to find averages or make graphs to show differences.
    - Once the data has been collected compare the results for the differing locations in the huddle.
    - Where were the highest temperatures? Where were the lowest temperatures?
    - In what formation did the temperatures change the most?
- Students watch the *How Does Huddling Help Penguins Stay Warm?* video and discuss as a class.

Resources:

- BBC Article and Video
- Learning Sequence #5 Slideshow
- How Does Huddling Help Penguins Stay Warm? | BBC Earth
    - Optional video: Emperor Penguins Huddle for Warmth Video

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

Back to Top of Page

- 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: behavior, adaptation, survival, group behavior, species, cooperative, trait, environment, parent, relationship

ELABORATE (Applications / Extensions)

Activity Description:
- Students are shown Slide #9 of the *Learning Sequence #5 Slideshow.*
- Students complete the WIS/WIM portion of Slide #10.
    - Teacher note: The butterfly is NOT known to be in groups during the day. However the Monarchs will often group up at night (roost) as they rest and prepare for their journey the following day. Once in Mexico the monarch roost for the winter in forests near Mexico city (see image). Scientists have noticed that monarchs during their migration roost at night in groups, when cold the monarchs roost closer to one another.
- Class reads and discusses *Why do monarchs form roosts during fall migration?* article.
- Students complete the question in the last section of Slide #10.
- Teacher facilitates a simple argumentation forum based on the students' answer to the last question (roosting is OR is not necessary for survival).
    - Students work with like minded peers to debate with opposing students. Each group supports their arguments with evidence.

Resources:
- Learning Sequence #5 Slideshow
- Why do monarchs form roosts during fall migration? from Journey North (text only)
- Why do monarchs form roosts during fall migration? from Journey North (with pictures)

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) (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.

Back to Top of Page

- ❏ **SEP:** *Engaging in Argument from Evidence; Constructing Explanations and Designing Solutions*
- ❏ **DCI:** *LS2.D: Social Interactions and Group Behavior*
- ❏ **CCC:** *Patterns; Cause and Effect*

Summative Assessment Description(s)

- WIS/WIM from Elaborate Slide #10 from the *Learning Sequence #5 Slideshow*.
- As the students work through each learning sequence, have them 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 the monarch butterfly, its survival adaptations and its changes in population.

Resources:

- Learning Sequence #5 Slideshow
- Evidence Logs

Suggested Instructional Strategies:

- 60 Formative Assessment Ideas

Culminating Performance Task

- Students use their Evidence Logs to develop a model that explains the reasons for which the monarch butterfly population in North America is changing.
  - The model should also include ways the monarch butterfly is able to overcome some of these challenges.
- Once complete, students should share their products with the class through a gallery walk.

Additional Resources:

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

Back to Top of Page

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only X **Board Meeting Date** January 13, 2022

Decision Requested _____ **Agenda Code** 10 e.

AGENDA REPORTING FORM

Agenda Topic: Science Grade 4 Unit – Mimicking the Natural World– First Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed Science Grade 4 Unit – Mimicking the Natural World

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 – Mimicking the Natural World to the full Board for a First Reading.

Titles of Attachments:

1. Science Grade 4 Unit

Frank Ryan
Signature of Staff Member Submitting Report

Peter Madaras
Signature of Superintendent of Schools

Unit 2 - Mimicking the Natural World

Biomimicry is how humans mimic the natural world in their innovations and designs. This bundle will compare and contrast energy transfer in the natural and designed worlds focusing on how electric currents, light and sound are received and perceived by both. As a result of observing those interactions in nature, much of human innovation and design can be directly attributed to how organisms survive all manner of energy inputs.

To access the flowchart for this unit, click here.

Suggested Pacing:
19 - 23 hrs

Anchoring Phenomenon/Design Problem:
How does nature inspire human innovation?

Unit Driving Question:
What is biomimicry and how have human innovations been inspired by observing the natural world?

Culminating Performance Task:
How Does A Device Mimic The Natural World?

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.
  - [Assessment Boundary: Assessment does not include quantitative measurements of energy.]
- 4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
  - [Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.]
- 4-PS4-3. Generate and compare multiple solutions that use patterns to transfer information.*
  - [Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.]
- 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
  - [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.]
  - [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]
- 4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
  - [Clarification Statement: Emphasis is on systems of information transfer.]
  - [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]
- 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:
	PS3.A: Definitions of Energy	Energy and Matter

Back to Top of Page

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.

Developing and Using Models

- Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.
- Develop a model to describe phenomena.
- Use a model to test interactions concerning the functioning of a natural system.

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.
- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.

- Energy can be moved from place to place by moving objects or through sound, light, or electric currents.

PS3.B: Conservation of Energy and Energy Transfer

- 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.
- Light also transfers energy from place to place.
- 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.

PS4.B: Electromagnetic Radiation

- An object can be seen when light reflected from its surface enters the eyes.

PS4.C: Information Technologies and Instrumentation

- Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa.

ETS1.C: Optimizing The Design Solution

- Different solutions need to be tested in order to
- Energy can be transferred in various ways and between objects.

Cause and Effect

- Cause and effect relationships are routinely identified.

Patterns

- Similarities and differences in patterns can be used to sort and classify designed products.

Systems and System Models

- A system can be described in terms of its components and their interactions.

Back to Top of Page

Engaging in Argument from Evidence • Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Construct an argument with evidence, data, and/or a model.	determine which of them best solves the problem, given the criteria and the constraints. (secondary) **LS1.A: Structure and Function** • Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. **LS1.D: Information Processing** • Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. **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. • 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.	

Possible Common Core State Standards Connections:

ELA/Literacy -

- RI.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information.*(4-PS4-3)*
- RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS4-3)
- W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1)
- W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-2),
- W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-2)
- SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-PS4-2)*(4-LS1-2)*

Mathematics -

- 4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-2)

Back to Top of Page

- 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. (4-LS1-1)
- 3-5.OA Operations and Algebraic Thinking (3-ETS1-2)
- MP.2 Reason abstractly and quantitatively. (3-5-ETS1-2)
- MP.4 Model with mathematics .(3-5-ETS1-2)(4-PS4-2)
- MP.5 Use appropriate tools strategically. (3-5-ETS1-2)

Possible Preconceptions/Misconceptions:

Students may believe that:

- energy can be made, used or lost.
- only living things have energy.
- bats are blind and can only hear well.
- Snakes can "hear"
- the result of light shining on something and brightening that item.
- plants do not respond to outside stimuli - they just grow straight up.
- plants obtain their energy directly from the sun.
- plants breath like humans
- plants leaves main job is to collect water
- things "use up" energy
- energy is lost
- electronic devices only use electricity to send and receive data.

PROGRESSION OF LEARNING

Learning Sequence 1

- **Learning Sequence Driving Question**
  - What is biomimicry and how have humans learned from observing nature?
- Learning Sequence 1
- **Relationship to Anchoring Phenomena/Design Problem**
  - This is the introduction to the anchoring phenomenon. Students are introduced to the idea that humans mimic nature in their designs. This is called biomimicry.
- **Student Expected Outcomes:**
  - Students will make observations about similarities and differences in the natural and designed world.
  - Students will generate questions about how humans mimic nature.

Learning Sequence 2

- **Learning Sequence Driving Questions**
  - What is energy?
  - What are sense receptors?
  - How do organisms receive and perceive energy stimuli for survival?
- Learning Sequence 2
- **Relationship to Anchoring Phenomena/Design Problem**
  - Students explore how animals receive and perceive energy through their sense receptors. This helps them to continue connecting how biomimicry often drives human innovation.
- **Student Expected Outcomes:**
  - Students will describe the cause effect relationships between sight, sound, touch and reaction by making and recording observations.
  - Students will investigate sense receptors to determine cause and effect relationships in relation to the phenomena.
  - Students will make observations about how animals use sense receptors and how they use that information.

Back to Top of Page

Learning Sequence 3

- Learning Sequence Driving Question
  - How do animals send and receive sound, and how have humans used this information in the design world?
- Learning Sequence 3
- Relationship to Anchoring Phenomena/Design Problem
  - Humans study how animals receive, perceive and respond to sound and base designs off of that information. Some examples of human design mimicking sound in nature can include whales/submarines, bats/lane changing or back up sensors and GPS.
- Student Expected Outcomes:
  - Students will use a model to identify similarities between animal sense receptors and human design.
  - Students will collect evidence to identify and describe how energy is transferred and sound is produced.

Learning Sequence 4

- Learning Sequence Driving Question
  - How is light received and perceived in the natural world?
- Learning Sequence 4
- Relationship to Anchoring Phenomena/Design Problem
  - Humans study how animals receive, perceive and respond to light and base designs off of that information.
- Student Expected Outcomes:
  - Students will develop a model to describe how light enters the eye and processes information.
  - Students will construct an argument to determine how the external structures in animals help serve various functions.

Learning Sequence 5

- Learning Sequence Driving Question
  - What sense receptors do plants have that help them survive?
- Learning Sequence 5
- Relationship to Anchoring Phenomena/Design Problem
  - Humans study plant structure and function and base designs off of that information. Some examples of human design mimicking plants are solar panels and velcro.
- Student Expected Outcome:
  - Students will use a model to describe the components of a plant and how its structures help them survive.

Learning Sequence 6

- Learning Sequence Driving Question
  - How do animals use electricity?
- Learning Sequence 6
- Relationship to Anchoring Phenomena/Design Problem
  - Students learn about electricity and energy transfer. Then apply that information to animals that generate electricity, as well as how humans use electricity for similar and different reasons.
- Student Expected Outcomes:
  - Students will collect evidence to identify and describe how electrical energy is transferred and produced.

Back to Top of Page

- Students will describe observations from an investigation to determine how electrical energy is transferred from place to place and can change into other forms of energy (sound and light).
- Students will investigate how animals use electricity to survive.

Assessments:

- Culminating Performance Task
  - Students compare the characteristics of an existing device to the natural world.

- Grade 4 Assessment Tasks and Rubrics
- 2019-2020 - G3-G8 Interim Assessment Blocks (IABS) by CREC Bundle

Additional Resources:

- G4 Unit Materials List
  - Click on specific tab for unit-specific materials
- EPIC! Digital Library - G4 U2A List
  - Includes ebooks and videos
  - Must have an educator user account for free access

Back to Top of Page

Learning Sequence 1

Brief Description:
This sequence introduces students to the phenomenon through side by side comparisons of the natural world and the design world. Students make observations, ask questions, and compare images to develop ideas. This lesson only has the engage and explore sections of the 5-E model. These concepts will be built upon in future lessons.

Suggested Pacing:
0.75 - 1.25 hrs

Lesson-Level Phenomenon/Design Problem:
What is biomimicry and how have humans learned from observing nature?

Relationship to Anchoring Phenomena/Design Problem:
This is the introduction to the anchoring phenomenon. Students are introduced to the idea that humans mimic nature in their designs. This is called biomimicry.

Learning Sequence Driving Question:

- What is biomimicry and how have humans learned from observing nature?

Student Expected Outcomes:

- Students will make observations and ask questions about biomimicry.
- Students will compare and contrast the natural world to the design world.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
• n/a	**LS1.A: Structure and Function** • Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. *This content is not achieved in this learning sequence. Students are introduced to the idea as they think about biomimicry.*	**Cause and Effect** • Cause and effect relationships are routinely identified. **Patterns** • Similarities and differences in patterns can be used to sort and classify designed products.

Related Performance Expectation(s) in this Unit:
n/a

Possible Common Core State Standards Connections:
n/a

Prior Student Knowledge:
n/a

Possible Preconceptions/Misconceptions:
Students may focus on "How" humans learn. Redirect to "What" humans learned.

LESSON PLAN – 5-E Model

Back to Top of Page

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

Activity Description:

- Students watch a Biomimicry slideshow that compares the natural world to the design world.
- Students complete an I Notice, I Wonder organizer to engage prior knowledge and generate interest.

Resources:

- Biomimicry Slideshow
- I Notice, I Wonder

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 work in groups and create a Venn diagram to focus on one slide that compares the natural world and design world.
- Students discuss and complete their Venn diagrams.
- Students complete a gallery walk to view classmates' ideas.
- Students provide feedback using post-it notes on their classmates' venn diagrams then revise their own venn diagrams from the feedback they receive.

Resources:

- Biomimicry Slideshow (Venn Diagram is Slide #10)

Suggested Instructional Strategies:

- Talk Activities

Teacher Action(s):

- Encourages the students to work together without direct instruction
- 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
- Tests predictions and hypotheses
- Forms new predictions and hypotheses
- Tries alternatives and discusses them with others

Back to Top of Page

- Records observations and ideas
- Suspends judgement

Additional Resources:

- G4 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 2

Brief Description:
This sequence introduces the concept of energy and how it is perceived by sense receptors. Students explore and build an understanding of how animals receive and perceive information through their senses and explore how different senses acquire information about different energy sources.

Suggested Pacing:
3.5 - 3.75 hrs

Lesson-Level Phenomenon/Design Problem:
How do sense receptors receive and perceive energy?

Relationship to Anchoring Phenomena/Design Problem:
Students explore how plants and animals receive and perceive energy through their sense receptors. This helps them to continue connecting how biomimicry often drives human innovation.

Learning Sequence Driving Question:

- What is energy? What are sense receptors? How do organisms receive and perceive energy stimuli for survival?

Student Expected Outcomes:

- Students will describe the cause and effect relationships between sight, sound, touch, and reaction by making and recording observations.
- Students will investigate sense receptors to determine cause and effect relationships in connection to the phenomena.
- Students will make observations about how animals use sense receptors and how they process the perceived information.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Developing and Using Models ● Develop a model to describe phenomena. **Engaging in Argument from Evidence** ● Construct an argument with evidence, data, and/or a model.	**PS3.A: Definitions of Energy** ● Energy can be moved from place to place by moving objects or through sound, light, or electric currents. **PS3.B: Conservation of Energy and Energy Transfer** ● 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	**Cause and Effect** ● Cause and effect relationships are routinely identified. **Systems and System Models** ● A system can be described in terms of its components and their interactions.

Back to Top of Page

	surrounding air; as a result, the air gets heated and sound is produced. ● Light also transfers energy from place to place. ● 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. **LS1.D: Information Processing** ● Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions	

Related Performance Expectation(s) in this Unit:

- 4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
  - [Assessment Boundary: Assessment does not include quantitative measurements of energy.]
- 4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
  - [Clarification Statement: Emphasis is on systems of information transfer.]
  - [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]

Possible Common Core State Standards Connections:

ELA/Literacy

- W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-2)
- W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-2)
- SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-LS1-2)

Prior Student Knowledge:

n/a

Possible Preconceptions/Misconceptions:

Students may believe that:

- energy can be made, used or lost.
- energy is only in living things.

Back to Top of Page

LESSON PLAN – 5-E Model

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

Activity Description:

- Students watch a short Energy Transfers video that shows various forms of energy once to observe a variety of motion.
- Students watch the video a second time and pick six types of motion and fill out the Engage Observation Chart while watching the slide show.
- Students share their ideas with their table and find at least one more idea to add to their paper.
- Create a Driving Question Board based around the central questions "What is energy and how do the senses receive/perceive it?"
- Keep the Driving Question Board handy for the duration of this learning sequence and remove questions as the students find answers for them.

Teacher Notes:
Possible types of motion from video: walking, breaking the eggs, kicking a ball, flames, flag waving, marshmallow toasting, heating a test tube, cooking and flipping pancakes, jumping into the water, smashing a watermelon, fireworks, flower blooming, canoeing, foosball, excavator.

Resources:

- Energy Transfers Video
- Engage Observation Chart

Suggested Instructional Strategies:

- Driving Question Board
- 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?" and "What can I find out about this?"
- Shows interest in the topic

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

Activity Description:
Activity #1: What is energy?

- Students observe the presence of energy through teacher led demonstrations
- Teacher demonstrates and prompts students to take note of the energy and the sense they use to identify the energy.
    - Breaking a glow stick
    - Moving a slinky
    - Strumming a ukulele
    - Lighting a match, etc..
- Students turn and talk after each demonstration and determine what type of energy is present and what sense they used to identify the event.

Activity #2: Your senses make sense of energy

Back to Top of Page

- Students go to 3 centers that explore touch, sight, and sound in terms of energy while completing their Recording Sheet. They will explore their senses as well as the energy that activates them:
  - Station #1 - Touch Without Seeing - Place hand in a mystery box with a hand warmer inside (heat energy)
  - Station #2 - Sight Without Sound - Wear sound-blocking headphones and shine a flashing light on and off (light energy)
  - Station #3 - Sound Without Sight - Be blindfolded and hear an alarm from a phone or some other adjustable-volume source (sound energy)
- Once students have gone through all 3 stations: Students briefly discuss their Recording Sheet
- Students expand on the activity by further discussing possible reactions to additional forms of energy gathered through sense receptors (ex, Being caught in a thunderstorm (lightning/thunder), touching a hot stove, taking a cold shower, etc…).
- The teacher asks how they think animals might react to the similar types of stimuli? Would it be the same or different than how humans react?

Resources:
- Recording Sheet

Suggested Instructional Strategies:
- Question Formulation Technique (QFT)
- Talk Activities

Teacher Notes:
- A sense receptor is a nerve ending that reacts to a physical stimulus - hearing, sight, touch, taste or smell. Different sense receptors gather different kinds of sensory information about the world. That information is in the form of different kinds of energy.

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
- Tests 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:

Why is it that we have many senses instead of just one? Take a stance on which sense is the most important.

- Students participate in an activity where they pick the sense they believe is the most important:
  - Students are asked: "If an animal had only one sense, which one do you think they'd need most?" (sight, sound, touch, smell, or taste).
  - Signs are placed around the room for each sense. Students move to the sign that they feel is the most important sense and discuss with their like-minded peers why they have taken that stance.
  - Students share their group's ideas with the whole class.

Back to Top of Page

    - After the class shares, students may move if their stance changes. (*Provide multiple animals to see if their stance changes.)
- Use epic! books' *Animal Senses* or another book about animal senses as a read aloud. Use the driving question board from the Engage section and see if any of their questions can now be answered.
- Students discuss how animals' senses compared to humans.
- The class discusses sense receptors and how different receptors receive/perceive particular kinds of energy
- Students discuss how humans have mimicked animal and plant senses in their designs.
    - Some examples:
    - Bats & Whale Sonar - Humans designed marine sonar technology
    - Animals heightened sensitivity to sound - Humans designed dog whistles and other sound devices
    - Snakes ability to sense infrared radiation from prey - Humans designed infrared technology
    - How plants response to light - Humans designed grow lights and solar panels that follow maximum light
    - Spider's ability to squeeze through tight spaces and turn quickly - Humans are working on a Prototype Rescue Robot that can work in areas too dangerous for humans.
    - Tentacle Inspired Prosthetic.
    - Humpback whale's shape - Humans designed wind turbine blades
    - Bird's wing & body shape - Humans designed airplanes
    - Leaves reaction to sunlight - Humans designed solar cells

Resources:
- epic! books: Animal Senses
- How Biomimicry is Inspiring Human Innovation
- The Best Of Biomimicry: Here's 7 Brilliant Examples of Nature-Inspired Design
- Prototype Rescue Robot
- Tentacle Inspired Prosthetic

Additional Teacher Information:
- Energy Background Information for Teacher PDF

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: movement, detect, response, receive, perceive, response, stimuli

Back to Top of Page

ELABORATE (Applications / Extensions)

Activity Description: What kind of information do animals get from their sense receptors? How do they use that information?

- As a class, read the *Sharks and Their Lateral Line article*.
- Students complete a *Write and Pass* activity about a shark's lateral line and what information they think the shark receives from the lateral line.
- Students develop a model or drawing to show what a shark can sense through their lateral line and what form of energy it is receiving and perceiving.

Teacher Note: This should also include a discussion of the interactions within the lateral line system to include more details of the system's physical, chemical and biological components and how they enable a shark to receive/perceive energy and what the shark then does with that information.

Resources:

- Sharks and Their Lateral Line article
- Write and Pass

Suggested Instructional Strategies:

- Talk Activities
- CCC Discussion Cards

Teacher Action(s):

- Expects students to use formal labels, definitions, and explanations provided previously
- Encourages students to apply or extend the concepts and skills in new situations
- Reminds students of alternate explanations
- Refers students to existing data and evidence and ask "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
- Draws 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:** *Developing and Using Models; Engaging in Argument from Evidence*
- ❏ **DCI:** *PS3.A: Definitions of Energy; PS3.B: Conservation of Energy and Energy Transfer; LS1.D: Information Processing*
- ❏ **CCC:** *Cause and Effects; Systems and System Models*

Summative Assessment Description(s)

- May assess student Recording Sheet and shark model/drawing
- Students should fill in their Summary Table - return back to the summary table and add in notes regarding the activities, important ideas and the relationship to the anchoring phenomenon (How humans mimic nature in their designs.). (*Teacher should collect and save these after each sequence.)

Back to Top of Page

Resources:
- Recording Sheet
- Summary Table

Suggested Instructional Strategies:
- 60 Formative Assessment Ideas

Additional Resources:
- G4 Unit Materials List
    - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 3

Brief Description:
This sequence has students explain a speaker model and also looks into the similarities between animal receptors and human design as seen in hearing aids. Then they identify and describe how that transfer of energy is produced specifically through sound.

Suggested Pacing:
3.25 - 3.75 hrs

Lesson-Level Phenomenon/Design Problem:
What human innovations were inspired by mimicking the way the natural world receives and perceives sound?

Relationship to Anchoring Phenomena/Design Problem:
Humans have mimicked the natural world through their observations of how sound is received and perceived in nature. Some examples of human design mimicking can include whales/submarines, bats/lane changing or back up sensors and GPS.

Learning Sequence Driving Question:

- How do animals send and receive sound, and how have humans used this information in the design world?

Student Expected Outcomes:

- Students will use a model to identify similarities between animal sense receptors and human design
- Students will collect evidence to identify and describe how energy is transferred and sound is produced

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:

Developing and Using Models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

- Develop a model to describe phenomena.
- Use a model to test interactions concerning the functioning of a natural system.

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 solution.

Disciplinary Core Ideas:

LS1.A: Structure and Function

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

LS1.D: Information Processing

- Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.

PS3.A: Definitions of Energy

- Energy can be moved from place to place by moving objects or through sound, light, or electric currents.

Crosscutting Concepts:

Energy and Matter

- Energy can be transferred in various ways and between objects.

Cause and Effect

- Cause and effect relationships are routinely identified.

Patterns

- Similarities and differences in patterns can be used to sort and classify designed products.

Back to Top of Page

	PS3.B: Conservation of Energy and Energy Transfer ● 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. ● Light also transfers energy from place to place. ● 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. **PS4.C: Information Technologies and Instrumentation** ● Digitized information can be transmitted over long distances without significant degradation. **ETS1.C: Optimizing The Design Solution** ● Different solutions need to be tested in order to determine which of them best solves the problem.	

Related Performance Expectation(s) in this Unit:

- 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
  - [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.]
  - [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]
- 4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
  - [Clarification Statement: Emphasis is on systems of information transfer.]

Back to Top of Page

- [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]
- 4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
  - [Assessment Boundary: Assessment does not include quantitative measurements of energy.]
- 4-PS4-3 Generate and compare multiple solutions that use patterns to transfer information.

Possible Common Core State Standards Connections:

ELA/Literacy -

- W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1)
- SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-LS1-2)

Mathematics -

- 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. (4-LS1-1)

Prior Student Knowledge:

4-LS1-1: 1.LS1.A; 1.LS1.D; 3.LS3.B

4-PS4-3: K.ETS1.A; 1.PS4.B; 1.PS4.C; 2.ETS1.B; 2.ETS1.C; 3.PS2.A

Possible Preconceptions/Misconceptions:

Students may believe that:

- bats are blind and can only hear well.
- snakes "hear."

LESSON PLAN – 5-E Model

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

Activity Description:

- Teacher shows the National Geographic *Elephant Communication Video.*
- Teacher displays the *I Notice, I Wonder Pictures* (Slides #2-5). The pictures depict the sending and receiving of various sound energies.
- Students fill in an I Notice, I Wonder Organizer (Slide #6) .
- Students engage in discussing their ideas. Discussions can be in the form of:
  - Small group or
  - Fishbowl
    - A group of students are chosen to discuss a given topic.
    - The rest of the class watches, listens, or reads the transcript of the discussion.
    - A secondary discussion occurs concerning the outcomes and process of the first.
- Once the discussions have finished, the teacher records student observations and questions from the model (use chart paper and keep for the duration of the sequence).

Resources:

- Elephant Communication Video
- I Notice, I Wonder Pictures and Organizer

Suggested Instructional Strategies:

- Talk Activities

Teacher Action(s):

- Creates interest

Back to Top of Page

- 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 and experiment with a paper roll speaker system model off of the directions in Wikihow's *How to Make Paper Cup iPhone Speakers* explanation.
    - Use two paper or plastic cups and an empty paper towel or toilet paper roll
    - Place the paper towel/toilet paper roll horizontally in front of you and trace the base of a cell phone onto the center of the paper roll.
    - With adult supervision, cut the phone's rectangle shape on the top part of the paper towel roll (paper towel roll should have only one hole so that phone will not fall through the paper roll)
    - Using a paper roll, trace a circle onto the side of each cup. Position the circles closer to the base of the cup as opposed to the rim of the cup. ***Caution: Positioning the circles too close to the rim of the cups will limit how the speakers amplify.*
    - Cut out circles on cups and insert paper roll (roll should fit snugly)
    - Insert phone into paper roll
- Explore ways to make sound louder and softer using different materials (different sizes and types of cups and length of paper tube) to guide students in discussing sound waves and what changes them.
    - The phone's loudspeakers vibrate and make sound waves
    - Sound waves spread out from each cup
    - Sound waves bounce off the tube walls
- Students record the design of their favorite speaker system into their Science Journals.
- Students fill in a *Give Me Five* sheet based on what they discover.
- When done, teacher should collect these for future reference in the Elaborate section to come later in the sequence.
- *Optional:* Ask what components could they add or change to effect more changes in the sound?

Teacher Note:

- It may be easier/more time efficient if the holes in the cups are pre-cut.

Resources:

- How to Make Paper Cup iPhone Speakers
- Give Me Five

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):

Back to Top of Page

- Thinks freely, within the limits of the activity
- Tests 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 #1 Description:

- Students work in pairs or small groups depending on computer access to complete the below listed 6 interactive pieces from the *DK Findout! SOUND Interactive Website*:
    - How are sounds created?
    - Making Music
    - Echoes
    - Loudness
    - Pitch
    - Using soundwaves to navigate
- Students fill in their *3-2-1 activity* sheet as they read each section
- Class reads about Morse Code and other technologies that enable digitized information to be transmitted over long distances in *Communication Technology: From Smoke Signals to Smartphones* by Tracey Kelly on epic! Books
- Class discusses the questions they still have based off of their 3-2-1 Activity sheet.

Resources:

- DK Findout! SOUND Interactive Website
- 3-2-1 Activity
- *Communication Technology: From Smoke Signals to Smartphones* by Tracey Kelly on epic! Books

Activity #2 Description:

- Students watch the following videos:
    - Anatomy Of The Ear
    - How Do Animals Hear?
    - How Do Hearing Aids Work?
- Students work in small groups (2-4 students) and fill in a Similarities and Differences Sheet.
    - Students write “Hearing Aids” in one center circle and “Animals” in the other center circle and then compare and contrast how each receives and perceives sound.
- Class discusses their findings and relates it back to their “Give Me Five” papers from the Explore portion of the sequence. After the discussion, students revise their Similarities and Differences Sheet.
- Teacher collects the revised sheets as part of their Evaluation.

Resources:

- Anatomy Of The Ear
- How Do Animals Hear?
- How Do Hearing Aids Work?
- Similarities and Differences Sheet

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

Back to Top of Page

- 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: vibrate, vibration, soundwave, transmit, wave

ELABORATE (Applications / Extensions)

Activity Description:

- Students revisit the *I Notice, I Wonder pictures* from Engage.
- Students work in 4 or 8 small groups with ONE of the four slides per group to add explanatory labels explaining how animals send and receive sound and how humans have mimicked this.

Resources:

- I Notice, I Wonder Pictures (print each slide #2-#5 on 11 x 17 paper if possible.)

Suggested Instructional Strategies:

- Talk Activities
- CCC Discussion Cards
- CER Organizing Template
  - 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
- Draws 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:** *Developing and Using Models; Constructing Explanations and Designing Solutions*
- ❏ **DCI:** *PS3.A: Definitions of Energy; PS3.B: Conservation of Energy and Energy Transfer; PS4.C: Information Technologies and Instrumentation; ETS1.C: Optimizing The Design Solution; LS1.A: Structure and Function; LS1.D: Information Processing*

Back to Top of Page

❏ CCC: *Energy and Matter; Cause and Effects; Patterns; Systems and System Models*

Summative Assessment Description(s)

- Revised Similarities and Differences sheet from the Explain section of the sequence.
- Students should fill in their Summary Table - return back to the summary table and add in notes regarding the activities, important ideas and the relationship to the anchoring phenomenon (How humans mimic nature in their designs.). (*Teacher should collect and save these after each sequence.)

Resources:

- Summary Table

Suggested Instructional Strategies:

- 60 Formative Assessment Ideas

Additional Resources:

- G4 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 4		
Brief Description: In this sequence, students learn how light is received by animals and how the eye processes that information. Students will discuss various animals that have light producing capabilities and how that light serves a purpose in the animal's survival.		
Suggested Pacing: 2 - 3 hrs		
Lesson-Level Phenomenon/Design Problem: What human innovations were inspired by mimicking the way the natural world receives and perceives light?		
Relationship to Anchoring Phenomena/Design Problem: Humans have mimicked the natural world through their observations of how light is received and perceived in nature.		
Learning Sequence Driving Question: How is light received and perceived in the natural world?		
Student Expected Outcomes: ● Students will develop a model to describe how light enters the eye and processes information. ● Students will construct an argument to determine how an animal's internal and external structures help serve various functions - bioluminescence for improving survival.		
CONNECTIONS TO STANDARDS		
Three Dimensions Related to the Specific Learning Performance(s):		
Science & Engineering Practices: **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. **Developing and Using Models** Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to	**Disciplinary Core Ideas:** **PS3.A: Definitions of Energy** ● Energy can be moved from place to place by moving objects or through sound, light, or electric currents. **PS3.B: Conservation of Energy and Energy Transfer** ● Light also transfers energy from place to place. **PS4.B: Electromagnetic Radiation** ● An object can be seen when light reflected from its surface enters the eyes. **LS1.A: Structure and Function** ● Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.	**Crosscutting Concepts:** **Energy and Matter** ● Energy can be transferred in various ways and between objects. **Systems and System Models** ● A system can be described in terms of its components and their interactions.

Back to Top of Page

represent events and design solutions. ● Develop a model to describe phenomena. ● Use a model to test interactions concerning the functioning of a natural system.	**LS1.D: Information Processing** ● Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions.	

Related Performance Expectation(s) in this Unit:

- 4-PS4-2: Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
  - [*Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.*]
- 4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
  - [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.]
  - [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]
- 4-LS1-2: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
  - [Clarification Statement: Emphasis is on systems of information transfer.]
  - [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]

Possible Common Core State Standards Connections:

ELA/Literacy -

- RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-PS3-1)
- RI.4.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text. (4-PS3-1)
- RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS3-1)
- SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-PS4-2) (4-LS1-2)
- W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1)
- W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (4-PS3-1)
- W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.(4-PS3-3)
- W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-1)(4-PS3-3)
- W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-PS3-1)

Mathematics -

Back to Top of Page

- MP.4 Model with mathematics (4-PS4-2)
- 4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-2)
- 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. (4-LS1-1)

Prior Student Knowledge:

PS3.A: N/A

PS3.B: K.PS2.B ; 3.PS2.A ;

PS4.B: 1.PS4.B ; 1.PS4.C

LS1.A: 1.LS1.A ; 1.LS1.D ; 3.LS3.B

LS1.D: N/A

Possible Preconceptions/Misconceptions:

Students may think sight (seeing something) is the result of light shining on something and brightening that item.

LESSON PLAN – 5-E Model

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

Activity Description:

- Students view the *Eyes, Eyes Baby! slideshow* and record what they notice and wonder about the different slides. Engage #1 focuses on different types of eyes.
- Print each slide (in color) and post them on chart paper around your room. Students can walk around and record what they notice and wonder about each on an Eyes Observation Chart.
- Following the activity, teacher should lead a discussion about what the students observed and wondered.

Resources:

- Eyes, Eyes, Baby! Slideshow
- Eyes Observation Chart

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:

Back to Top of Page

Students explore how the eye processes light through an activity where a baggie filled with water serves as a model for the lens of an eye. The following lesson has been adapted from BetterLesson.com's Understanding the Eye.

- To start the lesson take a toy ball that flashes when it hits a wall or floor and demonstrate using it.
- Instead of focusing on the question "How does it work?," asked students "How can you see this?" This question sets them up for understanding how their eyes work.
- Ask students to draw an initial model of an eyeball and how they think it works (*it lets light in*). Students can share their ideas, and then circle back together to discuss how they think an eye works.
- Students get into pairs and give each pair a baggy 80% filled with water (sealed really well) and a Snellen Eye Chart.
- Students look through the baggy at the Snellen Eye Chart from various distances. Asked them to note any observations on a Give Me Five sheet.
- If further explanation is needed, reference back to *page 2 "Investigate" from BetterLesson.com's* Understanding the Eye lab.

Resources:

- Understanding the Eye
- Snellen Eye Chart
- Give Me Five

Suggested Instructional Strategies:

- Question Formulation Technique (QFT)
- 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
- Tests 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 watch one (or more if necessary) of these short videos to learn about the parts of the eye.
  - *Bill Nye The Science Guy on The Eyeball (Bill Nye)*
  - *Sense of Sight - How Human Eyes Work (Make Me A Genius)*
  - *How the Body Works - The Eye (Kids Health)*
- After watching the video of choice, students think about what part of the eye the baggy represents (*lens*), and what the baggy is doing.
- Students draw a second eye model and compare it to their original. Discuss what's changed.
- Teacher shares *Your Eyes* article.
- Students label the parts of the eye on *How The Body Works -The Eye* Handout.
- Students compare their second eye model to this new labeled eye model.
- REVISIT THE QUESTION - How does light enter the eye? How is it processed?

Back to Top of Page

- Teacher asks "What in the design world mimics how an eye works?"
- Brief Elaboration: Revisit the initial slide show. Students think about which eyes let in more light?
- Students read *From Cat Eyes to...reflectors on epic! Books* and discuss how this applies to the way light is received and perceived.

Resources:

- Bill Nye The Science Guy on The Eyeball (Bill Nye)
- Sense of Sight - How Human Eyes Work (Make Me A Genius)
- How the Body Works - The Eye (Kids Health)
- Your Eyes
- How The Body Works -The Eye Handout
- From Cat Eyes to...reflectors on epic! Books

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: eyeball, cornea, pupil, iris, lens, retina, optic nerve and the brain

ELABORATE (Applications / Extensions)

Activity Description:

- Students view the *Elaborate Slideshow* and work either individually or in small groups to record what they notice and wonder on the Observation Chart.
- Teacher leads a discussion about what the students observed and wondered regarding why animals have/need bioluminescence. What message are they trying to convey? Teacher records their ideas.
    - Possible ideas:
        - To light up a dark area (help with vision)
        - To send a message/ flash (Communication)
        - To show where they are or show off (attract a mate to them)
        - To scare something away (warn)
        - To lure something in (predator/prey)
        - To appear larger or more fierce (protection)
        - To distract something away from something (protection of young)
        - To camouflage itself (protection)
- Briefly discuss how bioluminescence relates back to "What have humans designed by mimicking this phenomenon?"
- Students work in small groups of 3-4 students and watch one of the below videos to learn about how and why an animal uses bioluminescence to improve their chances of survival. Once they have seen the video, students fill out the How Is Bioluminescence Used?

Back to Top of Page

- Class shares their How is Bioluminescence Used? organizer.

Resources:

- Elaborate Slideshow
- Observation Chart
- How Is Bioluminescence Used? Organizer
- Angler Fish (From SciShowKids)
- Jellyfish (By Vince Patton)
- Fireflies (From SciShowKids)

Optional Resources:

- Bioluminescent Animals
- GLOW: Animals with Their Own Night-Lights
- Fireflies (Nocturnal Animals)
- Angler Fish (Real Life Sea Monsters)
- Bioluminescence - Nature and Science at Work
- What is Bioluminescence?
- Living Light: Is There a Future For Bioluminescence Technology?

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
- Draws 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:** *Planning and Carrying Out Investigations; Developing and Using Models*
- ❏ **DCI:** *PS3.A: Definitions of Energy; PS3.B: Conservation of Energy and Energy Transfer; PS4.B: Electromagnetic Radiation; LS1.A: Structure and Function; LS1.D: Information Processing*
- ❏ **CCC:** *Energy and Matter; Systems and System Models*

Summative Assessment Description(s)

Teacher can use the following to evaluate the students' understanding of this sequence:

- Eye Model

Back to Top of Page

- Students should fill in their Summary Table - return back to the summary table and add in notes regarding the activities, important ideas and the relationship to the anchoring phenomenon (How humans mimic nature in their designs.). (*Teacher should collect and save these after each sequence.)

Resources:

- Eye Model
- Summary Table

Suggested Instructional Strategies:

- 60 Formative Assessment Ideas
- Final Scientific Modeling
  - Small Group Models

Additional Resources:

- G4 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 5

Brief Description:
In this learning sequence, students explore how plants perceive and react to their environment. Students examine videos to see plants respond to light, touch, and other stimuli and observe how they respond for survival.

Suggested Pacing:
3 - 3.5 hrs

Lesson-Level Phenomenon/Design Problem:
What human innovations were inspired by mimicking the way plants respond to different energy stimuli?

Relationship to Anchoring Phenomena/Design Problem:
Humans study plant structure and function and base designs off of that information. Some examples of human design mimicking plants are solar panels and velcro.

Learning Sequence Driving Question:
What sense receptors do plants have that help them survive?

Student Expected Outcome:

- Students will use a model to describe the components of a plant and how its structures help them survive.

CONNECTIONS TO STANDARDS

Three Dimensions Related to the Specific Learning Performance(s):

Science & Engineering Practices:	Disciplinary Core Ideas:	Crosscutting Concepts:
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. ● Develop a model to describe phenomena. ● Use a model to test interactions concerning the functioning of a natural system. **Engaging in Argument from Evidence** Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). ● Construct an argument with evidence, data, and/or a model.	**LS1.A: Structure and Function** ● Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.	**Systems and System Models** ● A system can be described in terms of its components and their interactions.

Back to Top of Page

Related Performance Expectation(s) in this Unit:

- 4-LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Possible Common Core State Standards Connections:

4-LS1-1:
ELA/Literacy -

- W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1)
- SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-LS1-2)

Mathematics -

- 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. (4-LS1-1)

4-PS3-3:
ELA/Literacy -

- W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-3)
- W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-3)

Prior Student Knowledge:

4-LS1-1: 1.LS1.A; 1.LS1.D ; 3.LS3.B
3-5-ETS1-2: K-2.ETS1.A ; K-2.ETS1.B ; K-2.ETS1.C

Possible Preconceptions/Misconceptions:

Students may believe that:

- plants do not respond to outside stimuli - they just grow straight up.
- plants obtain their energy directly from the sun.
- plants breathe like humans.
- a plant's leaves' main job is to collect water.

LESSON PLAN – 5-E Model

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

Activity Description:

- Students view *Even Plants Have Senses!* video.
- Students complete an *I Notice, I Wonder* organizer.
- Students pair-share with a science partner what they've observed.
- Student complete *Initial Model Of A Plant* worksheet. These models should include all labels and information they know about plants. Students or teacher keep these models to revise later in the sequence.

Resources:

- Even Plants Have Senses! video
- I notice, I Wonder Organizer
- Initial Model Of A Plant

Suggested Instructional Strategies:

- Talk Activities

Back to Top of Page

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:

- Students observe three different plants. (Teacher picks a variety of plants that best suits the classroom or uses pictures if plants are not available.)
  - A plant with flowers
  - A succulent plant/cactus
  - A plant with needles (conifer)
- Students complete the *Compare and Contrast Sheet* for the three plants, and then come back together as a class to discuss what they observed.
- Teacher asks students and records their answers on chart paper or a Padlet for future reference in the Elaborate portion of the sequence.
  - Why do the plants have those certain characteristics?
  - Do they need those characteristics to survive?
  - How might those characteristics help them?
  - What do plants need to grow?

Resources:

- Compare and Contrast Sheet

Activity #2:

- Students watch the below videos and record how the plants in each video respond to light, touch, sound and any other observations they find.
- Students record their findings on the *Video Recording Sheet.*
  - Videos:
  - *Video #1 -Plants and Light*
  - *Video #2 - Plants and Touch*
  - *Video #3 - Plants and Vibrations*
  - *Video #4 - Plants in Motion*
  - Optional Videos:
    - *Can Plants Think?*
    - *Plants Can Actually Hear*
    - *Can Plants Hear*
    - *Are Plants Conscious?*
- After completing the Video Recording Sheet, students discuss their observations and what it means for a plant's survival, as well as how humans have mimicked these observations in the design world.

Resources:

Back to Top of Page

- Video Recording Sheet
- Video #1 - Plants and Light (By Vito Pettito)
- Video #2 - Plants and Touch (play the first minute of video by NikTheKat)
- Video #3 - Plants and Vibrations (By GeoBeatsNews)
- Video #4 - Plants in Motion (From SciFri)
- Optional Videos:
    - Can Plants Think? (From AsapSCIENCE)
    - Plants Can Actually Hear (From Veuer)
    - Can Plants Hear (By The Washington Post)
    - Are Plants Conscious? (From BrainStuff)

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
- Tests 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 watch: *Plant Parts and their Functions* (Stop the video at the 4:46 time stamp)
- Students view *Plants - Structures and Functions* slideshow
- Students fill in *Identify the Parts of a Plant* handout.
- Students discuss how plant structures allow them to survive.
- Students revise their *Initial Plant Models* to include plant part labels such as roots, trunk, branch, stem, leaves, flower, petal, fruit.

Resources:

- Plant Parts and their Functions Video (Stop the video at the 4:46 time stamp)
- Plants - Structures and Functions Slideshow
- Identify the Parts of a Plant Handout

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

Back to Top of Page

- 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: roots, trunk, stem, leaves, flower, fruit, branch, petal

ELABORATE (Applications / Extensions)

Activity Description:

- After watching the videos and presentation from the Explore Activity #2 and Explain sections and discussing how plants structures and functions promote survival, teacher shares the *Elaborate Slideshow* (slide #1-#5) following human designs, and asks students to work in small groups to break down why they believe the design was originally needed, and how a plant inspired that design.
    - Slide #1 - Coastal defense structures
    - Slide #2 - Solar cells
    - Slide #3 - A wind-driven planetary rover
    - Slide #4 - Hook and loop material (Velcro®)
    - Slide #5 - Paratroopers
- Students work in small groups to brainstorm what plant inspired the design on each slide.
- Groups fill in the Elaborate Organizer.
- Students share their ideas in a whole group discussion.
- Teacher shows Slides A-E (labeled in the upper left corner or slides 6-10) and students complete the last column of the handout with the matching slide.
- Elaborate Slideshow Answer Key
    - Slide #1/Slide C - Coastal defense structures inspired by mangrove trees
    - Slide #2/Slide A - Solar cells inspired by plant leaves (photosynthesis, capturing energy from sunlight as well as phototropism - directionally moving to maximize the sun's energy)
    - Slide #3/Slide E - A wind-driven planetary rover design that maximizes drag, learned from the tumbleweed
    - Slide #4/Slide D - Hook and loop material (Velcro®) inspired by cockleburs
    - Slide #5/Slide B - Paratroopers inspired by a dandelion
- Teacher shares the *14 Smart Ideas Inspired By Nature article*.
- Students work in small groups to complete a Discussion Diamond with the prompt question being: "Which ONE characteristic of plants do you believe to be the most helpful when applied to human design based on what it can accomplish?"
- Students share their consensus ideas with the class.

Resources:

- Elaborate Slideshow
- Elaborate Organizer
- 14 Smart Ideas Inspired By Nature article
- Discussion Diamond
- Discussion Diamond Directions

Suggested Instructional Strategies:

- Talk Activities
- CCC Discussion Cards
- CER Organizing Template
    - STEM Teaching Tool #17: Beyond the written CER

Back to Top of Page

- CER Rubric Example

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
- Draws 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:** *Developing and Using Models; Engaging in Argument from Evidence*
- ❏ **DCI:** *LS1.A: Structure and Function*
- ❏ **CCC:** *Systems and System Models*

Summative Assessment Description(s)

- Students should fill in their *Summary Table* - return back to the summary table and add in notes regarding the activities, important ideas and the relationship to the anchoring phenomenon (How humans mimic nature in their designs.). (*Teacher should collect and save these after each sequence.)

Resources:

- Summary Table

Suggested Instructional Strategies:

- 60 Formative Assessment Ideas

Additional Resources:

- G4 Unit Materials List
  - Click on specific tab for unit-specific materials

Back to Top of Page

Learning Sequence 6

Brief Description:
Through a variety of activities, students experience an assortment of energy transfers. These include light, sound and electrical energy. They explore how energy is used in the natural world and how those uses influence the design world.

Suggested Pacing:
4.5 - 5.25 hrs for 5E's
1 - 1.5 hrs for Culminating Activity

Lesson-Level Phenomenon/Design Problem:
Electric animals

Relationship to Anchoring Phenomena/Design Problem:
Students learn about electricity and energy transfer. Then apply that information to animals that generate electricity, as well as how humans use electricity for similar and different reasons.

Learning Sequence Driving Question:

- How do animals use electricity?

Culminating Performance Task:
How Does A Device Mimic The Natural World?

Student Expected Outcomes:

- Students will collect evidence to identify and describe how electrical energy is transferred and produced.
- Students will describe observations from an investigation to determine how electrical energy is transferred from place to place and can change into other forms of energy (sound and light).
- Students will investigate how animals use electricity to survive.

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 to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. **Constructing Explanations and Designing Solutions** • Generate and compare multiple solutions to a problem based on how well they meet the criteria	**LS1.A: Structure and Function** • Plants and animals have both internal and external structures that serve various functions. **LS1.D: Information Processing** • Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. **PS3.A: Definitions of Energy** • Energy can be moved from place to place.	**Energy and Matter** • Energy can be transferred in various ways and between objects. **Systems and System Models** • A system can be described in terms of its components and their interactions. **Cause and Effect** • Cause and effect relationships are routinely identified.

Back to Top of Page

and constraints of the design solution. **Developing and Using Models** ● Develop a model to describe phenomena. ● Use a model to test interactions concerning the functioning of a natural system.	**PS3.B: Conservation of Energy and Energy Transfer** ● 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. **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. ● 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.	

Related Performance Expectation(s) in this Bundle:

- 4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
  - [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.]
  - [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]
- 4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
  - [Clarification Statement: Emphasis is on systems of information transfer.]
  - [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]
- 4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.
  - [Assessment Boundary: Assessment does not include quantitative measurements of energy.]
- 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 -

- RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (3-5-ETS1-2)
- RI.5.1 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. (3-5-ETS1-2)
- RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (3-5-ETS1-2)
- W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1)

Back to Top of Page

- SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-LS1-2)
- W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-2),
- W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

Mathematics -

- 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.
- MP.2 Reason abstractly and quantitatively. (3-5-ETS1-2)
- MP.4 Model with mathematics. (3-5-ETS1-2)
- MP.5 Use appropriate tools strategically. (3-5-ETS1-2)
- 3-5.OA Operations and Algebraic Thinking (3-ETS1-2)

Prior Student Knowledge:

4-LS1-1: 1.LS1.A (4-LS1-1); 1.LS1.D (4-LS1-1); 3.LS3.B
4-LS1-2: N/A
4-PS3-2: N/A
3-5-ETS-1-2: K-2.ETS1.A ; K-2.ETS1.B ; K-2.ETS1.C

Possible Preconceptions/Misconceptions:

Students may believe that:

- energy can be made, used or lost
- energy is only in living things
- things "use up" energy
- energy is lost

LESSON PLAN – 5-E Model

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

Activity Description:

- Teacher asks the question - How do some animals use the electricity they can create? Then class reads *Electric Animals* on epic! Books.
- After reading the book, students pick the one animal that surprised them the most and draws a picture (initial model) of that animal and writes one statement about how their animal uses electricity.
- If time, students share their initial models with other students having the same animal.

Resources:

- *Electric Animals* by Natalie Kunis available on epic! Books

Suggested Instructional Strategies:

- Initial Scientific Model)
  - Small Group Models
- Talk Activities

Teacher Action(s):

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

Student Action(s):

Back to Top of Page

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

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

Activity Description:

This activity will be spread out over multiple class periods. These explorations allow students to elaborate beyond what they already know to start applying the idea of energy transfer in the design world. By the end of the two activities, students should be able to recognize that energy travels from one place to another. In Activity #1 students create a chain reaction design to demonstrate the transfer of kinetic energy and in Activity #2 students create a circuit to demonstrate the transfer of electrical energy.

Activity #1 - CHAIN REACTIONS - Demonstrating the transfer of kinetic energy

- Students start by viewing *Game On!* video (Teacher Note: this video is 14 minutes long, so plan accordingly, you can speed up the video or just show a portion of the video).
- Students work in small groups to create a simple chain reaction design using dominoes, cards, and marbles.
    - Each group gets a baggie with:
        - 15 Dominoes or similar blocks/shapes
        - 5 Playing Cards
        - 3 Marbles
- BEFORE BUILDING:
    - Students discuss how they want to design their reaction
    - Students work in groups and sketch in their science notebooks their group's first design/idea.
    - Once a design is recorded, they can begin building.
- Students record each attempt in their science notebooks using words and sketches and can adjust their designs with additional items as approved by the teacher.
    - Students are required to include in their science notebooks the following:
        - Which combinations are successful.
        - Which combinations are not successful.
        - What was done to improve the design.
        - How does the final design best transfer energy and why.
- Students demonstrate their most successful design and explain to the class how it demonstrates the transfer of kinetic energy.

Teacher Note:

- Kinetic Energy is the energy an object has due to its motion. An example would be the collision of two pool balls - the energy is transferred from one pool ball to the other.

Resources:

- Game On! Video

Activity #2 - Let There Be Light! Demonstrating the transfer of electrical energy.

- Students work in small groups.
- Each group must create a circuit that will successfully light a bulb using the materials provided.
    - Each group gets (can purchase Eisco Beginner Circuit Kits or use something similar from the hardware store):
        - 1 light bulb
        - 1 battery (Battery Holder - optional)
        - 2 lengths of wire (Students do not have to use both wires.)
        - Tape

Back to Top of Page

- BEFORE BUILDING:
  - Each group discusses how they want to design their circuit
  - Each student in the group sketches in their science notebooks their group's first design/idea.
  - Once a design is recorded, students may begin working.
- Students record each attempt in their science notebooks using words and sketches
- Students MUST include multiple (at least 2) possible solutions
  - Students are required to include in their science notebooks the following:
    - Which combinations are successful.
    - Which combinations are not successful.
    - What was done to improve the design.
    - How does the final design best transfer energy and why.
- At the end of the activity, students demonstrate their design and explain to the class how it demonstrates the transfer of electrical energy.
- Optional Extension Activity: STEM: Holiday Light Circuit

Teacher Note:

- Electrical energy is energy that is caused by moving electric charges. An example of this is electric energy moving from a power plant, to electric wires, to a house, to a TV or some other electronic device.
- Guide the discussion to include the following:
  - Electric currents need to travel in a complete loop to make a complete circuit in order to light a bulb.
  - Identify the essential components of a circuit including a pathway and a source.
  - Draw a complete circuit needed to light a bulb.
- Include the placement of the wire on the bulb - one needs to touch the side and one needs to touch the bottom.

Resources:

- Eisco Beginner Circuit Kits
- STEM: Holiday Light Circuit
- Optional Interactive website: Technology
- More electricity experiments pages 114-127 in *Hands On Science Experiments* by Gary Gibson on epic! Books

Suggested Instructional Strategies:

- Talk Activities

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

EXPLAIN (Concepts Explained / Vocabulary Defined)

Back to Top of Page

Activity Description:

- Once both activities are finished, students compare and contrast both kinetic and electrical energy in a class discussion.
- Students watch *The Power of Circuits* video and Science for Kids: *Energy Transformations* video
- Class creates anchor charts for vocabulary listed below
- Students work in 3 or 6 groups with each of the three *Crosscutting Concept Cards* for Energy & Matter, Systems & System Models, and Cause & Effect to explain each of the two Explore Activities.
- Students share their ideas with the class and discuss.

Resources:

- The Power of Circuits by SciShow Kids
- Science for Kids: Energy Transformations Video
- *All Charged Up: A Look at Electricity* by Jennifer Boothroyd on epic! Books
- *How Circuits Work* by James Roland on epic! Books
- Crosscutting Concept Cards

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: circuit, open circuit, closed circuit, insulator, conductor, kinetic energy, potential energy

ELABORATE (Applications / Extensions)

Activity Description:

- Teacher shares the following:
  - Newsela's It's a shocker: Electric eels bend their bodies to amp up voltage article.
  - *SciShow's The Shocking Truth about Electric Animals video*
  - *12 Animals That Use Electricity*
- Teacher asks:
  - Natural electricity generated by animals to help it survive. How do humans use electricity to survive?
  - Do humans use electricity similarly to animals? If so, how?"
  - Students fill in a *Compare and Contrast* organizer.
  - Students revisit the initial Engage model of electric animals and add zoom out boxes to explain further how their animal generates and uses electricity.
  - Class generates a list of human designs that mimic electric animals. Some examples are tasers, electric fencing, batteries.

Back to Top of Page

Resources:

- Newsela's It's a shocker: Electric eels bend their bodies to amp up voltage article.
- SciShow's The Shocking Truth about Electric Animals video
- 12 Animals That Use Electricity
- Compare and Contrast Organizer

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) (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:** *Planning and Carrying Out Investigations; Developing and Using Models; Constructing Explanations and Designing Solutions*
- ❏ **DCI:** *PS3.A: Definitions of Energy; PS3.B: Conservation of Energy and Energy Transfer; LS1.A: Structure and Function; LS1.D: Information Processing; ETS1.B: Developing Possible Solutions*
- ❏ **CCC:** *Energy and Matter; Cause and Effects; Systems and System Models*

Summative Assessment Description(s)

- Students science notebooks can be evaluated for details from the Explore Activities and Elaborate organizer and model.
- Students should fill in their Summary Table - return back to the summary table and add in notes regarding the activities, important ideas and the relationship to the anchoring phenomenon (How humans mimic nature in their designs.). (*Teacher should collect and save these after each sequence.)

Resources:

- Summary Table

Suggested Instructional Strategies:

- 60 Formative Assessment Ideas
- Final Scientific Modeling
  - Small Group Models
  - Sticky-notes + language scaffolds as tools for changing models

Back to Top of Page

Culminating Performance Task:

- Teacher begins the lesson showing a cell phone and asks students "What are some cellphone characteristics that mimic the natural world?"
- Students brainstorm a list of cellphone characteristics compared with organisms (any kind) in the natural world.
    - Things To Consider:
        - Structure and function
        - Communication
        - Energy transfer - receiving and giving of information
- Make a chart - *Animal Behavior vs Cell Phone Characteristics* - Sound, Vibration, lights, data transmission
- Students may refer back to their Summary Sheet to help jog their memories:
    - Learning Sequence #1 first introduced and explored the idea of biomimicry
    - Learning Sequence #2 explored how senses react to energy stimuli
    - Learning Sequence #3 explored the sending and receiving of sound
    - Learning Sequence #4 explored how light is received and perceived
    - Learning Sequence #5 explored how plants can receive and perceive vibrations (among other energies)
    - Learning Sequence #6 explored the transfer of energy (primarily electrical & kinetic)
- As a class fill in page 1 of How Does A Device Mimic The Natural World where the device is a Cell Phone.
- Teacher asks "In your life, what technology do you use that mimics the natural world?"
    - Possible examples:
        - Computer
        - Video Games
        - Vehicles: Car, Bus, Train, Airplane
        - Drone
        - SUV
        - Television
        - Watch
        - Fitness Trackers (FitBit, smart watches)
- Students compare the characteristics of an existing device to the natural world using the second page/side of How Does A Device Mimic The Natural World? handout.
    - Students draw the product and describe the design features on the third page of the How Does A Device Mimic The Natural World? handout.
    - Students focus on the use of energy transfer (light, sound, electricity).
    - Students explore ways these items not only receive information but also send/give information
    - Students may research their device on the computer.
    - Students are asked to identify which feature(s) are inspired by nature. If possible, have them be specific about what type of animal or plant it mimics and have them describe the design inspiration (plant or animal characteristics, etc.).
    - Students provide at least one creative idea on how their product could be made better using biomimicry.

Resources:

- How Does A Device Mimic The Natural World?

Additional Resources:

- G4 Unit Materials List
    - Click on specific tab for unit-specific materials

Back to Top of Page

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only X **Board Meeting Date** January 13, 2022

Decision Requested _____ **Agenda Code** 10 f.

AGENDA REPORTING FORM

Agenda Topic: SHS Textbook Proposal – AP Biology– First Reading

Summary of Issue: The Curriculum & Instruction Committee has reviewed SHS Textbook Proposal – AP Biology

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 SHS Textbook Proposal – AP Biology to the full Board for a First Reading.

Titles of Attachments:

1. SHS Textbook Proposal – AP Biology

Signature of Staff Member Submitting Report

Signature of Superintendent of Schools

R-6161 (2)

Southington Public Schools
Southington, CT

TEXTBOOK ADOPTION FORM – PART A

Date:	10/15/20

1.	Curriculum Committee or department submitting change:	SHS Science Department
2.	Grade levels and high school course(s) in which text will be used:	Gr. 10, 11, 12
3.	Proposed Text	
	a. *Title*	Campbell Biology in Focus, 3rd Edition
	b. *Author(s) full name(s)*	Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, Rebecca B. Orr
	c. *Publisher (name and location)*	Pearson Education, Hoboken, NJ
	d. *Copyright Date*	2020
4.	Cost of recommended text:	13,585.42
5.	Amount Budgeted:	13,585.42
6.	Number of student copies to be purchased:	80
7.	This text is (check one):	x *A replacement for existing text* ☐ *A new text for new or revised course*
8.	Rationale for selection of this text (if replacement for current text, be sure to indicate why the text needs to be replaced and the advantages of the proposed new text):	
	Compared to other text books for AP biology students, the cost of *Biology in Focus* is substantially cheaper and is of equal quality. Other AP biology teachers that are members of the AP biology community support the use of this text as well. All units prescribed by College Board are supported by this text and the resources that accompany it.	

Department or Committee Members:	Sharon Kirsche, Dave DeStefano, Nicole Raccio

Approvals:

Department Chair Signature Nicole Raccio

Principal Signature

THE EVALUATION

I. What other textbooks were evaluated to the one the committee is recommending? List by title, publisher, and date of publication.

Open Stax
Campbell's Biology, AP Edition
Campbell's Biology in Focus

II. In summary, explain why the committee is recommending this textbook rather than the others it evaluated. If no other texts were evaluated, explain why not.

Biology in Focus is a text that is commonly referred to by teachers on the College Board panel and as well as teachers that are part of the AP Biology Facebook Community. Biology in Focus is aligned with the standards that are set forth by College Board. The text is comprehensive but slightly more concise than the more expensive, Campbell AP Edition Biology, also by Pearson.

III. If the textbook is rated as "weak" on any of the evaluation criteria, explain why the committee is recommending its adoption.

N/A

IV. Is the readability level of the textbook consistent with the reading ability of the students who will use the text (attach the readability study to this form)? Yes X No ☐

If no, please explain why the textbook is being recommended.

EVALUATION OF PROPOSED TEXT – PART B

Directions: For each question, rate from a low of 1-point to a high of 3-points.

1 = Little or No Extent
2 = To Some Extent
3 = Great Extent
N/A = Not Applicable

OBJECTIVES AND CONTENT		1	2	3	N/A
1.	To what extent are the objectives of the text stated?	☐	☐	X	☐
2.	To what extent do the objectives of the text correlate with goals and objectives of the course?	☐	☐	X	☐
3.	To what extent do the objectives require students to use higher cognitive skills (analysis, synthesis, etc.)?	☐	☐	X	☐
4.	To what extent does the content of the text cover the content requirement of the course?	☐	☐	X	☐
5.	To what extent is the content of the text geared to the interests, abilities, and needs of the students using the material?	☐	☐	X	☐
6.	To what extent does the content of the text reflect recent scholarship in this subject area?	☐	☐	X	☐
7.	To what extent does the text clearly and accurately develop and present essential concepts, generalizations, and relationships?	☐	☐	X	☐
8.	To what extent does the text present charts, maps, graphs, and tables accurately and clearly?	☐	☐	X	☐
9.	To what extent do the text learning aids (pictures, graphs, suggested activities, etc.) focus on the major objectives of the chapter or unit?	☐	☐	X	☐
10.	To what extent are skills and skill development stressed throughout the text?	☐	☐	X	☐
11.	To what extent does the text offer practice opportunities to reinforce the skills that are taught?	☐	☐	X	☐
12.	To what extent is this text interesting to read?	☐	☐	X	☐
13.	To what extent do the text and supplemental materials reflect current learning theory and principles?	☐	☐	X	☐

Comments:	The book logically builds on background knowledge and explains new concepts clearly. It links to real world examples throughout to make concepts more engaging to students. See the rationale for more details.

PUBLICATION DATA AND PHYSICAL CHARACTERISTICS	1	2	3	N/A
1. To what extent do the authors (or contributors) have background and experience in the subject area and teaching experience to know how to present material to the students who will be using it?	☐	☐	X	☐
2. To what extent is the quality and binding sufficient to withstand the wear and tear of student use?	☐	☐	X	☐
3. To what extent is the typeface and type size suitable for the students who will be reading it?	☐	☐	X	☐
4. To what extent are the illustrations pleasing, well selected, and well placed?	☐	☐	X	☐
5. To what extent is the book effectively organized for maximum student learning?				

Comments:	The book is more efficiently organized than our current text, Campbell Biology, AP Edition. It was clearly written and organized to align with the AP Biology curriculum.

TEACHING AIDS	1	2	3	N/A
1. To what extent does the teacher's manual explain the aims and objectives of individual units and lessons?	☐	☐	X	☐
2. To what extent are up-to-date reference sources listed in an easily used format?	☐	☐	X	☐
3. To what extent does the book have accompanying learning aids (transparencies, videocassettes, CD's, charts, etc.)?	☐	☐	X	☐
4. To what extent are the workbooks (if included) challenging for students and do they reinforce the text's major concepts?	☐	☐	X	☐
5. To what extent are appropriate test materials available for teachers?	☐	☐	X	☐
6. To what extent are interesting activities suggested that will challenge youngsters to do further research?	☐	☐	X	☐
7. To what extent do the suggested activities and accompanying materials accommodate the range of learning abilities of the students most likely to be using it?	☐	☐	X	☐

Comments:	The text (and accompanying resources), having been written to specifically accompany the AP Biology curriculum, is not only an excellent resource on its own, but it also a wonderful complement to all of the AP Biology Resources on AP Classroom.

TREATMENT OF SENSITIVE AREAS

		1	2	3	N/A
1.	To what extent does the content of the text (both pictorial and written) reflect the pluralistic, multi-ethnic nature of our society, past and present?	☐	☐	X	☐
2.	To what extent is the role of gender and of various racial, ethnic, religious, and socio-economic groups past and present, accurately and fairly presented?	☐	☐	☐	X
3.	To what extent are all sides of a controversial issue treated fairly and objectively?	☐	☐	X	☐

Comments:	Relevant and applicable experimentation and works are referenced in the text. The text explicitly welcomes and embraces the nature of cultural diversity and gender neutral opinions and beliefs.

CONTENT AREA TEXT ASSESSMENT FOR TEACHING & LEARNING - PART C

Name of Text:	Campbell Biology in Focus, 3rd Edition
Author(s):	Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, Rebecca B. Orr
Copyright:	2020 Publisher: Pearson Education, Hoboken, NJ
Class:	AP Biology Grade(s): 10-12

EVALUATION OF TEXT CONTENT

Skills & Strategies	Criteria: Questions to ask about text	Yes / Sometimes / No
Meeting Curriculum Demands	Does the content of this text reflect what you feel are the essential concepts in your course?	Yes
	Does the content flow in a logical progression appropriate for this content (i.e. from simple to complex, chronological, topical, etc.)?	Yes
	Is the information up to date?	Yes
	Does the content, including illustrations and examples, appropriately present ethnic and gender diversity?	Yes

Teacher comments on ***Text Content***: _____

PRE-READING

Skills & Strategies	Criteria: Questions to ask about text	Yes / Sometimes / No
Activating Background Knowledge	Does the introduction to the chapter help students recall information previously learned about this subject?	Yes
	Does the introduction attempt to help students' relate their own life experiences to the chapter topic?	Yes
	Does the author build on the students' prior knowledge within the chapter subsections?	Yes
Setting Purpose for Reading	Does the chapter begin with a list of objectives, statements, or questions indicating what students will learn in this chapter?	Yes
	Do titles of sections within the chapter indicate the main idea of each section?	Yes
	Are section headings specific enough that students can convert them to focus-questions that direct their reading?	Yes

PRE-READING (Continued)

Skills & Strategies	Criteria: Questions to ask about text	Yes / Sometimes / No
Setting Purpose for Reading	Does the chapter begin with a list of objectives, statements, or questions indicating what students will learn in this chapter?	Yes
	Do titles of sections within the chapter indicate the main idea of each section?	Yes
	Are section headings specific enough that students can convert them to focus-questions that direct their reading?	Yes

Teacher comments on ***Pre-reading*** aids: A clear connection is made to all NGSS standards, key questions posed as well as key vocabulary defined at the start of every chapter.

ACTIVE READING

Skills & Strategies	Criteria: Questions to ask about text	Yes / Sometimes / No
Identifying the Main Idea	Is the main idea clearly stated for each paragraph?	Yes
	Will the main idea be obvious and easy for students to understand?	Yes
	Is the main idea (topic sentence) usually located at the beginning of the paragraph?	Yes
	Does the rest of the paragraph clearly explain the main idea? (Remember the students' limited knowledge base.)	Yes
Supporting & Reinforcing the Main Idea	Are explanations adequate?	Yes
	Are supporting details clear and sufficient in number?	Yes
	Do charts, pictures, and other graphics support the main ideas?	Yes
	Do charts, pictures, and other graphics support the main ideas?	Yes
	Are there special appendices to provide students with additional reference materials?	Yes
Organizing the Information	Is there a logical arrangement of text so students can easily take notes?	Yes
	Are signal words provided to indicate how ideas in the section are related to one another?	Yes

Is the presentation of main ideas and details consistent in each chapter?	Yes
Does the rest of the paragraph clearly explain the main idea? (Remember the students' limited knowledge base.)	Yes

ACTIVE READING (Continued)

Skills & Strategies	Criteria: Questions to ask about text	Yes / Sometimes / No
Organizing the Information	Is there a logical arrangement of text so students can easily take notes?	Yes
	Are signal words provided to indicate how ideas in the section are related to one another?	Yes
	Is the presentation of main ideas and details consistent in each chapter?	Yes
	Does the rest of the paragraph clearly explain the main idea? (Remember the students' limited knowledge base.)	Yes
Vocabulary Development	Are important words/concepts highlighted in the text?	Yes
	Are important words/concepts clearly defined or explained within the reading?	Yes
	Does the author provide more than just a definition? (e.g. pictures, examples, analogies, counter examples, etc.)	Yes
	Is the number of highlighted vocabulary terms appropriate for the concepts being explained? (Avoid too much jargon!)	Yes

Teacher comments on ***Active Reading*** components of text: ____

POST-READING

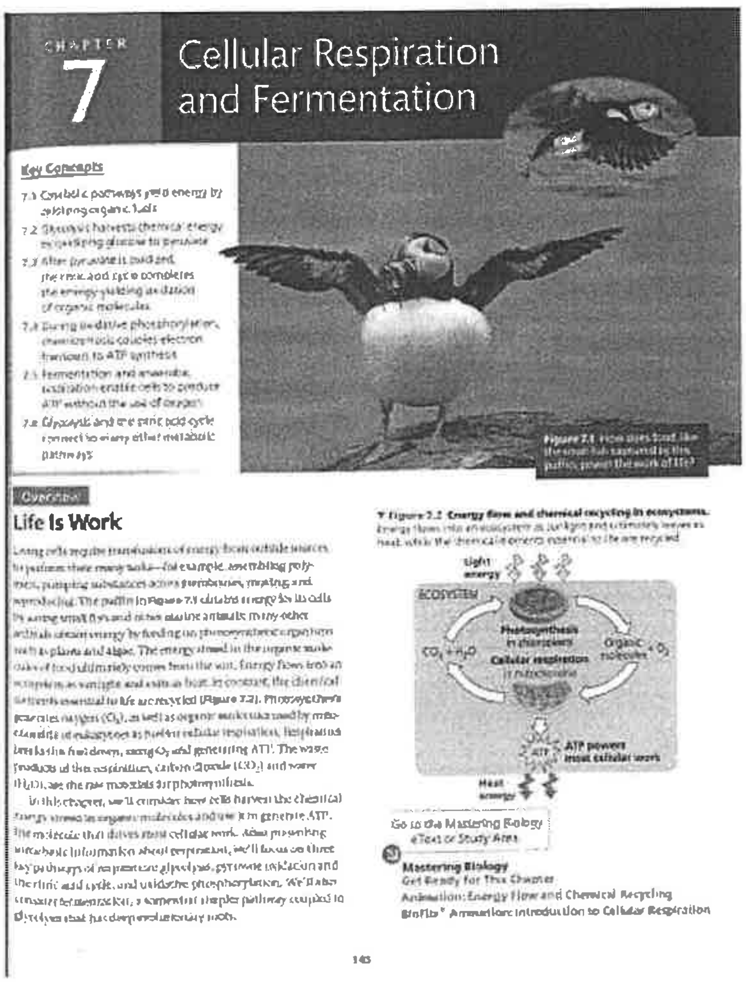
Skills & Strategies	Criteria: Questions to ask about text	Yes / Sometimes / No
Metacognition	Are there questions within the chapter to help students check their understanding as they read?	Yes
	Does the summary accurately reflect the main ideas and key supporting information within the chapter?	Yes
	Do the end-of-chapter questions correlate with the chapter objectives?	Yes
	Do the questions at the end of the chapter encourage higher order thinking skills?	Yes
	Are there questions within or at the end of a chapter to promote class or small group discussion or writing?	Yes

Teacher comments on ***Post-Reading*** components of text:

[redacted]

Textbook	Campbell Biology in Focus, 3rd Edition
Flesch Reading Ease	**N/A**
Flesch-Kincaid Grade Level	**N/A**

Insert text here: (eText)



CHAPTER 7

Cellular Respiration and Fermentation

Key Concepts

Overview

Life Is Work

Mastering Biology

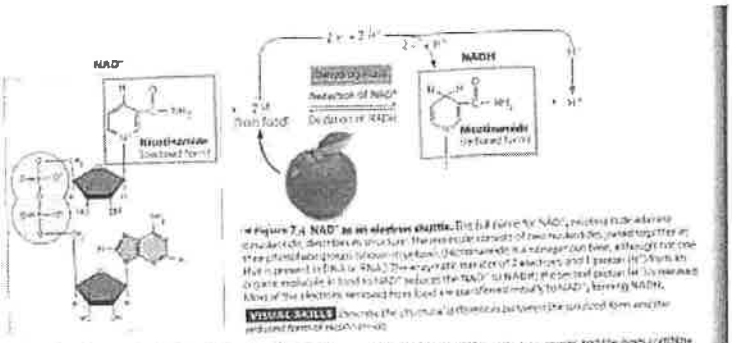


Figure 7.4 NAD⁺ as an electron shuttle. The full name for NAD⁺, missing in the abbreviation, describes its structure: The molecule consists of two nucleotides joined together at their phosphate groups. Shown in yellow is the nicotinamide ring, which can accept one H atom (2 electrons and 1 proton, H^+) from an organic molecule in food to NAD⁺, reducing the NAD⁺ to NADH. A second proton (H^+) remains in the surrounding solution. Most of the electrons removed from food are transferred initially to NAD⁺, forming NADH.

VISUAL SKILLS Describe the structural changes between the oxidized form and the reduced form of NAD+/NADH.

How does NAD⁺ capture electrons from glucose and other organic molecules in food? Enzymes called dehydrogenases remove a pair of hydrogen atoms (2 electrons and 2 protons) from the substrate (glucose, in the preceding example), thereby oxidizing it. The enzyme delivers the 2 electrons along with 1 proton to its coenzyme, NAD^+, forming NADH (Figure 7.4). The other proton is released as a hydrogen ion (H^+) into the surrounding solution:

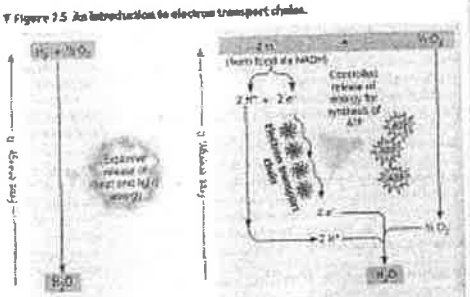
$$\text{H}-\overset{\text{H}}{\underset{\text{H}}{\text{C}}}-\text{OH} + \text{NAD}^+ \xrightarrow{\text{Dehydrogenase}} \text{C}=\text{O} + \text{NADH} + \text{H}^+$$

By accepting 2 negatively charged electrons but only 1 positively charged proton, the nicotinamide portion of NAD^+ has its charge neutralized when NAD^+ is reduced to NADH. The name NADH stems the hydrogen that has been received at the position. NAD^+ is the most versatile electron acceptor in cellular respiration and functions in several of the key steps during the breakdown of glucose.

Electrons lose very little of their potential energy when they are transferred from glucose to NAD^+. Each NADH molecule formed during respiration represents stored energy that can be tapped to make ATP when the electrons complete their "fall" down an energy gradient from NADH to oxygen.

How do electrons that are extracted from glucose and stored as potential energy in NADH finally reach oxygen? It will help to compare the redox chemistry of cellular respiration to a much simpler reaction: the reaction between hydrogen and oxygen to form water (Figure 7.5a). Mix H_2 and O_2 gases in a test tube, and they will remain virtually unchanged indefinitely. In fact, a combination of liquid H_2 and O_2 is harnessed to help power the rocket engines that boost satellites into orbit and launch spacecraft. The explosive response to a release of energy as the electrons of hydrogen "fall" closer to the electronegative oxygen atoms. Cellular respiration also brings hydrogen and oxygen together to form water, but there are two important differences. First, in cellular respiration, the hydrogen that reacts with oxygen was removed from organic molecules rather than H_2 stored in cylinders. Second, instead of releasing its energy in one explosive reaction, respiration uses an

Figure 7.5 An introduction to electron transport chains.



(a) Uncontrolled reaction. The (overall) energetic reaction of hydrogen with oxygen to form water releases a large amount of energy in the form of heat and light, an explosion.

(b) Cellular respiration. In cellular respiration, the same reaction occurs in stages. An electron transport chain breaks the "fall" of electrons in the reaction into a series of smaller steps and stores some of the released energy in a form that can be used to make ATP. (The rest of the energy is released as heat.)

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only X **Board Meeting Date** January 13, 2022

Decision Requested _____ **Agenda Code** 10 g

AGENDA REPORTING FORM

Agenda Topic: Policy 4118.8 – Alcohol and Drug Use – Policy Revision – First Reading

Summary of Issue: The Policy & Personnel Committee has reviewed Policy 4118.8– Alcohol and Drug Use – Policy Revision.

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 4118.8 to the full Board for a First Reading.

Signature of Staff Member Submitting Report

Titles of Attachments:

1. DRAFT Policy 4118.8

Signature of Superintendent of Schools

Policy 4118.8

Alcohol and Drug Use – Policy Revision

Draft

Series 4000: Personnel

Certified – Personnel

Permanent Personnel

Rights, Responsibilities and Duties

Alcohol and Drug Use

The unlawful manufacture, possession, use or distribution of intoxicating liquors or illegally obtained drugs by school employees in school buildings or on school grounds, or during any school activity is prohibited. Compliance with these standards of conduct is mandatory and any employee who violates them shall be subject to discipline which may include immediate dismissal, and referral for prosecution. Employees may further be required to complete an appropriate rehabilitation program for substance abuse.

The prohibition on smoking extends to "any area" of a school building, and extends the prohibition against using an electronic nicotine delivery system or vapor product on school grounds or in a school to also prohibit use of an "electronic cannabis delivery system" in such locations.
Because marijuana use is prohibited under federal law, the use of marijuana at work, or outside of work if it impairs an employee's ability to perform their job, constitutes a violation of this policy.

Employees may obtain information about drug and alcohol counseling, rehabilitation and re-entry programs from the office of the Personnel Manager.

The Board of Education directs the Superintendent of Schools to distribute this policy statement to all staff. Further, all potential new hires shall be given a copy of this policy and informed that they must abide by it. Further, all potential new hires must disclose any drug conviction as a condition of employment.

Public Act No. 21-1,
Conn. Gen. Stat. § 10-221(d)
Conn. Gen. Stat. § 10-154a

Policy adopted: December 1988
Policy revised: October 1990
Policy revised: May 1994
Policy reviewed: April 2003
Policy revised: 2022

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only X **Board Meeting Date** January 13, 2022

Decision Requested _____ **Agenda Code** 10 h

AGENDA REPORTING FORM

Agenda Topic: Policy 5131.6 – Drugs, Alcohol, Tobacco – Policy Revision – First Reading

Summary of Issue: The Policy & Personnel Committee has reviewed Policy 5131.6– Drugs, Alcohol, Tobacco – Policy Revision.

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 5131.6 to the full Board for a First Reading.

Titles of Attachments:

1. DRAFT Policy 5131.6

Signature of Staff Member Submitting Report

Signature of Superintendent of Schools

Policy 5131.6

Drugs, Alcohol, Tobacco – Policy Revision

Draft

Series 5000: Students

Activities

Conduct

Drugs, Alcohol, Tobacco

It is the policy of the schools to take positive action through education, counseling, parental involvement, medical referral, and police referral in the handling of incidents in the schools involving the possession, sale and/or use of illicit drugs and alcohol. In addition, students will be made aware that the possession, use or distribution of drugs or alcohol is prohibited and that students who violate this policy on school property or during a school sponsored activity will be subject to disciplinary action, up to and including expulsion from school.

The use, sale or possession of alcohol or controlled drugs by students on school property shall not result in a student facing greater discipline, punishment, or sanction for the use, sale or possession of cannabis than they would face for the use, sale or possession of alcohol.

Personal privacy rights of students shall be protected as provided by law.

School properties, including student desks and lockers, may be inspected by school authorities in the interest of maintaining health and safety. Inspections for the location of drugs, narcotics, liquor, weapons, poisons and missing properties are matters relating to health and safety and may be regarded as reasonable purposes for inspection by school personnel (cf. 5145.12 – Search and Seizure).

Smoking is prohibited at all times by students in the school buildings and on school grounds and at school sponsored activities. The prohibition on smoking extends to "any area" of a school building, and extends the prohibition against using an electronic nicotine delivery system or vapor product on school grounds or in a school to also prohibit use of an "electronic cannabis delivery system" in such locations.

Legal Reference:
Connecticut General Statutes
1-2lb Smoking prohibited in certain places
10-220b Policy statement on drugs
21a-242 Schedules of controlled substances
Sec, 31-409 Smoking in the Workplace

Sec, 53-198 Smoking in Motor Buses, Railroad Cars and School Buses

Public Act No. 21-1,
Conn. Gen. Stat. § 10-221(d)
Conn. Gen. Stat. § 10-154a

Policy Adopted: February 1989
Policy Revised: October 1990
Policy Revised: April 1995
Policy Revised: August 2002
Policy Revised: 2022

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only X **Board Meeting Date** January 13, 2022

Decision Requested _____ **Agenda Code** 10 i.

AGENDA REPORTING FORM

Agenda Topic: Policy 6146.1 – Grade Reporting – Policy Revision – First Reading

Summary of Issue: The Policy & Personnel Committee has reviewed Policy 6146.1– Grade Reporting – Policy Revision.

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 6146.1 to the full Board for a First Reading.

Titles of Attachments:

1. DRAFT Policy 6146.1

Signature of Staff Member Submitting Report

Signature of Superintendent of Schools

Policy 6146.1

Grade Reporting – Policy Revision

Draft

Series 6000: Instruction

Curriculum

Graduation Requirements

Grade Reporting

The primary purpose of grading is to keep parents and students fully informed of a student's progress and to provide a continuous and accurate record of each student's achievement for use in instruction.
The Board of Education shall approve the grading and reporting systems developed by the administration and faculty and recommended by the Superintendent of Schools. In accordance with Connecticut law, this policy shall explain the manner in which grade point averages are calculated within the District.

As specifically related to Southington High School, the Board approves the following course weighting system for the purposes of grading. ~~and class rank:~~

Weighting Factors

~~Weight Factor~~

~~Level 1 Courses 1.00~~
~~Level 2 Courses 1.05~~
~~Level 3 Courses 1.10~~
~~Level 4 and AP Courses 1.15~~

Academic Level	Actual Grade
Accelerated Level	Add .50 to GPA conversion
College Level Courses (any college credit course)	Add 1.0 to GPA conversion

Series 6000: Instruction

The Board believes, due to the rigorous nature of advanced placement classes the grades earned in such classes deserve additional weight for the purposes of calculating grade point average. These classes include advanced placement dual enrollment, dual credit or early college. Therefore, it is the policy of the Board to grant grades earned in such courses additional weight for the aforementioned purposes.

Calculating Grade Point Average

A student's grade point average shall be calculated in the following manner:

	Academic Level	Accelerated	College Level Courses
A+ (97-100)	4.33	4.83	5.33
A (93-96)	4.0	4.5	5.0
A- (90-92)	3.67	4.17	4.67
B+ (87-89)	3.33	3.83	4.33
B (83-86)	3.0	3.5	4.0
B- (80-82)	2.67	3.17	3.67
C+ (77-79)	2.33	2.83	3.33
C (73-76)	2.0	2.5	3.0
C- (70-72)	1.67	2.17	2.67
D+ (67-69)	1.33	1.83	2.33
D (63-66)	1.0	1.5	2.0
D- (60-62)	.67	1.17	1.67
F (Less than 60)	0	0	0

Series 6000: Instruction

Legal Reference:

Connecticut General Statutes § 10-220g

Public Act 21-199, "An Act Concerning Various Revisions and Additions to the Statutes Relating to Education and Workforce Development"

(cf. 5124 – Reporting to The Parent

Policy adopted: May 1989
Policy revised: October 1999
Policy reviewed: October 2002
Policy Revised: 2022

Series 6000: Instruction

Grade Reporting System

Procedures for Report Cards and Parent Conferences

Elementary

Report cards will be issued three (3) times during the school year. Each marking period will be approximately 60 days. The report cards will be sent home electronically to designated parent/guardian email addresses, given to parents during the report card conference, or sent home with the students after the end of each marking period. Parent conferences will be held after the close of the first and second marking periods.

Middle School

Report cards will be issued three (3) times during the school year. Each term will be approximately 60 days. The report cards will be sent home electronically to designated parent/guardian email addresses, sent home with the students after the close of each term, or mailed home. Parent conferences will be held after the close of the first term.

High School

Report cards will be issued four (4) times during the school year. Each quarter will be approximately 45 days. The report cards will be sent home electronically to designated parent/guardian email addresses, sent home with the students after the close of each quarter, or mailed home. Parent conferences will be held after the close of the first quarter.

Regulation approved: December 1989
Regulation reviewed: October 2002
Regulation revised: March 9, 2017

Series 6000: Instruction

Curriculum

Graduation Requirements

Grade Reporting System

Procedures for Issuing Progress Reports

Grades 6-12

At a point approximately halfway through each marking period at the middle and high schools, teachers are required to complete progress reports for students who are failing or experiencing difficulty and to submit the progress reports to the school office. Teachers are also encouraged to use the progress reports for students who have improved their performance or are doing exceedingly well.

Regulation approved: December 1989
Regulation revised: December 1995
Regulation reviewed: October 2002

Series 6000: Instruction

Curriculum

Graduation Requirements

Grade Reporting System

Guidelines for Honor Roll
The purpose of an Honor Roll is to provide student recognition for academic achievement.

Middle School
~~Students in grades 6, 7 and 8 are eligible for the Honor Roll if they meet the grade requirements. High Honors apply to students who have earned "A's" and no more than one grade of "B" or one grade of "S". Second Honors apply to students who have earned "A's" and B's" and no more than one grade of "C" or one grade of "S". All courses will be treated equally. Recognition will be given at the end of each marking period.~~

Middle School

Students in grades 6, 7 and 8 are eligible for the Honor Roll each trimester. First Honors is awarded to students who earn a GPA of 3.75 and above. Second Honors is awarded to students who earn a GPA of 3.5 to 3.74. A grade of "D", "F", "NG," or "I" in any course will disqualify a student from Honor Roll.

High School
Students in grades 9, 10, 11 and 12 are eligible for the Honor Roll if they meet the grade requirements.

First Honors are awarded to students who earn an unweighted average for all courses of ~~89.5~~ 4.0 and above. Second Honors is awarded students who earn an unweighted average for all courses of ~~84.5 to 89.4~~ 3.5-3.99. A grade of "D" in any course including physical education, even though physical education course averages are not included in determination of Honor Roll status, will disqualify a student from Honor Roll consideration. Recognition will be given at the end of each marking period.

~~Weighting Factors~~

~~Level Weight Factor~~

~~Level 1 Courses 1.00~~
~~Level 2 Courses 1.05~~

~~Level 3 Courses 1.10~~
~~Level 4 Courses 1.15~~

Regulation approved: December 1989
Regulation revised: December 1995
Regulation reviewed: October 2002
Regulation revised: 2021

BOARD OF EDUCATION
SOUTHINGTON, CONNECTICUT

Informational Only X **Board Meeting Date** January 13, 2022

Decision Requested **Agenda Code** 10 j.

AGENDA REPORTING FORM

Agenda Topic: Policy 9321 –Time, Place, Notification of Meetings– Policy Revision – First Reading

Summary of Issue: The Policy & Personnel Committee has reviewed Policy 9321– Time, Place, Notification of Meetings – Policy Revision.

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 9321 to the full Board for a First Reading.

Titles of Attachments:

1. DRAFT Policy 9321

Signature of Staff Member Submitting Report

Signature of Superintendent of Schools

Policy 9321

Time, Place, Notification of Meetings

Policy Revision

Draft

Series 9000: Bylaws of the Board

Methods of Operation

Time, Place, Notification of Meetings

All meetings of the Board of Education shall be conducted in compliance with Public Act 75-342, Sec. 6 (An Act Concerning Freedom of Information).

1. **Regular Meetings** – Regular meetings of the Board of Education shall be held on the second and/or fourth Thursday of each month at a time to be determined and at the established Board meeting place. At a minimum, one (1) meeting date per month will be set by the Board. Meeting dates, times, and places may be changed at the discretion of the Board.
    a. Regular meetings will be classified as either *Committee of the Whole ~ Operations* or *Committee of the Whole ~ Instruction*. The classification will be indicated on the agenda within the meeting posting. The order of business for each is specified in number 8 within policy 9321.
    b. The schedule of regular meetings of the Board of Education for the ensuing calendar year shall be filed with the Town Clerk no later than December 1 of each year, and no such meeting of the Board shall be held sooner than thirty (30) days after such schedule has been filed.

2. **Special Meetings** – Special meetings of the Board of Education shall be called by the Chairperson upon written request of three (3) of the members or whenever deemed necessary by the Chairperson. The call shall state the purpose of the meeting and no other business shall be transacted. Special meetings may not be called for the purpose of election of officers or for a vote to fill a vacancy on the Board.
    a. Notice of special meetings shall be given not less than twenty-four (24) hours prior to the time of such meeting by posting a notice of the time of such meeting in the office of the Town Clerk. In the case of an emergency, a special meeting may be held without complying with the foregoing requirement for the posting of notice, but a copy of the minutes of any such special meeting adequately setting forth the nature of the emergency and the proceedings occurring at such meeting shall be filed with the Town Clerk no later than seventy-two (72) hours following the holding of such meeting.
    b. Workshops of the Board of Education are held when it is necessary for the Board to discuss and consider, in depth, matters pertaining to Board of Education business. The Chairperson shall call workshops whenever deemed necessary or when requested by three (3) or more Board of

Series 9000: Bylaws of the Board

Methods of Operation

Time, Place, Notification of Meetings (continued)

Education members. Notice of workshops shall be given not less than forty eight (48) hours prior to the time of such meetings by posting a notice of both the time and place in the office of the Town Clerk. The agenda will state the purpose(s) of the meeting and no other business will be transacted. The Chairperson of the Board may invite those individuals, groups or agencies that have relevant information, knowledge or experience to contribute to the discussion and to the Board's decision making process. Other public input will be allowed at the discretion of the Board Chairperson. No formal votes will be taken during or at the conclusion of workshops.

3. **Committee Meetings** – The Chairperson of each committee will notify the Board as to the location, date, and time of all meetings. (cf 8133)

4. **Adjourned Meetings** – Any meeting of the Board of Education may be adjourned to a time and place specified in the order of adjournment.

5. **Quorum** – Five (5) members of the Board shall constitute a quorum for the transaction of business except where otherwise noted in Board policies.

6. **Parliamentary Procedure** – Robert's Rules of Order shall govern the proceedings of the Board, except when those rules are in conflict with the Board's approved policies and regulations. The Superintendent of Schools is designated as Board of Education parliamentarian.

7. **Agenda Notice** – The agenda for regular meetings of the Board of Education shall be given to all members a minimum of six (6) days prior to the meeting. ~~Business other than that~~ Other business included on the agenda may be transacted by a two thirds vote of all members present unless the subject is specifically referenced in other Board policies.

Series 9000: Bylaws of the Board

Methods of Operation

Time, Place, Notification of Meetings (continued)

8. **Order of Business** – The order of business at each regular meeting of the Board of Education shall be as follows:

Committee of the Whole - Operations

8.1 Call to Order
8.2 Pledge of Allegiance
8.2.1 Celebration of Excellence (as appropriate)
8.3 Approval of Minutes
8.4 Public Communications
a. ~~Public~~
~~b. Board of Education~~
~~c. Administration~~
~~d. Student Representatives~~
a. Student Representatives
b. Board of Education
c. Administration
d. Public
8.5 Committee Reports
8.6 Personnel Report (as appropriate)
8.7 Old Business
8.8 New Business
8.9 Adjournment

Committee of the Whole - Instruction

8.1 Call to Order
8.2 Pledge of Allegiance
8.3 Approval of Minutes
8.4 New Business
8.5 Public Communications
~~a. Public~~
~~b. Board of Education~~
~~c. Administration~~
~~d. Student Representatives~~
e. Student Representatives
f. Board of Education
g. Administration
h. Public

8.6 Adjournment

Series 9000: Bylaws of the Board

Methods of Operation

Time, Place, Notification of Meetings (continued)

9. **Requests for Hearing on Transportation** – Requests for hearings on transportation must be made in writing. The Board of Education shall hold such hearing within ten (10) days after receipt of written request and shall make a finding within ten (10) days after such hearing and in accordance with regulations of the State Board of Education.

(cf. 9327 – Electronic Mail Communications)

Legal Reference:
Connecticut General Statutes

- 1-200 (2) Definitions. "Meeting"
- 1-206 Denial of access to public records or meetings.
- 1-225 Meetings of government agencies to be public, as amended by June 11 Special Session, PA 08-3
- 1-227 Mailing of notice of meetings to persons filing written request.
- 1-228 Adjournment of meetings. Notice.
- 1-229 Continued hearings. Notice.
- 1-230 Regular meetings to be held pursuant to regulation, ordinance or resolution.
- 10-218 Officers. Meetings

Bylaw adopted by the Board: January 1990
Bylaw revised by the Board: April 1993
Bylaw reviewed by the Board: April 2003
Bylaw revised by the Board: March 2005
Bylaw revised by the Board: February 2009
Bylaw updated and recoded: June 22, 2017
Bylaw revised by the Board:_____2022__