Student Achievement Committee Meeting

Wednesday, April 30, 2025 6:30 PM
BOE - Room 36 and via Zoom Meeting Platform, 129 Church Street, Bristol, CT 06010

1.	**Call to Order/ Pledge of Allegiance**	
2.	**Decision: Approval of Minutes from February 19, 2025**	
3.	**Public Comment**	
4.	**Information**	
4.1.	School Calendar Discussion	
5.	**Decision**	
5.1.	PLTW Principles of Engineering	**Presenter:** Laura Lanza
5.2.	PLTW Introduction to Engineering and Design	**Presenter:** Laura Lanza
5.3.	ECE Chemistry	**Presenter:** Laura Lanza
5.4.	Career Workplace Experience (CWE) 50/100	**Presenter:** Laura Lanza
5.5.	Tools and Materials	**Presenter:** Laura Lanza
5.6.	Kindergarten Literacy	**Presenter:** Azra Redzic
5.7.	Kindergarten Music	**Presenter:** Kenneth Bagley
6.	**Adjournment**	

Student Achievement & Outcomes Committee
February 19, 2025
MINUTES - DRAFT

The minutes presented within this document are a summary of the discussion that took place at the Student Achievement Committee meeting. To view the meeting in its entirety and hear full reports please go to: February 19, 2025 SAC Meeting Recording

PRESENT Committee members: Jill Fitzsimons-Bula, Kristen Giantonio, Maria Simmons

ALSO PRESENT: Kenneth Bagley (Zoom), Crystal Davis Branch (Zoom), Kim Culkin, Carly Fortin, Sara Hale (Zoom), Mary Hawk, Michael Higgins (Zoom), Chair Shelby Pons, Scott Redman (Zoom), Azra Redzic, Jillian Romann (Zoom), Kristy Trelli (Zoom), Commissioner Jen Van Gorder (Zoom), Melanie Vetrano (Zoom), Leszek Ward, Iris White

Call to Order
Commissioner Fitzsimons-Bula called the meeting to order at 6:30 p.m.

Decision: Approval of Minutes from January 15, 2025 meeting
On a motion made by Commissioner Giantonio and seconded by Commissioner Simmons, it was unanimously;
VOTED: to approve the January 15, 2025 minutes.

Information: Next Generation Accountability Performance Indicators
Carly Fortin, Chief Academic Officer, discussed the District Performance Index (DPI) as a comprehensive measure of school and district quality, and showed that Bristol has been outperforming the state since 2021. Key improvements include higher math and science achievement, lower absenteeism, and increased college and career readiness. Several schools, including the high schools, recorded their best scores since 2020, and Hubbell was recognized as a "School of Distinction." Overall, Bristol's performance has improved across several indicators, including graduation and post-secondary entrance rates.

Questions followed.

Decision: NISE English Immersion Program
Mr. Michael Higgins, Principal of Bristol Eastern High School, and Mrs. Crystal Davis Branch, School Counselor, presented the overview and highlights of the NISE program. This program offers cultural exchange opportunities, including outbound programs to countries like Costa Rica, Germany, and Spain. The students do not enroll in classes but participate as classroom guests. The program provides benefits like liability insurance and a donation to the school. Bristol is considering making this a regular practice, as it offers a rich cultural experience for both visiting students and local students, with positive feedback from participants.

Comments and questions followed.

On a motion made by Commissioner Fitzsimons-Bula and seconded by Commissioner Giantonio, it was unanimously;
VOTED: to move the NISE English Immersion Program to the full Board of Education for approval.

Decision: K-5 Social Studies Revision
Mrs. Azra Redzic, Supervisor of Elementary Humanities, presented that the social studies curriculum has been revised to align with the new state framework, focusing on improving teacher resources and incorporating four key learning dimensions. The updates emphasize topics like citizenship, community, government, and economics, with a special focus on local history, and include support for multilingual learners and universal design for learning.

On a motion made by Commissioner Giantonio and seconded by Commissioner Fitzsimon-Bula, it was unanimously;
VOTED: to move the K-5 Social Studies curriculum revision to the full Board of Education for approval.

Decision: Journalism Revision
Mr. Leszek Ward, Supervisor of Secondary Humanities, presented the journalism curriculum as having been revised as part of a new journalism pathway, including a dual enrollment opportunity with Southern Connecticut State University. The revisions aim to update the course, clarify expectations, and reduce redundancy with the advanced "Media Freedom and Power" course. The course now focuses on news genres, and investigative reporting, and includes a structured progression from basic journalism concepts to in-depth reporting skills. The structure of the units has been reorganized for better alignment with the pathway while maintaining core content.

On a motion made by Commissioner Fitzsimons-Bula and seconded by Commissioner Giantonio, it was unanimously;
VOTED: to move the Journalism curriculum revision to the full Board of Education for approval.

Decision: Precalculus (Academic) Revision
Mrs. Fortin presented that the precalculus curriculum has been updated to include real-world applications and problem-solving opportunities, with a focus on supporting diverse learners and connecting math concepts to other subjects like science. The revisions aim to improve critical thinking and provide flexible learning strategies, with the curriculum being implemented with ongoing support for both students and teachers.

Questions followed.

On a motion made by Commissioner Giantonio and seconded by Commissioner Simmons, it was unanimously;
VOTED: to move the Precalculus curriculum revision to the full Board of Education for approval.

There being no further discussion, Commissioner Fitzsimons-Bula adjourned the meeting at 7:25pm.

Respectfully submitted,
Katlyne Laprise
Katlyne Laprise

PROCEDURES FOR REMOTE PUBLIC COMMENT

Members of the public are invited to comment to the Board on any topic related to school business.

Items requiring consideration by the Board must be approved as an agenda item by a 2/3ds vote of the Board members present. Such items may be referred for further study and not necessarily acted upon at this meeting.

Anyone wishing to address the Board should adhere to the following procedures:

PUBLIC COMMENT

Before a Remote Meeting

1. Send your comments to: KatlyneLaprise@bristolk12.org
2. Be sure to put **PUBLIC COMMENT-SAC** in the subject line.
3. Include your name and address.
4. Direct your comments to the Board Chair.
5. Your comments will be read at the meeting by the Board Chair.
6. All comments should be written in an appropriate manner, particularly if concerning a personnel matter.
7. Any comments not adhering to the guidelines will not be read at the meeting.

During a Remote Meeting

1. Everyone is requested to address the Chair for recognition.
2. Each speaker must state his/her name and address.
3. All speakers must observe rules of common etiquette. Personalities are not to be injected. Anyone violating this rule will be denied the floor. Unless waived by the Chairperson or a majority of the Board,
4. Each speaker shall limit his/her remarks to three (3) minutes.
5. A speaker will not be recognized for a second time on the same topic.
6. Each speaker must concern himself/herself with the topic under discussion. Anyone digressing from the topic will be ruled out of order.
7. Written statements and materials may be made available, in advance of comments, for distribution to Board members.
8. Speakers shall state their positions on the subject being discussed.
9. Board members will not respond directly to comments during the Board meeting. The Superintendent will direct the question to the appropriate staff member for follow-up.

Bristol Public Schools

Bristol, Connecticut

Course Title:	Content Area:	Grade Level:	Credit (if applicable)
PLTW Principles of Engineering	CTE: Engineering and Technology	9-12	1 High School Credit 3 College Credits via UNH upon meeting UNH criteria

Course Description:

Principles of Engineering is a full-year course designed to be a high school student's second exposure to the PLTW Engineering program and is appropriate for students in grades 9-12. In Principles of Engineering, students explore a broad range of engineering disciplines, careers, and design and solve real-world engineering problems.

This course introduces students to engineering concepts that are applicable to a variety of engineering disciplines and empowers them to develop technical skills through the use of engineering tools such as 3-D modeling software, hands-on prototyping equipment, programming software, and robotics hardware to bring their solutions to life. Students apply the engineering design process to solve real-world problems across a breadth of engineering fields such as mechanical, robotics, infrastructure, environmental sustainability, and product design and development.

Using PLTW's activity-, project-, problem-based (APB) instructional approach, students advance from completing structured activities to solving open-ended projects and problems that provide opportunities to develop planning and technical documentation skills, as well as in-demand, transportable skills such as problem solving, critical thinking, collaboration, communication, and ethical reasoning. The last is particularly important as the course encourages students to consider the impacts of engineering decisions.

Through individual and collaborative team activities, projects, and problems, students create solutions to problems as they practice common engineering design and development protocols, such as experimental design, testing, project management, and peer review.

Aligned Core Resources:	Connection to the ***BPS Vision of the Graduate***
• PLTW Online *(some elements require PLTW login credentials)* • Course Outline - Principles of Engineering • Common Core State Standards for English Language Arts Anchor Standards • Common Core State Standards for Mathematics • Next Generation Science Standards • Standards for Technological and Engineering Literacy	**Meaningfully contribute to a global society:** Collaboration **Effectively communicate in a global society:** Communications and Technology Literacy **Demonstrate Academic Knowledge and Skills:** Critical Thinking and Problem Solving
Additional Course Information: ***Knowledge/Skill Dependent courses/prerequisites***	**Link to *Completed Equity Audit***
Concurrent enrollment in grade appropriate math class.	Equity Curriculum Review - PLTW Principles of Engineering (2024-25)

Standard Matrix

See Standards Alignment - Principles of Engineering for alignment to:

- Common Core State Standards for English Language Standards *(Page 2)*
  - Anchor Standards: Research to Build and Present Knowledge
  - Writing: Text Types and Purposes
  - Reading Informational Text: Key Ideas and Details
- Common Core State Standards for Mathematics *(Page 7)*
  - Geometry: Visualization and Spatial Reasoning
  - Statistics and Probability: Interpreting Categorical and Quantitative Data
  - Statistics and Probability: Making Inferences and Justifying Conclusions
  - Number and Quantity: Quantities
- Next Generation Science Standards *(Page 12)*
  - Engineering Design: Developing Possible Solutions
  - Engineering Design: Evaluating Solutions
  - Engineering Design: Analyzing and Interpreting Data
  - Engineering Design: Optimizing the Design Solution
  - Engineering Design: Developing and Using Models
- Standards for Technological and Engineering Literacy *(Page 25)*

- Creativity and Innovation
- Communication and Collaboration
- Understanding and Applying Engineering Concepts
- Global Awareness in Engineering
- Technology and Engineering in Design
- Collaboration and Teamwork

Unit Links

Unit 0: Introduction to Product Design and Development

Unit 1: Mechanical Design

Unit 2: Application of Robotics

Unit 3: Energy in Action

Unit 4: Designing Infrastructure and Developing Sustainability

Unit Title:	
Unit 0: Introduction to Product Design and Development	
Relevant Standards: Bold indicates priority	
Common Core State Standards for English Language Arts Common Core State Standards for Mathematics Next Generation Science Standards **Standards for Technological and Engineering Literacy**	
Essential Question(s):	**Enduring Understanding(s):**
0.1 - 1 How does a design team know what problem to solve? 0.1 - 2 Why is empathy an important skill in engineering design? 0.1 - 3 How do engineers communicate designs and solutions? 0.1 - 4 What is a decision matrix and why is it used? 0.2 - 1 What techniques do engineers use to visually present design ideas? 0.2 - 2 What advantages does Computer-Aided Design (CAD) provide over traditional paper and pencil design? 0.2 - 3 What advantages does paper and pencil design provide over CAD? 0.2 - 4 What would happen if engineers did not follow accepted dimensioning standards and guidelines, but instead, used their own individual dimensioning methods? 0.2 - 5 What are the differences between manufacturing processes? 0.3 - 1 What properties should be considered when evaluating material choice for a product? 0.3 - 2 What data should be collected in a testing process? 0.3 - 3 How is material testing data useful? 0.3 - 4 How does an engineer predict the performance and safety of a selected material? 0.3 - 5 What is the difference between the independent variable and the dependent variable in experimental design? 0.4 - 1 What are two possible ways that a team could come to a consensus in a disagreement over a solution to a problem? 0.4 - 2 Why is it important for the team to come to a consensus on the issues that arise? What are some reasons that the team leader should not dictate the direction of the group? 0.4 - 3 How can you design a product that meets the needs of a user?	• Engineers define problems by understanding user needs, identifying constraints, and analyzing real-world contexts. • Empathy is essential to engineering design because it helps create solutions that are meaningful, inclusive, and user-centered. • Effective communication through sketches, models, CAD, and standardized drawings ensures ideas are clearly shared and understood. • Decision-making tools, like decision matrices, help engineers evaluate design options objectively and collaboratively. • Both manual sketching and CAD play important roles in visualizing and refining design ideas, each offering unique advantages. • Following industry-standard drawing and dimensioning practices is critical to ensure consistency, accuracy, and manufacturability. • Engineers choose materials and processes based on performance data, testing results, and intended product use. • Teamwork, respectful collaboration, and shared decision-making are key to solving problems effectively and developing successful designs.
Demonstration of Learning:	**Pacing for Unit**
• Written documents, Formative and Summative Assessment, Hands on activities • Student teams take on the role of a product development team using the engineering design process to solve problems and create value for others.	16 Class Periods
Family Overview (link below)	**Integration of Technology:**

Family Overview - PLTW Principles of Engineering Family Overview - PLTW Principles of Engineering (Spanish)	*N/A*

Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**

Problem Statement Design Brief Constraints Criteria Empathy User-Centered Design Stakeholder Sketching	Tolerance Standardization Decision Matrix Prototype Material Properties Stress/Strain Projection Dimensioning CAD (Computer-Aided Design)	Testing Manufacturing Process Consensus Collaboration Iteration Communication Feasibility Orthographic Technical Drawing

N/A

Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
• Students apply math skills when using measurement, precision, and tolerances in sketching and CAD work, as well as when analyzing data from material testing and decision matrices. • The scientific method and experimentation are reinforced as students test materials, define variables, collect data, and evaluate results to predict material performance and safety. • Through technical and informational writing, students strengthen their ability to clearly document and communicate design ideas, write reports, and present solutions to both technical and non-technical audiences. • Exploring the ethics and impact of design allows students to consider real-world implications, such as accessibility, sustainability, and cultural relevance, connecting engineering decisions to broader social and historical contexts.	• Students may think the problem is always clearly defined or given to them. • Students may believe empathy is only about "being nice" and not relevant to engineering. • Students may think rough sketches or personal styles are enough for communicating technical ideas. • Students may think CAD is always better than sketching. • Students may believe a decision matrix will always give the "correct" answer. • Students may assume the strongest material is always the best choice. • Students may think testing is just a final step to prove the design works. • Students may confuse independent and dependent variables, or think all variables are tested at once. • Students may believe consensus means everyone gets exactly what they want. • Students may assume the team leader should always make final decisions.

Connections to Prior Units:	**Connections to Future Units:**
N/A	• The foundational skills in sketching, CAD, and dimensioning from Unit 0 are directly applied when students model and refine mechanical parts in Unit 1. • The problem-solving and iterative design process introduced in Unit 0 is critical as students develop and refine robotic systems in Unit 2. • The scientific testing process and data analysis techniques from Unit 0 are essential when evaluating energy systems and material performance in Unit 3. • The user-centered design principles from Unit 0 inform how students consider environmental and societal impacts when designing sustainable infrastructure in Unit 4.

Differentiation through *Universal Design for Learning*

UDL Indicator	Teacher Actions:

Learning Target 1: I can identify and define a clear problem based on user needs, constraints, and criteria.

- **Engagement and Representation:** Present students with an authentic, ill-defined problem rooted in a real-world context (perhaps a challenge facing their school or community). This inherently engages their interest and necessitates exploring user needs and constraints to even begin defining the problem.

Learning Target 3: I can communicate my design ideas using sketches, models, presentations, and technical documentation.

- **Engagement and Action & Expression:** Provide opportunities for students to communicate their design ideas for different purposes and to diverse audiences (e.g., peers for feedback, experts for critique, younger students to explain a concept). This emphasizes the importance of tailoring communication methods.

Learning Target 4: I can use a decision matrix to evaluate and select the best solution among alternatives.

- **Engagement and Representation:** Engage students in a group process to define the criteria for evaluating potential solutions, assigning weights based on importance. Then, collaboratively apply the decision matrix to the generated alternatives. This fosters ownership and understanding of the selection process.

Learning Target 5: I can use sketching, orthographic projections, and 3D models to present design ideas.

- **Action & Expression and Representation:** Provide structured instruction and practice for each representation method. Then, offer students choices in which methods they use to present different aspects of their design, allowing them to leverage their strengths and the most appropriate tool for the task.

Learning Target 6: I can explain and demonstrate the advantages of CAD software in the design process.

- **Action & Expression and Representation:** Provide direct access to CAD software and guide students through tasks that highlight its advantages (e.g., easy modification, precise dimensioning, generating multiple views) by comparing the time and effort required to do the same tasks manually.

Learning Target 7: I can describe when hand sketching is more effective than CAD in the design process.

- **Engagement and Action & Expression:** Engage students in rapid ideation challenges where quick sketching is essential for exploring numerous concepts quickly. Follow this with discussions comparing the efficiency of sketching versus CAD for early-stage design.

Learning Target 8: I can follow accepted dimensioning rules to ensure accurate communication of designs.

- **Action & Expression and Representation:** Provide students with examples of technical drawings (both correct and incorrect) from industry or practical scenarios and have them analyze and correct the dimensioning errors. This makes the rules more meaningful.

Learning Target 9: I can compare different manufacturing processes and choose the best method for a given product.

- **Engagement and Representation:** Have students examine existing products and research the likely manufacturing processes used. This allows them to connect design features to manufacturing constraints and advantages.

Learning Target 10: I can evaluate materials based on mechanical, thermal, and physical properties.

- **Engagement and Representation:** Engage students in either physical or virtual testing of different materials to observe and collect data on their properties. Analyzing this firsthand data makes the properties more tangible and relevant.

Learning Target 11: I can identify and collect accurate data during material or product testing.

- **Engagement and Action & Expression:** Guide students in designing their own simple experiments, emphasizing the identification of variables and the development of a clear data collection plan. Incorporate peer review of these plans before testing to ensure accuracy and validity.

Learning Target 12: I can use test data to make informed decisions about material selection and safety.

- **Engagement and Action & Expression:** Present students with design scenarios and provide them with sets of test data for different materials. Require them to justify their material selection based on the data and safety considerations.

Learning Target 13: I can use material properties and testing results to predict how a material will perform.

- **Engagement and Representation:** Use software or simulations that allow students to input material properties and predict performance under various conditions. Where possible, connect these predictions to real-world examples.

Learning Target 14: I can correctly identify variables in an experiment and control them to ensure valid results.

- **Engagement and Action & Expression:** Present students with simple, observable phenomena (the "mystery box"). Challenge them to design experiments to investigate the phenomena, explicitly requiring them to identify and justify their choice of independent, dependent, and control variables.

Learning Target 15: I can apply collaborative strategies to reach group consensus on a design solution.

- **Engagement and Action & Expression:** Assign specific roles within design teams and provide structured protocols for collaborative activities (e.g., brainstorming rules, decision-making frameworks). Follow up with individual and group reflections on the effectiveness of their collaboration.

Learning Target 16: I can explain why shared decision-making is essential in team engineering projects.

- **Engagement and Representation:** Examine real-world engineering projects where the presence or absence of effective shared decision-making significantly impacted the outcome (both positively and negatively). This provides compelling context for the importance of collaboration.

Supporting Multilingual/English Learners	
Related *CELP standards:*	Learning Targets:

CELP Standard	LT1	LT2	LT3	LT4	LT5	LT6	LT7	LT8	LT9	LT10	LT11	LT12	LT13	LT14	LT15	LT16	LT17
1. Construct meaning from oral presentations and literary and informational text	X	X				X	X		X	X	X	X	X	X		X	X
2. Participate in grade-appropriate oral and written exchanges of information, ideas, and analyses	X	X	X	X	X	X	X		X		X	X		X	X	X	X
3. Speak and write about grade-appropriate complex literary and informational texts and topics			X			X	X		X	X		X	X	X		X	X
4. Construct grade-appropriate oral and written claims and support them with reasoning and evidence	X			X		X	X		X	X		X	X	X		X	X
5. Conduct research and evaluate and communicate findings to answer questions or solve problems	X	X							X	X	X	X	X	X			X
6. Analyze and critique the arguments of others orally and in writing				X		X	X		X			X	X	X	X	X	X
7. Adapt language choices to purpose, task, and audience when speaking and writing			X		X	X	X	X	X	X	X	X	X				X
8. Determine the meaning of words and phrases in oral presentations and literary and informational text	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9. Create clear and coherent grade-appropriate speech and text	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
10. Make accurate use of standard English to communicate in grade appropriate speech and writing	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
1	I can identify and define a clear problem based on user needs, constraints, and criteria.	• I can conduct research or interviews to discover user needs. • I can write a clear and concise problem statement. • I can identify constraints (e.g., cost, materials, safety). • I can explain how the problem aligns with real-world needs.	
2	I can demonstrate empathy to understand user perspectives and needs in the design process.	• I can use user feedback to guide design decisions. • I can ask questions that reveal pain points or challenges. • I can consider diverse viewpoints and accessibility in my designs. • I can reflect user needs in my final solution.	
3	I can communicate my design ideas using sketches, models, presentations, and technical documentation.	• I can create annotated sketches or technical drawings. • I can present ideas clearly using visuals and spoken explanation.	

		• I can use appropriate vocabulary to describe engineering decisions. • I can collaborate and give constructive feedback.
4	I can use a decision matrix to evaluate and select the best solution among alternatives.	• I can identify multiple design solutions. • I can select appropriate criteria and assign weights. • I can score and compare solutions based on objective data. • I can justify the final decision using matrix results.
5	I can use sketching, orthographic projections, and 3D models to present design ideas.	• I can create freehand sketches with labels and dimensions. • I can draw isometric and orthographic views. • I can build 3D models to communicate form and function. • I can use visual tools to express design intent.
6	I can explain and demonstrate the advantages of CAD software in the design process.	• I can create a digital 3D model of a design. • I can modify and test designs quickly in CAD. • I can use CAD tools to measure and evaluate dimensions. • I can explain how CAD supports manufacturing and prototyping.
7	I can describe when hand sketching is more effective than CAD in the design process.	• I can quickly communicate initial ideas using sketches. • I can capture design thinking during brainstorming. • I can create rough visualizations without software tools. • I can combine sketches with written notes for ideation..
8	I can follow accepted dimensioning rules to ensure accurate communication of designs.	• I can apply ANSI or ISO standards when dimensioning. • I can dimension all critical features of a part clearly. • I can avoid redundant or conflicting dimensions. • I can explain how poor dimensioning leads to manufacturing errors.
9	I can compare different manufacturing processes and choose the best method for a given product.	• I can describe common manufacturing processes (e.g., casting, milling, 3D printing, injection molding). • I can match materials to compatible processes. • I can consider cost, complexity, and volume in decision-making. • I can justify process selection based on product requirements.
10	I can evaluate materials based on mechanical, thermal, and physical properties.	• I can compare tensile strength, elasticity, hardness, etc. • I can match material properties to function and environment. • I can consider cost, weight, durability, and recyclability. • I can choose materials based on performance data.
11	I can identify and collect accurate data during material or product testing.	• I can define independent, dependent, and control variables. • I can record force, stress, strain, deflection, etc. • I can use proper measurement tools and techniques. • I can organize data in charts, tables, or graphs.
12	I can use test data to make informed decisions about material selection and safety.	• I can analyze data to find trends and failure points. • I can compare materials based on test results. • I can identify safety margins and tolerances.

		• I can use results to improve future designs.
13	I can use material properties and testing results to predict how a material will perform.	• I can use stress-strain curves and material specs. • I can apply factors of safety in designs. • I can predict failure modes under real-world conditions. • I can make recommendations for safe use of materials.
14	I can correctly identify variables in an experiment and control them to ensure valid results.	• I can define and label independent, dependent, and control variables. • I can design fair tests that isolate variables. • I can explain how each variable affects results. • I can analyze how changing one variable influences the outcome.
15	I can apply collaborative strategies to reach group consensus on a design solution.	• I can use structured discussion or voting. • I can weigh evidence and consider all viewpoints. • I can compromise when necessary to move forward. • I can respect all team members' contributions.
16	I can explain why shared decision-making is essential in team engineering projects.	• I can describe how consensus leads to stronger, more inclusive designs. • I can identify the risks of a leader dominating the process. • I can encourage input from all team members. • I can reflect on how team dynamics affect project success.
17	I can use user feedback and data to design a product that effectively solves a real problem.	• I can identify user needs and constraints. • I can design a solution that fits those needs. • I can collect feedback and test with users. • I can improve the design based on real input.

Unit Title:

Unit 1: Mechanical Design

Relevant Standards: Bold indicates priority

Common Core State Standards for English Language Arts
Common Core State Standards for Mathematics
Next Generation Science Standards
Standards for Technological and Engineering Literacy

Essential Question(s):	**Enduring Understanding(s):**
1.1 - 1 How do engineers quantify the mechanical advantage of a system? 1.1 - 2 How do engineers apply their knowledge of simple machines to solve problems? 1.1 - 3 How do engineers quantify energy, work, and power? 1.1 - 4 How do engineers apply their knowledge of energy, work, and power to solve problems? 1.2 - 1 How are mechanisms used to convert one type of motion to another? 1.2 - 2 How do engineers manipulate motion to solve design problems? 1.3 - 1 How can you apply your understanding of machines and mechanisms to solve an authentic problem?	Engineers apply principles of mechanical advantage, energy, work, power, and motion to design efficient systems that solve real-world problems. By understanding and manipulating simple machines and mechanisms, they can convert and control different types of motion to create innovative, functional, and efficient solutions.
Demonstration of Learning:	**Pacing for Unit**
• Written documents, Formative and Summative Assessment, Hands on activities • Students end the unit by working collaboratively and applying their knowledge to solve a real-world agricultural problem.	17 Class Periods
Family Overview (link below)	**Integration of Technology:**
Family Overview - PLTW Principles of Engineering Family Overview - PLTW Principles of Engineering (Spanish)	*N/A*
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**

Simple Machines	Mechanical	Friction
Force	Advantage	Load Distance
Work	Kinetic Energy	Effort Distance
Power	Potential Energy	Rotary Motion
Energy	Mechanical	Linear Motion
Input Force /	Efficiency	Gear Ratio
Output Force	Torque	Linkage
Effort / Load	Velocity	Crank
Pulley	Moment of Inertia	Work-Energy
Lever	Screw	Theorem
Inclined Plane	Wedge	Wheel and Axle

N/A

Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**

• Energy, Work, and Power: Understanding how mechanical systems involve the transfer of energy, work done, and the relationship between force, distance, and energy directly ties to physics principles such as motion and thermodynamics. • Mechanical Advantage and Force Calculations: Calculating mechanical advantage, force, and efficiency involves applying algebraic equations and ratios, helping students practice mathematical problem-solving skills.	• A higher mechanical advantage always means a more efficient system. • Energy and work are the same thing.
Connections to Prior Units:	**Connections to Future Units:**
• The problem-solving and empathy learned in Unit 0 are foundational for students as they design mechanical systems in Unit 1. • The tools and strategies for defining problems, brainstorming solutions, and testing prototypes in Unit 0 are directly applied when considering mechanical advantage, efficiency, and system optimization in Unit 1. • Both units emphasize a user-centered approach, with Unit 0 focusing on the broader problem and context, while Unit 1 applies that understanding to design efficient mechanical systems that solve real-world problems.	• In Unit 2 (Application of Robotics), the principles of mechanical design are used to create and control robotic systems. • In Unit 3 (Energy in Action), students build on mechanical principles to explore energy conversion and optimization. • In Unit 4 (Designing Infrastructure and Developing Sustainability), mechanical design knowledge is applied to develop sustainable infrastructure that is efficient and energy-conscious.
Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**
Engagement • Allow students to explore different mechanical design concepts (e.g., levers, pulleys, gears) through hands-on activities, simulations, or real-world case studies. Students can choose how they wish to engage with the material: through physical models, digital simulations, or problem-based learning activities. Action & Expression • Offer multiple ways to present complex mechanical design concepts, such as using visuals (diagrams, 3D models), providing interactive online tools (e.g., CAD software), and offering scaffolded explanations for technical terms. Provide glossaries and translated resources for English language learners (ELLs) to understand the specialized vocabulary used in mechanical design.	
Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**

CELP Standard	LT 1	LT 2	LT 3	LT 4	LT 5	LT 6	LT 7
1. Construct meaning from oral presentations and literary and informational text	X	X	X	X	X	X	X
2. Participate in grade-appropriate oral and written exchanges of information, ideas, and analyses	X	X	X	X	X	X	X
3. Speak and write about grade-appropriate complex literary and informational texts and topics	X	X	X	X	X	X	X
4. Construct grade-appropriate oral and written claims and support them with reasoning and evidence	X	X	X	X	X	X	X
5. Conduct research and evaluate and communicate findings to answer questions	X	X	X	X	X	X	X

or solve problems							
6. Analyze and critique the arguments of others orally and in writing	X	X	X	X	X	X	X
7. Adapt language choices to purpose, task, and audience when speaking and writing	X	X	X	X	X	X	X
8. Determine the meaning of words and phrases in oral presentations and literary and informational text	X	X	X	X	X	X	X
9. Create clear and coherent grade-appropriate speech and text	X	X	X	X	X	X	X
10. Make accurate use of standard English to communicate in grade appropriate speech and writing	X	X	X	X	X	X	X

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
1	I can calculate ideal and actual mechanical advantage using input and output forces or distances.	• I can correctly calculate IMA using distance ratios • I can correctly calculate AMA using force measurements • I can compare and explain differences between IMA and AMA • I can identify real-world factors (like friction) that affect mechanical advantage	
2	I can identify and apply simple machines to design systems that reduce effort or optimize mechanical advantage.	• I can identify the six types of simple machines in real mechanisms • I can choose appropriate simple machines to solve a problem • I can explain how a system of simple machines reduces force or changes motion • I can create or analyze a design using two or more simple machines	
3	I can calculate work, energy, and power using standard formulas and appropriate units.	• I can use formulas to calculate work (W = F × d), power (P = W/t), and energy • I can use correct units (joules, watts, newtons, etc.) in calculations • I can create labeled diagrams showing force, distance, and energy transfer • I can solve problems involving energy efficiency	
4	I can apply energy principles to analyze and improve the performance of mechanical systems.	• I can analyze a system for energy input, output, and losses • I can calculate power requirements for a machine or system • I can recommend ways to improve system efficiency • I can justify design choices based on energy and power calculations	
5	I can explain how different mechanisms (cams, gears, linkages) convert one type of motion into another.	• I can describe different types of motion (linear, rotary, reciprocating, oscillating) • I can identify mechanisms (like cams, cranks, rack and pinion) and explain their motion conversion • I can illustrate input/output motion using diagrams • I can match real-world devices to the appropriate motion transformation	
6	I can design systems that manipulate speed, torque, or direction of motion using mechanical components.	• I can calculate gear ratios, torque, and speed changes in mechanisms	

		• I can modify a mechanism to meet design criteria (e.g., increase torque or speed) • I can build and test a prototype that controls or changes motion • I can explain design choices using mechanical reasoning
7	I can use the engineering design process and my knowledge of machines and mechanisms to develop a functional solution to a real-world problem.	• I can identify a real-world problem that can be addressed with mechanical systems • I can use the engineering design process to brainstorm, design, build, and test a solution • I can integrate knowledge of machines and mechanisms into my design • I can evaluate and refine the solution based on performance data

Unit Title:

Unit 2: Application of Robotics

Relevant Standards: Bold indicates priority

Common Core State Standards for English Language Arts
Common Core State Standards for Mathematics
Next Generation Science Standards
Standards for Technological and Engineering Literacy

Essential Question(s):	**Enduring Understanding(s):**
2.1 - 1 What characteristics define a robot? 2.2 - 1 What practices do programmers use to write effective code? 2.2 - 2 How do engineers use sensors to solve design problems? 2.3 - 1 What is artificial intelligence, and how do engineers use it to solve problems? 2.3 - 2 What are some of the ethical implications of artificial intelligence? 2.4 - 1 How can you apply your understanding of mechanics and programming to solve a design problem?	Engineers integrate mechanical systems, programming, and sensors to design intelligent, responsive robots that solve real-world problems. By understanding how robots function, how to write efficient code, and how to apply artificial intelligence ethically and effectively, students are empowered to create solutions that interact with the physical world in meaningful and innovative ways.
Demonstration of Learning:	**Pacing for Unit**
- Written documents, Formative and Summative Assessment, Hands on activities	18 Class Periods
Family Overview (link below)	**Integration of Technology:**
Family Overview - PLTW Principles of Engineering Family Overview - PLTW Principles of Engineering (Spanish)	*N/A*

Unit-specific Vocabulary:			**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Automation Actuator Algorithm Artificial Intelligence (AI) Sensor Servo Motor Mechanical Engineering Programming Language	Feedback Loop End Effector Computer Vision Machine Learning Data Processing Binary Code Prototyping Simulation Microcontroller Control System	Torque Kinematics Feedback Mechanism Ethical Engineering Precision Engineering Human-Computer Interaction Cognitive Computing	N/A

Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
• Students can apply algebra and geometry concepts in programming logic, control systems, and sensor data processing (e.g., using equations to program motion paths or understand angular displacement in robotics).	• Robots are only machines that look human. • AI is a single, all-knowing system. • Robots are always autonomous and do not need human control. • Programming is only about writing code. • All AI systems are the same.

- Understanding of mechanics and physical forces (e.g., Newton's laws, force, and motion) can be applied to how robots interact with their environments, especially in designing robotic arms or autonomous vehicles.
- Exploring the societal and ethical implications of artificial intelligence, especially as it relates to job automation, privacy, and safety.

Connections to Prior Units:	**Connections to Future Units:**
• Unit 2 builds on the product development process from Unit 0 by applying the design, prototyping, and testing concepts to robotics. • Knowledge of user needs and concept sketches in Unit 0 are used to design functional robots in Unit 2. • Unit 2 applies mechanical design principles from Unit 1 (e.g., force, motion, actuators) to build robotic systems. • Students use mechanical design knowledge from Unit 1 to create the physical structures and movements of robots (e.g., joints, frames, gears).	• Robotics systems in Unit 2 require energy management for powering actuators, sensors, and motors, which connects to energy principles explored in Unit 3. • Robotics from Unit 2 can be applied to sustainable infrastructure projects, improving efficiency and reducing waste in sectors like construction and agriculture. • Robotics plays a role in sustainable design by automating tasks and optimizing resource usage, which ties into the sustainability focus of Unit 4.

Differentiation through *Universal Design for Learning*

UDL Indicator	**Teacher Actions:**

Representation
- Provide a variety of learning materials such as videos, interactive simulations, diagrams, and hands-on activities (e.g., robot building, coding exercises) to engage different types of learners. Use accessible language and scaffolding techniques when explaining complex concepts like AI and programming.

Engagement
- Allow students to choose a specific robot design problem or coding project based on their interests, encouraging creativity and autonomy. Provide real-world examples of how robotics and AI solve problems in various industries to emphasize relevance.

Action & Expression
- Encourage students to demonstrate their understanding of concepts through a variety of formats: presentations, videos, written reports, or building prototypes. For example, students could present a design proposal for a robot using diagrams and code, and explain its function to the class.

Supporting Multilingual/English Learners

Related *CELP standards:*	**Learning Targets:**

CELP Standard	LT 1	LT 2	LT 3	LT 4	LT 5	LT 6
1. Construct meaning from oral presentations and literary and informational text	X	X	X	X	X	X
2. Participate in grade-appropriate oral and written exchanges of information, ideas, and analyses	X	X	X	X	X	X
3. Speak and write about grade-appropriate complex literary and informational texts and topics	X	X	X	X	X	X
4. Construct grade-appropriate oral and written claims and support them with reasoning and evidence	X	X	X	X	X	X
5. Conduct research and evaluate and communicate findings to answer questions or solve problems	X	X	X	X	X	X
6. Analyze and critique the arguments of others orally and in writing		X		X	X	
7. Adapt language choices to purpose, task, and	X	X	X	X	X	X

audience when speaking and writing						
8. Determine the meaning of words and phrases in oral presentations and literary and informational text	X	X	X	X	X	X
9. Create clear and coherent grade-appropriate speech and text	X	X	X	X	X	X
10. Make accurate use of standard English to communicate in grade appropriate speech and writing	X	X	X	X	X	X

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
1	I can explain the key characteristics that define a robot, including its ability to perform tasks autonomously or semi-autonomously through sensors, actuators, and programming.	• I can identify at least three characteristics that define a robot (e.g., sensors, actuators, programming). • I can provide an example of a robot and explain how it fits the definition based on these characteristics. • I can distinguish between robots and other automated machines.	
2	I can describe best practices for writing effective code, including problem-solving techniques, debugging, and organizing code for efficiency and clarity.	• I can explain the steps of the programming process (e.g., planning, writing, testing, debugging). • I can identify common practices like using comments, breaking down problems into smaller steps, and modularizing code. • I can demonstrate debugging skills by identifying and fixing an error in a simple program.	
3	I can explain how engineers use different types of sensors (e.g., temperature, pressure, motion) to collect data and solve design challenges.	• I can describe at least two types of sensors and their functions in a robotic system or engineering design. • I can explain how sensor data informs decision-making in engineering projects (e.g., adjusting a robot's movement based on distance or obstacles). • I can demonstrate how to use a sensor in a simple engineering project to collect and apply data to solve a problem.	
4	I can define artificial intelligence and describe how engineers apply AI to solve real-world problems (e.g., automation, predictive modeling, autonomous vehicles).	• I can provide a clear definition of AI and distinguish it from basic programming or automation. • I can explain at least two ways engineers use AI to solve problems (e.g., object recognition in autonomous robots). I can apply AI concepts to a practical scenario, such as designing an AI-driven robot or system.	
5	I can identify and analyze the ethical implications of artificial intelligence, including issues like privacy, job displacement, and bias.	• I can list at least three ethical concerns related to AI (e.g., privacy violations, biased algorithms). • I can discuss real-world examples where AI raised ethical questions. • I can engage in a discussion or debate on the ethical considerations of implementing AI in society, presenting both sides of the argument.	
6	I can integrate principles of mechanics (e.g., force, motion) and programming to develop a solution to a design problem, such as creating a functional prototype.	• I can apply mechanical principles (e.g., using pulleys, gears, levers) to design and build a working mechanism. • I can write and test code to control a system or prototype (e.g., programming a robotic arm to move).	

		• I can troubleshoot and improve the functionality of my design by refining both the mechanical structure and the code.

Unit Title:	
Unit 3: Energy in Action	
Relevant Standards: Bold indicates priority	
Common Core State Standards for English Language Arts Common Core State Standards for Mathematics Next Generation Science Standards **Standards for Technological and Engineering Literacy**	
Essential Question(s):	**Enduring Understanding(s):**
3.1 - 1 How do you differentiate between circuit types? 3.1 - 2 How do you model electrical circuits? 3.1 - 3 How do you test circuit parameters? 3.1 - 4 What are the mathematical relationships between circuit parameters? 3.1 - 5 Why are Kirchhoff's Laws important to engineers and designers of electrical circuits? 3.2 - 1 What impact does fluid power have on our everyday lives? 3.2 - 2 What devices or systems might be improved with the use of fluid power? 3.2 - 3 What are the similarities and differences of mechanical advantage in simple machines? 3.2 - 4 Why are Pascal's Law, the perfect gas laws, Bernoulli's Principle, and other similar rules important to engineers and designers of fluid power systems? 3.3 - 1 How do we graph and analyze motion? 3.3 - 2 What equations govern how objects move? 3.3 - 3 How do we predict where projectiles will land?	• The behavior of electrical circuits can be understood and predicted through mathematical relationships like Ohm's Law and Kirchhoff's Laws. These laws are essential for designing and analyzing electrical systems. • Kirchhoff's Laws are critical for solving complex electrical circuits, ensuring the conservation of current and voltage. They are fundamental for engineers when working with circuits that have multiple components. • Fluid power systems (hydraulic and pneumatic) are essential in industries and everyday devices, offering powerful solutions for tasks requiring force multiplication and control. Understanding fluid dynamics helps engineers design efficient systems. • Simple machines, like levers and pulleys, use mechanical advantage to reduce the amount of force needed to accomplish tasks. Understanding this principle helps engineers design systems that maximize efficiency. • Fluid dynamics principles, such as Pascal's Law and Bernoulli's Principle, are foundational for designing and optimizing hydraulic and pneumatic systems used in a wide range of applications. • The motion of objects is governed by physical laws that can be described and predicted with mathematical equations. Understanding these laws is key to designing systems involving movement, like in mechanical and transportation engineering. • The behavior of projectiles can be predicted using kinematic equations, which account for both horizontal and vertical motion. Engineers use this to design systems that require trajectory planning, such as in robotics or aerospace.
Demonstration of Learning:	**Pacing for Unit**
• Written documents, Formative and Summative Assessment, Hands on activities	17 Class Periods
Family Overview (link below)	**Integration of Technology:**
Family Overview - PLTW Principles of Engineering Family Overview - PLTW Principles of Engineering (Spanish)	*N/A*
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology**

			(beyond core resources):
Voltage Current Resistance Ohm's Law Circuit Series Circuit Parallel Circuit Power (in circuits) Capacitance Pascal's Law	Inductance Kirchhoff's Current Law (KCL) Kirchhoff's Voltage Law (KVL) Fluid Power Hydraulic Systems Pneumatic Systems Bernoulli's Principle	Mechanical Advantage Simple Machines Force Velocity Acceleration Projectile Motion Kinematics Work-Energy Theorem	N/A

Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
• Understanding the mathematical relationships in circuits (Ohm's Law, Kirchhoff's Laws) requires algebra, and graphing motion involves geometric concepts (such as the trajectory of projectiles). • Fluid power systems rely on principles from fluid dynamics, such as Pascal's Law and Bernoulli's Principle, while motion analysis draws on kinematics and forces.	• In a series circuit, the current is different across each component. • Hydraulic and pneumatic systems work the same way because both use pressure. • The mechanical advantage of a machine is always greater than 1. • Projectiles move in a straight line when thrown. • Resistance always increases with temperature in a circuit.
Connections to Prior Units:	**Connections to Future Units:**
• Unit 3 builds on the design process from Unit 0 by applying energy principles to create functional and efficient products. • Knowledge from Unit 0 about prototyping and iterative testing informs how energy-efficient systems are tested and improved in Unit 3. • Energy principles in Unit 3 complement mechanical design concepts from Unit 1, where energy is transferred and converted within mechanical systems. • Understanding mechanical components, such as gears, pulleys, and levers from Unit 1, is essential for analyzing energy flow and efficiency in systems like engines or machines in Unit 3. • Unit 3 connects to Unit 2 as robotics systems often rely on energy sources, including electrical power and mechanical energy, to function. • Understanding how energy is used in robotics, such as motors and sensors, from Unit 2 ties directly into the energy analysis and optimization discussed in Unit 3.	• In Unit 3, energy principles are directly applied to energy-efficient systems, which ties into the sustainability focus of Unit 4. Students will learn how to design sustainable infrastructure that uses energy more effectively and reduces waste. • Energy systems discussed in Unit 3, such as renewable energy sources, will be foundational for creating sustainable infrastructure in Unit 4.

Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**
Representation • Use diagrams, circuit simulations, and interactive models to visually represent circuit behavior. Include verbal explanations of the key concepts while encouraging hands-on experiments to demonstrate circuit testing and fluid power systems. Engagement	

- Provide students with choices in project topics, such as designing a fluid power system or creating a working electrical circuit. Relate activities to real-world applications like hydraulics in construction or electrical circuits in electronics.

Action & Expression

- Allow students to present their findings in various formats, such as diagrams, written reports, or presentations. Encourage group work where students can build a physical prototype and explain its function in front of the class.

Supporting Multilingual/English Learners

Related *CELP standards:*	**Learning Targets:**

CELP Standard	LT 1	LT 2	LT 3	LT 4	LT 5	LT 6	LT 7	LT 8	LT 9	LT 10	LT 11	LT 12
1. Construct meaning from oral presentations and literary and informational text	X	X	X	X	X	X	X	X	X	X	X	X
2. Participate in grade-appropriate oral and written exchanges of information, ideas, and analyses	X	X	X	X	X	X	X	X	X	X	X	X
3. Speak and write about grade-appropriate complex literary and informational texts and topics	X	X	X	X	X	X	X	X	X	X	X	X
4. Construct grade-appropriate oral and written claims and support them with reasoning and evidence	X	X	X	X	X	X	X	X	X	X	X	X
5. Conduct research and evaluate and communicate findings to answer questions or solve problems	X	X	X	X	X	X	X	X	X	X	X	X
6. Analyze and critique the arguments of others orally and in writing	X		X	X	X		X	X	X	X	X	X
7. Adapt language choices to purpose, task, and audience when speaking and writing	X	X	X	X	X	X	X	X	X	X	X	X
8. Determine the meaning of words and phrases in oral presentations and literary and informational text	X	X	X	X	X	X	X	X	X	X	X	X
9. Create clear and coherent grade-appropriate speech and text	X	X	X	X	X	X	X	X	X	X	X	X
10. Make accurate use of standard English to communicate in grade appropriate speech and writing	X	X	X	X	X	X	X	X	X	X	X	X

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
1	I can identify and explain the differences between series and parallel circuits based on their electrical properties and behavior.	• I can distinguish between series and parallel circuits. I can explain how current and voltage behave differently in each type of circuit.	
2	I can create accurate diagrams of electrical circuits using standard symbols and explain the components and their connections.	• I can draw a circuit diagram that follows proper electrical symbols. I can explain the function of each component in a circuit diagram.	
3	I can measure voltage, current, and resistance in a circuit and analyze the results.	• I can use a multimeter to measure voltage, current, and resistance. I can interpret the measurements to identify problems or optimize circuit performance.	
4	I can apply Ohm's Law and other mathematical equations to calculate and	• I can calculate voltage, current, and resistance in a circuit using Ohm's Law.	

	analyze circuit parameters.	• I can apply Kirchhoff's Laws to solve for unknown circuit parameters.
5	I can explain the importance of Kirchhoff's Current and Voltage Laws in analyzing complex circuits.	• I can apply Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL) to solve circuit problems. • I can explain how these laws ensure that circuits are designed correctly and safely.
6	I can identify how fluid power systems are used in everyday devices and industries.	• I can list at least three devices or systems that use fluid power. • I can explain the benefits of fluid power in industrial application
7	I can describe how fluid power can improve the performance and efficiency of mechanical systems.	• I can identify a system or device that can be improved by fluid power. • I can explain how the use of fluid power improves system performance.
8	I can compare and contrast the mechanical advantage in simple machines (e.g., levers, pulleys).	• I can define mechanical advantage and explain how it works in different simple machines. • I can calculate the mechanical advantage in various simple machine systems.
9	I can explain the role of fundamental fluid dynamics principles (Pascal's Law, Bernoulli's Principle) in fluid power systems.	• I can explain Pascal's Law and Bernoulli's Principle in the context of fluid power systems. • I can describe how these principles are used to design efficient fluid power systems.
10	I can graph and interpret the motion of objects, including displacement, velocity, and acceleration.	• I can create motion graphs (e.g., position vs. time, velocity vs. time). • I can analyze the graphs to describe the object's motion.
11	I can apply kinematic equations to solve problems involving the motion of objects.	• I can use the kinematic equations to calculate displacement, velocity, and acceleration. • I can explain how these equations relate to the real-world motion of objects.
12	I can apply projectile motion equations to predict the landing location of a projectile.	• I can use the horizontal and vertical motion equations to solve projectile motion problems. • I can predict the range of a projectile given its initial velocity and angle of launch.

Unit Title:	
Unit 4: Designing Infrastructure and Developing Sustainability	
Relevant Standards: Bold indicates priority	
Common Core State Standards for English Language Arts Common Core State Standards for Mathematics Next Generation Science Standards **Standards for Technological and Engineering Literacy**	
Essential Question(s):	**Enduring Understanding(s):**
4.1 - 1 What factors impact beam deflection? 4.1 - 2 Why is the value of beam deflection useful? 4.1 - 3 What are the properties of structural members and why are they useful? 4.1 - 4 What is a centroid and how is it applied in structural members? 4.1 - 5 Why is it crucial for designers and engineers to construct accurate free body diagrams of the parts and structures that they design? 4.1 - 6 Why must designers and engineers calculate forces acting on bodies and structures? 4.1 - 7 What are the differences between stress and strain? 4.1 - 8 Why are stress and strain important factors to consider when designing? 4.1 - 9 How does the stress-strain curve help engineers during tensile testing? 4.1 - 7 What is a moment and how does it help solve problems in static structures? 4.1 - 8 When solving truss forces, why is it important to know that the structure is statically determinate? 4.1 - 9 How is the method of joints used to determine internal forces in trusses? 4.1 - 10 How do material properties affect structural stability, internal forces, and cost? 4.2 - 1 What are renewable and nonrenewable resources and how do humans use them? 4.2 - 2 In what innovative ways could the efficiency of electricity production using solar cells be maximized throughout the day? 4.3 - 1 What factors affect the rate of flow on a roadway? 4.3 - 2 How is the optimum speed limit determined for a roadway? 4.3 - 3 In your opinion, what type of intersection is prone to the most accidents? What can be done to maximize safety at this type of intersection? 4.4 - 1 What role does creativity have in the engineering design process? 4.4 - 2 What do engineers do to clearly document and communicate their work? Why is this important? 4.4 - 3 How are different elements of infrastructure related?	• Beam deflection is influenced by material properties, geometry, and load distribution, and understanding these factors is essential for designing stable and functional structures. • Beam deflection is a critical parameter that ensures structures perform without excessive bending or failure, aiding in the optimization of design for strength and safety. • The properties of structural members, such as strength, elasticity, and stiffness, determine their performance under load and are essential for safe and efficient design. • The centroid is essential for structural analysis, helping determine the distribution of forces and moments, enabling more efficient and balanced design. • Free body diagrams are vital tools for understanding and calculating the forces and moments acting on structures, ensuring accurate and reliable design analysis. • Calculating forces is fundamental to structural design, allowing engineers to ensure stability and prevent failure under expected load conditions. • Stress and strain describe how materials respond to forces, and understanding their relationship is key to selecting appropriate materials and ensuring structural integrity. • The stress-strain curve aids in understanding material behavior under tension, helping engineers choose materials that are best suited for specific structural requirements. • Creativity is integral to the engineering design process, enabling innovative solutions to complex problems and contributing to the development of efficient, sustainable designs. • Different infrastructure systems are interrelated, requiring an integrated approach to design to ensure that transportation, energy, and other systems function together effectively.
Demonstration of Learning:	**Pacing for Unit**

• Written documents, Formative and Summative Assessment, Hands on activities • Students work collaboratively in teams to develop solutions to structural design problems, sustainable approaches, and transportation design needs that have a lasting impact on local and global communities. • Students conclude their career exploration by examining the future of different careers and how they will be affected by the adoption of artificial intelligence.	20 Class Periods
Family Overview (link below)	**Integration of Technology:**
Family Overview - PLTW Principles of Engineering Family Overview - PLTW Principles of Engineering (Spanish)	*N/A*
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Reaction Force, Stress, Strain, Tensile Testing, Stress-Strain Curve, Elasticity, Modulus of Elasticity, Free Body Diagram (FBD), Force, Moment, Truss, Statically Determinate, Method of Joints, Internal Forces, Material Properties, Structural Member, Centroid, Shear Force, Bending Moment, Axial Force, Plastic Deformation, Ultimate Strength, Elastic Deformation, Beam Deflection, Load Distribution	N/A
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
• The principles of force, moment, and stress/strain tie directly into basic mechanics. Students will apply these concepts when analyzing and solving problems in both static and dynamic systems. • Calculating beam deflection, moments, and force distributions involves algebra and calculus to solve equations that model physical systems. • Concepts from structural analysis in Unit 4 can be connected to renewable energy systems, particularly in the design and analysis of structures like wind turbines and solar panels.	• Beam deflection is always proportional to the load applied. • Stress and strain are the same thing. If a structure doesn't fail immediately under a load, it's safe. Free body diagrams are only for static systems. Material properties are the same for all applications.
Connections to Prior Units:	**Connections to Future Units:**
• Unit 4 builds on the product design process from Unit 0, applying it to the design of sustainable infrastructure and energy-efficient systems, emphasizing real-world application and iterative testing. • The principles of mechanical design from Unit 1 are used to ensure the structural integrity and functionality of infrastructure systems in Unit 4, including material selection and load distribution. • Robotics concepts from Unit 2 connect to infrastructure design in Unit 4, where automation	N/A

and robotic systems could be integrated into the construction and maintenance of infrastructure for increased efficiency.
- Unit 4 extends the energy principles explored in Unit 3, focusing on renewable energy sources and sustainable design practices, such as wind, solar, and energy-efficient building methods.

Differentiation through *Universal Design for Learning*

UDL Indicator	**Teacher Actions:**

Representation
- Use diagrams and interactive models to demonstrate how forces act on beams and structures. Encourage students to use physical models or simulations to test different loads and observe beam deflection.

Engagement
- Provide students with project options that connect to real-world applications, such as designing a bridge or analyzing the forces on a building. This helps engage students by showing the relevance of structural analysis to everyday life.

Action & Expression
- Allow students to express their understanding through various formats, such as written reports, presentations, or physical prototypes. This supports different learning styles and helps students engage with the material in diverse ways.

Supporting Multilingual/English Learners

Related *CELP standards:*	**Learning Targets:**

CELP Standard	LT 1	LT 2	LT 3	LT 4	LT 5	LT 6	LT 7	LT 8	LT 9	LT 10	LT 11	LT 12
1. Construct meaning from oral presentations and literary and informational text	X	X	X	X	X	X	X	X	X	X	X	X
2. Participate in grade-appropriate oral and written exchanges of information, ideas, and analyses	X	X	X	X	X	X	X	X	X	X	X	X
3. Speak and write about grade-appropriate complex literary and informational texts and topics	X	X	X	X	X	X	X	X	X	X	X	X
4. Construct grade-appropriate oral and written claims and support them with reasoning and evidence	X	X	X	X	X	X	X	X	X	X	X	X
5. Conduct research and evaluate and communicate findings to answer questions or solve problems	X	X	X	X	X	X	X	X	X	X	X	X
6. Analyze and critique the arguments of others orally and in writing	X	X	X	X	X	X	X	X	X	X	X	X
7. Adapt language choices to purpose, task, and audience when speaking and writing	X	X	X	X	X	X	X	X	X	X	X	X
8. Determine the meaning of words and phrases in oral presentations and literary and informational text	X	X	X	X	X	X	X	X	X	X	X	X
9. Create clear and coherent grade-appropriate speech and text	X	X	X	X	X	X	X	X	X	X	X	X
10. Make accurate use of standard English to communicate in grade appropriate speech and writing	X	X	X	X	X	X	X	X	X	X	X	X

Lesson Sequence	**Learning Target**	**Success Criteria/ Assessment**	**Resources**

1	I can identify and explain the factors that influence beam deflection, including material properties, load distribution, and beam geometry.	• I can list factors affecting beam deflection and explain their impact using examples.
2	I can explain why beam deflection is a critical parameter in structural design.	• I can discuss how deflection affects the performance and safety of structures.
3	I can identify and explain the material properties (strength, stiffness, elasticity) that influence the performance of structural members.	• I can describe how material properties affect design decisions in structural engineering.
4	I can explain what a centroid is and how it is used in calculating moments and load distributions.	• I can calculate the centroid of simple shapes and apply it to structural analysis.
5	I can describe the purpose and process of creating free body diagrams for structural analysis.	• I can create a free body diagram for a simple structure and use it to solve for unknown forces.
6	I can explain the importance of calculating forces in the design and safety of structures.	• I can calculate the forces acting on a structure using known loads and support conditions.
7	I can explain the difference between stress and strain and describe how they are related.	• I can apply the concepts of stress and strain to real-world materials and structural problems.
8	I can explain why considering stress and strain is crucial for material selection and ensuring structural integrity.	• I can use the concepts of stress and strain to evaluate whether a material is suitable for a specific application.
9	I can interpret the stress-strain curve and explain how it helps engineers assess material performance during tensile testing.	• I can identify key points on a stress-strain curve (yield strength, ultimate strength) and explain their significance.
10	I can define a moment and explain its role in solving problems involving static structures.	• I can calculate moments acting on a structure and use them to determine the stability of the system.
11	I can explain the concept of statically determinate structures and why it is important for solving truss forces.	• I can identify whether a truss is statically determinate and explain how this impacts the solution process.
12	I can analyze how different material properties (e.g., strength, elasticity) affect structural stability and cost.	• I can select appropriate materials for a structure based on their properties and the requirements of the design.

Course Title:	Content Area:	Grade Level:	Credit (if applicable)
PLTW Introduction to Engineering and Design (Project Lead the Way)	Engineering and Technology	9-12	1 Credit 2 College credits through University of New Haven upon meeting UNH criteria

Course Description:

Introduction to Engineering Design (IED) is a high school engineering course in the PLTW Engineering Program. In IED, students explore engineering tools and apply a common approach to the solution of engineering problems, an engineering design process. Utilizing the activity-project-problem-based (APB) teaching and learning pedagogy, students progress from completing structured activities to solving open-ended projects and problems that require them to plan, document, communicate, and develop other professional skills.

Through both individual and collaborative team activities, projects, and problems, students apply systems thinking and consider various aspects of engineering design including material selection, human-centered design, manufacturability, assemblability and sustainability. Students develop skills in technical representation and documentation especially through 3D computer modeling using a Computer Aided Design (CAD) application. As part of the design process, students produce precise 3D-printed engineering prototypes using an additive manufacturing process. Student-developed testing protocols drive decision-making and iterative design improvements.

To inform design and problem solutions addressed in IED, students apply computational methods to inform design by developing algorithms, performing statistical analyses, and developing mathematical models. Students build competency in professional engineering practices including project management, peer review, and environmental impact analysis as part of a collaborative design team. Ethical issues related to professional practice and product development are also presented.

Aligned Core Resources:	Connection to the ***BPS Vision of the Graduate***
• PLTW Online *(some elements require PLTW login credentials)* • Course Outline - PLTW Intro to Engineering Design.pdf • Common Core State Standards for English Language Arts • Common Core State Standards for Mathematics • Next Generation Science Standards • Standards for Technological and Engineering Literacy	**Meaningfully contribute to a global society:** Collaboration **Effectively communicate in a global society:** Communications and Technology Literacy **Demonstrate Academic Knowledge and Skills:** Critical Thinking and Problem Solving
Additional Course Information: ***Knowledge/Skill Dependent courses/prerequisites***	**Link to *Completed Equity Audit***
Concurrent enrollment in grade-appropriate mathematics class.	Equity Curriculum Review - PLTW Intro to Engineering Design (2024-25)

Standard Matrix

See Standards Alignment - PLTW Intro to Engineering Design for alignment to:

- Common Core State Standards for English Language Standards *(Page 2)*
  - Anchor Standards: Research to Build and Present Knowledge
  - Writing: Text Types and Purposes
  - Reading Informational Text: Key Ideas and Details
- Common Core State Standards for Mathematics *(Page 12)*
  - Geometry: Visualization and Spatial Reasoning
  - Statistics and Probability: Interpreting Categorical and Quantitative Data
  - Statistics and Probability: Making Inferences and Justifying Conclusions
  - Number and Quantity: Quantities
- Next Generation Science Standards *(Page 19)*
  - Engineering Design: Developing Possible Solutions
  - Engineering Design: Evaluating Solutions
  - Engineering Design: Analyzing and Interpreting Data
  - Engineering Design: Optimizing the Design Solution
  - Engineering Design: Developing and Using Models
- Standards for Technological and Engineering Literacy *(Page 29)*
  - Creativity and Innovation
  - Communication and Collaboration
  - Understanding and Applying Engineering Concepts
  - Global Awareness in Engineering

- Technology and Engineering in Design
- Collaboration and Teamwork

Unit Links

Unit 1: Design and Problem Solving
Unit 2: Assembly Design
Unit 3: Thoughtful Product Design
Unit 4: Making Things Move

Unit Title:

Unit 1: Design and Problem Solving

Unit Description:

Unit 1 provides an overview of the engineering design process and helps students develop an understanding of the purpose and practice of modeling in engineering communication. Students are introduced to modeling methods and practice modeling skills important to the design of mechanical systems including technical sketching, 3D solid modeling and technical drawing using Computer-Aided Design (CAD), statistical analysis, and prototyping. Emphasis is placed on building CAD skills applied throughout the course. In addition, students learn statistical techniques to evaluate design solutions and apply statistics to inform the design of a game.

Relevant Standards: Bold indicates priority

Common Core State Standards for English Language Arts
Common Core State Standards for Mathematics
Next Generation Science Standards
Standards for Technological and Engineering Literacy

Essential Question(s):	**Enduring Understanding(s):**
1. What are effective ways to generate potential solutions to a problem? 2. When solving an engineering problem, how can you reasonably ensure you have created the best solution possible? 3. How is technical drawing similar to and different from artistic drawing? 4. In what ways can technical drawings help or hinder communication in a global community? 5. Why are spatial visualization skills crucial to engineering success? 6. What advantages does Computer-Aided Design (CAD) provide over traditional paper and pencil design? 7. What would happen if engineers did not follow accepted dimensioning standards and guidelines, but instead, used their own individual dimensioning methods? 8. Why do engineers use models? How reliable is a model? 9. Is it ever advantageous to create a design or solve a problem individually as opposed to using a team approach?	1. Generating potential solutions involves a variety of brainstorming techniques and collaborative methods that encourage creativity and diverse perspectives, allowing for a more comprehensive problem-solving process. 2. Ensuring the best solution involves systematic evaluation through criteria such as feasibility, efficiency, cost-effectiveness, and sustainability, as well as iterative testing and feedback cycles. 3. Recognize that while both technical and artistic drawings serve to communicate ideas, technical drawings prioritize precision, scale, and clarity to convey specific information, whereas artistic drawings focus on expression and visual interpretation. 4. Technical drawings can enhance communication across cultures and languages by providing standardized symbols and dimensions, but may also hinder understanding if the audience lacks familiarity with technical standards. 5. Spatial visualization skills are crucial for engineers as they allow for better understanding of complex designs and the ability to foresee potential issues in three-dimensional spaces. 6. Computer-Aided Design (CAD) offers significant advantages over traditional methods, including enhanced accuracy, ease of modifications, streamlined collaboration, and the ability to simulate and visualize designs in a virtual environment. 7. Not following accepted dimensioning standards could lead to misinterpretation of designs, resulting in errors in construction or manufacturing, and potentially jeopardizing safety and project success. 8. Engineers use models to simplify and test designs, but the reliability of a model can vary based on its fidelity to the real-world system it represents and the assumptions made during its creation. 9. Recognize that while individual work can foster innovation and personal accountability, teamwork often leads to richer insights and more robust

	solutions.
Demonstration of Learning:	**Pacing for Unit**
Students demonstrate learning by applying the engineering design process to solve a real-world problem, showcasing their ability to identify design constraints, brainstorm solutions, create detailed sketches and technical drawings, build a prototype, test and iterate on their design, and effectively communicate their process and findings through written documentation and presentations; all while adhering to engineering ethics and professional practices.	40 Full Class Periods
Family Overview (link below)	**Integration of Technology:**
Family Overview - PLTW Intro to Engineering Design Family Overview - PLTW Intro to Engineering Design (Spanish)	MasterCam CAD Software
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Design process Design brief Constraints Criteria Problem identification Brainstorm Iterate Research Client Design statement Engineer Innovation Assess Justification Valid Product CAD (Computer Aided Design) Prototype	N/A
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
• Statistical Analysis: Students use mathematical concepts such as mean, standard deviation, and probability to evaluate design solutions and optimize game performance. • Geometric Principles: Applying concepts like transformations, symmetry, and coordinate geometry in CAD modeling and technical drawing. • Mechanics & Forces: Understanding how forces affect mechanical systems and influence design choices. • Material Properties: Exploring the characteristics of materials used in prototyping and manufacturing, such as strength, durability, and flexibility. • Programming for CAD Automation: Using scripting and parametric design to create automated CAD models. • Data Analysis & Visualization: Using spreadsheets or software to analyze statistical data related to design optimization. • Visual Communication: Developing technical sketching and drawing techniques to clearly communicate design intent. • Aesthetics & User Experience: Considering color theory, ergonomics, and human-centered design principles in game development. • Product Development Process: Exploring how engineering designs transition from concept to production.	• Engineering follows a linear process rather than an iterative cycle of prototyping, testing, and refinement. • Simply using CAD guarantees a well-designed model, without understanding the importance of precise measurements, constraints, and iterative improvements. • Not appreciating freehand sketching to help with brainstorming, conceptualization, and quick problem-solving before using CAD software. • Struggle to see how statistical analysis informs design decisions, such as evaluating performance, optimizing features, and refining prototypes. • View failure as a negative outcome rather than a learning opportunity that leads to design improvements.

• Cost-Benefit Analysis: Evaluating manufacturing costs, material selection, and market demand when designing products.	
Connections to Prior Units:	**Connections to Future Units:**
N/A	**Unit 2: Assembly Design** • The technical sketching, 3D solid modeling, and CAD skills developed in Unit 1 provide the foundation for creating and assembling multiple components in Unit 2. Students apply the engineering design process to understand how individual parts fit together into functional assemblies. **Unit 3: Thoughtful Product Design** • The problem-solving and iterative design skills from Unit 1 help students analyze user needs and constraints when designing products in Unit 3. Statistical techniques from Unit 1 will be used to evaluate product performance and optimize design solutions. **Unit 4: Making Things Move** • The modeling and prototyping techniques introduced in Unit 1 are essential for designing mechanical systems with moving parts in Unit 4. The foundational understanding of problem-solving and constraints from Unit 1 will help students develop functional and efficient mechanical designs.
Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**
1. Representation • Visual Supports: Use diagrams, videos, and animations to illustrate engineering concepts and modeling techniques. This can help students better visualize complex ideas. • Text-to-Speech Tools: Incorporate software that reads technical documents and CAD instructions aloud, aiding comprehension for students with reading difficulties. • Graphical Organizers: Provide templates for students to organize information about the engineering design process, modeling techniques, and statistical methods visually. • Interactive Simulations: Utilize CAD software with simulation capabilities that allow students to manipulate models and visualize the effects of design changes in real-time. 2. Engagement • Choice Boards: Create a menu of project options related to the engineering design process, allowing students to select projects that interest them and align with their strengths. • Collaborative Learning: Facilitate group projects where students can share ideas and work together on modeling and prototyping tasks. Encourage them to assign roles based on individual strengths. • Real-World Applications: Connect lessons to real-world engineering problems or current events, motivating students to see the relevance of what they are learning. • Gamification: Incorporate game elements into learning activities, such as competitions for the best design or innovative solution, to increase motivation and engagement. 3. Action and Expression • Varied Project Formats: Allow students to choose how they demonstrate their learning, such as through presentations, videos, digital portfolios, or traditional reports. • Peer Review: Implement structured peer feedback sessions where students can share their CAD models and prototypes with classmates to receive constructive criticism and suggestions for improvement. • Reflection Journals: Encourage students to maintain a journal documenting their design process, challenges faced, and solutions found, promoting metacognitive skills and self-assessment. • Use of Technology: Provide access to various technical tools and software that allow students to express their designs and ideas creatively, whether through CAD, 3D printing, or digital modeling.	

Supporting Multilingual/English Learners	
Related CELP standards:	**Learning Targets:**

1. I can apply brainstorming and structured problem-solving techniques to generate multiple possible solutions to an engineering problem.
    - Level 1: I can identify basic problem-solving techniques, such as brainstorming.
    - Level 2: I can use brainstorming to identify at least two possible solutions to an engineering problem.
    - Level 3: I can apply structured problem-solving methods to generate a variety of solutions for an engineering problem.
    - Level 4: I can evaluate and compare multiple solutions generated through brainstorming and problem-solving techniques.
    - Level 5: I can facilitate group brainstorming and structured problem-solving sessions, leading to innovative solutions for complex engineering problems.
2. I can use an iterative process to refine and improve design solutions based on data and testing.
    - Level 1: I can define what an iterative process is in engineering.
    - Level 2: I can explain the basic steps of an iterative design process.
    - Level 3: I can use an iterative process to make improvements to a design after testing and gathering data.
    - Level 4: I can integrate feedback from multiple iterations to refine a design.
    - Level 5: I can lead a team through a full iterative design process, using testing and data to continuously improve solutions.
3. I can explain the purpose and characteristics of technical drawings and how they differ from artistic drawings.
    - Level 1: I can identify the difference between technical and artistic drawings.
    - Level 2: I can describe the key characteristics of technical drawings, such as accuracy and precision.
    - Level 3: I can explain how technical drawings communicate detailed engineering information.
    - Level 4: I can discuss the role of technical drawings in ensuring safety and functionality in engineering.
    - Level 5: I can evaluate the effectiveness of technical drawings in communicating design intent.
4. I can analyze how standardized technical drawings enable clear communication across different cultures and industries.
    - Level 1: I can explain the concept of standardized technical drawings.
    - Level 2: I can describe how standardization ensures clear communication in technical drawings.
    - Level 3: I can analyze how standardized technical drawings help prevent misunderstandings across cultures and industries.
    - Level 4: I can explain how standardized technical drawings enable global collaboration in engineering projects.
    - Level 5: I can lead discussions on how standardized technical drawings facilitate seamless communication in complex, global engineering projects.
5. I can use spatial visualization techniques to interpret and create engineering drawings.
    - Level 1: I can define spatial visualization in the context of engineering.
    - Level 2: I can interpret simple 2D engineering drawings using spatial visualization techniques.
    - Level 3: I can use spatial visualization to interpret and create 3D models from engineering drawings.
    - Level 4: I can utilize advanced spatial visualization techniques to create detailed and accurate engineering drawings.
    - Level 5: I can integrate spatial visualization into collaborative design processes to ensure clear communication of ideas.
6. I can describe how CAD enhances accuracy, efficiency, and collaboration in engineering design.
    - Level 1: I can explain what CAD is and why it is used in engineering.
    - Level 2: I can describe how CAD improves the accuracy of engineering designs.
    - Level 3: I can explain how CAD enables collaboration between engineers by allowing for shared files and real-time editing.
    - Level 4: I can analyze the advantages and challenges of using CAD in engineering design.
    - Level 5: I can lead the implementation of CAD tools and practices in a collaborative engineering project.
7. I can explain the benefits of hand sketching in the engineering design process.
    - Level 1: I can describe what hand sketching is in engineering.
    - Level 2: I can explain how hand sketching can help visualize ideas quickly and communicate initial concepts.
    - Level 3: I can explain how hand sketching aids in brainstorming and iterative design.
    - Level 4: I can evaluate the role of hand sketching in the overall design process and compare it to digital methods.
    - Level 5: I can mentor others in effectively using hand sketching as part of an engineering design process.
8. I can explain the importance of standardized dimensioning in engineering.
    - Level 1: I can define what standardized dimensioning is in engineering.
    - Level 2: I can explain how standardized dimensioning ensures clarity and consistency in engineering drawings.
    - Level 3: I can describe how standardized dimensioning improves the manufacturing and construction process.
    - Level 4: I can analyze the consequences of not using standardized dimensioning in technical drawings.
    - Level 5: I can lead a team in creating engineering drawings with standardized dimensioning for complex projects.
9. I can identify and evaluate the limitations of physical and digital models in engineering.
    - Level 1: I can describe what physical and digital models are in engineering.
    - Level 2: I can explain how physical and digital models are used to represent engineering designs.
    - Level 3: I can evaluate the strengths and weaknesses of physical and digital models in different engineering contexts.
    - Level 4: I can compare and contrast the limitations of physical and digital models based on cost, accuracy, and time constraints.
    - Level 5: I can design an engineering process that integrates both physical and digital models to optimize design and prototyping.

10. I can evaluate how statistics can be used or misused in engineering analysis.
    - Level 1: I can define statistics and explain how they are used in engineering.
    - Level 2: I can describe how statistics help engineers make decisions based on data.
    - Level 3: I can evaluate the validity of statistical data used in engineering analysis.
    - Level 4: I can assess how statistical tools can be used to improve the accuracy of engineering designs.
    - Level 5: I can lead discussions on ethical considerations when using statistics in engineering.
11. I can analyze sources of measurement error and their impact on engineering design.
    - Level 1: I can identify common sources of measurement error in engineering.
    - Level 2: I can describe how measurement errors can affect engineering designs.
    - Level 3: I can analyze the impact of measurement errors on the performance and safety of an engineering product.
    - Level 4: I can evaluate the significance of different types of measurement errors in engineering analysis.
    - Level 5: I can lead a team in addressing measurement errors and their impact on complex engineering projects.
12. I can evaluate the role of models in engineering and assess their reliability.
    - Level 1: I can define what a model is in the context of engineering.
    - Level 2: I can explain the purpose of using models in engineering design.
    - Level 3: I can evaluate the reliability of a model based on its design, assumptions, and data.
    - Level 4: I can compare the reliability of different models based on engineering requirements and goals.
    - Level 5: I can lead the development and evaluation of engineering models, ensuring their reliability and effectiveness in addressing real-world problems.
13. I can compare the benefits and drawbacks of individual versus team-based problem-solving in engineering.
    - Level 1: I can explain what individual and team-based problem-solving are.
    - Level 2: I can describe when individual problem-solving is more effective and when teamwork is preferred.
    - Level 3: I can compare the effectiveness of individual versus team-based problem-solving in different engineering contexts.
    - Level 4: I can evaluate the benefits and drawbacks of individual and team-based problem-solving in complex engineering projects.
    - Level 5: I can lead a team in solving complex engineering problems, integrating individual and team-based approaches for optimal results.

Lesson Sequence	Learning Target	Success Criteria/ Assessment
Lesson 1.1 Design Basics In Lesson 1.1 students review and apply an engineering design process to collaboratively design a carnival game. As part of the design process, students practice the art of brainstorming and begin to develop skills in graphically representing ideas through concept sketching. Students also develop and test a solution and improve the design through iteration. In addition, students learn statistical techniques to evaluate design solutions and apply statistics to inform design decisions related to their game design.		
1	I can apply brainstorming and structured problem-solving techniques to generate multiple possible solutions to an engineering problem.	• I can use brainstorming techniques such as mind mapping and SCAMPER to generate diverse ideas. • I can document and organize potential solutions using sketches and notes. • I can evaluate initial ideas using constraints and criteria to determine feasibility.
2	I can use an iterative process to refine and improve design solutions based on data and testing.	• I can compare multiple design iterations using criteria such as cost, performance, and sustainability. • I can analyze test results and adjust my design accordingly. • I can justify my final design choice using evidence from testing and analysis.
Lesson 1.2 Visualization and Solid Modeling Lesson 1.2 focuses on building student spatial visualization skills. The role of modeling as a means to represent and communicate ideas, designs, and problem solutions is emphasized. Students are introduced to technical sketching and practice sketching isometric views and orthographic projections to represent three-dimensional objects. As part of the design process, students develop basic 3D solid models of simple designs and produce technical drawings using CAD. The lesson culminates in a design project in which students design and prototype a product using additive manufacturing (3D printing).		
3	I can explain the purpose and characteristics of technical drawings and how they differ from artistic drawings.	• I can compare and contrast technical and artistic drawings based on precision, purpose, and audience. • I can describe how technical drawings use standardized symbols and annotations to communicate information.

4	I can explain the purpose and characteristics of technical drawings and how they differ from artistic drawings.	• I can compare and contrast technical and artistic drawings based on precision, purpose, and audience. • I can describe how technical drawings use standardized symbols and annotations to communicate information.
Lesson 1.3 CAD Fundamentals Lesson 1.3 focuses on building CAD skills to develop 3D models and technical drawings. Students learn the importance of precision measurement and use dial calipers to make precise measurements, as they come to understand the concepts of precision and accuracy and their implication on engineering design and manufacturing. Students apply statistics to quantify the precision and accuracy of measurements and of measuring tools. Multiple CAD topics are introduced, and students apply the engineering design process and their new CAD skills to design and 3D print a protective case for a product.		
5	I can analyze how standardized technical drawings enable clear communication across different cultures and industries.	• I can explain how international drafting standards improve global collaboration. • I can identify challenges that arise when technical drawings lack clarity or do not follow standards.
6	I can use spatial visualization techniques to interpret and create engineering drawings.	• I can mentally rotate and visualize 3D objects from 2D drawings. • I can sketch different views (orthographic, isometric) of an object accurately.
7	I can describe how CAD enhances accuracy, efficiency, and collaboration in engineering design.	• I can identify key advantages of CAD, such as precision, editing capabilities, and 3D visualization. • I can create basic 3D models in CAD and compare them to hand-drawn sketches.
8	I can explain the benefits of hand sketching in the engineering design process.	• I can describe how hand sketching is useful for quick idea generation and early-stage design thinking. • I can create clear technical sketches before transitioning to CAD.
9	I can explain the importance of standardized dimensioning in engineering.	• I can apply standard dimensioning rules to technical drawings. • I can analyze incorrect dimensioning and explain the potential consequences in manufacturing.
10	I can identify and evaluate the limitations of physical and digital models in engineering.	• I can explain how models may not fully represent real-world conditions (e.g., material properties, scale limitations). • I can justify when to use a model versus real-world testing.
11	I can evaluate how statistics can be used or misused in engineering analysis.	• I can analyze how data can be manipulated to support different conclusions. • I can use statistical methods to fairly interpret and validate design performance.
Lesson 1.4 Product Improvement Students work within teams to apply the design process and the skills and knowledge gained in this unit to evaluate and improve the design of a consumer product to meet stakeholder needs. Students will learn effective presentation techniques and present their solutions to an audience.		
12	I can analyze sources of measurement error and their impact on engineering design.	• I can explain the difference between systematic and random errors. • I can use appropriate precision and significant figures in engineering measurements.
13	I can evaluate the role of models in engineering and assess their reliability.	• I can explain why engineers use models to test ideas before full-scale production. • I can identify factors that influence the accuracy of a model.
14	I can compare the benefits and drawbacks of individual versus team-based problem-solving in engineering.	• I can explain when individual work might be more efficient in engineering. • I can describe how team collaboration improves complex problem-solving.

Unit Title:

Unit 2: Assembly Design

Unit Description:

Unit 2 emphasizes the design of systems of components. Students are introduced to the concept of reverse engineering and how to investigate and document the design of multi-component systems. Students learn various techniques used to connect components in a system, how systems are designed to allow desired interaction between components, and how to identify and select the materials from which products are made. They are also introduced to methods to improve the manufacturability of a product and reduce production costs. Students learn to apply two methods to create 3D assembly models in CAD and apply those techniques to design and document assemblies.

Relevant Standards: Bold indicates priority

Common Core State Standards for English Language Arts
Common Core State Standards for Mathematics
Next Generation Science Standards
Standards for Technological and Engineering Literacy

Essential Question(s):	**Enduring Understanding(s):**
1. Is it necessary to indicate a tolerance for every dimension on a technical drawing? 2. What are the benefits of working drawings when communicating the design of a consumer product? 3. Beyond creating working drawings to document a design, how can CAD be used in and beyond the design process? 4. Why is reverse engineering done? 5. How is information gathered through product disassembly? 6. When is it acceptable for a company to reverse engineer and reproduce a successful consumer product designed by another person/company? 7. Why are many consumer product designs not commercially successful? 8. How do you determine the properties of a material? 9. How does the material chosen for a product impact the design of the product? 10. How does an engineer predict the safety and reliability of a selected material? 11. What strategy would you use to form a design team in order to obtain the best solution possible? 12. Why is a design process so important to follow when creating a solution to a problem?	1. Students will understand when tolerances are necessary in technical drawings and how they impact fit and function. 2. Students will recognize the benefits of working drawings in effectively communicating design intent and manufacturing details. 3. Students will explore how CAD extends beyond technical drawings to include simulations, prototyping, and other engineering applications. 4. Students will analyze the purpose of reverse engineering in improving products, solving problems, and driving innovation. 5. Students will investigate how product disassembly provides insights into materials, manufacturing processes, and design decisions. 6. Students will evaluate when it is ethically and legally acceptable for companies to reverse engineer and reproduce a product. 7. Students will examine the reasons why many consumer product designs fail in the market. 8. Students will learn how to determine the properties of materials through testing and analysis. 9. Students will assess how material selection influences the design, functionality, and manufacturability of a product. 10. Students will explore how engineers predict material safety and reliability using data, simulations, and real-world testing. 11. Students will develop strategies for forming effective design teams to create innovative solutions. 12. Students will understand the importance of following a structured design process to develop successful solutions to engineering challenges.
Demonstration of Learning:	**Pacing for Unit**

Students demonstrate learning by designing and creating a 3D CAD model of a functional assembly, utilizing proper engineering practices to join parts together, specifying tolerances, and documenting their design through assembly drawings; effectively showcasing their understanding of mechanical fasteners, fits, and the assembly process while applying these concepts to reverse engineer and improve a consumer product.	40 Full Class Periods
Family Overview (link below)	**Integration of Technology:**
Family Overview - PLTW Intro to Engineering Design Family Overview - PLTW Intro to Engineering Design (Spanish)	MasterCam CAD Software
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Orthographic projection Multiview drawing Front view Top view Right side view Dimensioning Leader line Dimension line Tolerance Scale Hidden line Center line Edge Ellipse Isometric sketch Oblique sketch Auxiliary view Section view Detail view	N/A
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
• Geometry & Measurement: Apply geometric principles when creating technical drawings and calculating tolerances. • Statistics & Probability: Analyze product failure rates and material testing data to predict reliability. • Algebra & Calculus: Use equations to model forces, stress, and material properties in design. • Forces & Motion: Analyze how forces impact product durability and safety. • Energy & Thermodynamics: Investigate how heat affects materials and product performance. • Marketing & Consumer Behavior: Study why some products fail and how market demand shapes design. • Intellectual Property & Ethics: Discuss patents, copyrights, and ethical considerations in reverse engineering. • Cost Analysis: Evaluate how material selection and manufacturing affect product pricing. • Coding & Automation: Explore programming in manufacturing and product testing. • Aesthetic Design: Examine how color, shape, and texture impact consumer product appeal. • User Experience (UX) & Human-Centered Design: Explore how psychology and ergonomics influence product design. • Graphic Design: Create visually clear and effective technical drawings. • Global Trade & Manufacturing: Investigate how supply chains and material sourcing affect product design.	• Tolerances are needed for every dimension on a technical drawing. • CAD is just for making drawings. • Reverse engineering is simply copying other products • The best material for a product is always the strongest one. • Once the design process is complete, it doesn't need to be revisited.

• Ethics & Sustainability: Examine environmental impacts of material choices and manufacturing methods.	
Connections to Prior Units:	**Connections to Future Units:**
Unit 1: Design and Problem Solving • Unit 1 introduces foundational design thinking and problem-solving skills that are crucial for Unit 2 (Assembly Design). Students will apply these skills to understand how individual components fit together to create a functional assembly.	**Unit 3: Thoughtful Product Design** • Unit 2 focuses on assembling parts efficiently. These skills will be essential in Unit 3 where students will design products with attention to aesthetics, usability, and material selection, ensuring the parts come together in a user-friendly way. **Unit 4: Making Things Move** • The understanding of how components fit together in **Unit 2** is crucial for designing systems with mechanical movement. This supports students in Unit 4 where they will learn to incorporate moving parts into assemblies.
Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**
1. Representation • Visual Aids: Use flowcharts and diagrams to illustrate the components of multi-component systems and the reverse engineering process. This can help students understand system interactions visually. • Video Tutorials: Provide access to video demonstrations of reverse engineering techniques and CAD assembly modeling. This allows students to learn at their own pace and revisit complex concepts as needed. • Interactive Models: Utilize 3D models that students can manipulate digitally to understand how components fit together and interact. This hands-on experience can reinforce learning. • Annotated Examples: Present annotated examples of successful assembly designs, highlighting how different components work together and the considerations for material selection. 2. Engagement • Choice in Investigation: Allow students to choose which product to reverse engineer based on their interests, promoting ownership of their learning process. • Group Collaboration: Facilitate collaborative group work where students can share insights and strategies while reverse engineering and documenting their findings. This encourages teamwork and diverse perspectives. • Guest Speakers: Invite industry professionals to speak about real-world applications of assembly design and reverse engineering, providing students with insights into the relevance of their work. 3. Action and Expression • Flexible Presentation Options: Allow students to present their reverse engineering findings and assembly designs in various formats, such as reports, presentations, or digital portfolios. • Documentation Templates: Provide structured templates for students to document their reverse engineering process, including component analysis, material selection, and design improvements, ensuring clarity and organization. • Hands-On Prototyping: Encourage students to build physical prototypes of their assembly designs using accessible materials. This tactile experience reinforces their understanding of assembly techniques and manufacturability. • Feedback Mechanisms: Implement peer review sessions where students can share their documentation and assembly designs with classmates to receive feedback and suggestions for refinement.	
Related *CELP standards:*	**Learning Targets:**
1. Students will understand the importance of tolerances in technical drawings and how they impact the manufacturing process. Level 1: I can define what tolerances are in technical drawings. Level 2: I can explain how tolerances affect the precision and fit of manufactured parts. Level 3: I can analyze the impact of tolerances on the manufacturing process and product performance. Level 4: I can assess the trade-offs between tighter and looser tolerances in terms of cost and performance. Level 5: I can design technical drawings with appropriate tolerances to meet engineering and manufacturing requirements.	

2. Students will be able to explain the importance of working drawings in the design communication process.
   Level 1: I can define what a working drawing is in engineering design.
   Level 2: I can explain how working drawings communicate design details to manufacturers.
   Level 3: I can describe the role of working drawings in ensuring the accuracy of construction or manufacturing.
   Level 4: I can evaluate how working drawings facilitate clear communication among engineering teams, clients, and manufacturers.
   Level 5: I can create detailed working drawings that effectively communicate the design intent and specifications.
3. Students will understand the expanded role of CAD in both the design and manufacturing processes.
   Level 1: I can explain what CAD is and its basic uses in engineering.
   Level 2: I can describe how CAD is used to create and modify designs in the engineering process.
   Level 3: I can explain how CAD supports the manufacturing process through simulations and prototyping.
   Level 4: I can assess the advantages of using CAD for both design and manufacturing processes, including cost and time savings.
   Level 5: I can lead a design project that integrates CAD for both design development and the manufacturing process.
4. Students will understand the reasons behind reverse engineering and how it is applied in product development.
   Level 1: I can define reverse engineering in the context of product development.
   Level 2: I can explain why reverse engineering is used to understand existing products and improve designs.
   Level 3: I can describe how reverse engineering is applied to analyze and recreate a product's components.
   Level 4: I can assess how reverse engineering contributes to innovation and competitive advantage in product development.
   Level 5: I can lead a reverse engineering project to analyze an existing product and use the insights to develop new design solutions.
5. Students will be able to describe the process of gathering data and insights through product disassembly.
   Level 1: I can explain what product disassembly is and why it is important.
   Level 2: I can describe the basic steps involved in disassembling a product for analysis.
   Level 3: I can explain how data collected through disassembly is used to understand product design and function.
   Level 4: I can analyze the information obtained from product disassembly to identify design improvements.
   Level 5: I can manage a product disassembly process to gather detailed insights for product redesign and development.
6. Students will understand the ethical and legal boundaries of reverse engineering in the context of intellectual property.
   Level 1: I can define intellectual property and reverse engineering.
   Level 2: I can explain the basic legal and ethical considerations involved in reverse engineering.
   Level 3: I can analyze situations where reverse engineering may violate intellectual property rights.
   Level 4: I can evaluate the ethical implications of reverse engineering in the context of innovation and competition.
   Level 5: I can lead discussions on how to navigate the legal and ethical boundaries of reverse engineering while respecting intellectual property rights.
7. Students will understand the factors that contribute to the commercial success or failure of consumer products.
   Level 1: I can identify factors that influence the commercial success of a product, such as design and cost.
   Level 2: I can explain how consumer needs, marketing, and design affect a product's success.
   Level 3: I can analyze how the price, functionality, and usability of a product impact its commercial success.
   Level 4: I can assess the role of competition, market trends, and customer feedback in the success or failure of consumer products.
   Level 5: I can evaluate and design strategies to enhance the commercial success of consumer products in the marketplace.
8. Students will understand how to assess and select materials based on their properties for engineering applications.
   Level 1: I can identify different types of materials used in engineering, such as metals and plastics.
   Level 2: I can describe how the properties of materials, like strength and durability, influence their use in engineering.
   Level 3: I can explain how to select materials based on their specific properties for a given engineering application.
   Level 4: I can analyze the trade-offs between material properties to select the most appropriate material for a design.
   Level 5: I can lead a process for selecting materials for a complex engineering project based on performance, cost, and environmental impact.
9. Students will understand the impact of material selection on the product's design, functionality, and manufacturing process.
   Level 1: I can define how material selection affects a product's design and function.
   Level 2: I can describe how the choice of material impacts manufacturing processes, such as cost and ease of production.
   Level 3: I can explain how different materials can affect the performance and longevity of a product.
   Level 4: I can analyze how material properties must be considered in both the design and manufacturing stages of a product.
   Level 5: I can assess and optimize material selection in a design to balance cost, functionality, and manufacturability.
10. Students will understand the methods engineers use to predict and assess the safety and reliability of materials.
   Level 1: I can identify common methods used to test the safety and reliability of materials.
   Level 2: I can explain how engineers use testing to evaluate material strength, durability, and performance.
   Level 3: I can describe how engineers use data and modeling to predict material failure under various conditions.
   Level 4: I can assess the safety and reliability of materials based on testing and real-world applications.

Level 5: I can lead the development of testing protocols to predict and ensure the safety and reliability of materials in complex engineering designs.

11. Students will learn how to form effective design teams that can collaborate to find the best solutions.
    - Level 1: I can explain the basic concepts of team collaboration in engineering design.
    - Level 2: I can describe how different team roles contribute to effective design problem-solving.
    - Level 3: I can demonstrate how effective communication and teamwork lead to better design solutions.
    - Level 4: I can analyze how team dynamics influence the success of a design project and suggest improvements.
    - Level 5: I can lead and manage a multidisciplinary design team to collaborate on solving complex engineering challenges.
12. Students will understand the importance of following a structured design process to create effective solutions.
    - Level 1: I can define what a structured design process is in engineering.
    - Level 2: I can describe the steps involved in a structured design process, such as ideation and prototyping.
    - Level 3: I can explain how following a structured design process helps create effective and functional solutions.
    - Level 4: I can analyze how each step of the design process contributes to the final product's success.
    - Level 5: I can lead a design project, ensuring all steps of the structured design process are followed to develop a successful engineering solution.

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
Lesson 2.1 Put it Together Students continue to build skills in CAD. Methods to physically join parts into an assembly (including mechanical fasteners and adhesives as well as press fits and hinges) are presented. Interference and clearance fits are introduced, and students learn to apply tolerances to achieve desired fits between interacting parts. CAD assembly modeling is introduced, and students learn to create simple bottom-up assemblies that realistically simulate physical assemblies. Assemblies are documented in CAD with assembly drawings. Students are challenged to iterate on an earlier design project to incorporate skills and knowledge that they have learned in this lesson.			
1	Students will understand the importance of tolerances in technical drawings and how they impact the manufacturing process.	• Students can explain why tolerances are necessary for ensuring parts fit together and function as intended. • Students can describe the potential consequences of not indicating tolerances on a technical drawing. • Students can provide examples of how different tolerances are applied to different types of dimensions on technical drawings.	
2	Students will be able to explain the importance of working drawings in the design communication process.	• Students can identify key components of a working drawing and how they communicate detailed information. • Students can explain how working drawings improve collaboration between engineers, manufacturers, and clients. • Students can discuss how accurate and clear working drawings can prevent errors and ensure product quality.	
3	Students will understand the expanded role of CAD in both the design and manufacturing processes.	• Students can explain how CAD is used to create detailed models and simulations during the design process. • Students can identify how CAD tools can be used for testing, prototyping, and even generating manufacturing instructions. • Students can describe how CAD can be used for visualization, collaboration, and documentation beyond the initial design phase.	
Lesson 2.2 Take it Apart Lesson 2.2 exposes students to the application of engineering principles and practices to reverse engineer a consumer product. Reverse engineering involves disassembling and analyzing a product or system in order to understand and document the visual, functional, and/or structural aspects of its design. In this lesson, students assess all three aspects of a product's design. Students are introduced to a second method of CAD assembly modeling, top-down modeling and use it to model the consumer product they have reverse-engineered. Students will also conduct a case study of a common consumer product to identify ways to improve the manufacturability and ease of assembly of the product. Then they apply the design process again to design and prototype (3D print) an integrated accessory for the reversed engineered product and present the design.			

4	Students will understand the reasons behind reverse engineering and how it is applied in product development.	• Students can explain the primary reasons for reverse engineering, including understanding a competitor's product or improving an existing design. • Students can provide examples of industries or situations where reverse engineering is commonly used. • Students can discuss the ethical considerations associated with reverse engineering.
5	Students will be able to describe the process of gathering data and insights through product disassembly.	• Students can outline the steps involved in disassembling a product to learn about its components and design. • Students can identify specific types of information that can be obtained through disassembly (e.g., materials used, manufacturing techniques). • Students can explain how product disassembly aids in improving or replicating design features.
6	Students will understand the ethical and legal boundaries of reverse engineering in the context of intellectual property.	• Students can describe when reverse engineering is acceptable (e.g., for research, repair, or education). • Students can explain when it is illegal or unethical to reverse engineer a product (e.g., patent infringement or violation of copyrights). • Students can give examples of cases where reverse engineering has led to legal disputes.
7	Students will understand the factors that contribute to the commercial success or failure of consumer products.	• Students can identify common reasons why consumer products fail, such as poor market research, design flaws, or pricing issues. • Students can analyze the importance of understanding customer needs and market trends in designing successful products. • Students can discuss how failure to innovate or adapt to new technology impacts a product's commercial success.
Lesson 2.3 A Material World Students investigate a variety of materials through experimentation to identify properties that determine material selection. The types of materials investigated include wood, metals, ceramics, plastics, and composites. Properties investigated may include density, conductivity, strength, flexibility, hardness, and so on. Students are then tasked with selecting materials to serve specific purposes. They learn how to assign specific materials to CAD model components and to differentiate between assigning the physical properties of a material to a part and only changing the visual appearance of the part. Finally, students work on a team to imagine the future through research of innovative materials and brainstorm a new consumer product composed of one or more advanced material.		
8	Students will understand how to assess and select materials based on their properties for engineering applications.	• Students can describe the key properties of materials (e.g., strength, flexibility, thermal conductivity, corrosion resistance). • Students can explain different methods for determining material properties, including testing and research. • Students can select a material based on its suitability for a given engineering project or design.
9	Students will understand the impact of material selection on the product's design, functionality, and manufacturing process.	• Students can explain how material properties affect a product's strength, weight, and durability. • Students can discuss how material selection influences manufacturing processes such as casting, molding, or machining. • Students can provide examples of how the wrong material choice can lead to design flaws or product failure.
10	Students will understand the methods engineers use to predict and assess the safety and reliability of materials.	• Students can describe methods used to test material strength and reliability, such as stress tests or fatigue testing. • Students can explain how engineers use data to predict how a material will behave under different conditions.

		• Students can identify the importance of safety standards and regulations in selecting reliable materials for products.
Lesson 3.3 Solve a Problem In teams, students act as an engineering consultant group to solve a problem from a list of problems gathered from school and/or community stakeholders. As part of the design process, the team applies the engineering design process to develop a sustainable solution that includes consideration of material choices and the life cycle of the design solution. As part of the design process students meet with the client to understand user needs, develop effective design criteria to inform the design and create a project design brief. Students also practice important project management skills including developing a task and delivery schedule to manage and monitor project work and periodically reporting out on project process.		
11	Students will learn how to form effective design teams that can collaborate to find the best solutions.	• Students can describe the roles and responsibilities of different team members in a design team. • Students can explain how to identify the strengths and weaknesses of team members to create a balanced team. • Students can discuss how communication, collaboration, and conflict resolution contribute to the success of a design team.
12	Students will understand the importance of following a structured design process to create effective solutions.	• Students can explain the steps of a standard design process (e.g., define the problem, brainstorm solutions, prototype, test). • Students can describe how following the design process helps ensure thorough problem-solving and efficient use of resources. • Students can provide examples of how skipping steps in the design process can lead to poor design outcomes.

Unit Title:

Unit 3: Thoughtful Product Design

Unit Description:

Unit 3 introduces students to a broader interpretation of the word design to include universal principles that contribute to successful product design. Students are exposed to design principles (other than the visual design principles presented in Unit 2) that can impact the appeal, usability, safety, and sustainability of a product. Design topics that are introduced or reinforced include product life-cycle, sustainability, manufacturability, human centered design, and systems thinking.

Relevant Standards: Bold indicates priority

Common Core State Standards for English Language Arts
Common Core State Standards for Mathematics
Next Generation Science Standards
Standards for Technological and Engineering Literacy

Essential Question(s):	**Enduring Understanding(s):**
1. What does it mean to be ethical in your work? 2. How do ethics impact the manufacturing of products? 3. How do design criteria and constraints limit material choices for a design? 4. What are the benefits of human-centered design? 5. Why is it important to have clear, accurate, and detailed communication among all involved in the design, manufacturing, and distribution process? 6. Why is it important to study a product's life cycle? 7. What are team norms and why do they matter? 8. What questions should you ask yourself before beginning a project?	1. Students will understand that being ethical means making choices that are fair, honest, and responsible in their work and in their impact on others. 2. Students will recognize that ethics affect the manufacturing process by influencing decisions about sustainability, labor practices, safety, and the environmental impact of products. 3. Students will understand that design criteria and constraints, like cost, function, and user needs, limit the types of materials that can be used in a product. 4. Students will recognize that human-centered design focuses on creating products that meet the needs and preferences of the people who will use them. 5. Students will understand that clear, accurate, and detailed communication ensures that everyone involved in the design, manufacturing, and distribution process is on the same page, preventing mistakes and delays. 6. Students will recognize that studying a product's life cycle helps identify its environmental impact and guides decisions on how to make more sustainable choices. 7. Students will understand that team norms are rules or guidelines that help teams work well together, promoting respect, responsibility, and effective collaboration. 8. Students will ask important questions, like "What problem am I solving?" and "What resources do I need?" to ensure that they are ready and focused before starting a project.
Demonstration of Learning:	**Pacing for Unit**

Students demonstrate learning by applying design principles and systems thinking to solve a real-world problem, showcasing their understanding through detailed sketches, comprehensive design documentation, a well-developed prototype, and a presentation that clearly communicates their design process, rationale, and justification for design decisions, while incorporating feedback from user testing and considering sustainability factors throughout the project.	40 Full Class Periods
Family Overview (link below)	**Integration of Technology:**
Family Overview - PLTW Intro to Engineering Design Family Overview - PLTW Intro to Engineering Design (Spanish)	MasterCam CAD Software
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Measurement units (inches, centimeters, millimeters) Precision Accuracy Mean Median Mode Standard deviation Data analysis Scatter plot Correlation Statistical inference Sample size Margin of error Tolerance Dimensioning Design constraints	N/A
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
• Ethical Design and Social Studies: Connect ethical design principles to discussions about social responsibility, fairness, and human rights in social studies, exploring how engineering impacts society and aligns with ethical considerations in global contexts. • Communication and English/Language Arts: Integrate clear, detailed communication with writing and speaking skills, emphasizing the importance of conveying complex technical information effectively in reports, presentations, and discussions. • Life Cycle Analysis and Environmental Science: Link the study of a product's life cycle to environmental science concepts like sustainability, resource conservation, and ecological impact, emphasizing the importance of considering long-term environmental effects during the design process. • Design Constraints and Mathematics/Physics: Connect design constraints to mathematical problem-solving and physics principles, helping students understand how measurements, calculations, and material properties influence design decisions related to forces, weight, and cost.	• Ethical design only concerns personal integrity and doesn't need to account for the environmental or societal impacts of a product. • Communication among team members doesn't need to be very detailed as long as everyone knows their individual tasks. • The life cycle of a product only involves its time in use and disposal, ignoring the environmental and social effects during manufacturing. • Design constraints are just restrictions that limit creativity, so they should be avoided whenever possible to allow for more freedom in design. • Human-centered design only focuses on making products look good or user-friendly, but doesn't need to consider the practicality or functionality of the design.
Connections to Prior Units:	**Connections to Future Units:**
Unit 1: Design and Problem Solving • Unit 3 builds on the problem-solving and creative thinking skills learned in Unit 1 by guiding students to apply those skills in developing thoughtful and functional product designs. It	**Unit 4: Making Things Move** • Unit 3 lays the groundwork for Unit 4 by encouraging students to think about how their designs can incorporate movement and mechanical functionality. It introduces concepts

encourages students to consider not only the technical aspects but also user needs and ethical implications, expanding on the foundation of problem-solving. **Unit 2: Assembly Design** • Unit 3 connects to Unit 2 by focusing on the integration of individual parts into a well-thought-out product design. While Unit 2 emphasized how components fit together, Unit 3 teaches students to consider factors like usability, sustainability, and overall design coherence, making the assembly process more intentional.	related to forces, materials, and energy, which will be crucial when students begin to explore how to create moving components in Unit 4.

Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**
1. Representation • Case Studies: Provide case studies of successful products that exemplify universal design principles. Analyze these examples in class to highlight how different factors influence product success. • Interactive Simulations: Use simulations to demonstrate the product life cycle and the impact of design choices on sustainability and manufacturability. This allows students to see the consequences of their decisions in a virtual environment. • Resource Libraries: Compile a collection of articles, videos, and other resources that explore various aspects of thoughtful product design. This allows students to explore topics that interest them at their own pace. 2. Engagement • Design Challenges: Present students with real-world problems that require thoughtful product design solutions. Encourage them to apply design principles to develop innovative ideas, fostering creativity and critical thinking. • Cross-Disciplinary Connections: Integrate lessons with other subjects, such as environmental science or ethics, to show the relevance of design principles across disciplines and increase student interest. • Peer Collaboration: Encourage collaborative projects where students can work in teams to design a product that meets specific criteria related to usability and sustainability. This promotes teamwork and diverse perspectives. • Community Involvement: Involve local stakeholders or community members to provide input on design projects, allowing students to understand the impact of their designs on real users. 3. Action and Expression • Diverse Project Formats: Allow students to express their understanding of design principles through various formats, such as presentations, prototypes, reports, or digital media projects. This enables them to showcase their strengths. • Reflective Journals: Encourage students to maintain a reflective journal throughout the unit, documenting their design process, challenges faced, and lessons learned related to product design principles. This promotes metacognition and self-assessment. • User Testing: Incorporate user testing into the design process, allowing students to gather feedback on their prototypes or concepts from peers or community members. This helps them refine their designs based on real user experiences.	

Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**
1. Students will understand what it means to be ethical in their work and how ethics guide decision-making in engineering. Level 1: I can define ethics and explain why they are important in engineering. Level 2: I can describe how ethical considerations influence decision-making in engineering projects. Level 3: I can analyze how ethical issues can affect the outcomes of engineering designs and decisions. Level 4: I can evaluate the impact of ethical decision-making on the long-term success of engineering projects. Level 5: I can lead discussions on how engineers can navigate ethical challenges and make responsible decisions in complex projects. 2. Students will understand how ethics impact the manufacturing of products. Level 1: I can explain what ethical issues may arise in manufacturing. Level 2: I can describe how unethical practices in manufacturing can affect product quality and safety.	

Level 3: I can explain how ethical considerations, such as labor practices and environmental impact, influence manufacturing decisions.
Level 4: I can evaluate how companies can implement ethical practices in the manufacturing process to improve outcomes.
Level 5: I can lead initiatives that ensure ethical practices are integrated into the manufacturing process across projects.

3. Students will understand how design criteria and constraints limit material choices for a design.
   Level 1: I can define design criteria and constraints in engineering.
   Level 2: I can describe how design criteria, such as strength and cost, impact material selection.
   Level 3: I can explain how constraints, like weight and environmental impact, limit material choices in a design.
   Level 4: I can analyze how different design constraints interact and affect material selection in complex projects.
   Level 5: I can make material recommendations based on specific design criteria and constraints to meet project goals.
4. Students will understand the benefits of human-centered design.
   Level 1: I can explain what human-centered design is.
   Level 2: I can describe how human-centered design focuses on user needs and experiences.
   Level 3: I can analyze the benefits of human-centered design in creating products that are functional and user-friendly.
   Level 4: I can evaluate how human-centered design improves product satisfaction and user engagement.
   Level 5: I can apply human-centered design principles to lead the creation of innovative, user-focused engineering solutions.
5. Students will understand the importance of clear, accurate, and detailed communication among all involved in the design, manufacturing, and distribution process.
   Level 1: I can explain why clear communication is important in the engineering process.
   Level 2: I can describe how accurate and detailed communication helps reduce errors in design and manufacturing.
   Level 3: I can explain how effective communication among teams improves the overall efficiency of a project.
   Level 4: I can analyze the consequences of poor communication on the design, manufacturing, and distribution of a product.
   Level 5: I can implement strategies to enhance communication across all stages of design, manufacturing, and distribution.
6. Students will understand why it is important to study a product's life cycle.
   Level 1: I can define what a product life cycle is.
   Level 2: I can explain the stages of a product's life cycle, from design to disposal.
   Level 3: I can describe how studying the product life cycle helps engineers identify environmental and economic impacts.
   Level 4: I can analyze how different stages of the product life cycle influence the sustainability and cost-effectiveness of a product.
   Level 5: I can lead a life cycle analysis for a product to identify areas for improvement in sustainability and efficiency.
7. Students will understand the concept of team norms and why they matter.
   Level 1: I can define what team norms are.
   Level 2: I can describe how team norms help improve collaboration and productivity.
   Level 3: I can explain the role of team norms in creating a respectful and efficient working environment.
   Level 4: I can evaluate how well-established team norms contribute to successful team performance and conflict resolution.
   Level 5: I can facilitate the development and enforcement of team norms to foster a collaborative, effective team environment.
8. Students will understand the key questions to ask themselves before beginning a project.
   Level 1: I can identify basic questions to ask before starting a project.
   Level 2: I can describe why it's important to ask questions like "What is the goal of the project?"
   Level 3: I can explain how asking the right questions at the beginning of a project helps clarify objectives and scope.
   Level 4: I can analyze the impact of asking key questions on project success and avoiding potential pitfalls.
   Level 5: I can lead a team in formulating and addressing critical questions before starting complex engineering projects.

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
Lesson 3.1 Responsible Design Lesson 3.1 begins with students reverse engineering a multi-material consumer product, then identifying and researching the component materials and the material properties that likely contribute to their selection for use in the product. Students are introduced to life cycle analysis and the principles of sustainable development then compare the life cycle of common competing products. The importance of identifying measurable design criteria to define a successful solution and that can be used to evaluate a potential solution is emphasized in this lesson.			
1	I can understand what it means to be ethical in their work and how ethics guide decision-making in engineering.	• I can explain the concept of ethics and its application to the engineering profession. • I can identify examples of ethical and unethical behavior in product design and manufacturing. • I can discuss how ethical considerations impact their decisions and actions in an engineering context.	
2	I can understand how ethics impact the manufacturing of products.	• I can explain how ethical issues, such as labor practices, environmental impact, and product safety, influence manufacturing decisions.	

		• I can describe the consequences of unethical practices in manufacturing. • I can identify strategies for ensuring ethical manufacturing processes.
3	I can understand how design criteria and constraints limit material choices for a design.	• I can explain how factors such as cost, durability, weight, and environmental impact affect material selection. • I can discuss how design constraints like size or strength influence the choice of materials for a product. • I can identify examples where design criteria directly impacted material selection.
Lesson 3.2 More Than Parts Students are introduced to the concept of human-centered design as they are led through a design experience focused on user needs, perceptions and behaviors and the design trade-offs necessary in every design process. Students also apply systems thinking to engineering design and consider the ethical implications of engineering decisions. A modern CAD feature, generative design is introduced as a tool to optimize design solutions. Students use the output from a generative design algorithm to explore and select a design alternative. Finally in pairs, students identify a product and apply human-centered design principles and systems thinking to design a product as they practice collaboration and communication skills. Final products are presented through a short commercial.		
4	I can understand the benefits of human-centered design.	• I can explain what human-centered design is and why it focuses on the end user's needs. • I can identify how human-centered design improves product usability, accessibility, and overall user experience. • I can provide examples of products that were enhanced by using human-centered design principles.
5	I can understand the importance of clear, accurate, and detailed communication among all involved in the design, manufacturing, and distribution process.	• I can describe how communication impacts the efficiency and success of the design and manufacturing process. • I can identify potential issues that can arise from poor communication in product development. • I can explain how accurate documentation, such as technical drawings and specifications, helps avoid misunderstandings.
6	I can understand why it is important to study a product's life cycle.	• I can explain the concept of a product life cycle and its stages (design, manufacturing, use, disposal). • I can discuss the environmental, economic, and social impacts of each stage of the product life cycle. • I can analyze how understanding a product's life cycle can lead to more sustainable design choices.
Lesson 3.3 Solve a Problem In teams, students act as an engineering consultant group to solve a problem from a list of problems gathered from school and/or community stakeholders. As part of the design process, the team applies the engineering design process to develop a sustainable solution that includes consideration of material choices and the life cycle of the design solution. As part of the design process students meet with the client to understand user needs, develop effective design criteria to inform the design and create a project design brief. Students also practice important project management skills including developing a task and delivery schedule to manage and monitor project work and periodically reporting out on project process.		
7	I can understand the concept of team norms and why they matter.	• I can define team norms and explain how they contribute to team collaboration and productivity. • I can identify examples of positive and negative team norms in a design team setting. • I can describe how adhering to team norms helps maintain a healthy, efficient working environment.
8	I can understand the key questions to ask themselves before beginning a project.	• I can identify critical questions to ask before starting a project, such as "What is the problem?" and "Who is the end user?" • I can explain how these questions guide the planning and design phases of a project. • I can describe how answering these questions helps focus the project's objectives and leads to better design outcomes.

Unit Title:

Unit 4: Making Things Move

Unit Description:

Unit 4 builds students' basic engineering knowledge related to simple mechanical and electrical systems and the use of mathematical models to represent design ideas and to inform design decisions. Students will apply their new knowledge in the design of an electromechanical solution. Students also learn advanced CAD skills to support the design, documentation, and communication of engineering solutions.

Relevant Standards: Bold indicates priority

Common Core State Standards for English Language Arts
Common Core State Standards for Mathematics
Next Generation Science Standards
Standards for Technological and Engineering Literacy

Essential Question(s):	**Enduring Understanding(s):**
1. What are the benefits of parametric modeling? 2. How can you use a graph to describe motion? 3. How are force and motion related? 4. How can friction be helpful in a vehicle? 5. How are current, voltage, and resistance related in an electrical circuit? 6. Why is safety of the utmost importance when working with electricity or electronics? 7. What is the difference between a DC and AC circuit? 8. How should one decide what information and/or artifacts to include in a portfolio? 9. Why should a portfolio include documentation of the complete design process?	1. Students will understand that parametric modeling allows for easy changes to designs by adjusting key dimensions, which automatically updates the rest of the model, improving efficiency and flexibility in design. 2. Students will recognize that a graph can visually show how an object moves over time, helping to analyze speed, direction, and acceleration. 3. Students will understand that force and motion are connected—force causes objects to move, and motion can be measured and analyzed to understand the effect of different forces. 4. Students will recognize that friction can be useful in vehicles by providing the necessary grip for tires to move safely, control speed, and stop effectively. 5. Students will understand that in an electrical circuit, current, voltage, and resistance are related through Ohm's Law, which helps determine how electricity flows through a circuit. 6. Students will understand that safety is critical when working with electricity or electronics to prevent accidents, injuries, and damage to equipment due to electrical hazards. 7. Students will differentiate between DC (direct current) and AC (alternating current) circuits, understanding how each type of current flows and its uses in different applications. 8. Students will understand that when creating a portfolio, it's important to choose artifacts that show the process, challenges, and solutions in their design, demonstrating growth and learning. 9. Students will recognize that a portfolio should include documentation of the complete design process to show how they arrived at a solution, reflecting their creativity, problem-solving, and decision-making.
Demonstration of Learning:	**Pacing for Unit**
Students demonstrate learning by applying their understanding of mechanical systems and mathematical modeling to design and build an electromechanical solution, showcasing their knowledge through detailed	40 Full Class Periods

engineering drawings, calculations, a functional prototype, and a comprehensive presentation explaining their design process and reasoning; this typically involves using CAD software to create detailed models, conducting experiments to test their design, and effectively communicating their findings to an audience.

Family Overview (link below)	**Integration of Technology:**
Family Overview - PLTW Intro to Engineering Design Family Overview - PLTW Intro to Engineering Design (Spanish)	MasterCam CAD Software

Unit-specific Vocabulary:			**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Assembly Assembly drawing Component CAD (Computer-Aided Design) Cartesian coordinate system	Degree of freedom Extrusion Geometric constraint Model Origin Prototype	Solid modeling Subassembly Translation Working drawing Annotate Feature Revolution Constraint	N/A

Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
• Social Studies/History: Ethics in manufacturing (historical context, labor movements, industrialization). • Environmental Science: Ethics in manufacturing and life cycle analysis (environmental impact, sustainability). • Mathematics: Design criteria and constraints, project planning (calculations for material selection, project budgets, and timelines). • Physics: Material properties for design (tensile strength, thermal conductivity, force, motion). • Psychology: Human-centered design (understanding user needs, cognitive behavior). • Art/Design: Aesthetic considerations in human-centered design (visual design, product styling). • Economics: Product life cycle (cost analysis, economic viability, resource allocation). • English/Language Arts: Communication (writing project plans, proposals, and documentation).	• Ethics only matter if the product is harmful or dangerous. • More expensive materials are always better because they result in better performance. • Human-centered design is only about making products look good and attractive. • A product's life cycle only matters after it has been released to the market. • You only need to ask questions about what the project looks like at the end.

Connections to Prior Units:	**Connections to Future Units:**
Unit 1: Design and Problem Solving • In Unit 1, students learn how to define problems and find solutions. In Unit 4, they apply these skills to design systems that move, using the same problem-solving steps to create functional movement. **Unit 2: Assembly Design** • Unit 2 teaches students how to put different parts together. In Unit 4, they use this knowledge to design moving parts, ensuring everything fits and works properly. **Unit 3: Thoughtful Product Design**	N/A

• In Unit 3, students learn how to design products that are functional and user-friendly. In Unit 4, they apply these ideas to moving systems, making sure the movement is practical, safe, and easy to use.	

Differentiation through *Universal Design for Learning*

UDL Indicator	**Teacher Actions:**

1. Representation
   - Dynamic Visualizations: Use animations and simulations to demonstrate mechanical and electrical systems in action. This helps students visualize concepts such as forces, motion, and circuit behavior.
   - Hands-On Demonstrations: Conduct live demonstrations or use video tutorials to showcase simple mechanical and electrical systems, allowing students to observe how these systems function in real time.
   - Mathematical Modeling Tools: Introduce software tools that allow students to create and manipulate mathematical models of electromechanical systems. This enables them to see how changes in variables affect system performance.
   - Annotated Diagrams: Provide diagrams of mechanical systems and electrical circuits with annotations explaining key components and their functions. This aids in understanding complex systems.
2. Engagement
   - Real-World Scenarios: Present students with real-world problems or scenarios that require the design of electromechanical solutions. This encourages them to apply their knowledge in a meaningful context.
   - Interactive Workshops: Organize hands-on workshops where students can collaboratively build simple mechanical and electrical systems, fostering engagement through active participation.
   - Choice in Projects: Allow students to select projects that interest them, such as designing a simple robot or automated device, to increase motivation and ownership of their learning.
3. Action and Expression
   - Flexible Design Presentations: Encourage students to present their electromechanical designs using various formats (e.g., videos, digital portfolios, or live demonstrations), allowing them to choose the medium that best showcases their work.
   - Collaborative Problem-Solving: Implement team-based activities where students design, build, and test electromechanical solutions together. This encourages collaboration and diverse problem-solving approaches.
   - Iterative Design Process: Promote an iterative design process where students can test their prototypes, gather feedback, and make improvements based on their observations and results.
   - Reflective Practices: Encourage students to document their design process, challenges encountered, and solutions developed in a reflective journal, fostering self-assessment and critical thinking.

Supporting Multilingual/English Learners

Related *CELP standards:*	**Learning Targets:**

1. I can explain the advantages of parametric modeling in engineering design.
   Level 1: I can identify and name basic terms related to parametric modeling with support from visuals or examples.
   Level 2: I can describe one advantage of parametric modeling in simple terms, using sentence frames or keywords.
   Level 3: I can explain at least two advantages of parametric modeling in engineering design, using complete sentences and some technical vocabulary.
   Level 4: I can articulate multiple advantages of parametric modeling, providing examples and connecting ideas to real-world applications in engineering design.
   Level 5: I can critically evaluate the advantages of parametric modeling in engineering design, comparing it to traditional modeling techniques and discussing implications for efficiency and innovation.
2. I can interpret and create graphs to describe an object's motion.
   Level 1: I can recognize basic graphs and identify key components (axes, labels) with support.
   Level 2: I can interpret simple graphs to describe an object's motion, identifying trends (e.g., increasing or decreasing).
   Level 3: I can create basic graphs to represent an object's motion, including labeling axes and providing a title.
   Level 4: I can analyze and interpret complex graphs, explaining the relationship between variables and describing the motion of the object in detail.
   Level 5: I can create and interpret sophisticated graphs, offering insights into the motion of an object, predicting future motion, and justifying conclusions with data.
3. I can explain the relationship between force and motion using Newton's Laws.
   Level 1: I can identify basic terms related to force and motion with support.
   Level 2: I can describe one of Newton's Laws of Motion in simple terms, explaining its connection to force and motion.

Level 3: I can explain all three of Newton's Laws of Motion and how each law relates to the concepts of force and motion, using examples.
Level 4: I can analyze real-world scenarios applying Newton's Laws, discussing how they explain various motions and forces in everyday life.
Level 5: I can evaluate complex systems involving force and motion, applying Newton's Laws to predict outcomes and explain their significance in physics and engineering.

4. I can describe how friction impacts the movement and safety of vehicles.
Level 1: I can identify basic terms related to friction and vehicle movement with support.
Level 2: I can describe one way friction affects the movement of vehicles in simple terms.
Level 3: I can explain multiple ways friction impacts vehicle movement and safety, using complete sentences and examples.
Level 4: I can analyze different types of friction (e.g., static, kinetic) and their effects on vehicle performance and safety in various driving conditions.
Level 5: I can evaluate the role of friction in vehicle design and safety features, discussing how different materials and designs can enhance or reduce friction for optimal performance.

5. I can explain the relationship between current, voltage, and resistance using Ohm's Law.
Level 1: I can identify basic terms like current, voltage, and resistance with support.
Level 2: I can describe Ohm's Law in simple terms, stating the relationship between current, voltage, and resistance.
Level 3: I can explain Ohm's Law using a formula and provide examples of how changing one variable affects the others.
Level 4: I can analyze scenarios involving Ohm's Law, explaining real-world applications and implications of the relationship between current, voltage, and resistance.
Level 5: I can evaluate and apply Ohm's Law in complex circuits, discussing its significance in electrical engineering and providing detailed examples of its practical applications.

6. I can explain the importance of safety when working with electrical components.
Level 1: I can recognize basic safety terms related to electrical components with support.
Level 2: I can describe one safety rule for working with electrical components in simple terms.
Level 3: I can explain multiple safety practices that should be followed when working with electrical components, using complete sentences.
Level 4: I can analyze safety scenarios in electrical work, discussing the consequences of ignoring safety measures and the importance of following them.
Level 5: I can evaluate complex safety situations involving electrical components, proposing solutions and justifying the importance of safety protocols in preventing accidents.

7. I can compare and contrast direct current (DC) and alternating current (AC) circuits.
Level 1: I can identify basic terms related to DC and AC circuits with support.
Level 2: I can describe one difference between DC and AC circuits in simple terms.
Level 3: I can explain at least two similarities and two differences between DC and AC circuits, using complete sentences.
Level 4: I can analyze the advantages and disadvantages of DC and AC circuits, providing examples of where each type is used.
Level 5: I can evaluate the applications of DC and AC circuits in various technologies, discussing their impact and relevance in modern electrical engineering.

8. I can evaluate and select relevant materials for an engineering portfolio.
Level 1: I can identify basic materials related to engineering portfolios with support.
Level 2: I can describe one type of material that could be included in an engineering portfolio in simple terms.
Level 3: I can explain multiple relevant materials for an engineering portfolio, using complete sentences and examples to support my choices.
Level 4: I can analyze the importance of different materials in an engineering portfolio, discussing how they showcase skills and projects effectively.
Level 5: I can evaluate and justify the selection of materials for an engineering portfolio, considering factors such as audience, purpose, and professional presentation, and I can create a cohesive and impactful portfolio.

9. I can explain why documenting the design process is essential in engineering.
Level 1: I can identify basic terms related to the design process and documentation with support.
Level 2: I can describe one reason why documenting the design process is important in simple terms.
Level 3: I can explain multiple reasons why documenting the design process is essential in engineering, using complete sentences and examples.
Level 4: I can analyze the consequences of poor documentation in engineering projects, discussing how it affects collaboration, communication, and project outcomes.
Level 5: I can evaluate best practices for documenting the design process, discussing its long-term benefits for professional development, knowledge transfer, and innovation in engineering.

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
Lesson 4.1 You've Got to Move It Students begin the lesson by reverse engineering a mechanical device to identify simple machines and mechanisms that influence motion and contribute to the function of the device. Students identify different types of motion			

(rotary, oscillating, linear, reciprocating, and so on) and investigate mechanisms that cause motion (including cams, gears, pulleys, chain and sprockets) and later use these mechanisms to create, transform and control motion to solve a problem. Students take a deep dive into how cams transform motion and use motion graphs to design a cam to create a desired motion. They practice CAD skills by developing models of the mechanisms they investigate and simulating motion in the CAD environment. To support efficient CAD modeling, students also learn to use mathematical functions to represent relationships in dimensional properties of a modeled object within the 3D environment.		
1	I can explain the advantages of parametric modeling in engineering design.	• I can define parametric modeling and describe how it is used in engineering. • I can explain how parametric modeling improves efficiency, accuracy, and flexibility in design. • I can demonstrate how modifying one parameter affects an entire model.
2	I can interpret and create graphs to describe an object's motion.	• I can identify key components of a motion graph (position-time and velocity-time graphs). • I can analyze a motion graph to determine speed, velocity, and acceleration. • I can create a motion graph based on real-world data or a given scenario.
Lesson 4.2 May the Force Be With You In lesson 4.2 students investigate forces that resist motion. First students study spring forces and develop a mathematical model to determine the relationship between spring displacement and force for a given spring. Students then use a spring scale to study the force of friction and consider ways to reduce friction, especially in machine design. Finally, students apply their knowledge of mechanisms, springs and friction to design an automaton to create a desired motion with minimal frictional resistance. As part of the automata design process, each student creates a CAD assembly model of their design, CAD technical drawings, and a physical working model of their design.		
3	I can explain the relationship between force and motion using Newton's Laws.	• I can define force and motion and describe how they interact. • I can explain Newton's Laws of Motion and apply them to real-world examples. • I can predict how an object will move when forces are applied to it.
4	I can describe how friction impacts the movement and safety of vehicles.	• I can explain how friction between tires and the road affects acceleration, braking, and control. • I can describe different ways engineers optimize friction for safety (e.g., tire tread design, road surfaces). • I can analyze a real-world situation where friction is beneficial in vehicle performance.
Lesson 4.3 Automating Motion In lesson 4.3 students learn about simple electrical circuits and how to transform electrical power to motion using a motor. Students design and install a circuit to run a hobby motor to power their previously designed automaton. Students build a simple variable resistor as part of their circuit and develop a mathematical model to inform the design of a motor speed control mechanism. Students then revise their physical automaton to incorporate the new electrical system and demonstrate their use of the resulting electromechanical system to control the automaton motion.		
5	I can explain the relationship between current, voltage, and resistance using Ohm's Law.	• I can define current, voltage, and resistance. • I can apply Ohm's Law (V = IR) to calculate unknown values in a circuit. • I can analyze how changes in resistance affect current and voltage.
6	I can explain the importance of safety when working with electrical components.	• I can identify potential hazards when working with electricity and electronics. • I can describe safety procedures and personal protective equipment (PPE) used in electrical work. • I can demonstrate proper safety practices when handling electrical circuits.

7	I can compare and contrast direct current (DC) and alternating current (AC) circuits.	• I can define and describe how DC and AC circuits function. • I can explain common applications of DC and AC in real-world systems. • I can analyze and determine which type of circuit is best suited for a given application.
Lesson 4.4 Make It Move In the final lesson of Unit 4, students collaborate to develop an electromechanical system to solve a problem. To solve the problem, team members work closely together to apply the knowledge and skills they have gained in this course and create a public display to present the solution.		
8	I can evaluate and select relevant materials for an engineering portfolio.	• I can identify key components of an effective engineering portfolio. • I can choose artifacts that showcase my skills, knowledge, and growth. • I can organize my portfolio to highlight my best work and learning progress.
9	I can explain why documenting the design process is essential in engineering.	• I can describe the steps of the engineering design process. • I can explain how documentation helps track progress, justify decisions, and support innovation. • I can create a portfolio that demonstrates my problem-solving process from start to finish.

Course Title:	Content Area:	Grade Level:	Credit (if applicable)
UConn ECE Chemistry 1127Q and 1128Q	Science	10-12	2.0 BPS 1127Q: 4.0 UConn 1128Q: 4.0 UConn

Course Description:

This course enables students to undertake, in their first year, second-year work in the chemistry sequence at their institution or to register for courses in other fields where chemistry is a prerequisite. Students will attain a depth of understanding of fundamentals and competence in dealing with chemical problems.

Through quantitative and qualitative analysis, students will gain a deeper understanding of matter, and how it changes. Major units of study include: Matter and change, solutions, gasses, heat, electronic structure of the atom, bonding, intermolecular forces, colligative properties, kinetics, equilibrium, thermodynamics, electrochemistry and nuclear chemistry. Through cooperative learning and lab experiences, students will improve communication and critical thinking skills.

Aligned Core Resources:	Connection to the *BPS Vision of the Graduate*
Textbook *Chemistry: The Central Science, 15th edition* Brown, LeMay, Bursten, Murphy, Woodward, Stoltzfus **Other** • ChemQuiz.net Autogenerated and customizable practice questions • PhET Interactive simulations • The Organic Chemistry Tutor - YouTube Chemistry tutorials at a college level • Khan Academy Video tutorials, practice problems, and articles. • Chemistry 2e Free online textbook	CONTENT MASTERY • Develop and draw from a baseline understanding of knowledge in academic disciplines from our Bristol curriculum. CRITICAL THINKING AND PROBLEM SOLVING • Collect, assess and analyze relevant information • Reason effectively. Use systems thinking. • Make sound judgments and decisions. Identify, define and solve authentic problems and essential questions. • Reflect critically on learning experience, processes and solutions. • Transfer knowledge to other situations.
Additional Course Information: ***Knowledge/Skill Dependent courses/prerequisites***	**Link to *Completed Equity Audit***
• Must be enrolled in or have taken Algebra 2 ACC. • Have an“83” average in Biology ACC or a “93” in Biology ACA. • Students must be concurrently taking Pre-Calculus ACC or have the permission of the instructor. • Grade 10 students may take concurrently with Biology ACC with teacher recommendation and an “83” average in Physical Science ACC.	Equity Curriculum Review (ECE Chemistry 2024-25)

Standard Matrix

Learning Objective 1: To explain and apply basic principles, definitions, laws and theories of chemistry
Learning Objective2: To apply basic principles to solve real world problems described verbally, graphically, symbolically or numerically.
Learning Objective 3: To develop laboratory skills and techniques along with data collection, data analysis and interpretation.
Learning Objective4: To develop logical analytical skills which can be used in real life problem solving and analysis

Common Curriculum objective	Course student learning objective(s)	Course assessment(s)
• LO-1 Students will be able to explain and appropriately utilize basic scientific language and concepts.	• LO 1- To explain and apply basic principles, definitions, laws and theories of chemistry	• Conceptual questions based on the first two domains of Bloom’s taxonomy (remembering and understanding) on the exams
• LO-2 Students will be able to design or conduct an experiment or analysis suitable to test a	• LO 3 – to develop laboratory skills and techniques along with data collection, data analysis and	• Pre-lab quizzes, data analysis and conclusion reports submitted after every laboratory

scientific hypothesis and be able to interpret the results. • LO-1 Through application-based experiences utilizing the scientific method, students will be able to identify problems, make observations, analyze data, interpret data, and develop models or explanations	interpretation.	experiment. Required participation in scheduled laboratory activities in person.
• LO-3 Students will be able to solve problems described verbally ,graphically, symbolically, or numerically.	• LO 2- To apply basic principles to solve real world problems described verbally, graphically, symbolically or numerically. • LO 4- To develop logical analytical skills which can be used in real life problem solving and analysis	• Open ended quantitative problems on the exams. • Online Homework assignments. • Higher-order comprehensive numerical problems on the exam and online homework. These problems cannot be directly solved by plugging values into a standard equation. Students must critically analyze the problem and combine multiple concepts in a logical manner to solve the problem.

Unit Links

Unit 1: Matter and Change (1127)
Unit 2: Solutions and Gasses (1127)
Unit 3: Heat, Electronic Structure of the Atom , and Bonding (1127)
Unit 4: Liquids and Solids (1127)
Unit 5: Colligative Properties and Kinetics (1128)
Unit 6: Concepts of Equilibrium (1128)
Unit 7: Solubility equilibria, Thermodynamics, and Electrochemistry (1128)
Unit 8: Nuclear Chemistry (1128)

Unit Title:	
Unit 1: Matter and Change (1127)	
Relevant Standards: Bold indicates priority	
LO 1: To explain and apply basic principles, definitions, laws and theories of chemistry. LO 2: To apply basic principles to solve real world problems described verbally, graphically, symbolically or numerically. **LO 3: To develop laboratory skills and techniques along with data collection, data analysis and interpretation.** LO 4: To develop logical analytical skills which can be used in real life problem solving and analysis.	
Essential Question(s):	**Enduring Understanding(s):**
• What is matter, and how is it classified? • What are the properties of matter, and how can they be measured? • How does matter change and transform? • What is the atomic structure of matter, and how does it relate to its properties? • How do we model and predict changes in matter?	• Matter exists in various forms and states, each characterized by distinct properties and behaviors. • Classification of matter into elements, compounds, and mixtures helps us understand its composition and structure. • Physical properties such as mass, volume, and density are intrinsic to matter and can be quantitatively measured. • Understanding and measuring these properties allow for characterization and comparison of different substances. • Matter undergoes physical changes (like phase changes) and chemical changes (like reactions) that alter its properties. • Changes in matter can be observed through indicators such as color change, temperature change, or formation of new substances. • Matter is composed of atoms, which combine to form molecules with specific chemical and physical properties. • The structure and arrangement of atoms and molecules dictate the macroscopic properties and behavior of matter. • Models, such as particle models and atomic models, provide frameworks for understanding and predicting the behavior of matter. • Knowledge of matter's properties and changes enables the application of scientific principles to real-world scenarios and phenomena.
Demonstration of Learning:	**Pacing for Unit**
• UConn provided exams • UConn provided labs • Teacher created assignments	Approximately 20 classes
Family Overview (link below)	**Integration of Technology:**
Family Overview ECE Chemistry	• Thin Layer Chromatography simulation for chemical separation lab • Spectrophotometer (Colorimeter) for aspirin synthesis
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Unit Specific Vocabulary ECE Chemistry	N/A
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Math Connection:	• Matter is only something solid and visible.

• Unit conversions and dimensional analysis with math classes Science Connection: • Structure of an atom and the periodic table from physical science.	• All matter can be classified in the same way. • Properties like color, size, or texture are only observable, and cannot be measured scientifically. • Mass and weight are the same. • All changes in matter involve chemical reactions. • Matter only changes when it is heated or cooled. • Atoms are solid and indivisible particles. • All atoms of an element are identical in their arrangement of subatomic particles. • Changes in matter can always be predicted based on appearance or basic knowledge. • Models of matter are always accurate representations of reality.
Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**
Representation: *I can name and write formulas for compounds* • Use diagrams and charts to illustrate chemical structures and formulas. This can include molecular models or flowcharts showing the naming conventions for compounds. • Incorporate videos that demonstrate chemical reactions and the formation of compounds, allowing students to see the concepts in action. • Provide written materials that include step-by-step guides for naming compounds, along with examples. Use clear, concise language and highlight key terms.	
Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**
An EL can conduct research and evaluate and communicate findings to answer questions or solve problems. *I can name and write formulas for compounds* • Level 1: I can verbally describe the parts of a chemical formula • Level 2: I can interpret and manipulate chemical formulas • Level 3: I can analyze scenarios (word problems) and choose appropriate equations to solve problems independently. I can explain my problem-solving process and justify my choices of equations. • Level 4: I can critique and refine problem-solving strategies based on verbal or written feedback. • Level 5: I can synthesize information from multiple sources to solve real-world problems involving motion and explain my solutions effectively. **The CELP guidance is to **support the development of language**; access to course content expectations should not change as a result of MLL status.*	

Lesson Sequence	Learning Target	Success Criteria/Assessment/Resources
1	I can explain the concepts of matter, atoms, and molecules	• I can demonstrate how molecules and the atoms that compose them are represented by molecular models • I can compare and contrast the different states of matter • I can distinguish between elements compounds and mixture
2	I can investigate the properties of matter	• I can distinguish between chemical and physical properties and changes. • I can distinguish between intensive and extensive properties • I can describe how filtration, distillation, and chromatography can be used to separate mixtures.
3	I can measure and perform calculations according to the rules of uncertainty.	• I can convert between the 7 base units used in the metric system. • I can convert between temperature units K, C, F • I can interconvert among mass, volume and density

		• I can calculate energy in Joules • I can differentiate between exact and inexact numbers • I can explain the difference between accuracy and precision • I can demonstrate the use of significant figures in exponential notation and SI units in calculations • I can use dimensional analysis to perform calculations using conversion factors.
4	I can investigate the formation of modern atomic structure	• I can describe the structure of atoms • I can describe the historic discovery of atomic structure • I can describe early investigations to characterize the atom
5	I can understand how to read and utilize the periodic table	• I can describe and calculate the relationship between the atomic weight of an element, and the weights and abundances of a naturally occurring isotope of the same element. • I can infer an element's general properties from its location on the periodic table. • I can describe the differences between groups and periods. • I can relate an element's atomic number and atomic mass with the number of subatomic particles its atoms would contain.
6	I can name and write formulas for compounds	• I can name and write formulas for ions • I can write the formula for binary and ternary ionic compounds • I can name binary and ternary ionic compounds • I can write formulas for and name simple molecular compounds. • I can distinguish between molecular and empirical formulas.
7	I can quantitatively study matter	• I can calculate the molar mass of a compound and relate it to its formula weight. • I can define the mole is 6.022x10^23 • I can interconvert between grams, moles and molecules • I can calculate Empirical and Molecular formulas and percent composition of a compound
8	I can understand chemical reactions in a quantitative manner	• I can write and balance chemical equations • I can describe the proportional relationships between the substances involved in a chemical reaction. • I can describe and determine the limiting and excess reagents in a chemical reaction • I can perform calculations involving percent yield

Unit Title:	
Unit 2: Solutions and Gasses (1127)	
Relevant Standards: Bold indicates priority	
LO 1: To explain and apply basic principles, definitions, laws and theories of chemistry. **LO 2: To apply basic principles to solve real world problems described verbally, graphically, symbolically or numerically.** LO 3: To develop laboratory skills and techniques along with data collection, data analysis and interpretation. LO 4: To develop logical analytical skills which can be used in real life problem solving and analysis.	
Essential Question(s):	**Enduring Understanding(s):**
• What are solutions, and how do solutes interact with solvents? • How do we measure and describe the concentration of solutions? • What factors affect solubility, and how does it impact solution behavior? • What are the key properties of gasses, and how are they measured? • How do gas laws describe the behavior of gasses? • What factors influence the behavior of gasses, and what are their real-world applications?	• Solutions are mixtures where solutes dissolve in solvents to form homogeneous mixtures. • Concentration measures like molarity and percent composition describe how much solute is in a solution. • Solubility is influenced by temperature, pressure, and the nature of solute-solvent interactions. • Saturated, unsaturated, and supersaturated solutions have distinct stability and properties. • Gasses have properties like pressure, volume, and temperature, described by gas laws such as Boyle's, Charles's, and the Ideal Gas Law (PV = nRT). • Gas behavior is predictable under different conditions due to these laws. • Gasses diffuse rapidly and mix uniformly due to their high kinetic energy and lack of fixed volume or shape. • Understanding gas behavior is crucial in fields like meteorology, engineering, and environmental science.
Demonstration of Learning:	**Pacing for Unit**
• UConn provided exams • UConn provided labs • Teacher created assignments	Approximately 20 classes
Family Overview (link below)	**Integration of Technology:**
Family Overview ECE Chemistry	• pH probe and LabQuest device for gravimetric analysis lab • Pressure sensor and LabQuest device for gas behavior lab
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Unit Specific Vocabulary ECE Chemistry	*N/A*
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Math Connections: • Algebraic Relationships: Solving for variables in equations like the Ideal Gas Law uses skills from Algebra I and II (e.g., rearranging equations, working with formulas). • Ratios and Proportions: Calculating molarity and percent composition involves using ratios to express how much solute is present in a solution—aligned with standards in data analysis	• Solutions are only formed by liquids dissolving in other liquids. • The solute is always completely dissolved in the solvent. • Solvents are always liquid. • Solutes and solvents mix without any change in their properties. • Solubility is the same for all substances at any temperature.

and problem solving. Science Connection: • Diffusion and Particle Motion: High school physics explores motion and forces—concepts that relate to how gas particles move and spread out quickly in open spaces.	• Gases do not have mass or volume.

Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**
Representation: *I can describe the composition of solutions, qualitatively and quantitatively.* • Use diagrams and images to show different types of solutions (e.g., homogeneous vs. heterogeneous) and their components. This can include labeled diagrams illustrating solutes and solvents. • Incorporate videos demonstrating how solutions are made, showing real-life examples of solutes dissolving in solvents, which can help students visualize the process. • Provide written explanations with clear definitions of key terms such as "solute," "solvent," "concentration," and "dilution." Use straightforward language and highlight important concepts.	

Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**
An EL can conduct research and evaluate and communicate findings to answer questions or solve problems. *I can describe the composition of solutions, qualitatively and quantitatively.* • Level 1: I can verbally describe the parts of a solution • Level 2: I can interpret and manipulate solutions • Level 3: I can analyze scenarios (word problems) and choose appropriate equations to solve problems independently. I can explain my problem-solving process and justify my choices of equations. • Level 4: I can critique and refine problem-solving strategies based on verbal or written feedback. • Level 5: I can synthesize information from multiple sources to solve real-world problems involving solutions and explain my solutions effectively. **The CELP guidance is to **support the development of language**; access to course content expectations should not change as a result of MLL status.*	

Lesson Sequence	**Learning Target**	**Success Criteria/ Assessment**	**Resources**
1	I can describe the composition of solutions, qualitatively and quantitatively.	• I can recognize that substances dissolved in water exist as ions, molecules or a mixture of the two. • I can describe electrolytes and nonelectrolytes • I can describe the concentration of particles in solution using units of molarity • I can dilute a solution to create a new solution of known molarity	
2	I can describe acid/base reactions	• I can explore reactions in which protons, H+ ions are transferred from one reactant to another • I can perform an acid/base titration to determine the concentration of a solution	
3	I can describe precipitation reactions	• I can write complete and net ionic equations. • I can define spectator ions. • I can predict if two solutions will form a precipitate when mixed. • I can perform stoichiometric calculations on precipitation reactions	
4	I can describe oxidation and reduction reactions	• I can determine the oxidation numbers of elements in a compound • I can identify which species are oxidized and reduced in a redox reaction. (and the oxidizing and reducing agents) • I can write oxidations and reduction half reactions	

		• I can write full redox equations in acidic and basic medium
5	I can connect the kinetic molecular theory of gasses to the concept of pressure	• I can describe how the properties of gasses differ from those of solids and liquids • I can define gas pressure and how manometers work, • I can interconvert between units of pressure
6	I can qualitatively and quantitatively use the gas laws	• I can define a direct and indirect relationship in reference to gas behavior • I can relate the ideal gas law to Boyle's, Charle's, and Avogadro's Laws. • I can use the ideal gas law to calculate any variable in the ideal gas equation. • I can perform gas density and molar mass calculations • I can explain avogadro's and molar volume at STP • I can qualitatively and quantitatively describe gas mixtures using Dalton's Law of partial pressures • I can qualitatively and quantitatively describe gas effusion and diffusion using Graham's Law.

Unit Title:

Unit 3: Heat, Electronic Structure of the Atom , and Bonding (1127)

Relevant Standards: Bold indicates priority

LO 1: To explain and apply basic principles, definitions, laws and theories of chemistry.
LO 2: To apply basic principles to solve real world problems described verbally, graphically, symbolically or numerically.
LO 3: To develop laboratory skills and techniques along with data collection, data analysis and interpretation.
LO 4: To develop logical analytical skills which can be used in real life problem solving and analysis.

Essential Question(s):	**Enduring Understanding(s):**
• What is heat, and how does it transfer between objects or substances? • What factors influence the transfer of heat, and how is it measured? • How does heat energy affect the properties and states of matter? • What are the basic components of an atom, and how are they organized? • How do electrons occupy energy levels (shells) around the nucleus of an atom? • What determines the stability and reactivity of atoms based on their electron configurations? • What are chemical bonds, and how do atoms form bonds to become stable? • What are the differences between ionic, covalent, and metallic bonds? • How does the type of bonding affect the properties of substances, such as their strength, conductivity, and melting points?	• Heat is energy transferred between objects or substances due to temperature differences. • Heat transfer occurs through conduction, convection, and radiation. • Heat energy influences the physical properties and changes of matter, such as phase transitions and chemical reactions. • Atoms consist of a nucleus containing protons and neutrons, surrounded by electrons in energy levels (shells). • Electrons occupy specific energy levels and orbitals around the nucleus according to principles such as the Aufbau principle, Pauli exclusion principle, and Hund's rule. • The arrangement of electrons determines the chemical properties and reactivity of elements. • Chemical bonds form between atoms to achieve stability by filling electron shells or achieving a stable electron configuration. • Ionic bonds involve transfer of electrons between atoms, covalent bonds involve sharing of electrons, and metallic bonds involve a sea of delocalized electrons. • The type of bonding influences the properties of substances, including their strength, conductivity, and melting points.
Demonstration of Learning:	**Pacing for Unit**
• UConn provided exams • UConn provided labs • Teacher created assignments	Approximately 20 classes
Family Overview (link below)	**Integration of Technology:**
Family Overview ECE Chemistry	• Calorimeter and temperature probe for thermochemistry lab • Digital barometer for vapor pressure lab
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Unit Specific Vocabulary ECE Chemistry	*N/A*
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Math Connections: • Calorimetry Equation: Understanding and applying the calorimetry equation involves algebraic manipulation, reinforcing skills in solving equations and working with variables.	• Heat is the same as temperature. • Heat transfer only depends on the temperature difference between objects. • All substances change state at the same temperature.

• Graph Interpretation: Determining if a reaction is endothermic or exothermic using data or graphs requires skills in data analysis and interpretation of visual information, linking math with scientific inquiry. • Quantitative Descriptions: Describing relationships between speed, frequency, wavelength, and energy of light waves involves using formulas and calculations, which reinforces mathematical concepts such as ratios and direct proportionality. ELA Connection: • Creating Lewis Structures: Writing out and explaining Lewis structures necessitates precise language use and can involve persuasive writing if students need to argue for the most favorable structure based on formal charge or resonance.	• Electrons are located on the surface of atoms. • Electrons orbit the nucleus in fixed paths. • All bonds are identical in strength.

Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**

Representation:
I can use the Bohr model and quantum mechanical model of the atom.
- Use diagrams and illustrations of both the Bohr model and quantum mechanical model. Include labeled parts to highlight key features, such as energy levels in the Bohr model and electron clouds in the quantum model.
- Incorporate videos and animations that explain both models, demonstrating how electrons behave in each model, and showcasing their historical context and development.
- Provide clear, concise written descriptions of both models, emphasizing their differences and similarities. Use bullet points or tables to compare key features.

Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**

An EL can conduct research and evaluate and communicate findings to answer questions or solve problems.
I can use the Bohr model and quantum mechanical model of the atom.
- Level 1: I can verbally describe the parts of an atom
- Level 2: I can interpret and manipulate atomic models
- Level 3: I can analyze scenarios (word problems) and choose appropriate equations to solve problems independently. I can explain my problem-solving process and justify my choices of equations.
- Level 4: I can critique and refine problem-solving strategies based on verbal or written feedback.
- Level 5: I can synthesize information from multiple sources to solve real-world problems involving more modern models of the atom (quantum mechanical model) and explain my solutions effectively.

The CELP guidance is to **support the development of language; access to course content expectations should not change as a result of MLL status.*

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
1	I can use calorimetry concepts to study the heat of a chemical reaction	• I can define heat as a measurement of energy, and distinguish it from temperature • I can use the calorimetry equation to solve for any of its equations. • I can determine, from data or from a graph, if a reaction is endothermic or exothermic	
2	I can use Hess's law	• I can describe the enthalpy of formation from the enthalpy of reaction. • I can calculate the enthalpy of a reaction using the enthalpy of formation values.	
3	I can describe the wave nature of light	• I can qualitatively and quantitatively describe the relationship between the speed frequency and wavelength and energy of the light waves	

		• I can describe the electromagnetic spectrum and order the waves based on energy
4	I can use the Bohr model and quantum mechanical model of the atom.	• I can describe electronic transitions and qualitatively and quantitatively predict properties of light emitted or absorbed • I can state the name, symbols, and allowed combinations of quantum numbers • I can determine the electron configuration (including abbreviated and orbital diagrams) for any atom or ion on the periodic table • I can predict atomic radius, electronegativity, electron affinity, ion size, and ionization energy for an element based on its periodic table location.
5	I can describe the structure and bonding of covalent compounds	• I can describe the types of atoms that participate in covalent bonding. • I can use electronegativity to describe bond polarity and dipole moments. • I can describe the polarity and partial ionic character of a covalent bond
6	I can create and evaluate Lewis structures	• I can use the total number of valence electrons in a formula and the octet rule to determine the appropriate lewis structure • I can create Lewis structures for compounds that are exceptions to the octet rule. • I can calculate formal charge and use it to determine the more likely structure. • I can describe the concept of resonance
7	I can describe the geometry of covalent compounds.	• I can describe VSEPR theory • I can use VSEPR theory to predict and name, shapes,, bond angles, and hybridization • I can differentiate between pi and sigma bonds

Unit Title:	
Unit 4: Liquids and Solids (1127)	
Relevant Standards: Bold indicates priority	
LO 1: To explain and apply basic principles, definitions, laws and theories of chemistry. LO 2: To apply basic principles to solve real world problems described verbally, graphically, symbolically or numerically. LO 3: To develop laboratory skills and techniques along with data collection, data analysis and interpretation. **LO 4: To develop logical analytical skills which can be used in real life problem solving and analysis.**	
Essential Question(s):	**Enduring Understanding(s):**
• What are intermolecular forces, and how do they affect the properties of substances? • What are the different types of intermolecular forces (e.g., London dispersion forces, dipole-dipole interactions, hydrogen bonding)? • How do intermolecular forces influence physical properties such as boiling point, melting point, and solubility?	• Intermolecular forces are attractive forces between molecules that determine their physical state and behavior. • London dispersion forces arise from temporary fluctuations in electron distribution and exist between all molecules. • Dipole-dipole interactions occur between polar molecules due to permanent dipoles. • Hydrogen bonding is a special type of dipole-dipole interaction where hydrogen atoms bonded to highly electronegative atoms (such as nitrogen, oxygen, or fluorine) exhibit a strong attraction to lone pairs on neighboring molecules. • Intermolecular forces increase with molecular size and polarity, affecting properties such as boiling point (higher forces require more energy to overcome), melting point, and solubility (like dissolves like principle).
Demonstration of Learning:	**Pacing for Unit**
• UConn provided exams • UConn provided labs • Teacher created assignments	Approximately 20 classes
Family Overview (link below)	**Integration of Technology:**
Family Overview ECE Chemistry	*N/A*
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Unit Specific Vocabulary ECE Chemistry	*N/A*
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Math Connection: • Quantitative Relationships: Relating vapor pressure to the heat of vaporization using the Clausius-Clapeyron equation involves algebraic manipulation and logarithmic calculations, enhancing students' skills in applying mathematical concepts to real-world scenarios. ELA Connection: • Descriptive Writing: Describing hydrogen bonding and differentiating between bond and molecular polarity require students to articulate complex scientific concepts succinctly, enhancing their descriptive writing skills.	• Intermolecular forces are the same as chemical bonds. • All intermolecular forces are equally strong.
Differentiation through *Universal Design for Learning*	

UDL Indicator	Teacher Actions:
Representation: *I can relate Intermolecular forces of attraction to physical properties and molecular structures.* • Use diagrams and charts to illustrate different types of intermolecular forces (e.g., hydrogen bonding, dipole-dipole interactions, London dispersion forces) and how they relate to molecular structures and physical properties like boiling point, melting point, and solubility. • Incorporate videos that explain intermolecular forces, showcasing real-life examples of how these forces affect the properties of substances, such as the behavior of water versus oil. • Provide written explanations that define key terms and concepts, using clear and straightforward language. Include examples that connect intermolecular forces to observable physical properties.	
Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**
An EL can conduct research and evaluate and communicate findings to answer questions or solve problems. *I can relate Intermolecular forces of attraction to physical properties and molecular structures.* • Level 1: I can verbally describe intermolecular forces • Level 2: I can interpret and manipulate molecular structures • Level 3: I can analyze scenarios (word problems) and choose appropriate equations to solve problems independently. I can explain my problem-solving process and justify my choices of equations. • Level 4: I can critique and refine problem-solving strategies based on verbal or written feedback. • Level 5: I can synthesize information from multiple sources to solve real-world problems involving IMFs and their effect on physical properties, and explain my solutions effectively. **The CELP guidance is to **support the development of language**; access to course content expectations should not change as a result of MLL status.*	

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
1	I can relate Intermolecular forces of attraction to physical properties and molecular structures.	• I can differentiate between bond and molecular polarity • I can use bond polarity and molecular geometry to determine the polarity of the molecule. • I can compare the strength of intermolecular forces given different structures • I can describe hydrogen bonding • I can relate intermolecular forces to freezing point, boiling point, melting point, and vapor pressure. • I can quantitatively relate vapor pressure to the heat of vaporization using the Clausius-Clapeyron • I can read and interpret phase diagrams	

Unit Title:

Unit 5: Colligative Properties and Kinetics (1128)

Relevant Standards: Bold indicates priority

LO 1: To explain and apply basic principles, definitions, laws and theories of chemistry.
LO 2: To apply basic principles to solve real world problems described verbally, graphically, symbolically or numerically.
LO 3: To develop laboratory skills and techniques along with data collection, data analysis and interpretation.
LO 4: To develop logical analytical skills which can be used in real life problem solving and analysis.

Essential Question(s):	**Enduring Understanding(s):**
• What are colligative properties, and how do they depend on the number of solute particles in a solution? • What are the common colligative properties (e.g., vapor pressure lowering, boiling point elevation, freezing point depression), and how are they calculated? • How do colligative properties affect practical applications, such as in freezing point depression in antifreeze or boiling point elevation in cooking? • What is chemical kinetics, and how does it relate to reaction rates? • What factors influence the rate of chemical reactions (e.g., concentration, temperature, catalysts)? • How are reaction mechanisms and rate laws used to describe and predict reaction rates?	• Colligative properties depend solely on the number of solute particles present, not on their identity. • Vapor pressure lowering, boiling point elevation, and freezing point depression are directly proportional to the solute concentration in a solution. • Colligative properties are important in various industrial and everyday applications, such as in pharmaceuticals, food science, and automotive fluids • Chemical kinetics studies the speed at which chemical reactions occur and the factors that influence reaction rates. • Reaction rates increase with higher concentrations of reactants, higher temperatures, and the presence of catalysts. • Rate laws and reaction mechanisms describe how reactants transform into products over time, providing insights into reaction pathways and controlling reaction rates in practical applications.
Demonstration of Learning:	**Pacing for Unit**
• UConn provided exams • UConn provided labs • Teacher created assignments	Approximately 20 classes
Family Overview (link below)	**Integration of Technology:**
Family Overview ECE Chemistry	*N/A*
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Unit Specific Vocabulary ECE Chemistry	*N/A*
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Math Connections: • Calculations of Concentration: Expressing concentrations using mole fraction and molality involves mathematical calculations, reinforcing skills in ratios and proportions, which are fundamental in solving real-world problems in chemistry. • Equations and Graphing: Using mathematical equations to describe colligative effects, such as the van't Hoff factor, requires students to perform algebraic manipulations and graph relationships between variables like solute concentration and boiling point.	• Boiling point elevation and freezing point depression only occur with ionic solutes, not molecular ones. • Adding more solute always results in a greater change in freezing or boiling points. • Colligative properties only have an impact in extreme conditions, not in everyday life. • Chemical kinetics is only concerned with the speed of reactions, not with the factors influencing it. • Reaction rates only depend on temperature and not on other factors such as concentration or catalysts. • Catalysts change the equilibrium of a reaction. • The rate law is only relevant for complex reactions, not for simple ones.

• Reaction Rate Calculations: Calculating reaction rates from experimental data involves applying statistical analysis and understanding rates of change, emphasizing the importance of quantitative reasoning in scientific inquiry. ELA Connection: • Descriptive Explanations: Explaining why some solutions produce or absorb heat when they form requires students to articulate complex scientific concepts clearly, enhancing their ability to write detailed and coherent explanations.	

Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**

Representation:

I can use rate and concentration data to identify reaction orders and derive rate laws.

- Use graphs to illustrate how concentration changes over time during a reaction. Different reaction orders can be represented visually (e.g., linear graphs for first-order reactions) to highlight the relationship between concentration and reaction rate.
- Incorporate videos that demonstrate the process of analyzing rate and concentration data, including examples of how to identify reaction orders and derive rate laws from experimental results.
- Use simulations that allow students to manipulate concentration values and observe the effects on reaction rates and graphs, providing a hands-on understanding of the concepts.

Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**

An EL can conduct research and evaluate and communicate findings to answer questions or solve problems.

I can use rate and concentration data to identify reaction orders and derive rate laws

- Level 1: I can verbally describe what is meant by rate of a chemical reaction
- Level 2: I can interpret data to determine rate laws
- Level 3: I can analyze scenarios (word problems) and choose appropriate equations to solve problems independently. I can explain my problem-solving process and justify my choices of equations.
- Level 4: I can critique and refine problem-solving strategies based on verbal or written feedback.
- Level 5: I can synthesize information from multiple sources to solve real-world problems involving reaction rates and rate laws and explain my solutions effectively.

The CELP guidance is to **support the development of language; access to course content expectations should not change as a result of MLL status.*

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
1	I can describe the basic properties of solutions and how they form	• Predict whether a given mixture will yield a solution based on molecular properties of its components • I can explain why some solutions either produce or absorb heat when they form • I can define and give examples of electrolytes • I can distinguish between the physical and chemical changes that accompany dissolution of ionic and covalent electrolytes • I can relate electrolyte strength to solute-solvent attractive forces • I can describe the effects of temperature and pressure on solubility • I can state Henry's law and use it in calculations involving the solubility of a gas in a liquid • I can describe the idea of "like dissolves like" • I can use the term miscible appropriately	

2	I can qualitatively and quantitatively describe the colligative properties of solutions	• I can express concentrations of solution components using mole fraction and molality • I can describe the effect of solute concentration on various solution properties (vapor pressure, boiling point, freezing point, and osmotic pressure) • I can perform calculations using the mathematical equations that describe these various colligative effects, including the van't Hoff factor • I can describe the process of distillation and its practical applications • I explain the process of osmosis
3	I can calculate and describe how to manipulate reaction rates	• I can define chemical reaction rate • I can derive rates from the balanced equation for a given chemical reaction • I can calculate reaction rates from experimental data • I can describe and explain using collision theory the effects of chemical nature, physical state, temperature, concentration, and catalysis on reaction rates • I can define the concepts of activation energy and transition states, and relate them to a potential energy graph • I can use the Arrhenius equation in calculations
4	I can determine and utilize the rate law and the integrated rate law of a reaction	• I can explain the form and function of a rate law • I can use rate laws to calculate reaction rates • I can use rate and concentration data to identify reaction orders and derive rate laws • I can explain the form and function of an integrated rate law • I can perform integrated rate law calculations for zero-, first-, and second-order reactions • I can define half-life and carry out related calculations • I can identify the order of a reaction from concentration/time data

Unit Title:

Unit 6: Concepts of Equilibrium (1128)

Relevant Standards: Bold indicates priority

LO 1: To explain and apply basic principles, definitions, laws and theories of chemistry.
LO 2: To apply basic principles to solve real world problems described verbally, graphically, symbolically or numerically.
LO 3: To develop laboratory skills and techniques along with data collection, data analysis and interpretation.
LO 4: To develop logical analytical skills which can be used in real life problem solving and analysis.

Essential Question(s):	**Enduring Understanding(s):**
• What is chemical equilibrium? • How do we express equilibrium in terms of the equilibrium constant (K)? • What factors affect the position of equilibrium? • How do we calculate equilibrium concentrations or pressures? • How does equilibrium relate to acids and bases?	• Chemical equilibrium is a dynamic state where the rate of the forward reaction equals the rate of the reverse reaction, resulting in no net change in the concentrations of reactants and products over time. • The equilibrium constant (K) expresses the ratio of product concentrations (or partial pressures) to reactant concentrations (or partial pressures) at equilibrium, with each raised to the power of their respective stoichiometric coefficients. • Factors such as concentration, pressure (for gasses), and temperature influence the position of equilibrium according to Le Chatelier's Principle. • Equilibrium concentrations (or pressures) can be calculated using the equilibrium expression and known initial conditions of reactants and products. • Equilibrium concepts apply to acids and bases through the acid dissociation constant Ka and base dissociation constant Kbwhich quantify the strength of acids and bases in aqueous solutions.
Demonstration of Learning:	**Pacing for Unit**
• UConn provided exams • UConn provided labs • Teacher created assignments	Approximately 20 classes
Family Overview (link below)	**Integration of Technology:**
Family Overview ECE Chemistry	• LabQuest and SpectroVis for K of a chemical reaction lab • LabQuest and pH probe for pH measurements lab
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Unit Specific Vocabulary ECE Chemistry	*N/A*
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Math Connections: • Equilibrium Calculations: Calculating equilibrium concentrations and constants involves algebraic manipulations and applying mathematical formulas, reinforcing students' skills in solving equations and working with variables. • Reaction Quotient and Equilibrium Expressions: Deriving expressions for reaction quotients and equilibrium constants requires understanding ratios and exponents, which enhances students' mathematical reasoning and comprehension of proportional relationships.	• Chemical equilibrium means that the concentrations of reactants and products are equal. • At equilibrium, the reaction stops and no further changes occur. • Chemical equilibrium is a one-time event, rather than a dynamic process. • The equilibrium constant (K) is always the same, regardless of temperature or pressure. • Only changes in concentration can affect the position of equilibrium. • The equilibrium constant and rate constant are the same.

• pH Calculations: Calculating the pH of buffer solutions and performing titration calculations involves logarithmic functions and understanding concentration, providing practical applications of math in chemistry. ELA Connection: • Technical Documentation: Writing equations for acid and base ionization reactions and discussing the behavior of amphiprotic substances helps students develop their ability to document scientific processes accurately, enhancing their technical writing skills.	• Acids and bases do not reach equilibrium in water because they dissociate completely.

Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**

Representation:
I can interpret titration curves for strong and weak acid-base systems and compute sample pH at important stages of a titration.

- Provide clear, labeled graphs of titration curves for strong and weak acids, illustrating the changes in pH at different stages of the titration. Highlight key points such as the equivalence point, buffer region, and initial and final pH values.
- Use diagrams to depict the chemical reactions occurring during titration, showing how the acid and base interact and change in concentration.
- Incorporate videos that explain titration processes, including how to read titration curves and how to calculate pH at various stages. Visual demonstrations can enhance understanding of the concepts.

Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**

An EL can conduct research and evaluate and communicate findings to answer questions or solve problems.
I can interpret titration curves for strong and weak acid-base systems and compute sample pH at important stages of a titration.

- Level 1: I can verbally describe the parts of a titration curve
- Level 2: I can interpret and manipulate the graph to match specific titrations
- Level 3: I can analyze scenarios (word problems) and choose appropriate equations to solve problems independently. I can explain my problem-solving process and justify my choices of equations.
- Level 4: I can critique and refine problem-solving strategies based on verbal or written feedback.
- Level 5: I can synthesize information from multiple sources to solve real-world problems involving titration curves and explain my solutions effectively.

The CELP guidance is to **support the development of language; access to course content expectations should not change as a result of MLL status.*

Lesson Sequence	**Learning Target**	**Success Criteria/ Assessment**	**Resources**
1	I can qualitatively and quantitatively describe reversible chemical reactions	• I can describe the reversible and dynamic nature of equilibrium systems • I can derive expressions for reaction quotients and equilibrium expressions • I can calculate values of reaction quotients and equilibrium constants, using concentrations and pressures • I can relate the magnitude of an equilibrium constant to properties of the chemical system • I can describe the ways in which an equilibrium system can be stressed • I can predict the response of a stressed equilibrium using Le Châtelier's principle	

		• I can identify the changes in concentration or pressure that occur for chemical species in equilibrium systems when a stress is applied. • I can calculate equilibrium concentrations or pressures and equilibrium constants, using various algebraic approaches
2	I can qualitatively and quantitatively describe acid base equilibria	• I can identify acids, bases, and conjugate acid-base pairs according to the Brønsted-Lowry and Lewis definitions. • I can write equations for acid and base ionization reactions • I can describe the acid-base behavior of amphiprotic substances • I can assess the relative strengths of acids and bases according to their ionization constants • I can rationalize trends in acid–base strength in relation to molecular structure* • Carry out equilibrium calculations for weak acid–base systems • I can predict whether a salt solution will be acidic, basic, or neutral • I can extend previously introduced equilibrium concepts to acids and bases that may donate or accept more than one proton
3	I can perform acid-base titrations(including weak acids and bases) and qualitatively and quantitatively explain the concept of buffers	• I can describe the composition and function of acid–base buffers • I can calculate the pH of a buffer before and after the addition of added acid or base • I can interpret titration curves for strong and weak acid-base systems • I can compute sample pH at important stages of a titration • I can explain the function of acid-base indicators and choose appropriate indicators for particular acid base titrations. • I can describe how the presence of a common ion will effect an acid /base solutions • I can understand the concept of buffer capacity

Unit Title:	
Unit 7: Solubility equilibria, Thermodynamics, and Electrochemistry (1128)	
Relevant Standards: Bold indicates priority	
LO 1: To explain and apply basic principles, definitions, laws and theories of chemistry. LO 2: To apply basic principles to solve real world problems described verbally, graphically, symbolically or numerically. **LO 3: To develop laboratory skills and techniques along with data collection, data analysis and interpretation.** LO 4: To develop logical analytical skills which can be used in real life problem solving and analysis.	
Essential Question(s):	**Enduring Understanding(s):**
• What factors affect the solubility of a compound in a solvent? • How do we express the solubility of a compound in quantitative terms? • How do we calculate the solubility of a compound given its Ksp? • How does Le Chatelier's Principle apply to solubility equilibria? • What is the fundamental concept of thermodynamics? • How do we calculate changes in internal energy, enthalpy, and entropy? • What is Gibbs free energy (ΔG) and how is it used to predict spontaneity? • How does thermodynamics apply to phase equilibria and chemical equilibria? • What are redox reactions, and how are they represented? • How do we measure the spontaneity and extent of redox reactions? • What is the relationship between ΔG and Ecell • What are galvanic cells?	• Solubility of a compound in a solvent is influenced by temperature, pressure (for gasses), pH, and the presence of common ions. • Solubility can be expressed quantitatively • Le Chatelier's Principle predicts how changes in concentration, temperature, or pressure affect solubility equilibrium. • Thermodynamics deals with energy transformations within a system and between the system and its surroundings. • Gibbs free energy (ΔG) quantifies the spontaneity of a process; ΔG < 0 indicates spontaneity under standard conditions. • ΔG helps predict the feasibility of reactions and phase changes at constant temperature and pressure • Redox reactions involve electron transfer between species, where oxidation involves loss of electrons and reduction involves gain. • ΔG = -nFEcell • Galvanic cells (electrochemical cells) convert chemical energy into electrical energy through redox reactions
Demonstration of Learning:	**Pacing for Unit**
• UConn provided exams • UConn provided labs • Teacher created assignments	Approximately 20 classes
Family Overview (link below)	**Integration of Technology:**
Family Overview ECE Chemistry	• LabQuest and temperature probe for thermodynamic measurements lab. • Labquest and voltage meter for voltaic cell lab
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Unit Specific Vocabulary ECE Chemistry	*N/A*
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Math Connections: • Equilibrium Computations: Carrying out equilibrium computations involving solubility, equilibrium expressions, and solute concentrations requires algebraic manipulation and understanding of ratios, reinforcing students' mathematical skills in solving equations. • Entropy and Free Energy Calculations: Calculating	• Balancing chemical equations is simply about having the same number of atoms on each side, without understanding the conservation of mass and charge. • Misunderstand the common ion effect, thinking that the presence of a common ion always increases solubility, rather than recognizing that it can actually decrease solubility for certain salts. • Confuse entropy with disorder and think that a

entropy changes for phase transitions and chemical reactions, as well as calculating free energy changes using formation values, involves applying mathematical formulas and principles, enhancing quantitative reasoning. • Nernst Equation: Using the Nernst equation to determine cell potentials under nonstandard conditions involves logarithmic calculations, emphasizing the application of math in real-world chemistry scenarios. ELA Connection: • Technical Writing Skills: Writing chemical equations and equilibrium expressions necessitates careful attention to detail and accuracy in scientific notation, enhancing students' technical writing skills.	process with higher entropy is always "messier," not understanding that it is a measure of the number of microstates and energy dispersal. • Believe that spontaneity means a reaction occurs quickly, rather than understanding that it refers to the thermodynamic favorability of a reaction. • That electrode mass increases at both the anode and cathode, not realizing that oxidation occurs at the anode (mass decreases) and reduction occurs at the cathode (mass increases). • That standard cell potentials apply in all conditions without considering the effects of concentration and temperature, leading to confusion when applying the Nernst equation.

Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**
Representation: *I can carry out equilibrium computations involving solubility, equilibrium expressions, and solute concentrations.* • Use diagrams to illustrate the concept of chemical equilibrium, showing the forward and reverse reactions, along with visual representations of solubility products and concentration changes. • Create flowcharts that outline the steps for calculating solubility, equilibrium expressions, and solute concentrations, making the process clearer and more accessible. • Incorporate videos that explain equilibrium concepts, including solubility and the calculation of equilibrium expressions. Visual aids can help clarify complex ideas and computations.	

Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**
An EL can conduct research and evaluate and communicate findings to answer questions or solve problems. *I can carry out equilibrium computations involving solubility, equilibrium expressions, and solute concentrations.* • Level 1: I can verbally describe a saturated solution • Level 2: I can interpret and manipulate the Ksp expression • Level 3: I can analyze scenarios (word problems) and choose appropriate equations to solve problems independently. I can explain my problem-solving process and justify my choices of equations. • Level 4: I can critique and refine problem-solving strategies based on verbal or written feedback. • Level 5: I can synthesize information from multiple sources to solve real-world problems involving Ksp and saturated solutions and explain my solutions effectively. **The CELP guidance is to **support the development of language**; access to course content expectations should not change as a result of MLL status.*	

Lesson Sequence	**Learning Target**	**Success Criteria/ Assessment**	**Resources**
1	I can qualitatively and quantitatively describe the equilibria of saturated solutions	• I can write chemical equations and equilibrium expressions representing solubility equilibria • I can carry out equilibrium computations involving solubility, equilibrium expressions, and solute concentrations • I can qualitatively and quantitatively describe how the presence of a common ion will affect the solubility of a salt. • I can use Ksp to predict precipitation.	
2	I can qualitatively and quantitatively describe entropy, and gibbs free energy.	• I can distinguish between spontaneous and nonspontaneous processes • I can differentiate between order and disorder • I can define entropy	

		• I can explain the relationship between entropy and the number of microstates • I can predict the sign of the entropy change (both system and surroundings) for chemical and physical processes • I can state and explain the second and third laws of thermodynamics • I can calculate entropy changes for phase transitions and chemical reactions under standard conditions • I can define Gibbs free energy, and describe its relation to spontaneity • I can calculate free energy change for a process using free energies of formation for its reactants and products • I can calculate free energy change for a process using enthalpies of formation and the entropies for its reactants and products • I can explain how temperature affects the spontaneity of some processes • I can relate standard free energy changes to equilibrium constants
3	I can qualitatively and quantitatively describe electrochemistry	• I can describe defining traits of redox chemistry • I can Identify what has been oxidized/reduced/ oxidizing agent / reducing agent. • I can balance chemical equations for redox reactions using the half-reaction method • I can describe the function of a galvanic cell and its components, and any changes in electrode mass • I can use cell notation to symbolize the composition and construction of galvanic cells • I can describe and relate the definitions of electrode and cell potentials • I can calculate cell potentials • I can qualitatively and quantitatively explain the relations between potential, free energy change, and equilibrium constants • I can use the Nernst equation to determine cell potentials under nonstandard conditions • I can describe the process of electrolysis • I can perform stoichiometric calculations for electrolytic processes

Unit Title:	
Unit 8: Nuclear Chemistry (1128)	
Relevant Standards: Bold indicates priority	
LO 1: To explain and apply basic principles, definitions, laws and theories of chemistry. **LO 2: To apply basic principles to solve real world problems described verbally, graphically, symbolically or numerically.** **LO 3: To develop laboratory skills and techniques along with data collection, data analysis and interpretation.** LO 4: To develop logical analytical skills which can be used in real life problem solving and analysis.	
Essential Question(s):	**Enduring Understanding(s):**
• What is radioactivity, and what causes it? • How do we quantify radioactive decay? • What factors influence nuclear stability? • What are nuclear reactions, and how do they differ from chemical reactions?	• Radioactivity arises from the instability of atomic nuclei, leading to the emission of radiation in the form of alpha particles, beta particles, and gamma rays. • Radioactive decay follows exponential decay kinetics described by the decay laws • Nuclear stability is influenced by the balance between nuclear forces (strong force binding protons and neutrons) and the electrostatic repulsion between protons (Coulomb force)
Demonstration of Learning:	**Pacing for Unit**
• UConn provided exams • UConn provided labs • Teacher created assignments	Approximately 20 classes
Family Overview (link below)	**Integration of Technology:**
Family Overview ECE Chemistry	*N/A*
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Unit Specific Vocabulary ECE Chemistry	*N/A*
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Math Connections: • Calculating Mass Defect and Binding Energy: Calculating mass defect and binding energy for nuclei involves applying mathematical formulas and performing unit conversions, reinforcing students' skills in quantitative reasoning and algebra. • Kinetic Parameters: Calculating half-life and other kinetic parameters for decay processes requires an understanding of exponential functions and logarithms, illustrating the mathematical principles behind radioactive decay. • Balancing Nuclear Equations: Writing and balancing nuclear equations necessitates an understanding of conservation laws and numerical relationships, enhancing students' abilities in algebraic manipulation and problem-solving. ELA Connections: • Descriptive Writing: Describing nuclear structure in terms of protons, neutrons, and electrons requires clear and precise language, helping students develop their ability to convey complex	• Think that binding energy is always a positive quantity and do not recognize that it represents the energy required to disassemble a nucleus into its individual protons and neutrons. • Believe that all radioactive decay processes are the same, failing to recognize the differences between alpha decay, beta decay, and gamma decay, and their respective characteristics. • Have difficulty writing or balancing decay equations, believing they can ignore the conservation of mass and charge, leading to incorrect representations of nuclear reactions.

scientific concepts effectively. • Interpreting Nuclear Decay Reactions: Writing and interpreting nuclear decay equations enhances reading comprehension and analytical skills, as students must understand the implications of nuclear changes and the particles involved.	

Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**

Representation:
I can qualitatively and quantitatively describe nuclear chemistry.

- Provide information in various formats, such as videos, infographics, and interactive simulations. For example, using animations to illustrate nuclear decay processes helps visualize complex concepts.
- Use diagrams, charts, and models to represent nuclear structures, decay equations, and energy changes. Visual aids can help students grasp abstract concepts and enhance understanding.
- Offer bilingual materials or glossaries that include key terms in both English and the students' native languages. This support ensures comprehension of scientific vocabulary essential for qualitative and quantitative descriptions.

Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**

An EL can conduct research and evaluate and communicate findings to answer questions or solve problems.
I can identify common particles and energies involved in nuclear reactions

- Level 1: I can verbally describe the parts of a nuclear chemical reaction
- Level 2: I can interpret nuclear chemical reaction
- Level 3: I can analyze scenarios (word problems) and choose appropriate equations to solve problems independently. I can explain my problem-solving process and justify my choices of equations.
- Level 4: I can critique and refine problem-solving strategies based on verbal or written feedback.
- Level 5: I can synthesize information from multiple sources to solve real-world problems involving nuclear equations and reactions and explain my solutions effectively.

The CELP guidance is to **support the development of language; access to course content expectations should not change as a result of MLL status.*

Lesson Sequence	**Learning Target**	**Success Criteria/ Assessment**	**Resources**
1	I can qualitatively and quantitatively describe nuclear chemistry	• I can describe nuclear structure in terms of protons, neutrons, and electrons • I can calculate mass defect and binding energy for nuclei • I can Identify common particles and energies involved in nuclear reactions • I can write and balance nuclear equations • I can recognize common modes of radioactive decay • I can Identify common particles and energies involved in nuclear decay reactions • I can write and balance nuclear decay equations • I can calculate kinetic parameters for decay processes, including half-life	

Course Title:	Content Area:	Credit (if applicable)
Cooperative Work Experience 50/100	CTE	CWE 50 Hours: 0.50 credit CWE 100 Hours: 1.00 credit

Course Description:

The Career Work Experience course provides students with the opportunity to gain real-world experience through a 50- or 100-hour internship in a career field of interest. Students will apply academic knowledge and develop essential workplace skills such as communication, teamwork, time management, and problem-solving. Through hands-on learning, students will gain a better understanding of professional expectations, workplace safety, and ethical responsibilities. They will engage in meaningful reflection to identify their strengths, areas for growth, and future career goals. Students will also create and maintain a career portfolio to support their career readiness. This course helps students connect classroom learning to real-world applications, build confidence, and prepare for life beyond high school.

Aligned Core Resources:	Connection to the ***BPS Vision of the Graduate***
Work Based Learning Software - Tracking internship hours and job placements	Meaningfully Contribute to a Global Society • Collaboration • Social and Cross-Cultural Skills • Empathy Effectively Communicate in a Global Society • Communication • Technology Literacy Successfully Employ Skills for Self-Sufficiency • Goal Directed

Additional Course Information: ***Knowledge/Skill Dependent courses/prerequisites***	Link to ***Completed Equity Audit***
Prerequisite BPS Course: Introduction to Cooperative Work Experience - successful completion with a course grade of 75% or better and teacher recommendation	CWE 50/100 Equity Curriculum Review

Standard Matrix

District Learning Expectations and Standards NBEA National Standards 2023	Internship
Career Development	
4. School-to-Career Transition Develop strategies to effectively transition from school to career	X
5. Lifelong Learning Relate the importance of lifelong learning to personal career success.	X
Communication	
1. Foundations of Communication Listen actively, use the communication, read and research information, and integrate technology to enhance communication effectiveness.	X
2. Interpersonal Skills Apply interpersonal skills in personal and professional environments to communicate effectively.	X
3. Written Communication Prepare clear, complete, concise, correct, and courteous written messages for personal and professional uses.	X
4. Spoken Communication Demonstrate professional speaking techniques and strategies.	X

Unit Links

Internship

Unit Title:
Internship
Relevant Standards: Bold indicates priority
NBEA Standards 2023 Career Development 4. School-to-Career Transition Develop strategies to effectively transition from school to career 5. Lifelong Learning Relate the importance of lifelong learning to personal career success. Communication 1. Foundations of Communication Listen actively, use the communication, read and research information, and integrate technology to enhance communication effectiveness. 2. Interpersonal Skills Apply interpersonal skills in personal and professional environments to communicate effectively. 3. Written Communication Prepare clear, complete, concise, correct, and courteous written messages for personal and professional uses. 4. Spoken Communication Demonstrate professional speaking techniques and strategies.

Essential Question(s):	**Enduring Understanding(s):**
• What skills are essential in the workplace, and how can I develop them? • How can I apply what I have learned in school to real-world situations? • What are my strengths and areas for growth in the workplace, and how can I improve? • What are ethical considerations I should be aware of in the workplace? • How can I evaluate my internship experience and use it to inform my future career goals?	• Students will participate in an internship within their chosen career. • Students will demonstrate language arts & mathematics knowledge and skills as applicable in their individual internship placements. • Students will use a variety of communication techniques in their individual internship placements. • Students will effectively communicate with their co-workers and supervisors through oral, written, and nonverbal communication. • Students will employ proper grammar, punctuation, and spelling in all written communications and documents. • Students will demonstrate critical thinking and problem solving skills as needed in individual internship placements. • Students will use technology as appropriate for their individual workplace internships. • Students will demonstrate proper use of workplace technology as applicable. • Students will be able to describe the nature of the business they are in. • Students will demonstrate personal safety. • Students will follow all jobsite safety rules and regulations. • Students will be able to describe all emergency procedures. • Students will demonstrate leadership and teamwork skills at their individual placements. • Students will develop working professional relationships with their colleagues. • Students will be able to identify ethical and legal requirements within their individual internship placements.

	• Students will demonstrate positive behaviors and employability skills throughout their internship placement. • Students will maintain a career portfolio. • Students will identify requirements for maintaining a position and furthering their career. • Students will identify professional development opportunities in their career field. • Students will research licensing, certification, and credentialing requirements. • Students will use information management techniques and strategies in the workplace to assist in decision-making in their individual internship placements. • Students will employ time management skills in their internship placements.
Demonstration of Learning:	**Pacing for Unit**

• Internship
• Supervisor Evaluation
• Teacher Evaluation
• Self-Reflection
• Portfolio
• Weekly journal entries
	• Ongoing - entirety of semester
	  ○ 50 hours (average 4-6 hours per week)
	  ○ 100 hours (average 6-8 hours per week)

Family Overview (link below)	**Integration of Technology:**
CWE 50/100 Family Overview CWE 50/100 Family Overview - Spanish	Students will use Google Classroom and Google Docs to complete journal entries weekly. Students will use technology to create their portfolio. They can use among multiple Google tools: Sites, Sheets, Docs, or Slides
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Internship, career, knowledge, skills, communication, strategies, active listening, grammar, punctuation, spelling, oral, nonverbal, critical thinking, solutions, problem solving, technology, applications, organizations, scope, OSHA, Safety, Health, Emergency, Rules, Regulations, leadership, teamwork, ethics, legal, policies, procedures, employability skills, career portfolio, professional development, licensing, certification, credentials, decision-making, information management, time management,	N/A
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Students will participate in an internship in their career field of choice. Students will be exposed to learning beyond the classroom.	• Working in an internship/job is easy and requires minimal skill level. • Internships are just about completing basic tasks. • Students think they know everything before they start. • Students will not make an impact on the business. • Students will get a job offer at the end of the internship. • Students will only learn technical skills, not soft skills.
Connections to Prior Units:	**Connections to Future Units:**

N/A	N/A
Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**
Engagement • 7.1 Optimize choice and autonomy • 7.2 Optimize relevance, value, and authenticity *Representation* • 3.1 Connect prior knowledge to new learning *Action/Expression* • 6.1 Set meaningful goals • 6.2 Anticipate and plan for challenges • 6.3 Enhance capacity for monitoring progress	*Engagement* • 7.1 Teachers will ensure students explore a field of interest and design a collaborative approach to design learning goals and activities • 7.2 Teachers will ensure activities are personalized, age, ability appropriate for the learners' lives; invite self-reflection to activities *Representation* • 3.1 Teachers will analyze student journal entries to understand their learning and help build connections between what was taught in the Introduction to Cooperative Work Experience course. • 3.1 Guide students in developing a portfolio that they can take with them post high school. *Action/Expression* • 6.1 - 6.3 Teacher will guide students in the development of goals and planning for their future through self-reflection and the development of their career portfolio.
Supporting Multilingual/English Learners	
Related *CELP standards*	**Learning Targets**
Communicate effectively in written and orally in a professional manner. • I understand and can apply essential workplace skills, including communication, teamwork, and problem-solving. ○ Level 1: I can understand and use basic workplace phrases and vocabulary to ask simple questions and follow instructions in team activities. ○ Level 2: I can use basic workplace language to participate in short conversations and ask for clarification or help when working with a team. ○ Level 3: I can communicate effectively in the workplace by sharing my ideas, asking questions and working with others to solve problems. ○ Level 4: I can use workplace-specific language to actively participate in team discussions, provide feedback, and solve problems independently and with others. ○ Level 5: I can confidently communicate and collaborate in the workplace, solve complex problems, and lead team discussions using advanced language skills. • I can gain insights into industry-specific practices, trends, and challenges relevant to the internship field. ○ Level 1: I can recognize and understand basic industry-related vocabulary and phrases related to the internship field. ○ Level 2: I can understand and use basic language to discuss industry practices, trends, and challenges in simple terms. ○ Level 3: I can explain basic industry practices, trends, and challenges using appropriate language, and begin to understand how they apply to the internship. ○ Level 4: I can analyze and explain industry-specific trends, practices, and challenges in more detail, using appropriate vocabulary and examples from my internship experience. ○ Level 5: I can critically evaluate industry-specific trends, practices, and challenges, and clearly explain their implications in the context of the internship field. • I can learn to manage time effectively, prioritize tasks, and contribute to team projects. ○ Level 1: I can understand and follow basic instructions related to time management and team tasks. ○ Level 2: I can use basic language to talk about time management and working on tasks as part of a team. ○ Level 3: I can manage my time by following instructions to complete tasks and contribute to team projects. ○ Level 4: I can manage my time effectively, prioritize tasks, and contribute meaningfully to team projects. ○ Level 5: I can independently manage my time, prioritize tasks, and take a leadership role in team projects.	

- I can develop the ability to assess personal strengths and areas for improvement based on feedback and experiences.
  - Level 1: I can understand basic feedback and recognize simple strengths and areas for improvement with support.
  - Level 2: I can express simple thoughts about my strengths and areas of improvement based on feedback.
  - Level 3: I can reflect on feedback and describe my strengths and areas for improvement.
  - Level 4: I can assess my own strengths and weaknesses based on feedback and set goals to improve.
  - Level 5: I can independently assess my strengths and areas for growth, set clear improvement goals, and reflect on progress

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
Ongoing	I can understand and apply essential workplace skills, including communication, teamwork, and problem-solving.	• I can demonstrate effective verbal and written communication skills in daily interactions. • I can actively contribute to team projects, showing the ability to collaborate and share responsibilities. • I can resolve conflicts or misunderstandings with peers using appropriate problem-solving techniques. • I can receive constructive feedback from supervisors on professional behavior and engagement.	
Ongoing	I can gain insights into industry-specific practices, trends, and challenges relevant to the internship field.	• I can complete a research project that includes key industry trends, terminology, and best practices. • I can engage in discussions about industry trends and apply insights to tasks. • I can shadow professionals in the field and summarize key takeaways in a reflective journal.	
Ongoing	I can learn to manage time effectively, prioritize tasks, and contribute to team projects.	• I can develop and submit a personal time management plan. • I can maintain a calendar, either on paper or electronically. • I complete all tasks on time and am accountable to my peers and employer.	
Ongoing	I can develop the ability to assess personal strengths and areas for improvement based on feedback and experiences.	• I can maintain a reflective journal documenting experiences, challenges, and learning outcomes. • I can submit a final self-assessment that includes goals achieved, skills developed, and plans for future growth.	

Course Title	Content Area	Grade Level:	Credit (if applicable)
Tools and Materials	CTE	9-12	0.5 Credit

Course Description

This laboratory-based exploratory course introduces students to a variety of materials and to the tools and machines used to process them. Materials utilized may include woods, metals, and plastics. A variety of manufacturing processes will be surveyed, including separating, forming, combining, joining, conditioning, and finishing. The hands-on instructional aspects of this course focus on proper operating procedures and safe operation of tools and machines.

Aligned Core Resources	Connection to the ***BPS Vision of the Graduate***
CCTC Standards (CTE)	CONTENT MASTERY • Develop and draw from a baseline understanding of knowledge in academic disciplines from our Bristol curriculum. CRITICAL THINKING AND PROBLEM SOLVING • Collect, assess and analyze relevant information • Reason effectively. Use systems thinking. • Make sound judgments and decisions. Identify, define and solve authentic problems and essential questions. • Reflect critically on learning experience, processes and solutions. • Transfer knowledge to other situations.
Additional Course Information: ***Knowledge/Skill Dependent courses/prerequisites***	**Link to *Completed Equity Audit***
None	Tools & Materials - Equity Curriculum Review (2025)

Standard Matrix

Standard	Unit 1	Unit 2	Unit 3	Unit 4
CCTC - AC - Use vocabulary, symbols and formulas common to architecture and construction.	X			
CCTC - AC-CST - Compare and contrast the building systems and components required for a construction project.		X		X
CCTC - AC - Comply with regulations and applicable codes to establish and manage a legal and safe workplace.			X	X
CCTC - AC -Use architecture and construction skills to create and manage a project				X

Unit Links

Unit 1: Measurements
Unit 2: Materials
Unit 3: Safety
Unit 4: Tools and Material Processing

Unit Title	
Unit 1: Measurements	
Relevant Standards: Bold indicates priority	
CCTC - AC 1 - Use vocabulary, symbols and formulas common to architecture and construction.	
Essential Question(s)	**Enduring Understanding(s)**
Can you measure to the nearest 1/16 of an inch?	Learning how to measure properly is a skill that is beneficial in everyday life.
Demonstration of Learning	**Pacing for Unit**
• Written documents • Formative and Summative Assessment	3 Days
Family Overview (link below)	**Integration of Technology**
Tools & Materials - Family Overview (2025)	N/A
Unit-specific Vocabulary	**Aligned Unit Materials, Resources, and Technology (beyond core resources)**
Ruler, Tape Measure, 1/16th's, Inches, feet, millimeter, centimeter, meter.	N/A
Opportunities for Interdisciplinary Connections	**Anticipated misconceptions**
Students will use and reinforce what they learned in math classes regarding the relationship between fractions and decimals, addition and subtraction of fractions.	Students may struggle with reading a ruler and understanding what each mark means on a ruler.
Connections to Prior Units	**Connections to Future Units**
N/A	Students will be using measurements throughout the course on various projects.
Differentiation through *Universal Design for Learning*	
UDL Indicator and Teacher Actions	
Representation • Use color-coded rulers with labeled increments for better differentiation of whole inches, half-inch, quarter-inch, etc. • Provide diagram posters showing measurement breakdowns. • Offer fraction equivalency charts with visuals to support simplification (e.g., showing 8/16 and 1/2 as equal). • Use demonstration videos or AR/VR tools to show real-world applications. • Provide digital measurement tools (e.g., virtual rulers, online fraction games). • Offer verbal explanations alongside written instructions. Action & Expression • Allow students to physically manipulate rulers and tape measures to explore increments. • Use tangible fraction tiles or folded paper strips to show measurement divisions. • Provide sentence starters for explanations (e.g., "This mark is __ inches because…"). • Use peer teaching where students explain a measurement process to a partner. Engagement • Connect measurements to real woodworking projects (e.g., building a small shelf). • Allow students to choose a woodworking project that involves applying measurements. • Use examples from students' backgrounds (e.g., measuring in different construction styles or traditional woodworking). • Encourage students to compare measurement systems (e.g., metric vs. imperial).	
Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets**

CELP Level	LT 1	LT 2
Emerging	• Recognizes and points to ruler markings with visual or gesture-based support. • Names basic increments with a word bank or	• Recognizes visual fraction models • Identifies equivalent fractions with the support of charts or manipulatives.

	bilingual glossary. • Uses sentence starters to explain markings • Copies measurements with modeling from the teacher or a peer. • Uses pre-marked templates or traces existing measurements. • Describes measurement placement using basic phrases	• Answers yes/no questions about simplification • Matches fractions to simplified forms using visual aids. • Reduces fractions by recognizing common patterns • Uses sentence frames
Expanding	• Names all ruler increments and describes spacing patterns • Explains where a measurement is found using simple sentences. • Uses comparisons • Accurately marks measured points and explains steps for transferring measurements. • Uses sequencing words to describe the process • Asks for clarification when needed using content-specific language	• Uses step-by-step reasoning to determine if a fraction can be simplified. • Explains simplification using basic mathematical language • Identifies real-world examples of fraction simplification • Independently reduces fractions and explains how • Applies simplification when reading or writing measurements. • Uses complete sentences with some academic vocabulary
Bridging	• Explains precisely how ruler increments relate to each other. • Uses technical vocabulary to describe measurements • Justifies answers using mathematical reasoning • Explains why certain measuring techniques improve accuracy. • Uses self-correction strategies • Writes or speaks using detailed multi-step instructions for measuring and cutting wood.	• Uses formal mathematical reasoning • Justifies simplification choices with evidence • Applies fraction simplification automatically while working with measurements. • Explains the impact of simplification in practical contexts • Teaches peers how to simplify fractions using academic and technical vocabulary.

Lesson Sequence	**Learning Target**	**Success Criteria/Assessment**
1	I can accurately measure to the nearest 1/16th of an inch.	• I can identify and explain the markings on a standard ruler or tape measure, including whole inches, half-inch, quarter-inch, eighth-inch, and sixteenth-inch increments. • I can transfer accurate measurements onto wood for cutting, drilling, or assembling.
2	I can accurately reduce fractions as necessary.	• I can identify when a fraction can be simplified. • I can simplify fractions in woodworking measurements (e.g., reducing 8/16 to 1/2 inch).

Unit Title	
Unit 2: Materials	
Relevant Standards: Bold indicates priority	
CCTC - AC-CST - Compare and contrast the building systems and components required for a construction project.	
Essential Question(s)	**Enduring Understanding(s)**
How can selecting the proper material lead to a product which can meet strength, durability, cost and aesthetics constraints?	• Material selection involves balancing properties, cost, availability, and environmental impact. • Wood properties and applications are determined by its deciduous or coniferous origin. • Ferrous and non-ferrous metals differ significantly in magnetic properties, corrosion resistance, and uses. • The diverse structures and properties of thermoplastics, thermosets, and elastomers dictate their wide range of polymer applications. • Composites combine materials to achieve enhanced properties beyond those of individual components.
Demonstration of Learning	**Pacing for Unit**
• Formative and summative assessments • Project design demonstrating why they chose the best material	7 Days
Family Overview (link below)	**Integration of Technology**
Tools & Materials - Family Overview (2025)	N/A
Unit-specific Vocabulary	**Aligned Unit Materials, Resources, and Technology (beyond core resources)**
Ferrous, non-ferrous, composite, coniferous, deciduous, malleable, ductility, insulator, conductor, engineered lumber	N/A
Opportunities for Interdisciplinary Connections	**Anticipated misconceptions**
Students will use and reinforce what they may have learned in science classes such as chemistry and biology regarding the lifecycle of a material.	• All woods are the same and have no direct impact on the impact of a project • The cost of a material is the only thing that should be considered when choosing the best material for a project. • Plastic, fiberglass, carbon fiber and kevlar are all the same basic thing.
Connections to Prior Units	**Connections to Future Units**
How wood is sold related to how a particular size is determined	Material selection based upon project constraints
Differentiation through *Universal Design for Learning*	
UDL Indicator and Teacher Actions	
Representation • Provide diverse resources, such as diagrams, videos, or hands-on demonstrations of material properties, to cater to different learning styles. Action and Expression • Facilitate student exploration by providing opportunities to test materials, such as strength tests or cost evaluations, and allow them to reflect on their choices. Engagement • Use case studies of successful product designs or failures to spark discussion about the importance of selecting the right material. Encourage students to share their opinions on how different materials affect their own daily experiences.	
Supporting Multilingual/English Learners	

Related CELP standards:	Learning Targets					
CELP Level	**LT 1**	**LT 2**	**LT 3**	**LT 4**	**LT 5**	**LT 6**
Emerging	Identifies *one* basic factor influencing material choice (e.g., "It needs to be strong" or "It shouldn't cost too much") and gives a simple example.	Names at least *two* broad categories of wood (e.g., hardwood and softwood) and gives one example of each.	Names at least *one* type of engineered lumber (e.g., plywood) and states *one* thing it's used for.	Recognizes common nominal lumber dimensions (e.g., 2x4) and relates them to the idea of standard sizing.	Names at least *two* common types of metal (e.g., steel, aluminum) and states *one* general use for each.	Names at least *two* common types of plastic (e.g., water bottle plastic, grocery bag plastic) and states *one* common use for each.
Expanding	Identifies *multiple* factors contributing to material selection (e.g., strength, cost, weight, appearance) and provides basic explanations of their importance for different general applications.	Describes *several* classifications of wood (e.g., hardwood vs. softwood, domestic vs. imported, coniferous vs. deciduous) and provides examples for each, explaining a basic difference between the categories.	Describes the basic characteristics (e.g., made of layers, strong) and identifies *multiple* uses and benefits of *several* types of engineered lumber (e.g., plywood, OSB, MDF).	Explains the difference between nominal and actual lumber dimensions and describes how standard sizing impacts purchasing and construction, possibly identifying common thicknesses and widths for different lumber types.	Describes basic characteristics (e.g., strength, conductivity, malleability) and identifies *multiple* uses and benefits of *several* common metals (e.g., steel, aluminum, copper, brass).	Describes basic characteristics (e.g., flexibility, durability, transparency) and identifies *multiple* uses and benefits of *several* types of plastics (e.g., PET, HDPE, PVC), possibly distinguishing between thermoplastics and thermosets in a basic way.
Bridging	Explains *how* several interacting factors influence material selection for a *specific* application, justifying reasoning with details about material properties and the demands of the application, perhaps considering trade-offs.	Explains the *basis* for different wood classifications (e.g., botanical origin, density, grain structure) and discusses how these classifications relate to the properties and typical uses of different types of wood.	Explains *how* the manufacturing process of different engineered lumber products results in specific characteristics and benefits, and analyzes why a particular type of engineered lumber might be chosen over solid lumber for a given application.	Explains the reasons behind nominal sizing conventions, discusses how these standards facilitate trade and construction, and perhaps understands how moisture content affects final dimensions.	Explains *how* the atomic structure and alloying processes of different metals result in specific characteristics and benefits, and analyzes why a particular metal might be chosen for a specific engineering application.	Explains *how* the chemical structure and processing of different types of plastics result in specific characteristics and benefits, and analyzes the trade-offs between different plastics for a particular application, perhaps considering environmental impacts.

Lesson Sequence	Learning Target	Success Criteria/Assessment
1	I can explain what factors contribute to a material being selected for an application.	• I can give three reasons why a material is selected for an intended application
2	I can explain the different classifications of wood materials.	• I can name the two classifications of wood • I can name three species for each classification above
3	I can describe the characteristics of engineered lumber and know its uses and benefits.	• I can give four examples of an engineered lumber • I can name three the benefits of engineered wood products

4	I can explain how wood products are sized for commerce.	• I can explain the difference between a board foot, dimensional and nominally sized lumber as well as wood sold by the linear foot
5	I can describe the characteristics of metal materials and know its uses and benefits.	• I can name the two classifications of metals • I can explain the difference between ferrous and non-ferrous metal • I can name three types for each classification above
6	I can describe the characteristics of different types of plastics and know their uses and benefits.	• I can name the two classifications of a polymer • I can name three different composites. • I can name two characteristics for the composite above

Unit Title	
Unit 3: Safety	
Relevant Standards: Bold indicates priority	
CCTC - AC - Comply with regulations and applicable codes to establish and manage a legal and safe workplace.	
Essential Question(s)	**Enduring Understanding(s)**
How is incorporating safety important inside and outside the laboratory?	• Safety is a top priority in whatever you do. • Tool and machine safety keeps every
Demonstration of Learning	**Pacing for Unit**
• Formative and summative assessments	5 Days
Family Overview (link below)	**Integration of Technology**
Tools & Materials - Family Overview (2025)	N/A
Unit-specific Vocabulary	**Aligned Unit Materials, Resources, and Technology (beyond core resources)**
OSHA, SDS/MSDS, PPE, Z87	N/A
Opportunities for Interdisciplinary Connections	**Anticipated misconceptions**
Safety knowledge can be important for other lab based courses such as Science.	• Eyewear is not important • Injuries will not happen to me
Connections to Prior Units	**Connections to Future Units**
N/A	Use of selected materials for project creation with tools

Differentiation through *Universal Design for Learning*

UDL Indicator and Teacher Actions

Representation

- Present safety procedures and guidelines in multiple formats (e.g., verbal instructions, visual safety posters, demonstrations, interactive videos) to ensure all students can understand the safety protocols effectively.
- Display clear safety posters around the classroom and lab that explain safety rules and emergency procedures.
- Verbally walk students through safety procedures, providing step-by-step instructions on handling tools, equipment, and materials.
- Show students how to use equipment safely and demonstrate proper safety gear usage.
- Use online safety quizzes or interactive simulations to test students' understanding of safety rules before engaging in lab work.

Action and Expression

- Allow students to practice safety procedures in a controlled environment before they engage in actual work. Provide opportunities to demonstrate their understanding of safety practices both in and outside the lab.
- Create hands-on activities where students can practice using safety equipment like goggles, gloves, or lab coats. Make sure they demonstrate proper use before allowing them to begin independent tasks.
- Regularly check that students understand and can apply safety procedures. Provide them with safety checklists to complete before they begin any lab activities.
- Ask students to explain the importance of each safety measure and how it contributes to maintaining a safe environment.

Engagement

- Make safety engaging by connecting it to real-life scenarios and the importance of maintaining a safe environment in personal and professional contexts. Help students see the value of safety beyond just classroom rules.
- Discuss real-world examples of laboratory accidents (without graphic content) and show how safety protocols could have prevented those incidents. Relate this to industries like construction, healthcare, or engineering where safety is also critical.
- Create safety challenges where students must identify potential hazards in a mock setup, explaining how they would mitigate each risk using safety procedures.

Supporting Multilingual/English Learners

Related *CELP standards:*	Learning Targets

CELP Standard	LT 1	LT 2	LT 3	LT 4
Emerging	Identifies *one* or *two* common examples of PPE (e.g., gloves, safety glasses) and states a *basic* reason for their use (e.g., "to protect you").	Recognizes that OSHA is an organization related to workplace safety. Might state a simple idea like "they make rules for work."	Identifies *one* or *two* basic rules for safe electrical usage (e.g., "don't touch wires," "don't overload outlets").	Identifies *one* or *two* visible characteristics of a safe work environment (e.g., "clean floor," "no broken things").
Expanding	Explains the *general* purpose of PPE as protecting workers from hazards and can name *several* types of PPE along with the body parts they protect.	Explains that OSHA sets and enforces workplace safety standards to prevent injuries and illnesses. Can identify *some* of OSHA's responsibilities, such as conducting inspections.	Explains *several* rules and guidelines for safe electrical usage, such as proper grounding, avoiding damaged cords, and using appropriate tools. Can describe potential hazards of electrical misuse.	Describes *several* characteristics of a safe work environment, including things like clear pathways, proper lighting, labeled hazards, and accessible safety equipment.
Bridging	Explains the *specific* purpose of different types of PPE in relation to various workplace hazards. Can analyze a work task and determine the appropriate PPE needed and why.	Explains the *comprehensive* role of OSHA in ensuring safe and healthy working conditions, including its standard-setting process, enforcement mechanisms, and worker rights. Can discuss the impact of OSHA on workplace safety.	Applies a *range* of rules and guidelines for safe electrical usage in different scenarios. Can troubleshoot basic electrical safety issues and explain the scientific principles behind safe practices (e.g., grounding paths, circuit overload).	Explains the *systemic* elements that contribute to a safe work environment, including safety protocols, training programs, hazard identification and control measures, and a safety-conscious culture. Can analyze a workplace and suggest improvements to enhance safety.

Lesson Sequence	Learning Target	Success Criteria/Assessment
1	I can explain the purpose of PPE	• I can name different types of PPE to protect the five senses • I can name appropriate PPE types to protect each of the human senses
2	I explain the purpose of OSHA in the workplace	• I can explain the purpose of the organization. • I can explain how OSHA uses training and fines to encourage workplace safety
3	I can apply rules and guidelines of safe electrical usage	• I can explain what the guidelines are for electrical usage. • I can apply safe electric usage rules to a factory setting.
4	I can explain what a safe work environment may look like	• I can explain the importance of lighting and a clean workplace • I can explain the importance of appropriate ventilation in the workplace • I can use safe work practices when working with tools, materials and machines

Unit Title	
Unit 4: Tools and Material Processing	
Relevant Standards: Bold indicates priority	
CCTC - AC -Use architecture and construction skills to create and manage a project. CCTC - AC - Comply with regulations and applicable codes to establish and manage a legal and safe workplace. CCTC - AC-CST - Compare and contrast the building systems and components required for a construction project.	
Essential Question(s)	**Enduring Understanding(s)**
How can I use my previous knowledge of measurements, materials and safety to complete a project?	This is a culminating unit that will ensure students understand: • Accurate measurement is foundational for successful project planning and execution. • Appropriate material selection, informed by understanding material properties, is crucial for creating functional and durable projects. • Adherence to safety protocols is paramount for ensuring well-being and the responsible completion of projects. • The integration of measurement, material knowledge, and safety practices leads to the creation of reliable, long-lasting, and safe outcomes in any project.
Demonstration of Learning	**Pacing for Unit**
• Written documents • Student created project demonstrating culmination of knowledge from entire course	26 Days
Family Overview (link below)	**Integration of Technology**
Tools & Materials - Family Overview (2025)	N/A
Unit-specific Vocabulary	**Aligned Unit Materials, Resources, and Technology (beyond core resources)**
Band saw, table saw, orbital drum sander, belt/disc sander center punch, awl, scroll saw, coping saw, files, sandpaper drill press, drills, hole saw, forstner bit, grit, finishing	N/A
Opportunities for Interdisciplinary Connections	**Anticipated misconceptions**
Association to math when adding and subtracting dimensions	• Measurements do not need to be accurate • Mistakes can't always be fixed - measure twice/ cut once - don't rush
Connections to Prior Units	**Connections to Future Units**
Connection to the units on measurement, materials and safety.	Introductory exposure to tool and materials usage which can be built upon for a subsequent future course
Differentiation through *Universal Design for Learning*	
UDL Indicator and Teacher Actions	
Representation: • Provide visual flowcharts or graphic organizers outlining the steps of the design process. Offer examples of how different projects have moved through these stages. • Create a visual library of tools and machines with clear images, labels, and brief descriptions of their function and safety precautions. Use video demonstrations of proper and safe tool use. • Post clear and visual safety rules and procedures throughout the workshop. Use diagrams and models to illustrate safe practices (e.g., proper attire, emergency procedures, tool handling). • Provide multiple examples of technical drawings with varying levels of complexity. Offer visual aids explaining different drawing conventions (e.g., line types, dimensions, symbols). Use 3D models alongside drawings to aid visualization. • Provide physical samples of sandpaper with different grits clearly labeled. Use visual charts or diagrams that	

show the progression of grits and their typical applications (e.g., rough shaping, fine finishing).

Action & Expression:

- Allow students to choose how they document their progress through the design process (e.g., written journal, video log, digital portfolio). Offer templates or sentence starters for each stage.
- Provide students with opportunities to demonstrate their ability to identify tools and explain their safe usage through hands-on activities, verbal explanations, or creating safety posters/guides.
- Have students participate in safety walkthroughs, identify potential hazards, and demonstrate safe practices during activities. Allow them to create safety checklists or presentations for their peers.
- Provide students with opportunities to practice interpreting drawings by answering questions, labeling parts, or creating simple sketches based on drawings. Allow them to create physical models based on technical drawings.
- Have students sort sandpaper by grit, describe the feel of different grits, and explain when to use each grit for various tasks. Allow them to experiment with different grits on sample materials.

Engagement

- Begin each workshop session with a brief safety review. Use scenarios or case studies to discuss the importance of safety and the consequences of unsafe actions.
- Incorporate "tool talks" or interactive demonstrations where students can handle (safely) and ask questions about different tools. Connect tool usage to real-world projects and applications that students find motivating.
- Use real-world examples of technical drawings for projects that students are working on or find interesting. Incorporate puzzles or challenges that require interpreting drawings to find solutions.

Supporting Multilingual/English Learners

Related *CELP standards:* | **Learning Targets**

CELP Standard	LT 1	LT 2	LT 3	LT 4	LT 5
1. Construct meaning from oral presentations and literary and informational text	Understanding the steps of the design process	Understanding information about tools and safety	Understanding workshop safety rules	Understanding information in technical drawings	Understanding information about sandpaper grits
2. Participate in grade-appropriate oral and written exchanges of information, ideas, and analyses	Discussing design ideas and process with others	Discussing tool usage and safety with others	Discussing safety concerns and procedures	Discussing interpretations of technical drawings	Discussing sandpaper types and applications
3. Speak and write about grade-appropriate complex literary and informational texts and topics	Explaining the stages of the design process	Explaining the safe operation of various tools	Explaining the rationale behind safety practices	Explaining the information conveyed in drawings	Explaining the science behind sandpaper grits
4. Construct grade-appropriate oral and written claims and support them with reasoning and evidence	Justifying design choices based on the process	Justifying the safe usage procedures for tools	Justifying adherence to safety rules	Justifying interpretations of drawing features	Justifying the selection of specific sandpaper grits
5. Conduct research and evaluate and communicate findings to answer questions or solve problems	Researching design methodologies	Researching tool operation and safety guidelines	Researching best workshop safety practices	Researching drawing conventions and standards	Researching sandpaper properties and applications
6. Analyze and critique the arguments of others orally and in writing	Evaluating the effectiveness of different designs	Evaluating the safety explanations of others	Evaluating adherence to safety by others	Evaluating the accuracy of drawing interpretations	Evaluating the appropriateness of sandpaper choices
7. Adapt language choices to purpose, task, and audience when speaking and writing	Explaining the design process to different groups	Explaining tool safety to different audiences	Explaining workshop safety to different groups	Explaining technical drawings to different audiences	Explaining sandpaper grits to different audiences
8. Determine the meaning	Understanding	Understanding	Understanding	Understanding	Understanding

of words and phrases in oral presentations and literary and informational text	design-related terminology	tool names and safety terms	workshop safety vocabulary	technical drawing vocabulary	sandpaper-related terms
9. Create clear and coherent grade-appropriate speech and text	Explaining the design process clearly	Explaining tool safety clearly	Explaining workshop safety clearly	Explaining technical drawings clearly	Explaining sandpaper grits clearly
10. Make accurate use of standard English to communicate in grade appropriate speech and writing	Using correct terminology for design	Using correct terminology for tools and safety	Using correct safety terminology	Using correct technical drawing terminology	Using correct terminology for sandpaper

Lesson Sequence	Learning Target	Success Criteria	Assessment
1	I can properly use the design process to design a project.	• I can explain the steps of the design process. • I can use the design process to create a product to be manufactured.	Formative assessment, written response, push tool project (5 days)
2	I can properly identify hand/ power tools as well as machines and explain their safe usage to complete a project.	• I can correctly name and describe the function of each tool and machine used in my project. • I can explain the proper handling and operation of each tool and machine.	Formative assessment, project completion (10 days)
3	I can follow safe workshop practices expected in the laboratory	• I can work independently or collaboratively while maintaining a safe work environment.	Formative assessment, project completion
4	I can read and interpret the information contained in a technical drawing to create an object	• I can differentiate the different views on a technical drawing • I can understand the relationship between lines and surfaces of a part between views on a technical drawing • I can accurately read a technical drawing to obtain measurements and annotations of features on an object	Formative assessment, exit slip, quiz
5	I can distinguish between the different sandpaper grits and their usage.	• I can correctly identify different sandpaper grits by their number (e.g., coarse: 40-60, medium: 80-120, fine: 150-220, extra fine: 240+) • I can apply proper sanding techniques, including sanding with the grain and using even pressure. • I can maintain a clean work area by managing dust and debris properly.	Formative assessment, project completion

Curriculum Writing Notes:

Address UDL and CELP AFTER learning targets are written, in process they'll be developed after all learning targets and success criteria. These targets with UDL and CELP will be a model of what could/should be done for all learning targets but can't be completed (to keep the process concise) . Through the curriculum writing process, teachers can build a deeper understanding of how to approach this differentiation.

Enduring understanding/Essential questions may be easier to develop at the end of the process.

Committees can alter the format but these are the required pieces.

Course Title:	Content Area:	Grade Level:	Credit (if applicable)
Kindergarten ELA	Literacy	Kindergarten	N/A

Course Description:

In Grade K, students participate in a structured literacy block that includes oral language, phonological awareness, phonics, fluency, vocabulary, comprehension, and writing. Students study compelling topics through engaging texts. Teachers and students use the Heggerty program, Fundations program, Flyleaf, Geodes and Heggerty small group readers, as well as the Wit & Wisdom program to engage in the structured literacy block. The Wit & Wisdom framework of inquiry helps students build rich layers of knowledge. Wit & Wisdom's integrated approach to learning enables students to activate and develop content and vocabulary knowledge while learning skills. In each module, students write about what they read, learn grammar, and then articulate the meaning of each text in formal and informal discussions with their peers. The Wit & Wisdom approach helps teachers celebrate the joy of reading and writing with students, while also supporting all learners in meeting the rigor of the ELA standards. By reading engaging texts and participating meaningfully in their learning, students develop the knowledge and skills they need to be successful readers, critical thinkers, and effective communicators who love to learn and can succeed in college and careers.

Through a rigorous and careful module design, students gain content knowledge and an awareness of how to read texts, write, speak, and listen. Each of the four modules in Kindergarten has a topical focus. For each module, students read—or, in the case of younger students, hear read aloud—a series of authentic texts on the topic and consider those texts critically and systematically. Frameworks of questioning, the Content Stages and Content Framing Questions, engage students in the content and in the process of reading complex texts. Content Framing Questions guide students' daily work of encountering, understanding, and analyzing complex text. Students then distill each text's deeper meaning and, finally, articulate how the texts, individually and collectively, build their knowledge of the topic.

Throughout each module, standards are addressed in an integrated manner. Instead of addressing and assessing standards one by one, in isolation, the curriculum teaches reading, writing, speaking, listening, and language in an integrated manner so that students learn all skills in the context of module content. This integrated approach enables students to activate and build on their developing background and vocabulary knowledge of the module topic while learning skills in other areas.
In Grade K, students participate in 4 units/modules centered around the five senses, studying farms, how America changed over time, and the continents.

Please see module overview below.

Grade	Module 1	Module 2	Module 3	Module 4
K	***The Five Senses*** **Essential Question**: How do our senses help us learn? **Module Summary**: The five senses help humans experience, learn, and communicate about the world. **Knowledge Goals**: Recognize and describe the five senses and related body parts. Identify rhyme and repetition within texts. Describe the use of color and shape in visual art. **EOM Writing Type**: Informative **EOM Task**: Students write a book describing how the five senses help both them and a character from a text learn about the world.	***Once Upon a Farm*** **Essential Question**: What makes a good story? **Module Summary**: Stories of farm life and animals lead to a discovery of the universal elements of well-crafted stories. **Knowledge Goals**: Identify the differences among the seasons and how they affect life on the farm. Describe key details about different farm animals, including how they help humans. Retell classic folktales featuring farm animal characters, using various story elements as a guide. Understand the elements that make up a narrative and how these elements work together to create a cohesive story. **EOM Writing Type**: Narrative **EOM Task**: Students write an original narrative, set on Maple Hill Farm, featuring one farm animal they learned about in the module.	***America, Then and Now*** **Essential Question**: How has life in America changed over time? **Module Summary**: While people's basic needs may not change over time, the ways that people meet their needs do change, as new inventions and innovations take hold. **Knowledge Goals**: Understand the difference between the past and the present. Identify how aspects of life in America–specifically, home life, school life, transportation, and communication–have changed. Describe key details about how the topics of home, school, transportation, and communication have changed over time. Understand how a main topic or topic statement is supported by key details. **EOM Writing Type**: Informative (Research) **EOM Task**: Students create an informative poster to explain how one aspect of life in America has changed over time.	***The Continents*** **Essential Question**: What makes the world fascinating? **Module Summary**: The world's splendor comes to life through an examination of the unique natural features, animals, and activities of Earth's seven continents. **Knowledge Goals**: Identify the seven continents. Describe the different natural features, things to do, and animals on each continent. Demonstrate understanding of maps and their purpose. Understand how illustrations, photographs, and words in a text communicate important information. **EOM Writing Type**: Opinion **EOM Task**: Students sort module texts into informational texts and stories. They then create a travel brochure for a chosen continent.

Aligned Core Resources:	**Connection to the *BPS Vision of the Graduate***
Wit & Wisdom slide decks	Communication • Articulates thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts • Utilize multiple media and technologies, and know how to judge their effectiveness as well as assess their impact • Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions. Use

	communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) Empathy • Demonstrating understanding of others perspectives and needs • Understand the concept of community as a means for supporting others in need Critical Thinking and Problem Solving • Collect, assess and analyze relevant information Civic Literacy • Understand the local and global implications of civic decisions • Understand other nations and cultures including the use of non-English language
Additional Course Information: ***Knowledge/Skill Dependent courses/prerequisites***	**Link to *Completed Equity Audit***
	2025 K ELA Equity Curriculum Review

Standard Matrix

WW_GK3_ScopeSequence.pdf

District Learning Expectations and Standards	Unit 1	Unit 2	Unit 3	Unit 4
Reading Literature Standards				
CSS.ELA-Literacy.RL.K.1 With prompting and support, ask and answer questions about key details in a text.	X	X	X	X
CCSS.ELA-Literacy.RL.K.2 With prompting and support, retell familiar stories, including key details.	X	X	X	X
CCSS.ELA-Literacy.RL.K.3 With prompting and support, identify characters, settings, and major events in a story.	X	X	X	X
CCSS.ELA-Literacy.RL.K.4 Ask and answer questions about unknown words in a text.	X	X	X	X
CCSS.ELA-Literacy.RL.K.5 Recognize common types of texts (e.g., storybooks, poems).	X	X	X	X
CCSS.ELA-Literacy.RL.K.6 With prompting and support, name the author and illustrator of a story and define the role of each in telling the story.	X	X		
CCSS.ELA-Literacy.RL.K.7 * With prompting and support, describe the relationship between illustrations				X

and the story in which they appear (e.g., what moment in a story an illustration depicts).				
CCSS.ELA-Literacy.RL.K.9 With prompting and support, compare and contrast the adventures and experiences of characters in familiar stories.		X		
CCSS.ELA-Literacy.RL.K.10 Actively engage in group reading activities with purpose and understanding.	X	X	X	X
Reading Informational Standards				
CCSS.ELA-Literacy.RI.K.1 With prompting and support, ask and answer questions about key details in a text.	X	X	X	X
CCSS.ELA-Literacy.RI.K.2 With prompting and support, identify the main topic and retell key details of a text.	X	X	X	X
CCSS.ELA-Literacy.RI.K.3 With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.	X	X	X	X
CCSS.ELA-Literacy.RI.K.4 With prompting and support, ask and answer questions about unknown words in a text.	X	X	X	X
CCSS.ELA-Literacy.RI.K.5 Identify the front cover, back cover, and title page of a book.	X	X	X	
CCSS.ELA-Literacy.RI.K.6 Name the author and illustrator of a text and define the role of each in presenting the ideas or information in a text.	X		X	
CCSS.ELA-Literacy.RI.K.7 With prompting and support, describe the relationship between illustrations and the text in which they appear (e.g., what person, place, thing, or idea in the text an illustration depicts).	X	X	X	X
CCSS.ELA-Literacy.RI.K.8 With prompting and support, identify the reasons an author gives to support points in a text.			X	X
CCSS.ELA-Literacy.RI.K.9 With prompting and support, identify basic similarities in and differences between two texts on the same topic (e.g., in illustrations, descriptions, or procedures).	X	X	X	X
CCSS.ELA-Literacy.RI.K.10 Actively engage in group reading activities with purpose and understanding.	X	X	X	X

Speaking & Listening Standards				
CCSS.ELA-Literacy.SL.K.1 Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.	X	X	X	X
CCSS.ELA-Literacy.SL.K.1.a Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and texts under discussion).	X	X	X	X
CCSS.ELA-Literacy.SL.K.1.b Continue a conversation through multiple exchanges.	X			
CCSS.ELA-Literacy.SL.K.2 Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.	X	X	X	X
CCSS.ELA-Literacy.SL.K.3 Ask and answer questions in order to seek help, get information, or clarify something that is not understood.	X		X	X
CCSS.ELA-Literacy.SL.K.4 Describe familiar people, places, things, and events and, with prompting and support, provide additional detail.	X	X		X
CCSS.ELA-Literacy.SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail.			X	
CCSS.ELA-Literacy.SL.K.6 Speak audibly and express thoughts, feelings, and ideas clearly.	X	X		X
Writing Standards				
CCSS.ELA-Literacy.W.K.1 Use a combination of drawing, dictating, and writing to compose opinion pieces in which they tell a reader the topic or the name of the book they are writing about and state an opinion or preference about the topic or book (e.g., My favorite book is . . .).		X	X	X
CCSS.ELA-Literacy.W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.	X	X	X	X
CCSS.ELA-Literacy.W.K.3	X	X	X	X

Use a combination of drawing, dictating, and writing to narrate a single event or several loosely linked events, tell about the events in the order in which they occurred, and provide a reaction to what happened.				
CCSS.ELA-Literacy.W.K.5 With guidance and support from adults, respond to questions and suggestions from peers and add details to strengthen writing as needed.		X		X
CCSS.ELA-Literacy.W.K.6 With guidance and support from adults, explore a variety of digital tools to produce and publish writing, including in collaboration with peers.		X		
CCSS.ELA-Literacy.W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them)			X	X
CCSS.ELA-Literacy.W.K.8 With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.	X	X	X	X
Language Standards				
CCSS.ELA-Literacy.L.K.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.	X	X	X	X
CCSS.ELA-Literacy.L.K.1.a Print many upper- and lowercase letters.		X		
CCSS.ELA-Literacy.L.K.1.b Use frequently occurring nouns and verbs.		X	X	X
CCSS.ELA-Literacy.L.K.1.c Form regular plural nouns orally by adding /s/ or /es/ (e.g., dog, dogs; wish, wishes).		X	X	
CCSS.ELA-Literacy.L.K.1.d Understand and use question words (interrogatives) (e.g., who, what, where, when, why, how).	X	X	X	X
CCSS.ELA-Literacy.L.K.1.e Use the most frequently occurring prepositions (e.g., to, from, in, out, on, off, for, of, by, with).	X	X		X
CCSS.ELA-Literacy.L.K.1.f Produce and expand complete sentences in shared language activities.	X	X	X	X

CCSS.ELA-Literacy.L.K.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.	X	X	X	X
CCSS.ELA-Literacy.L.K.2.a Capitalize the first word in a sentence and the pronoun I			X	X
CCSS.ELA-Literacy.L.K.2.b Recognize and name end punctuation.	X	X	X	X
CCSS.ELA-Literacy.L.K.2.c Write a letter or letters for most consonant and short-vowel sounds (phonemes).	X	X	X	X
CCSS.ELA-Literacy.L.K.2.d Spell simple words phonetically, drawing on knowledge of sound-letter relationships.	X	X	X	X
CCSS.ELA-Literacy.L.K.4 Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on kindergarten reading and content.	X	X	X	X
CCSS.ELA-Literacy.L.K.4.a Identify new meanings for familiar words and apply them accurately (e.g., knowing duck is a bird and learning the verb to duck).	X	X	X	X
CCSS.ELA-Literacy.L.K.4.b Use the most frequently occurring inflections and affixes (e.g., -ed, -s, re-, un-, pre-, -ful, -less) as a clue to the meaning of an unknown word.	X	X	X	X
CCSS.ELA-Literacy.L.K.5 With guidance and support from adults, explore word relationships and nuances in word meanings.	X	X	X	X
CCSS.ELA-Literacy.L.K.5.a Sort common objects into categories (e.g., shapes, foods) to gain a sense of the concepts the categories represent.	X	X	X	X
CCSS.ELA-Literacy.L.K.5.b Demonstrate understanding of frequently occurring verbs and adjectives by relating them to their opposites (antonyms).		X	X	X
CCSS.ELA-Literacy.L.K.5.c Identify real-life connections between words and their use (e.g., note places at school that are colorful).	X	X	X	X
CCSS.ELA-Literacy.L.K.5.d Distinguish shades of meaning among verbs describing the same general action (e.g., walk, march, strut, prance) by acting out the	X	X	X	X

meanings.				
CCSS.ELA-Literacy.L.K.6 Use words and phrases acquired through conversations, reading and being read to, and responding to texts.	X	X	X	X

Unit Links

If unit headings are formatted as a heading, then we can link a Table of Contents to better organize and provide faster access to each unit

Unit Title:

Module 1 The Five Senses

Relevant Standards: Bold indicates priority

See above

Essential Question(s):	**Enduring Understanding(s):**
How do our senses help us learn?	Students in Kindergarten will understand the following concepts as a result of this module: • We have five senses: smell, taste, touch, hearing, and sight. • Our senses take in information and make us aware of the world around us. • People use their senses to learn about the world and to learn from books. • Details in illustration, speech, and text provide more information for readers. • Words and illustrations work together to tell a story and present information.
Demonstration of Learning:	**Pacing for Unit**
Students may demonstrate their learning within this unit in a variety of ways. Possible methods for this include (but are not limited to): • Reading • Writing	12 Weeks

- Speaking
- Listening
- Analyzing text
- Using evidence
- Engaging in discussions

Family Overview (link below)

WW_GK_M1_FamilyTipSheet_English.pdf
September Elementary K Memo

Integration of Technology:

Videos
“Bojangles Step Dance”
“Eight-Year-Old Tap Prodigy Little Luke”
“Chicka Chicka Boom Boom”

Unit-specific Vocabulary:

Academic Vocabulary

senses	notice	wonder
tableau	reveal	author
respond	prompt	essential meaning
enjoy	learn	whenever
whatever	every	aware
adjectives	Socratic Seminar	enough
alphabet	preposition	checklist

Content Vocabulary

city	shadow	piano
garbage	fire engine	rabbit
bananas	perfume	medicine
coin	knit	freedom
trick	palm	tuning
curlers	curb	rhythm
graffiti	witness	soup kitchen
familiar	wipers	freckled
duck	daydream	tangled

Aligned Unit Materials, Resources, and Technology (beyond core resources):

Picture Books (Informational)
- My Five Senses, Aliki
- My Five Senses, Margaret Miller
- Rap a Tap Tap, Leo Dillon and Diane Dillon

Picture Books (Literary)
- Chicka Chicka Boom Boom, Bill Martin Jr. and John Archambault; Illustrations, Lois Ehlert
- Last Stop on Market Street, Matt de la Peña; Illustrations, Christian Robinson

Supplementary Texts/ Articles
- “Great Depression,” Britannica Kids
- “The Harlem Renaissance,” Britannica Kids

Paintings
- Flower Day, Diego Rivera
- Le Gourmet, Pablo Picasso

knotted	stooped	greet
art	folks	boom

Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**

Science: The module directly teaches students about the anatomy and functions of the five senses, fostering early scientific inquiry and observation skills. It introduces the idea that our senses help us make sense of the world, and it explores sensory adaptation and environmental interactions.
 	
Social Studies: The module connects to social studies by discussing how senses are involved in social interactions, how they help us navigate our communities, and how different cultures use sensory experiences. Additionally, it may touch on how community helpers rely on their senses in their work.
 	
Social Emotional Learning
The "Five Senses" module in *Wit & Wisdom* not only introduces foundational science concepts but also promotes essential social-emotional skills. By reflecting on their own sensory experiences, students develop self-awareness and begin to recognize the connection between their senses and emotions. Activities that focus on regulating sensory input foster self-regulation skills, while group work and discussions encourage social awareness and the development of relationship skills. Through these activities, students learn to empathize with others, share their experiences, and collaborate effectively, all of which are key elements of social-emotional learning.
	• Students may have misconceptions of:
	  ○ Difference between the five senses
	  ○ Being able to use more than one sense at a time.
	  ○ All people experience the same sensory stimuli in the same way.
	  ○ My senses always work the same way all the time.
	  ○ Touching can only be done with the hands.
	  ○ I can only taste with my mouth.

Connections to Prior Units:	**Connections to Future Units:**
• N/A	In Kindergarten, Module 1 on **The Five Senses**, there are many potential connections that can be made to future lessons. These connections help students build a foundation for understanding the world around them and expand on this knowledge as they progress. By connecting sensory exploration to a variety of subjects, you help students build an interconnected understanding of the world, making future learning more meaningful and engaging.

Differentiation through *Universal Design for Learning*

UDL Indicator	Teacher Actions:
2 Language & Symbols	• Clarify vocabulary, symbols, and language structures (consideration 2.1) • Support decoding of text, mathematical notation, and symbols (consideration 2.2) • Cultivate understanding and respect across languages and dialects (consideration 2.3) • Address biases in the use of language and symbols (consideration 2.4) • Illustrate through multiple media (consideration 2.5)
3 Building Knowledge	• Connect prior knowledge to new learning (3.1) • Highlight and explore patterns, critical features, big ideas, and relationships (3.2) • Cultivate multiple ways of knowing and making meaning (3.3)
9 Emotional Capacity	• Maximize transfer and generalization • Recognize expectations, beliefs, and motivations (9.1) • Develop awareness of self and others (9.2)
1 Perception	• Represent a diversity of perspectives and identities in authentic ways (1.3)

Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**
An EL with guidance and supports, can participate in short discussions, conversations, and short written exchanges using words and phrases acquired in conversations, reading, and being read to.	I can participate in conversations and discussions about the five senses.

Lesson Sequence	Learning Target /Success Criteria/ Assessment	Resources
1	LT: I can explain how our five senses help us learn. SC: I named the five senses. SC: I asked and answered questions about my five senses.	00.01.L01.pptx

2	LT: I can explain how our five senses help us learn. SC: I identified key details. SC: I discussed the main topic.	00.01.L02.pptx
3	LT: I can explain how our five senses help us learn. SC: I communicated key details using pictures and words about my five senses.	00.01.L03.pptx
4	LT: I can explain how our five senses help us learn. SC: I used pictures and words to show the text's essential meaning. SC: I spoke in a complete sentence. SC: I described my senses using adjectives.	00.01.L04.pptx
5	LT: I can explain how our five senses help us learn. SC: I explained the purpose of each of the five senses. SC: I described my senses using adjectives.	00.01.L05.pptx
6	LT: I can explain how our five senses help us learn. SC: I asked and answered questions about my five senses. SC: I asked and answered questions about the important words in *My Five Senses.*	00.01.L06.pptx
7	LT: I can explain how our five senses help us learn. SC: I used the book to help me answer questions. SC: I identified key details. SC: I discussed the main topic.	00.01.L07.pptx

8	LT: I can explain how our five senses help us learn. SC: I used pictures and words to tell key details in My Five Senses. SC: I used evidence from the book to complete a sentence. SC: I described my senses using adjectives.	00.01.L08.pptx
9	LT: I can explain how our five senses help us learn. SC: I used pictures and words to show the text's essential meaning. SC: I used evidence from the book to complete a sentence. SC: I used adjectives to describe my senses.	00.01.L09.pptx
10	LT: I can explain how our five senses help us learn. SC: I named examples of how my five senses help us learn about the world. SC: I named the parts of a book. SC: I described my senses using adjectives.	00.01.L10.pptx
11	LT: I can explain how our five senses help us learn. SC: I asked questions about the text. SC: I asked and answered questions about important vocabulary. SC: I listened with all my senses.	00.01.L11.pptx
12	LT: I can explain how our five senses help us learn. SC: I told the key events in the text. SC: I listened with all my senses.	00.01.L12.pptx

	SC: I explained that some words have multiple meanings.	
13	LT: I can explain how our five senses help us learn. SC: I answered questions about what senses CJ used. SC: I added details to my drawings about senses. SC: I used adjectives from Last Stop on Market Street in a sentence to describe real life experiences.	00.01.L13.pptx
14	LT: I can explain how our five senses help us learn. SC: I used descriptive words and text evidence from Last Stop on Market Street to answer questions. SC:I added details from the text to my drawing about senses. SC: I told the parts of a complete sentence.	00.01.L14.pptx
15	LT: I can explain how our five senses help us learn. SC: I used pictures and words to show the text's essential meaning of Last Stop on Market Street. SC: I explained how CJ's senses helped him learned about the world. SC: I used complete sentences to tell about the pictures in Last Stop on Market Street.	00.01.L15.pptx
16	LT: I can explain how our five senses help us learn. SC: I took turns when talking. SC: I explained how CJ's senses helped him learned about the world. SC: I named the job author and the illustrator in Last Stop on Market Street. SC: I used grade level vocabulary.	00.01.L16.pptx

17	LT: I can explain how our five senses help us learn. SC: I asked questions about the events in Chicka Chicka Boom Boom. SC: I participated in labelling details in Flower Day.	00.01.L17.pptx
18	LT: I can explain how our five senses help us learn. SC: I told key events and details from Chicka Chicka Boom Boom. SC: I labelled the Flower Day picture using the beginning sound I hear in the word. SC: I used descriptive words from Chicka Chicka Boom Boom to describe things in my life.	00.01.L18.pptx
19	LT: I can explain how our five senses help us learn. SC: I used pictures and words to tell key details in Chicka Chicka Boom Boom. SC: I labelled the Chicka Chicka Boom Boom picture using the beginning sound I hear in the word. SC: I spoke in complete sentences to tell the events in Chicka Chicka Boom Boom.	00.01.L19.pptx
20	LT: I can explain how our five senses help us learn. SC: I named words and phrases that repeat in Chicka Chicka Boom Boom. SC: I used pictures and words to collect evidence to answer questions	00.01.L20.pptx

21	LT: I can explain how our five senses help us learn. SC: I used pictures and words to show the text's essential meaning in Chicka Chicka Boom Boom. SC: I used my five senses when reading Chicka Chicka Boom Boom. SC: I used grade level vocabulary. Assessment 21B	00.01.L21.pptx
22	LT: I can explain how our five senses help us learn. SC: I used my five senses when reading Chicka Chicka Boom Boom. SC: I labeled my drawing with the sounds I hear.	00.01.L22.pptx
23	LT: I can explain how our five senses help us learn. SC:I asked questions about key events, details, and words in Rap a Tap Tap. SC: I labeled a drawing with sounds I hear. SC: I asked and answered questions about important vocabulary.	00.01.L23.pptx
24	LT: I can explain how our five senses help us learn. SC: I named key details in *Rap a Tap Tap*. SC: I labeled a drawing with sounds I hear. SC: I named prepositions words.	00.01.L24.pptx
25	LT: I can explain how our five senses help us learn. SC: I explained how illustrations can help me understand more in *Rap a TapTap*.	00.01.L25.pptx
26	LT: I can explain how our five senses help us learn.	00.01.L26.pptx

	SC: I described how the words and sounds helped me understand more about *Rap a TapTap*.	
27	LT: I can explain how our five senses help us learn. SC: I used pictures and words to show the text's essential meaning in *Rap a TapTap.*	00.01.L27.pptx
28	LT: I can explain how our five senses help us learn. SC: I explained how the senses helped me learn from *Rap a TapTap.*	00.01.L28.pptx
29	LT: I can explain how our five senses help us learn. SC: I showed my understanding of the unit by participating in conversations.	00.01.L29.pptx
30	LT: I can explain how our five senses help us learn. SC: I explained how the senses help me learn.	00.01.L30.pptx
31	LT: I can explain how our five senses help us learn. SC: I explained how the senses help me learn. SC: I wrote a book about how the senses help us learn about the world around us.	00.01.L31.pptx

Unit Title: What Makes A Good Story?	
Module 2 Once Upon A Farm	
Relevant Standards: Bold indicates priority	
Content Standards: See above.	
Essential Question(s):	**Enduring Understanding(s):**

<table>
<tr><td>

- What makes a good story?

</td><td>

Students in Kindergarten will understand the following concepts as a result of this module:

- Authors of informational texts teach us information about real life through their books.
- Informational texts have main topics supported by key details that tell readers more about a topic.
- Life at home and life at school in America have changed over time.
- Modes of transportation and communication in America have changed over time.
- Inventions make life easier and help people do things in new ways.

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<tr><td>Demonstration of Learning:</td><td>Pacing for Unit</td></tr>
<tr><td>

Students may demonstrate their learning within this unit in a variety of ways. Possible methods for this include (but are not limited to):

- Reading
- Writing
- Speaking
- Listening
- Analyzing text
- Using evidence
- Engaging in discussions

</td><td>

9 weeks

</td></tr>
<tr><td>Family Overview (link below)</td><td>Integration of Technology:</td></tr>
<tr><td>

WW_GK_M2_FamilyTipSheet_English.pdf
December Elementary K Memo

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Song

- “Old MacDonald Had a Farm,” Kidsongs

Videos

- “Making Bread,” *Between the Lions* PBS
- “Seasons Song,” Have Fun Teaching

</td></tr>
<tr><td>Unit-specific Vocabulary:</td><td>Aligned Unit Materials, Resources, and Technology (beyond core resources):</td></tr>
</table>

Academic Vocabulary

notice	run	dig
wonder	recall	Key details
leap	roll	scratch
sneak	Tip toe	Roll over
differences	expand	setting
characters	Elements	Character trait
illustration	pattern	Hand motion
problem/solution	Resolution	retelling
sun	seeds	Chicks
Farm animals		

Content Vocabulary

poem	voice	Swimming holes
Circula picture	strut	gallop
Waddle	season	Autumn
Opposites	Clothing	Story stones
sneak	lurk	creep
neigh	execute	jam
circle	Thresh	roar
trip	trap	beaks

Picture Books (Informational)

- Farm Animals, Wade Cooper
- The Year at Maple Hill Farm, Alice and Martin Provensen

Picture Books (Literary)

- The Little Red Hen, Jerry Pinkney
- The Three Billy Goats Gruff, Paul Galdone
- Three Little Pigs, Adaptation, Raina Moore; Illustrations, Thea Kliros

Supplementary Texts
Paintings

- American Gothic, Grant Wood
- The Cornell Farm, Edward Hicks

Poem

- “Morning Is Come,” Singing Together BBC

Song

- “Old MacDonald Had a Farm,” Kidsongs

Videos

- “Making Bread,” Between the Lions PBS
- “Seasons Song,” Have Fun Teaching

Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**

1. **Social Studies**: Understanding rural communities, historical farming practices, and global farming traditions. 2. **Language Arts**: Vocabulary development, reading farm-related stories, writing about farm life, and storytelling. 3. **Science**: Learning about animals, plants, weather, and ecosystems on a farm, along with hands-on observation of growth and life cycles. 4. **Mathematics**: Counting animals, measuring farm tools or animals, sorting, and identifying patterns in farming tasks. 5. **Art**: Creating visual representations of farm life, drawing farm animals, and constructing models of farm scenes. 6. **Music**: Singing farm-related songs, mimicking animal sounds, and exploring rhythm through farm themes. These interdisciplinary connections allow students to see the relevance of farm life across multiple domains, deepening their understanding of the content while fostering skills in various subject areas. The hands-on nature of the activities ensures that students engage both creatively and analytically with the topic.	Some misconceptions students may have in this unit include: • All animals on the farm are the same. • Farm animals can live without care. • Plants grow quickly just like in stories. • Farms only produce food. • Farmers only work during harvest season. • Crops grow on a farm without any special care or attention. • All food comes from the grocery store • Farm life is easy and fun all the time. • Animals can only be kept on farms. • The roles on the farm only involve taking care of animals..
Connections to Prior Units:	**Connections to Future Units:**
The *"Once Upon a Farm"* module builds on the foundational concepts developed in the *Five Senses* unit by offering students opportunities to explore the farm environment using their senses in real-world contexts. Students apply their sensory skills to observe animals, plants, and the farm ecosystem, deepening their understanding of how their senses help them learn about and interact with the world around them. By making these connections, students can reinforce both scientific concepts and social-emotional skills while developing a deeper appreciation for the sensory-rich experiences on a farm.	The connection between *"Once Upon a Farm"* and *"America Then and Now"* lies in their shared focus on community, work, and how life in the past and present shapes the lives of people. Both modules provide students with foundational knowledge about farming, work roles, and economic contributions while introducing the idea of change over time. The second module helps students see farming as part of the larger story of America's growth, encouraging them to think about how past practices influence the present and future. Through these connections, students gain a deeper understanding of the ways in which history, culture, and technology intersect with daily life, fostering an appreciation for both the continuity and change in the world around them.
Differentiation through *Universal Design for Learning*	

UDL Indicator	Teacher Actions:
7. Perception	• Support opportunities to customize the display of information (1.1) • Support multiple ways to perceive information (1.2) • Represent a diversity of perspectives and identities in authentic ways. (1.3)
8. Language and Symbols	• Clarify vocabulary, symbols, and language structures (2.1) • Illustrate through multiple media (2.5)
9. Building Knowledge	• Connect prior knowledge to new learning (3.1) • Highlight and explore patterns, critical features, big ideas, and relationships (3.2) • Maximize transfer and generalization (3.4)
10. Interaction	• Vary and honor the methods for response, navigation, and movement. (4.1) • Optimize access to accessible materials and assistive and accessible technology and tools.
11. Expression & Community	• Use multiple tools for construction, composition, and creativity (5.2) • Build fluencies with graduated support for practice and performance (5.3)
12. Strategy Development	• Organize information and resources (6.3)
13. Welcoming Interests & Identities	• Optimize choice and autonomy (7.1)
14. Sustaining Effort & Persistence	• Optimize challenge and support (8.2) • Foster collaboration, interdependence, and collective learning (8.3) • Foster belonging and community (8.4) • Offer action-oriented feedback (8.5)
15. Emotional Capacity	• Recognize expectations, beliefs, and motivations (9.1) • Develop awareness of self and others (9.2)
Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**

An EL with guidance and supports, can participate in short discussions, conversations, and short written exchanges using words and phrases acquired in conversations, reading, and being read to.	• I can explain what makes a good story

Lesson Sequence	Learning Target/ Success Criteria/ Assessment	Resources
1	LT: I can explain what makes a good story. SC: I asked questions about Three Little Pigs using question words. SC: I learned how to plan a sentence by telling who did what.	WW23_GK_M2_Projected_L01.p...
2	LT: I can explain what makes a good story. SC: I asked questions and shared my observation about the book Farm Animals. SC: I practiced speaking with a strong voice.	WW23_GK_M2_Projected_L02.p...
3	LT: I can explain what makes a good story. SC: I practiced retelling using key details. SC: I practiced reading fluently with a strong voice. SC: I planned a sentence by telling what each animal did.	WW23_GK_M2_Projected_L03.p...
4	LT: I can explain what makes a good story. SC: I learned information about the animals in the book by looking at the pictures. SC: I practiced reading fluently with a strong voice. SC: I used vocabulary words to plan a sentence.	WW23_GK_M2_Projected_L04.p...
5	LT: I can explain what makes a good story. SC: I created my animal fact card. SC: I identified the meaning of the text Farm Animals. SC: I used my alphabet strip to help me write words.	WW23_GK_M2_Projected_L05.p...
6	LT: I can explain what makes a good story. SC: I can tell what important information I learned in the book Farm Animals.	WW23_GK_M2_Projected_L06.p...

	SC: I practiced reading fluently with a strong voice. SC: I used my alphabet strip to help me write words.	
7	LT: I can explain what makes a good story. SC: I used words from the question cube to ask questions about The Year at Maple Hill Farm. SC: I wrote about a noticing I made about the farm in January. SC: I described the types of weather in the seasons.	WW23_GK_M2_Projected_L07.p...
8	LT: I can explain what makes a good story. SC:I practiced retelling using key details from the story. SC: I learned why it is important to expand sentences. SC: I used an alphabet strip to help me write words.	WW23_GK_M2_Projected_L08.p...
9	LT: I can explain what makes a good story. SC:I described key details throughout the story to describe the setting. SC: I used words to describe clothes worn in each season.	WW23_GK_M2_Projected_L09.p...
10	LT: I can explain what makes a good story. SC: I expanded sentences about life on Maple Hill Farm. SC: I used the illustrations and words to write about what happened on Maple Hill Farm. SC: I used an alphabet strip to help me write words. SC: I sang The Seasons Song.	WW23_GK_M2_Projected_L10.p...
11	LT: I can explain what makes a good story. SC:I used the words and illustrations in the story to determine the text's essential meaning. SC: I learned why settings are important to a story. SC: I learned how to plan a sentence by telling who did what and added when.	WW23_GK_M2_Projected_L11.pp...
12	LT: I can explain what makes a good story.	WW23_GK_M2_Projected_L12.p...

	SC:I showed my understanding of the setting by telling what was happening on the farm in one season. SC: I sang the song for fluency. SC: I wrote a sentence about the season using where and when.	
13	LT: I can explain what makes a good story. SC: I identified the characters in the story. SC: I acted out the character traits of the three little pigs SC: I drew and labeled a picture of one of the characters.	WW23_GK_M2_Projected_L13.p...
14	LT: I can explain what makes a good story. SC: I illustrated a setting in The Three Little Pigs. SC: I described the mother in The Three Little Pigs. SC: I used a tool to help me spell my words.	WW23_GK_M2_Projected_L14.p...
15	LT: I can explain what makes a good story. SC: I described the characters in Three Little Pigs using adjectives and text evidence. SC: I described a character in American Gothic. SC: I acted out the vocabulary words to show my understanding of their meaning.	WW23_GK_M2_Projected_L15.p...
16	LT: I can explain what makes a good story. SC: I determined the essential meaning of the story. SC: I compared and contrasted two pigs in the story. SC: I used my tools to help me write my high frequency words.	WW23_GK_M2_Projected_L16.p...
17	LT: I can explain what makes a good story. SC: I wrote a sentence using a character trait to describe a character from the story and drew a picture. SC: I added a sentence telling what the character did that showed the trait. SC: I identify the difference between hearing and	WW23_GK_M2_Projected_L17.p...

	listening. SC: I used my tools to help me write my high frequency words.	
18	LT: I can explain what makes a good story. SC: I discussed the problem and resolution in the Three Little Pigs. SC: I identified the characters and setting in The Little Red hen. SC: I wrote and drew to show what I noticed in the text. SC: I used question words to ask questions about The Little Red Hen. SC: I learned new meanings for familiar words.	WW23_GK_M2_Projected_L18.p...
19	LT: I can explain what makes a good story. SC: I described what I learned about the characters in *The Little Red Hen*. SC: I wrote about the characters and setting in my own story. SC: I acted out the vocabulary words to show my understanding of their meaning.	WW23_GK_M2_Projected_L19.p...
20	LT: I can explain what makes a good story. SC: I identified the problem and resolution in *The Little Red Hen*. SC: I wrote about a problem in my own story. SC: I explained how adding -s to words can help me figure out the meaning of words.	WW23_GK_M2_Projected_L20.p...
21	LT: I can explain what makes a good story. SC: I explained why the repeated language in the story *The Little Red Hen* is important. SC: I wrote about an event in our class book. SC: I added content and frequently occurring words to my writing.	WW23_GK_M2_Projected_L21.p...
22	LT: I can explain what makes a good story.	WW23_GK_M2_Projected_L22.p...

	SC: I explained the essential meaning of *The Little Red Hen.* SC: I wrote a new problem and solution for the character in *The Little Red Hen*.	
23	LT: I can explain what makes a good story. SC: I compared characters from *The Little Red Hen* and *Three Little Pigs.* SC: I wrote a new problem and solution for the character in *The Little Red Hen*. *SC:* I added content and frequently occuring words to my writing.	WW23_GK_M2_Projected_L23.p...
24	LT: I can explain what makes a good story. SC: I explained the story elements of *The Three Billy Goats Gruff*. SC: I identified and sorted story elements correctly.	WW23_GK_M2_Projected_L24.p...
25	LT: I can explain what makes a good story. SC: I explained the importance of the main problem in *Three Billy Goats Gruff.* SC: I explained the importance of multiple attempts to solve a problem throughout the story.	WW23_GK_M2_Projected_L25.p...
26	LT: I can explain what makes a good story. SC: I explained the importance of the order of events in a story. SC: I wrote a solution to a story's problem. SC: I explained my understanding of adjectives about size.	WW23_GK_M2_Projected_L26.p...
27.	LT: I can explain what makes a good story. SC: I determined the essential meaning of the story *The Three Billy Goats Gruff* using events from the story. SC: I expressed an understanding of sequencing events in a story by adding two events to the class narrative.	WW23_GK_M2_Projected_L27.p...

28.	LT: I can explain what makes a good story. SC: I expressed my understanding of sequencing events in a story. SC: I added content and frequently occurring words to my writing.	WW23_GK_M2_Projected_L28.p...
29.	LT: I can explain what makes a good story. SC: I collaborated in conversation to synthesize information. SC: I identified and sorted story elements correctly.	WW23_GK_M2_Projected_L29.p...
30.	LT: I can explain what makes a good story. SC: I demonstrated understanding of how to create a good story. SC: I demonstrated understanding of grade-level vocabulary.	WW23_GK_M2_Projected_L30.p...
31.	LT: I can explain what makes a good story. SC: I expressed my understanding of how to create a good story. SC: I evaluated writing and used complete sentences to share my reflections.	WW23_GK_M2_Projected_L31.p...
32.	LT: I can explain what makes a good story. SC: I expressed my understanding of how to create a good story. SC: I evaluated writing and used complete sentences to share my reflections.	WW23_GK_M2_Projected_L32.p...

Unit Title:	
Module 3 America Then and Now	
Relevant Standards: Bold indicates priority	
Content Standards: See Above	
Essential Question(s):	**Enduring Understanding(s):**
How has life in America changed over time?	Students in Kindergarten will understand the following concepts as a result of this module:

<table>
<tr><td></td><td>

- People and things change over time.
- History helps us understand how people lived in the past.
- Communities and traditions connect us to the past.
- Technology and tools change over time, influencing how people live.
- Comparing life “then” and “now” helps us understand how things have changed.
- Symbols and celebrations help us remember and honor important parts of American history.

</td></tr>
<tr><td>Demonstration of Learning:</td><td>Pacing for Unit</td></tr>
<tr><td>

Students may demonstrate their learning within this unit in a variety of ways. Possible methods for this include (but are not limited to):

- Reading
- Writing
- Speaking
- Listening
- Analyzing text
- Using evidence
- Engaging in discussions

</td><td>8 weeks</td></tr>
<tr><td>Family Overview (link below)</td><td>Integration of Technology:</td></tr>
<tr><td>

WW_GK_M3_FamilyTipSheet_English.pdf
February Kindergarten Family Memo

</td><td>

Songs

- “Engine on the Track” (nursery rhyme)
- “This Land Is Your Land,” Woody Guthrie
- “You’re a Grand Old Flag,” George M. Cohan

Video

- “Sounds of a Glass Armonica,” *Toronto Star*

</td></tr>
<tr><td>Unit-specific Vocabulary:</td><td>Aligned Unit Materials, Resources, and Technology (beyond core resources):</td></tr>
<tr><td>

Academic Vocabulary

<table>
<tr><td>photographs</td><td>when</td><td>Close up</td></tr>
<tr><td>background</td><td>enough</td><td>change</td></tr>
<tr><td>wave</td><td>forever</td><td>plural</td></tr>
<tr><td>American Flag</td><td>event</td><td>echo</td></tr>
<tr><td>Topic statement</td><td>Long ago</td><td>now</td></tr>
</table>

</td><td>

Picture Books (Informational)

- Communication Then and Now, Robin Nelson
- Home Then and Now, Robin Nelson
- Now & Ben: The Modern Inventions of Benjamin Franklin, Gene Barretta
- School Then and Now, Robin Nelson
- Transportation Then and Now, Robin Nelson
- When I Was Young in the Mountains, Cynthia Rylant
- Picture Books (Literary)

</td></tr>
</table>

retell	then	Map
Illustration	glossary	Punctuation
Order	Old	clean
Dirty	young	Fill
awake	Long ago	Now
Then	retell	Glossary

Content Vocabulary

Swimming hole	American Flag	Bifocal lens
measure	odometer	device
distance	postal	routes
sanitation	voyage	Grand emblem
City scene	Country scene	Burst
transportation	communication	Inventions
Little house		

- The Little House, Virginia Lee Burton

Painting

- Washington Crossing the Delaware, Emanuel Leutze

Photographs

- "Betsy Ross and the American Flag: Flag Picture Gallery," Independence Hall Association
- Old Hand Water Pump, Judson McCranie
- "Then & Now: The Stunning Speed of Urban Development," S.A. Rogers

Poem

- "Now We Are Six," A.A. Milne

Songs

- "Engine on the Track" (nursery rhyme)
- "This Land Is Your Land," Woody Guthrie
- "You're a Grand Old Flag," George M. Cohan

Video

- "Sounds of a Glass Armonica," Toronto Star

Opportunities for Interdisciplinary Connections:

- **Social Studies**: Understanding historical changes, geography, and the role of communities.
- **Language Arts**: Reading, writing, and vocabulary development related to history and technology.
- **Art**: Visual representations of historical life and changes in society.
- **Mathematics**: Time, sequencing, counting, and graphing historical data.
- **Science**: Technology and environmental changes, inventions, and exploration of how they have shaped daily life.
- **Music**: Exploring historical and cultural songs to understand the role of music in history.

Anticipated misconceptions:

- The concept of time: Students may not fully grasp the concept of "then" and "now."
- Students may have trouble understanding the difference between fictional characters and historical figures.
- Students may believe that all technology, such as modern tools, has always existed.
- Students may have a narrow view of American history, focusing only on well-known events or figures.
- Students may think that certain traditions or celebrations have always been celebrated in the same way.
- Students may believe that things in the past were only "old-fashioned" and that everything today is better or more advanced.
- Students may believe that everyone in the past had the same roles or jobs.

By connecting **"America Then and Now"** with these other subject areas, students get a more holistic and enriching learning experience that supports their understanding of history while engaging multiple learning pathways. This interdisciplinary approach helps students see the connections between different areas of knowledge and better understand how the past has shaped the present.	• Students may not understand the difference between historical artifacts and everyday objects they see today. • Students may not understand the significance of national symbols like the flag or bald eagle.
Connections to Prior Units:	**Connections to Future Units:**
• Senses as a Lens for Understanding Change: The exploration of senses in Module 1 provides a foundation for comparing how sensory experiences have changed over time, particularly when discussing life on the farm in Module 2 and how rural and urban settings have evolved in Module 3. • Historical Context of Work: Module 2 introduces students to farm life, which can be compared in Module 3 to modern farming practices and urban life, highlighting changes in work and technology. • Community Life and Traditions: Module 2's exploration of farming communities connects to Module 3 by comparing rural and urban communities across time. • Technology's Role in Change: The comparison of farming tools and practices in Module 2 with modern technologies in Module 3 helps students understand technological advancement as a key part of historical change. By drawing on sensory experiences, community life, and technological changes, students can deepen their understanding of how America has evolved from the past to the present. These connections allow students to see the continuity and change in their environment, giving them a well-rounded view of history and progress.	• America's Geographic Position: Students learn how the United States fits within North America, and how geography has played a role in the country's development. • Historical Change and Global Context: Students compare historical changes in America to changes across other continents, broadening their understanding of historical development globally. • Geography's Role in History: The geography of America influenced its historical developments, and students can compare this with how other continents were shaped by their geography and people's needs. • Cultural Comparisons: By learning about America's evolution and comparing it to other continents, students can understand the role of culture, community, and environment in shaping societies around the world. • Global Influence: Students explore how American history has influenced, and been influenced by, other continents, whether through trade, technology, or migration. • Mapping and Spatial Awareness: Learning about maps and continents helps students understand the spatial context for historical events in America. • These connections help students see the broader world around them and understand that the history of America is intertwined with geography, culture, and history on a global scale. By making these connections, students gain a deeper understanding of

	both America Then and Now and the concept of Continents.
Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**
1. Perception	• Support opportunities to customize the display of information (1.1) • Support multiple ways to perceive information (1.2) • Represent a diversity of perspectives and identities in authentic ways. (1.3)
2. Language and Symbols	• Clarify vocabulary, symbols, and language structures (2.1) • Illustrate through multiple media (2.5)
3. Building Knowledge	• Connect prior knowledge to new learning (3.1) • Highlight and explore patterns, critical features, big ideas, and relationships (3.2) • Maximize transfer and generalization (3.4)
4. Interaction	• Vary and honor the methods for response, navigation, and movement. (4.1) • Optimize access to accessible materials and assistive and accessible technology and tools.
5. Expression & Community	• Use multiple tools for construction, composition, and creativity (5.2) • Build fluencies with graduated support for practice and performance (5.3)
6. Strategy Development	• Organize information and resources (6.3)
7. Welcoming Interests & Identities	• Optimize choice and autonomy (7.1)
8. Sustaining Effort & Persistence	• Optimize challenge and support (8.2) • Foster collaboration, interdependence, and collective learning (8.3) • Foster belonging and community (8.4) • Offer action-oriented feedback (8.5)

9. Emotional Capacity	• Recognize expectations, beliefs, and motivations (9.1) • Develop awareness of self and others (9.2)

Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**
An EL with guidance and supports, can participate in short discussions, conversations, and short written exchanges using words and phrases acquired in conversations, reading, and being read to.	I can describe how life in America has changed over time.

Lesson Sequence	**Learning Target / Success Criteria/Assessment**	**Resources**
1	LT: I can describe how life in America has changed over time. SC: I used question words to ask questions about the text *School Then and Now*. SC:I showed my thinking through writing and drawing.	WW23_GK_M3_Projected_L01.p...
2	LT: I can describe how life in America has changed over time. SC: I used question words to ask questions about the text *When I was Young in the Mountains*. SC: I described the role of the author and illustrator and how they add to the story.	WW23_GK_M3_Projected_L02.p...
3	LT: I can describe how life in America has changed over time. SC: I identified the main topic and key details in the text *When I was Young in the Mountains.* SC: I acted out opposite words.	WW23_GK_M3_Projected_L03.p...
4	LT: I can describe how life in America has changed over time. SC: I shared evidence of the key details in the text *When I was Young in the Mountains*. SC: I discussed a special memory from the past.	WW23_GK_M3_Projected_L04.p...
5	LT: I can describe how life in America has changed over time. SC: I used words and illustrations to determine the author's message in the text *When I was Young in the Mountains.*	WW23_GK_M3_Projected_L05.p...

	SC: I compared the author's life in the past to my life now using evidence from the text *When I was Young in the Mountains.* SC: I used a capital letter I in my written response.	
6	LT: I can describe how life in America has changed over time. SC: I compared the author's life in the past to my life now using evidence from the text *When I was Young in the Mountains.*	WW23_GK_M3_Projected_L06.p...
7	LT: I can describe how life in America has changed over time. SC: I used question words to ask questions about the text *Home Then and Now*. SC: I capitalized the first word in my sentence.	WW23_GK_M3_Projected_L07.p...
8	LT: I can describe how life in America has changed over time. SC: I identified the main topic and key details in the text *Home Then and Now.* SC: I showed my understanding by sorting nonfiction texts between home and school	WW23_GK_M3_Projected_L08.p...
9	LT: I can describe how life in America has changed over time. SC: I identified the main topic and key details in the text *Home Then and Now.* SC:I wrote about how life at home has changed over time.	WW23_GK_M3_Projected_L09.p...
10	LT: I can describe how life in America has changed over time. SC: I made connections between the photographs in *School Then and Now* and *Home Then and Now.* SC: I wrote how school in America has changed over time.	WW23_GK_M3_Projected_L10.p...
11	LT: I can describe how life in America has changed over time. SC: I shared my understanding of how school and home has changed in America over time.	WW23_GK_M3_Projected_L11.p...
12	LT: I can describe how life in America has changed over	WW23_GK_M3_Projected_L12.p...

	time. SC: I asked and answered questions about The Little House. SC: I can act out and use vocabulary from the text.	
13	LT: I can describe how life in America has changed over time. SC: I described the setting of *The Little House* and how it changed throughout the story.	WW23_GK_M3_Projected_L13.p...
14	LT: I can describe how life in America has changed over time. SC: I retold the story of *The Little House* using key details. SC: I worked with others to create a topic statement. SC: I acted out words to understand their meaning.	WW23_GK_M3_Projected_L14.p...
15	LT: I can describe how life in America has changed over time. SC: I explained how the main character responded to the changes around her using details and illustrations from the text. SC: I identified evidence that supports my topic statement.	WW23_GK_M3_Projected_L15.p...
16	LT: I can describe how life in America has changed over time. SC: I used words and illustrations to determine the author's message in the text *The Little House.* SC: I described changes the main character sees in her neighborhood.	WW23_GK_M3_Projected_L16.p...
17	LT: I can describe how life in America has changed over time. SC: I used evidence from the text to write about the changes the main character sees in her neighborhood. SC: I asked and answered questions about The Little House in a discussion.	WW23_GK_M3_Projected_L17.p...
18	LT: I can describe how life in America has changed over	WW23_GK_M3_Projected_L18.p...

	time. SC: I used question words to ask questions about the text *Transportation Then and Now* SC: I recognized and named punctuation marks.	
19	LT: I can describe how life in America has changed over time. SC: I identified the main topic and key details in the text *Then and Now.* SC: I examined the importance of writing a conclusion sentence in a paragraph.	WW23_GK_M3_Projected_L19.p...
20	LT: I can describe how life in America has changed over time. SC: I made connections between related photographs in the text.	WW23_GK_M3_Projected_L20.p...
21	LT: I can describe how life in America has changed over time. SC: I demonstrated understanding of how *Transportation and Communication Then and Now* builds knowledge of change in America.	WW23_GK_M3_Projected_L21.p...
22	LT: I can describe how life in America has changed over time. SC: I asked and answered questions about the words and pictures in *Now & Ben.*	WW23_GK_M3_Projected_L22.p...
23	LT: I can describe how life in America has changed over time. SC: I identified the main topic and key details in *Now & Ben.* SC: I described how illustrations add more detail to informative writing.	WW23_GK_M3_Projected_L23.p...
24	LT: I can describe how life in America has changed over time. SC: I used words and illustration in *Now & Ben* to learn more about his inventions. SC: I used drawings to add more details to my writing about inventions.	WW23_GK_M3_Projected_L24.p...

25	LT: I can describe how life in America has changed over time. SC: I used words and illustrations in the text to determine the essential meaning of *Now & Ben.* SC: I described how Benjamin Franklin's inventions are used in America today through informative writing.	WW23_GK_M3_Projected_L25.p...
26	LT: I can describe how life in America has changed over time. SC: I expressed my understanding of how *Now & Ben* builds knowledge of change in America. SC: I described how Benjamin Franklin's inventions are used in America today through informative writing.	WW23_GK_M3_Projected_L26.p...
27	LT: I can describe how life in America has changed over time. SC: I used drawings to support and enhance a group conversation.	WW23_GK_M3_Projected_L27.p...
28	LT: I can describe how life in America has changed over time. SC: I expressed my understanding of how life in America has changed over time. SC: I demonstrated understanding of grade-level vocabulary.	WW23_GK_M3_Projected_L28.p...
29	LT: I can describe how life in America has changed over time. SC: I expressed my understanding of how life in America has changed over time. SC: I elevated my writing and used sentences to share reflections.	WW23_GK_M3_Projected_L29.p...
30	LT: I can describe how life in America has changed over time. SC: I expressed my understanding of how life has changed over time. SC: I elevated my writing and used sentences to share reflections.	WW23_GK_M3_Projected_L30.p...

Unit Title:	
Module 4 The Continents	
Relevant Standards: Bold indicates priority	
Content Standards: See Above	
Essential Question(s):	**Enduring Understanding(s):**
What makes the world fascinating?	Students in Kindergarten will understand the following concepts as a result of this module: • The world is a large place with diverse people and places. • Each continent is characterized by its own animals, natural features, and things to do. • Maps and photographs can visually transport viewers to different locations around the world. • Stories can transport readers to another place through language and illustrations. • Collecting and reflecting upon information allows a person to make and support an informed opinion with reasons.
Demonstration of Learning:	**Pacing for Unit**
Students may demonstrate their learning within this unit in a variety of ways. Possible methods for this include (but are not limited to): • Reading • Writing • Speaking • Listening • Analyzing text • Using evidence • Engaging in discussions	8 weeks
Family Overview (link below)	**Integration of Technology:**
WW_GK_M4_FamilyTipSheet_English.pdf April Kindergarten Family Memo	Songs • "Penguin Song," *Preschool Education* • "*Where in the World is Carmen Sandiego?* from Smithsonian Folkways," *Smithsonian Folkways Recordings* Videos • "Antarctic Sights and Sounds," James Napoli

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- "Burkina Faso: Music," *Our Africa*
- "Explore Views of the Burj Khalifa with Google Maps," Google Maps
- "The Seven Continents Song," Silly School

Songs

- "Storm-Proofing the World's Biggest Mud Building," BBC Earth
- "Traditional Chinese Dance—'Flowers Contend in Beauty'," by Li Qian, Lin Chen

Web Pages

- "Americas—Fact Files," *Go Wild*
- "Moles," *DK Find Out!*

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<tr><td>Unit-specific Vocabulary:</td><td>Aligned Unit Materials, Resources, and Technology (beyond core resources):</td></tr>
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Academic Vocabulary

world	map	oceans
land	fascinating	north
south	opinion	opposite
east	west	topic
details	heading	modern
marvel	interesting	language
custom	stick	horns
enough	point	touch
poke	feature	few
action	giant	thick
blow	swirl	flow
amazing	describing	proud
bobbing	bear	lumber
slide	glide	crawl
mischief	fetch	timid
respond	compliment	scurried

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Picture Books (Informational)

- *Africa*, Rebecca Hirsch
- *Antarctica*, Rebecca Hirsch
- *Asia*, Rebecca Hirsch
- *Australia*, Rebecca Hirsch
- *Europe*, Rebecca Hirsch
- *Introducing North America*, Chris Oxladethr
- *South America*, Rebecca Hirsch
- *World Atlas*, Nick Crane; Illustrations, David Dean

Picture Books (Literary)

- *Moon Rope*, Lois Ehlert
- *The Story of Ferdinand*, Munro Leaf; Illustrations, Robert Lawson
- *Why Mosquitoes Buzz in People's Ears: A West African Tale*, Verna Aardema; Illustrations, Leo and Diane Dillon

Article

- "5 Reasons Why Animal Moms Are Awesome," April Capochino Myers

Paintings

- *Carta Marina,* Olaus Magnus
- *Cornell Farm*, Edward Hicks
- *Washington Crossing the Delaware,* Emanuel Leutze

Photographs

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leap	creep	heap
slithering	imaginary	uncertainly
unkind	unwilling	snap
mind	unusual	uneven
uncommon	table of contents	hitch
hang		
visit	introduce	quote
quotation	flat	

Content Vocabulary

continents	Asia	Europe
spherical	monsoon	North America
South America	Africa	Australia
Antarctica	dunes	mountain
Natural feature	atlas	transport
cartographer	folktale	scale
Origin story	island	add
Coral reef	caption	pouch
waterfall	restate	culture
shadow		

- *Earth from Space,* Stöckli, Reto, et al.
- "Grand Canyon Scenic Splendor," *National Park Service*
- "Patterns of Chinchero," *Descendants of the Incas*

Picture Books (Informational)

- *When I Was Young in the Mountains*, Cynthia Rylant; Illustrations, Diane Goode
- Poem
- "Lions Roar" (Repeated Language Chart)
- Quotation
- "What is life?" Crowfoot

Opportunities for Interdisciplinary Connections:

1. **Social Studies**: Understanding global geography, cultural diversity, and the role of geography in shaping human life.
2. **Language Arts**: Vocabulary development, reading, writing, and storytelling related to the continents.
3. **Science**: Learning about animal habitats, climate, weather, and adaptations across different continents.
4. **Mathematics**: Counting, sorting, graphing, and

Anticipated misconceptions:

- All continents are similar in size and shape
- All countries and cultures on a continent are the same.
- All continents have the same climate or weather.
- People from other continents live in exactly the same way as people in their own country.
- Antarctica is a continent where people live.
- There is only one climate on each continent
- Continents are unchangeable and have

measuring related to geographical features, animal populations, and continent size. 5. **Art**: Creating maps, flags, and cultural art projects inspired by different regions of the world. 6. **Music**: Exploring traditional music, rhythms, and instruments from different continents. By incorporating these interdisciplinary connections, students can build a richer and more holistic understanding of the world while enhancing their skills in multiple subject areas. The **"Continents"** module encourages curiosity about the world, fosters appreciation for cultural diversity, and provides a global perspective on the interconnections between geography, culture, science, and the arts.	always been the same. • The continents are the same distance apart from each other. • People live in every part of each continent. • All people on a continent speak the same language.
Connections to Prior Units:	**Connections to Future Units:**
In Module 4, "The Continents," students have an opportunity to build upon their learning from previous modules in a way that deepens their understanding of the world. Connections to Module 1 (The Five Senses), Module 2 (Life on the Farm), and Module 3 (America Then and Now) help students explore the diversity of the world's continents, the impact of environment on lifestyle, and how cultures and histories shape the way people live today. Through these connections, students can develop a more comprehensive understanding of the world around them and grow in their social-emotional awareness and empathy for others.	Module 4, "The Continents," serves as a foundation for future units in Wit & Wisdom offering students a broad understanding of the world. It sets the stage for exploration of topics like weather, animals, communities, landmarks, transportation, and space, all of which will build on their growing knowledge of geography, cultural diversity, and the interconnectivity of the world. By making these connections, students can see how learning about the continents not only helps them understand where they live but also prepares them for deeper exploration of the world around them. Wit & Wisdom Kindergarten Module 4: The Continents establishes a strong foundation for future learning in Grade 1 by helping students develop: • Basic geographical knowledge (continents, climates, environments) • Awareness of cultural diversity and different ways of life • An understanding of the world as an interconnected place • Inquiry skills for exploration and problem-solving By the time students reach Grade 1, they will be prepared to delve into more detailed studies of geography, history, and social studies, using the

	broad concepts introduced in Kindergarten as a springboard for deeper exploration.
Differentiation through *Universal Design for Learning*	
UDL Indicator	**Teacher Actions:**
1. Perception	• Support opportunities to customize the display of information (1.1) • Support multiple ways to perceive information (1.2) • Represent a diversity of perspectives and identities in authentic ways. (1.3)
2. Language and Symbols	• Clarify vocabulary, symbols, and language structures (2.1) • Illustrate through multiple media (2.5)
3. Building Knowledge	• Connect prior knowledge to new learning (3.1) • Highlight and explore patterns, critical features, big ideas, and relationships (3.2) • Maximize transfer and generalization (3.4)
4. Interaction	• Vary and honor the methods for response, navigation, and movement. (4.1) • Optimize access to accessible materials and assistive and accessible technology and tools.
5. Expression & Community	• Use multiple tools for construction, composition, and creativity (5.2) • Build fluencies with graduated support for practice and performance (5.3)
6. Strategy Development	• Organize information and resources (6.3)
7. Welcoming Interests & Identities	• Optimize choice and autonomy (7.1)
8. Sustaining Effort & Persistence	• Optimize challenge and support (8.2) • Foster collaboration, interdependence, and collective learning (8.3) • Foster belonging and community (8.4) • Offer action-oriented feedback (8.5)

9. Emotional Capacity	• Recognize expectations, beliefs, and motivations (9.1) • Develop awareness of self and others (9.2)

Supporting Multilingual/English Learners	
Related *CELP standards:*	**Learning Targets:**
An EL with guidance and supports, can participate in short discussions, conversations, and short written exchanges using words and phrases acquired in conversations, reading, and being read to.	I can explain what makes the world fascinating.

Lesson Sequence	**Learning Target/ Success Criteria/Assessment**	**Resources**
1	LT: I can explain what makes the world fascinating. SC: I used different question words to ask questions about *Asia.* SC: I wrote about what I learned today. SC: I sorted land and water items into the categories: *continent* and *ocean*.	WW23_GK_M4_Projected_...
2	LT: I can explain what makes the world fascinating. SC: I used text features to identify the main topic and details in the book *Asia*. SC: I wrote a sentence stating my opinion. SC: I explained common adjectives using their opposites.	WW23_GK_M4_Projected_...
3	LT: I can explain what makes the world fascinating. SC: I used text features to identify the main topic and details in the book *Europe*. SC: I identified unknown words in The Story of Ferdinand. SC: I explained my understanding of words by saying them and acting them out.	WW23_GK_M4_Projected_...
4	LT: I can explain what makes the world fascinating. SC: I used photographs and details from the text to describe things people can do in *Asia*. SC: I formed an opinion using the illustrations and words from the	WW23_GK_M4_Projected_...

	text. SC: I identified the parts of a sentence. SC: I described how a sentence was expanded.	
5	LT: I can explain what makes the world fascinating. SC: I used photographs and details from the text to describe things people can do in Europe. SC: I described the events in the story *The Story of Ferdinand* using its illustrations and details. SC: I explained new meanings of words and used them correctly.	WW23_GK_M4_Projected_...
6	LT: I can explain what makes the world fascinating. SC: I identified the reasons the author used to make a point in *Asia*. SC: I formed an opinion using the picture and words from the text. SC: I acted out the vocabulary words to show my understanding of their meaning.	WW23_GK_M4_Projected_...
7	LT: I can explain what makes the world fascinating. SC: I identified the reasons the author used to make a point in *Europe*. SC: I wrote an opinion using evidence from *Asia* and *Europe*. SC: I acted out the vocabulary words to show my understanding of their meaning.	WW23_GK_M4_Projected_...
8	LT: I can explain what makes the world fascinating. SC: I shared important learning from *Asia* using evidence from the organizer and text. SC: I explained the similarities between *Europe* and *World Atlas*. SC: I created a sentence using a preposition.	WW23_GK_M4_Projected_...
9	LT: I can explain what makes the world fascinating. SC: I showed my learning in my writing and drawing. SC: I used different question words to ask questions about *Africa*. SC: I explained common adjectives by matching them to their	WW23_GK_M4_Projected_...

	opposites.	
10	LT: I can explain what makes the world fascinating. SC: I used text features to identify the main topic and details in a section of the book *Africa*. SC: I explained common adjectives by matching them to their opposites.	WW23_GK_M4_Projected_...
11	LT: I can explain what makes the world fascinating. SC: I used photographs and details from the text to describe natural features in *Africa*. SC: I supported an opinion using the illustrations and words from the text. SC: I explained my understanding of words by acting out their opposites.	WW23_GK_M4_Projected_...
12	LT: I can explain what makes the world fascinating. SC: I used photographs and details from the text to describe natural features in *Antarctica*. SC: I supported an opinion using the illustrations and words from the text. SC: I explained the meaning of words by acting them out.	WW23_GK_M4_Projected_...
13	LT: I can explain what makes the world fascinating. SC: I explained the reasons the author gives to support a point in *Africa*. SC: I provided reasons from the text to support the point, "African elephant moms are awesome!" SC: I added on to my sentences by adding describing words.	WW23_GK_M4_Projected_...
14	LT: I can explain what makes the world fascinating. SC: I formed an opinion statement using text evidence from *Africa* and *Antarctica.* SC: I explained similarities and differences between *Africa* and World Atlas. SC: I used the meaning of the ending-ful to help me figure out the meaning of new describing words.	WW23_GK_M4_Projected_...

15	LT: I can explain what makes the world fascinating. SC: I formed and supported an opinion using information from *Africa* and *Antarctica*. SC: I shared understanding of the text by answering questions during group discussions. SC: I used the meaning of the ending-less to help me figure out the meaning of new describing words.	WW23_GK_M4_Projected_...
16	LT: I can explain what makes the world fascinating. SC: I used familiar words in, Why Mosquitoes Buzz in People's Ears, to figure out new words SC: I used question words to ask questions about *Carta Marina.* SC: I used both meanings of the words *bear* and *lumber.*	WW23_GK_M4_Projected_...
17	LT: I can explain what makes the world fascinating. SC: I used illustrations from *Why Mosquitoes Buzz in People's Ears* to understand events in the story. SC: I followed agreed upon rules for discussion when sharing my writing with a peer. SC: I used the meaning of the prefix -re to help me figure out the meaning of unknown words.	WW23_GK_M4_Projected_...
18	LT: I can explain what makes the world fascinating. SC: I used context clues from words and illustrations to determine unknown words in *Why Mosquitoes Buzz in People's Ears* SC: I gave feedback to my peers about their writing. SC: I demonstrated understanding of l*umbered, scurried, returned* and *left* by acting out their opposites.	WW23_GK_M4_Projected_...
19	LT: I can explain what makes the world fascinating. SC: I used the words and illustrations to describe the characters' actions. SC: I used illustrations to determine what is happening in one scene of the text. SC: I used the meaning of the prefix -un to help me figure out the meaning of unknown words.	WW23_GK_M4_Projected_...
20	LT: I can explain what makes the world fascinating.	WW23_GK_M4_Projected_...

	SC: I determine essential meanings of the text *Why Mosquitoes Buzz in People's Ears* . SC: I expressed understanding of the characters in *Why Mosquitoes Buzz in People's Ears* by writing an opinion piece about a favorite character. SC: I described the meanings of the words *snap* and *mind*.	
21	LT: I can explain what makes the world fascinating. SC: I expressed understanding of the characters in *Why Mosquitoes Buzz in People's Ears* by writing an opinion piece about a favorite character. SC: I figured out the different shades of meaning between verbs of movement. SC: I wrote a complete sentence and added to it by adding an adjective and preposition.	WW23_GK_M4_Projected_...
22	LT: I can explain what makes the world fascinating. SC: I represented my learning through writing and drawing. SC: I used a variety of question words to ask and answer questions about *Australia.* SC: I used the meaning of the prefix -un as a clue to help me figure out the meaning of unknown words.	WW23_GK_M4_Projected_...
23	LT: I can explain what makes the world fascinating. SC: I used text features to identify the main topic and key details in sections of *South America.* SC: I used knowledge of word relationships and illustrations in *Moon Rope* to define key vocabulary. SC: I determined shades of meaning between hitch and hang by acting out their meanings and analyzing how the meaning of the words change the meaning of the story.	WW23_GK_M4_Projected_...
24	LT: I can explain what makes the world fascinating. SC: I used text features to identify the main topic and key details in a section of *Australia.* SC: I added details to strengthen a piece of writing. SC: I determined the difference between a phrase and a complete sentence.	WW23_GK_M4_Projected_...

	SC: I identified the letter that should be capitalized in a complete sentence.	
25	LT: I can explain what makes the world fascinating. SC: I used photographs and details from the text to describe animals in *South America*. SC: I improved my writing using ideas from my friends. SC: I wrote a caption in a complete sentence with a capital letter.	WW23_GK_M4_Projected_...
26	LT: I can explain what makes the world fascinating. SC: I answered questions using photographs and details from *South America*. SC: I formed an opinion about animals from *South America* and *Australia*. SC: I explained the meaning of grade level vocabulary.	WW23_GK_M4_Projected_...
27	LT: I can explain what makes the world fascinating. SC: I supported my opinion about a continent using information from *South America and Australia*. SC: I improved my writing using ideas from my friends. SC: I explained the similarities and differences between *South America and Australia*. SC: I wrote a complete sentence with a capital letter.	WW23_GK_M4_Projected_...
28	LT: I can explain what makes the world fascinating. SC: I used different question words to ask questions about *Introducing North America.* SC: I explored the importance of a conclusion sentence in an opinion paragraph. SC: I identified a complete sentence and explained the end punctuation.	WW23_GK_M4_Projected_...
29	LT: I can explain what makes the world fascinating. SC: I used text features to identify the main topic and details in the book *Introducing North America*. SC: I created a complete sentence and explained the end punctuation.	WW23_GK_M4_Projected_...

30	LT: I can explain what makes the world fascinating. SC: I used photographs and details from the text to describe natural features and animals in *Introducing North America*. SC: I formed an opinion about North America using the text *Introducing North America*. SC: I wrote a complete sentence with the correct punctuation mark.	WW23_GK_M4_Projected_...
31	LT: I can explain what makes the world fascinating. SC: I found correct end punctuation. **assessment*** SC: I supported my opinion about North America using the text *Introducing North America*. SC: I explained the similarities and differences between *North America and World Atlas*. SC: I sorted photographs into the categories based on the natural feature it represents.	WW23_GK_M4_Projected_...
32	LT: I can explain what makes the world fascinating. SC: I sorted texts into types of genres. SC: I orally described things using details. SC: I wrote a sentence and added to it. SC: I used a capital letter and the correct punctuation mark in my sentence.	WW23_GK_M4_Projected_...
33	LT: I can explain what makes the world fascinating. SC: I explained the unique features, animals, and things to do on the different continents. SC: I described familiar places using descriptive words. SC: I explained the meaning of grade level vocabulary	WW23_GK_M4_Projected_...
34	LT: I can explain what makes the world fascinating. SC: I explained the unique features, animals, and things to do on the different continents. SC: I looked closely at our writing and shared my thoughts in complete sentences.	WW23_GK_M4_Projected_...
35	LT: I can explain what makes the world fascinating.	WW23_GK_M4_Projected_...

	SC: I explained my understanding of the unique natural features, animals, and things to do on the different continents. SC: I orally described how a detail in one of my reasons compares to a characteristic of North America. SC: I looked closely at our writing and shared my thoughts in complete sentences.	
36	LT: I can explain what makes the world fascinating. SC: I thought about the learning across the whole year and shared a text that sparked a sense of interest. SC: I drew and labeled one detail from a module text that sparked a sense of interest.	WW23_GK_M4_Projected_...

Course Title:	Content Area:	Grade Level:	Credit (if applicable)
Kindergarten Music	Music	**Kindergarten**	na

Course Description:

This classroom experience is a part of a sequential music curriculum, which offers each student the opportunity to engage in the art of music utilizing the Four Artistic Processes as outlined in the National Coalition for Core Arts Standards: Creating, Performing, Responding, and Connecting. This course provides an introduction to the musical concepts of Rhythm, Melody, Expression, Form, Timbre, Literacy and Technique. Students will explore these concepts through various musical activities including singing, performing on instruments, moving, composing and improvising, listening, and evaluating.

Aligned Core Resources:	Connection to the BPS Vision of the Graduate
First Steps in Music The Book of Echo Songs The Book of Movement Exploration The Book of Fingerplays and Action Songs The Book of Call & Response The Book of Children's Songtales The Book of Beginning Circle Games The Book of Pitch Exploration The Book of Songs and Rhymes with Beat Motions First Steps in Music with Orff Schulwerk First Steps with The Nutcracker First Steps in Global Music First Step in Music for Infants and Toddlers (light purple) First Steps in Music Vocal Development kit (White box) Pitch Exploration Pathways posters Pitch Exploration Stories posters Down by the Bay posters Oh in the Woods posters Keeping the Beat (CD) Music for Creative Movement (CD) Move It #1 (DVD) Move It #2 (DVD) Lomax the Hound of Music (DVD)	SOCIAL AND CROSS-CULTURAL SKILLS - Know when it is appropriate to listen and when to speak - Conduct themselves in a respectable, professional manner EMPATHY - Demonstrating understanding of others perspectives and needs - Understand the concept of community as a means for supporting others in need COMMUNICATION - Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions. Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade) CRITICAL THINKING AND PROBLEM SOLVING - Transfer knowledge to other situations

Additional Course Information: ***Knowledge/Skill Dependent courses/prerequisites***	Link to Completed Equity Audit
NA	**Music K - Equity Curriculum Review**

Standard Matrix

District Learning Expectations and Standards	RHYTHM: Beat	MELODY: Melodic Contour	Dynamics (Loud & Quiet)	Tempo (Fast and Slow)	I Sing, You Sing	Same/Different	Descriptive Music	4 Voices	One Voice or Many Voices	How Do Instruments Sound?	Reading Left to Right	Tracking Top to Bottom (Melodic Contour)	Rest, Ready, Perform	Posture Matters!
Creating														
MU:Cr1.1 Generate and conceptualize artistic ideas and work.	P		S	S		P					S	P		
MU:Cr2.1 Organize and develop artistic ideas and work.						S					S	S		
MU:Cr3.1 Refine and complete artistic work.						S					S	P		
Performing														
MU:Pr4.1 Select, analyze and interpret artistic work for presentation.	S	P	S	P		P	P	S	S			S		
MU:Pr5.1 Develop and refine artistic techniques and work for presentation.			S	S	S							P	S	S
MU:Pr6.1 Convey meaning through the presentation of artistic work.	P	P	S	P	P				S			S	S	S
Responding														
MU:Re7.1 Perceive and analyze artistic work.		P	S	S		P				S		S		
MU:Re8.1 Interpret intent and meaning in artistic work.			S	P						S				
MU:Re9.1 Apply criteria to evaluate artistic work.			S	S										
Connecting														
MU:Cn10.0 Synthesize and	S		S	S		S						S		

relate knowledge and personal experiences to make art.														
MU:Cn11.1 Relate artistic ideas and works with societal, cultural and historical context to deepen understanding.		S	S	S		S								

Unit Links

Unit Title:	
# RHYTHM: Beat	
Relevant Standards: Bold indicates priority	
MU:Cr1.1.Ka - With guidance, explore and experience music concepts (such as beat and melodic contour). **MU:Cr1.1.Kb - With guidance, generate musical ideas (such as movements or motives).** **MU:Pr4.3.Ka** - With guidance, demonstrate awareness of expressive qualities (such as voice quality, dynamics, and tempo) that support the creators' expressive intent. **MU:Pr6.1.Ka** - With guidance, perform music with expression. **MU:Pr6.1.Kb - Perform appropriately for the audience.** **MU:Cn10.0.Ka** - Demonstrate how interests, knowledge, and skills relate to personal choices and intent when creating, performing, and responding to music	
Essential Question(s):	**Enduring Understanding(s):**
Cr1.1 - How do musicians generate creative ideas? **Pr4.3 -**How do performers interpret musical works? **Pr6.1 -** When is a performance judged ready to present? How do context and the manner in which musical work is presented influence audience response? **Cn10.0 -** How do musicians make meaningful connections to creating, performing, and responding?	**Cr1.1 - The creative ideas, concepts, and feelings that influence musicians' work emerge from a variety of sources.** **Pr4.3 -** Performers make interpretive decisions based on their understanding of context and expressive intent. **Pr6.1 - Musicians judge performance based on criteria that vary across time, place, and cultures. The context and how a work is presented influence the audience response.** **Cn10.0 -** Musicians connect their personal interests, experiences, ideas, and knowledge to creating, performing, and responding
Demonstration of Learning:	**Pacing for Unit**
• Perform steady beat for Engine, Engine using body percussion • Perform steady beat for Engine, Engine using small percussion • Perform steady beat for Pitter, Patter using body percussion • Point to visual representation of steady beat for Pitter, Patter • Perform steady beat for KTB #6 (Rameau) and KTB #18 (Locatelli) using body percussion • Identify beat v. no beat worksheet	Full year
Family Overview (link below)	**Integration of Technology:**
Utilizing a repertoire of simple songs, games, audio recordings, and tunes, students will be expected to	Smartboard integration • Youtube videos

create with, perform with, and respond to steady beat and rhythmic patterns.	• Feierabend Move It Videos • Google Docs/Slides CD Player/Speakers
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Beat Steady	Keeping the Beat CD, First Steps in Music book and CD, Small percussion instruments, beat pages, Move It DVDs, The Book of Fingerplays and Actions Songs, The Book of Songs and Rhymes with Beat Motions, Share the Music
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Mathematics	• Students do not pat their legs. • Students do not pat their leg to the beat. • Students do not use their instruments to show the beat. • Students do not use their instrument the correct way. • Students speak to show the beat instead of body percussion. • Students play the rhythm instead of the beat. • Students pat the rhythm instead of the beat.
Connections to Prior Units:	**Connections to Future Units:**
Tempo Reading Left to Right Descriptive Music Tracking Top to Bottom	Tempo Reading Left to Right Descriptive Music Tracking Top to Bottom
Differentiation through Universal Design for Learning	
UDL Indicator	**Teacher Actions:**
Interaction 4.1 Vary and honor the methods for response, navigation, and movement	• Offer options for physically responding or indicating selections (e.g., alternatives to marking with pen and pencil, alternatives to mouse control). • Offer options for physically interacting with materials by hand, voice, single switch, joystick, keyboard, or adapted keyboard. •
Expression & Communication 5.1 Use multiple media for communication	• Solve problems using a variety of strategies.
Supporting Multilingual/English Learners	
Related CELP standards:	**Learning Targets:**
K.1 An EL can construct meaning from oral	K1. I can, with prompting and supports, identify a few

presentations and literary and informational text through grade appropriate listening, reading, and viewing. K.2 An EL can participate in grade appropriate oral and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions.	key words/attributes. K.2 I can, with prompting and supports, listen with occasional participation in short conversations using a limited number of words and phrases acquired in conversations and being read to. K2. I can, with prompting and supports, respond verbally and nonverbally to simple yes/no and some wh-questions.

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
1	I can perform a steady beat using my body.	I can use my hands and feet to match the steady beat of the music I hear	First Steps in Music repertoire, Beat pages, Move Its, Keeping the Beat CD, folk dances, small percussion
2	I can hear whether the sound I hear has a steady beat or not	I can confidently identify a steady beat when there is one	Collection of instrumental music with steady beat and ambient sound
3	I can perform the steady beat I hear with my finger on a page	I can use my finger to tap the steady beat icon on a beat sheet	Beat sheet
4	I can perform a steady beat using classroom instruments	I can use a classroom percussion instrument to demonstrate the steady beat	Percussion instruments
5	I can perform a steady beat when grouped in 3's	I can emphasize the first beat in a group of three	Collection of instrumental music with steady beat

Unit Title:

MELODY: Melodic Contour

Relevant Standards: Bold indicates priority

MU:Pr4.2.Ka - With guidance, explore and demonstrate awareness of music contrasts (such as high/low, loud/soft, same/different) in a variety of music selected for performance.

MU:Pr6.1.Ka - With guidance, perform music with expression.

MU:Pr6.1.Kb - Perform appropriately for the audience.

MU:Re7.2.Ka - With guidance, demonstrate how a specific music concept (such as beat or melodic direction) is used in music.

MU:Cn11.0.Ka - Demonstrate understanding of relationships between music and the other arts, other disciplines, varied contexts, and daily life.

Essential Question(s):	**Enduring Understanding(s):**
Pr4.2 - How does understanding the structure and context of musical works inform performance? **Pr6.1 -** When is a performance judged ready to present? How do context and the manner in which musical work is presented influence audience response? **Re7.2 -** How does understanding the structure and context of music inform a response? **Cn11.0 -** How do the other arts, other disciplines, contexts, and daily life inform creating, performing, and responding to music?	**Pr4.2 -** Analyzing creators' context and how they manipulate elements of music provides insight into their intent and informs performance. **Pr6.1 -** Musicians judge performance based on criteria that vary across time, place, and cultures. The context and how a work is presented influence the audience response. **Re7.2 -** Response to music is informed by analyzing context (social, cultural, and historical) and how creators and performers manipulate the elements of music. **Cn11.0 -** Understanding connections to varied contexts and daily life enhances musicians' creating, performing, and responding.
Demonstration of Learning:	**Pacing for Unit**
Create high/low patterns Create Arioso Perform high/low patterns Perform echo patterns Perform Simple Songs Identify high/low sounds	Year Long
Family Overview (link below)	**Integration of Technology:**
Utilizing a repertoire of simple songs, games, audio recordings, and tunes, students will be expected to create with, perform with, and respond to melodic contours and patterns.	Smartboard integration • Youtube videos • Feierabend Move It Videos • Google Docs/Slides CD Player/Speakers
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Melody Ariosa	First Steps in Music, The Book of Echo Songs, The Book of Call and Response Songs, Pitch Exploration Stories, Vocal Exploration Tub, Pitch Pathway Cards
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Cadence and contour of speaking.	- Students do not use their hands to follow the melodic contour. - Students use their talking voice instead of their singing voice.
Connections to Prior Units:	**Connections to Future Units:**
Tempo Reading Left to Right Descriptive Music Tracking Top to Bottom	Tempo Reading Left to Right Descriptive Music Tracking Top to Bottom
Differentiation through Universal Design for Learning	

UDL Indicator	Teacher Actions:
Perception 1.2 Support multiple ways to perceive information	• Provide visual diagrams, charts, or notations of music or sound. • Provide visual and/or emotional description for musical interpretation.
Interaction 4.1 Vary and honor the methods for response, navigation, and movement	• Offer options for physically responding or indicating selections (e.g., alternatives to marking with pen and pencil, alternatives to mouse control). • Offer options for physically interacting with materials by hand, voice, single switch, joystick, keyboard, or adapted keyboard. •
Expression & Communication 5.1 Use multiple media for communication	• Solve problems using a variety of strategies.

Supporting Multilingual/English Learners	
Related CELP standards:	**Learning Targets:**
K.2 An EL can . . . participate in grade appropriate oral and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions. K.7 An EL can . . . adapt language choices to purpose, task, and audience when speaking and writing.	K.2 I can, with prompting and supports, listen with occasional participation in short conversations using a limited number of words and phrases acquired in conversations and being read to. K2. I can, with prompting and supports, respond verbally and nonverbally to simple yes/no and some wh-questions. K.7 I can, with prompting and supports, repeat and use frequently occurring words and phrases. K.7 I can, with prompting and supports, recognize the meaning of high frequency words learned through conversations, reading, and being read to.

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
1	I can perform high and low sounds with my voice.	I am changing the pitch of my voice to be high and low	First Steps in Music, Vocal Development Kit
2	I can identify sounds as high or low in a listening example	I can use the words “high” and “low” to describe the pitch of what I hear	First Steps in Music, Vocal Development Kit
3	I can perform combinations of high and low as a melodic contour	I can combine patterns of high and low sounds in my singing voice	First Steps in Music,

			Vocal Development Kit
4	I can identify melodic contour in listening examples	I can describe the direction and sequence of sounds I hear	First Steps in Music, Vocal Development Kit

Unit Title:
EXPRESSION: Dynamics (Loud & Quiet)
Relevant Standards: Bold indicates priority
MU:Cr1.1.Ka - With guidance, explore and experience music concepts (such as beat and melodic contour). **MU:Cr1.1.Kb** - With guidance, generate musical ideas (such as movements or motives). **MU:Pr4.2.Ka** - With guidance, explore and demonstrate awareness of music contrasts (such as high/low, loud/soft, same/different) in a variety of music selected for performance. **MU:Pr4.3.K** - With guidance, demonstrate awareness of expressive qualities (such as voice quality, dynamics, and tempo) that support the creators' expressive intent. **MU:PR.5.Kb** - With appropriate guidance, use suggested strategies in rehearsal to improve expression in music. **MU:Pr6.1.Ka** - With guidance, perform music with expression. **MU:Pr6.1.Kb** - Perform appropriately for the audience. **MU:Re7.2.1a** - With limited guidance,demonstrate and identify how specific music concepts (such as beat or pitch) are used in various styles of music for a purpose. **MU:Re8.1.K** - With guidance, demonstrate awareness of expressive qualities (such as dynamics and tempo) that reflect creators'/performers' expressive intent. **MU:Re9.1.Ka** - With guidance, apply personal and expressive preferences in the evaluation of music. **MU:Cn10.0.K** - Demonstrate how interests, knowledge, and skills relate to personal choices and intent when creating, performing, and responding to music **MU:Cn11.0.Ka**. Demonstrate understanding of relationships between music and the other arts, other disciplines, varied contexts, and daily life.

Essential Question(s):	**Enduring Understanding(s):**
Cr1.1 - How do musicians generate creative ideas? **Pr4.2 -** How does understanding the structure and context of musical works inform performance? **Pr4.3 -** How do performers interpret musical works?	**Cr1.1.Ka**The creative ideas, concepts, and feelings that influence musicians' work emerge from a variety of sources. **Pr4.2** - Analyzing creators' context and how they manipulate elements of music provides insight into their

PR.5 -How do musicians improve the quality of their performance? **Pr6.1 -** When is a performance judged ready to present? How do context and the manner in which musical work is presented influence audience response? **Re7.2 -** How does understanding the structure and context of music inform a response? **Re8.1 -** How do we discern the musical creators' and performers' expressive intent? **Re9.1 -** How do we judge the quality of musical work(s) and performance(s) **Cn10.0 -** How do musicians make meaningful connections to creating, performing, and responding? **Cn11.0 -** How do the other arts, other disciplines, contexts, and daily life inform creating, performing, and responding to music?	intent and informs performance. **Pr4.3** - Performers make interpretive decisions based on their understanding of context and expressive intent. **PR.5** - To express their musical ideas, musicians analyze, evaluate, and refine their performance over time through openness to new ideas, persistence, and the application of appropriate criteria. **Pr6.1 -** Musicians judge performance based on criteria that vary across time, place, and cultures. The context and how a work is presented influence the audience response. **Re7.2 -** Response to music is informed by analyzing context (social, cultural, and historical) and how creators and performers manipulate the elements of music. **Re8.1 -** Through their use of elements and structures of music, creators and performers provide clues to their expressive intent **Re9.1 -** The personal evaluation of musical work(s) and performance(s) is informed by analysis, interpretation, and established criteria **Cn10.0 -** Musicians connect their personal interests, experiences, ideas, and knowledge to creating, performing, and responding **Cn11.0 -** Understanding connections to varied contexts and daily life enhances musicians' creating, performing, and responding.
Demonstration of Learning:	**Pacing for Unit**
Create Loud/quiet sounds Create fast/slow sounds Perform loud/quiet sound/songs Perform fast/slow sounds/songs Identify loud/quiet sounds Identify fast/slow sounds Respond to loud/quiet and fast/slow with appropriate movements	full-year
Family Overview (link below)	**Integration of Technology:**
Utilizing a repertoire of simple songs, games, audio recordings, and tunes, students will be expected to create with, perform with, and respond to the expressive qualities of music.	*Smart board*

Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Loud Quiet	First Steps in Music Move It! DVDs Vocal Development Kit
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Animal Sounds, School Building Sounds	Confusing low with quiet and high with loud
Connections to Prior Units:	**Connections to Future Units:**
What sounds do you hear in the room/place?	1st grade Piano and Forte
Differentiation through Universal Design for Learning	
UDL Indicator	**Teacher Actions:**
Perception 1.2 Support multiple ways to perceive information	• Provide visual diagrams, charts, or notations of music or sound. • Provide visual and/or emotional description for musical interpretation.
Interaction 4.1 Vary and honor the methods for response, navigation, and movement	• Offer options for physically responding or indicating selections (e.g., alternatives to marking with pen and pencil, alternatives to mouse control). • Offer options for physically interacting with materials by hand, voice, single switch, joystick, keyboard, or adapted keyboard. •
Expression & Communication 5.1 Use multiple media for communication	• Solve problems using a variety of strategies.
Supporting Multilingual/English Learners	
Related CELP standards:	**Learning Targets:**
K.1 An EL can . . . construct meaning from oral presentations and literary and informational text through grade appropriate listening, reading, and viewing. K.2 An EL can . . . participate in grade appropriate oral and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions.	K1. I can, with prompting and supports, identify a few key words/attributes. K.2 I can, with prompting and supports, listen with occasional participation in short conversations using a limited number of words and phrases acquired in conversations and being read to. K2. I can, with prompting and supports, respond verbally and nonverbally to simple yes/no and some wh-questions.

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
1	I can perform loudly and quietly	I can use my body or voice to demonstrate the concepts of loud and quiet	First Steps in Music, Move It! DVDs, Vocal Development Kit
2	I can identify loud and quiet in listening selections	I can use the words of "loud" and "quiet" to describe the dynamics of what I hear	First Steps in Music, Move It! DVDs, Vocal Development Kit
3	I can create movements to represent loud and quiet	I can respond to the dynamics of music by creating a larger, heavier motion for loud and a gentler, smaller motion for quiet	First Steps in Music, Move It! DVDs, Vocal Development Kit
4	I can perform loudly and quietly using classroom instruments	I can use a classroom instrument to make loud and quiet sounds	First Steps in Music, Move It! DVDs, Vocal Development Kit

Unit Title:

EXPRESSION: Tempo (Fast and Slow)

Relevant Standards: Bold indicates priority

MU:Cr1.1.Ka - With guidance, explore and experience music concepts (such as beat and melodic contour).
MU:Cr1.1.Kb - With guidance, generate musical ideas (such as movements or motives).

MU:Pr4.2.K - With guidance, explore and demonstrate awareness of music contrasts (such as high/low, loud/soft, same/different) in a variety of music selected for performance.

MU:Pr4.3.K - With guidance, demonstrate awareness of expressive qualities (such as voice quality, dynamics, and tempo) that support the creators' expressive intent.

MU.PR.5.1.Kb - With appropriate guidance, use suggested strategies in rehearsal to improve expression in music.

MU:Pr6.1.Ka - With guidance, perform music with expression.
MU:Pr6.1.Kb - Perform appropriately for the audience.

MU:Re7.2.K - With guidance, demonstrate how a specific music concept (such as beat or melodic direction) is used in music.

MU:Re8.1.K - With guidance, demonstrate awareness of expressive qualities (such as dynamics and tempo) that reflect creators'/performers' expressive intent.

MU:Re9.1.Ka - With guidance, apply personal and expressive preferences in the evaluation of music.

MU:Cn10.0.K - Demonstrate how interests, knowledge, and skills relate to personal choices and intent when creating, performing, and responding to music

MU:Cn11.0.K - Demonstrate understanding of relationships between music and the other arts, other disciplines, varied contexts, and daily life.

Essential Question(s):	**Enduring Understanding(s):**
Cr1.1 - How do musicians generate creative ideas? **Pr4.2** - How does understanding the structure and context of musical works inform performance? **Pr4.3** - How do performers interpret musical works? **PR.5.1** - How do musicians improve the quality of their performance? **Pr6.1** - When is a performance judged ready to present? How do context and the manner in which musical work is presented influence audience response? **Re7.2**-How does understanding the structure and context of music inform a response? **Re8.1** - How do we discern the musical creators' and performers' expressive intent? **Re9.1** - How do we judge the quality of musical work(s) and performance(s) **Cn10.0** - How do musicians make meaningful connections to creating, performing, and responding? **Cn11.0** - How do the other arts, other disciplines, contexts, and daily life inform creating, performing, and responding to music?	**Cr1.1** - The creative ideas, concepts, and feelings that influence musicians' work emerge from a variety of sources. **Pr4.2** - Analyzing creators' context and how they manipulate elements of music provides insight into their intent and informs performance. **Pr4.3** - Performers make interpretive decisions based on their understanding of context and expressive intent. **PR.5.1** - To express their musical ideas, musicians analyze, evaluate, and refine their performance over time through openness to new ideas, persistence, and the application of appropriate criteria. **Pr6.1** - Musicians judge performance based on criteria that vary across time, place, and cultures. The context and how a work is presented influence the audience response. **Re7.2** - Response to music is informed by analyzing context (social, cultural, and historical) and how creators and performers manipulate the elements of music. **Re8.1** - Through their use of elements and structures of music, creators and performers provide clues to their expressive intent **Re9.1 -** The personal evaluation of musical work(s) and performance(s) is informed by analysis, interpretation, and established criteria **Cn10.0** - Musicians connect their personal interests, experiences, ideas, and knowledge to creating, performing, and responding **Cn11.0** - Understanding connections to varied contexts and daily life enhances musicians' creating, performing, and responding.
Demonstration of Learning:	**Pacing for Unit**
Match speed of beat movement exploration activities Wake Up You Sleepyheads	Year Long
Family Overview (link below)	**Integration of Technology:**

Utilizing a repertoire of simple songs, games, audio recordings, and tunes, students will be expected to create with, perform with, and respond to music in different tempi (speed).	Smartboard integration • Feierabend Move It Videos • Youtube videos • Google Docs/Slides CD Player/Speakers
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Fast Slow Steady Beat	First Steps in Music, Move It! DVDs, Vocal Development Kit
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
ELA, Science	Students struggling with maintaining a steady beat may not keep the tempo as fast or slow as necessary A fast tempo often causes students to excitedly rush and be *too* fast Rhythms and steady beat may be confounded with students choosing a tempo based on the rhythm pattern and not the beat.
Connections to Prior Units:	**Connections to Future Units:**
Beat	Dynamics
Differentiation through Universal Design for Learning	
UDL Indicator	**Teacher Actions:**
Perception 1.2 Support multiple ways to perceive information	• Provide visual diagrams, charts, or notations of music or sound. • Provide visual and/or emotional description for musical interpretation.
Interaction 4.1 Vary and honor the methods for response, navigation, and movement	• Offer options for physically responding or indicating selections (e.g., alternatives to marking with pen and pencil, alternatives to mouse control). • Offer options for physically interacting with materials by hand, voice, single switch, joystick, keyboard, or adapted keyboard. •
Expression & Communication 5.1 Use multiple media for communication	• Solve problems using a variety of strategies.
Related CELP standards:	**Learning Targets:**
K.1 An EL can . . . construct meaning from oral presentations and literary and informational text through grade appropriate listening, reading, and viewing. K.2 An EL can . . . participate in grade appropriate oral	K1. I can, with prompting and supports, identify a few key words/attributes. K.2 I can, with prompting and supports, listen with occasional participation in short conversations using a

and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions.	limited number of words and phrases acquired in conversations and being read to. K2. I can, with prompting and supports, respond verbally and nonverbally to simple yes/no and some wh-questions.

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
1	I can perform in ways that are fast and slow	I can use my body or voice to demonstrate the concepts of fast and slow	First Steps in Music repertoire, Move Its, Keeping the Beat CD, folk dances
2	I can identify fast and slow in listening selections.	I can use the words of "fast" and "slow" to describe the tempo of what I he	First Steps in Music repertoire, Move Its, Keeping the Beat CD, folk dances
3	I can create movements to represent fast and slow.	I can respond to the tempo of music by creating a smaller, quicker motions for fast and a slower, longer motions for slow	First Steps in Music repertoire, Beat pages, Move Its, Keeping the Beat CD, folk dances, small percussion
4	I can perform fast and slow sequences of sounds using classroom instruments SC:	I can use a classroom instrument to play quickly or slowly	Vocal Development Kit, Small Percussion

Unit Title:

FORM: I Sing, You Sing

Relevant Standards: Bold indicates priority

MU:Pr5.1.Ka - With guidance, apply personal, teacher, and peer feedback to refine performances.

MU:Pr6.1.Ka - With guidance, perform music with expression.

Essential Question(s):	Enduring Understanding(s):
Pr5.1 - How do musicians improve the quality of their performance? **Pr6.1** - When is a performance judged ready to present? How do context and the manner in which musical work is presented influence audience response?	**Pr5.1** - To express their musical ideas, musicians analyze, evaluate, and refine their performance over time through openness to new ideas, persistence, and the application of appropriate criteria. **Pr6.1 -** Musicians judge performance based on criteria that vary across time, place, and cultures. The context and how a work is presented influence the audience

	response
Demonstration of Learning:	**Pacing for Unit**
• Oh My, No More Pie (echo) • Where, Oh Where • John the Rabbit (Call and response)	Year Long
Family Overview (link below)	**Integration of Technology:**
Utilizing a repertoire of simple songs, games, iconic notation, non-linguistic representation, audio recordings, poems, and tunes, students will be expected to create with, perform with, and respond to same/different patterns.	Smartboard
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Singing Voice Pitch	The Book of Call and Response Songs, The Book of Echo Songs, First Steps in Music – Book and CD, Lomax the Hound of Music DVD
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
ELA	Students use a speaking voice instead of a singing voice Students use a singing voice but at too high or low of a pitch
Connections to Prior Units:	**Connections to Future Units:**
Melodic Contour	1st Grade Do Re Mi
Differentiation through Universal Design for Learning	
UDL Indicator	**Teacher Actions:**
Perception 1.2 Support multiple ways to perceive information	• Provide visual diagrams, charts, or notations of music or sound. • Provide visual and/or emotional description for musical interpretation.
Interaction 4.1 Vary and honor the methods for response, navigation, and movement	• Offer options for physically responding or indicating selections (e.g., alternatives to marking with pen and pencil, alternatives to mouse control). • Offer options for physically interacting with materials by hand, voice, single switch, joystick, keyboard, or adapted keyboard. •
Expression & Communication 5.1 Use multiple media for communication	• Solve problems using a variety of strategies.

Supporting Multilingual/English Learners			
Related CELP standards:		**Learning Targets:**	
K.1 I can construct meaning from oral presentations and literary and informational text through grade appropriate listening, reading, and viewing		K1. I can, with prompting and supports, identify a few key words/attributes.	
Lesson Sequence	**Learning Target**	**Success Criteria/ Assessment**	**Resources**
	I can accurately echo song fragments and patterns	I can use matching pitch and rhythm to perform the same pattern as the teacher	
	I can accurately perform a complete echo song	I can use matching pitch and rhythm to consistently perform an echo to my teacher's singing	
	I can accurately provide responses to a call and response activity	I can use matching pitch and rhythm to perform the response of a different pattern to my teacher's call	
	I can accurately perform along to a complete call and response song	I can use matching pitch and rhythm to consistently perform the response to my teacher's call	

Unit Title:
FORM: Same/Different
Relevant Standards: Bold indicates priority
MU:Cr1.1.Ka - With guidance, explore and experience music concepts (such as beat and melodic contour). **MU:Cr2.1.Kb** - With guidance, organize personal musical ideas using iconic notation and/or recording technology. **MU:Cr3.1.K** - With guidance, apply personal, peer, and teacher feedback in refining personal musical ideas. **MU:Pr4.2.K - With guidance, explore and demonstrate awareness of music contrasts (such as high/low, loud/soft, same/different) in a variety of music selected for performance.** **MU:Pr4.3.K**-With guidance, demonstrate awareness of expressive qualities (such as voice quality, dynamics, and tempo) that support the creators' expressive intent.

MU:Re7.2.K - With guidance, demonstrate how a specific music concept (such as beat or melodic direction) is used in music.

MU:Cn10.1.K - Demonstrate how interests, knowledge, and skills relate to personal choices and intent when creating, performing, and responding to music.

MU:Cn11.1.K - Demonstrate understanding of relationships between music and the other arts, other disciplines, varied contexts, and daily life.

Essential Question(s):	**Enduring Understanding(s):**
Cr1.1 - How do musicians generate creative ideas? **Cr2.1 -** How do musicians make creative decisions? **Cr3.1 -** How do musicians improve the quality of their creative work? **Pr4.2 -** How does understanding the structure and context of music inform a response? **Re7.2 -** How does understanding the structure and context of musical works inform performance? **Cn10.1 -** How do musicians make meaningful connections to creating, performing, and responding? **Cn11.1 -** How do the other arts, other disciplines, contexts, and daily life inform creating, performing, and responding to music?	**Cr1.1 -** The creative ideas, concepts, and feelings that influence musicians' work emerge from a variety of sources. **Cr2.1 -** Musicians' creative choices are influenced by their expertise, context, and expressive intent. **Cr3.1 -** Musicians evaluate, and refine their work through openness to new ideas, persistence, and the application of appropriate criteria. **Pr4.2 -** Analyzing creators' context and how they manipulate elements of music provides insight into their intent and informs performance. **Re7.2 -** Response to music is informed by analyzing context (social, cultural, and historical) and how creators and performers manipulate the elements of music. **Cn10.1 -** Musicians connect their personal interests, experiences, ideas, and knowledge to creating, performing, and responding. **Cn11.1 -** Understanding connections to varied contexts and daily life enhances musicians' creating, performing, and responding.
Demonstration of Learning:	**Pacing for Unit**
• Waltz in Ab, Brahms, Move It! #1 – Track 2 • Create same, similar, and different instrument pieces with iconic notation	Year Long
Family Overview (link below)	**Integration of Technology:**
Utilizing a repertoire of simple songs, games, iconic notation, non-linguistic representation, audio recordings, poems, and tunes, students will be expected to create with, perform with, and respond to same/different patterns.	Drag/identify images of musical notation into categories of same and different using the Smartboard and MusicFirst Elementary
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Same and Different	First Steps in Music, Move It! DVDs, Vocal Development Kit
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Math problems that are same/different, weather that is	Confusing low with quiet and high with loud

the same/different, words that sound the same/different	
Connections to Prior Units:	**Connections to Future Units:**
Tempo, Dynamics, Melodic Contour	1st grade Piano and Forte
Differentiation through Universal Design for Learning	
UDL Indicator	**Teacher Actions:**
Expression and Communication 5.3 Build fluencies with graduated levels of support for practice and performance	• Use scaffolds that can be gradually released with increasing independence and skills (e.g., embedded into digital reading and writing software).
Welcoming Interests & Identities 7.2 Optimize relevance, value, and authenticity	• Design activities so learning outcomes are authentic, communicate to real audiences, and reflect a purpose that is clear to the participants.
Supporting Multilingual/English Learners	
Related CELP standards:	**Learning Targets:**
K.1 I can construct meaning from oral presentations and literary and informational text (or music) through grade appropriate listening, reading, and viewing.	K1. I can, with prompting and supports, identify a few key words/attributes.

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
	I can echo songs and patterns	I can perform the same pattern as the teacher	Lomax, the Hound of Music DVD (Too-da-la & Pay Me My Money Down), First Steps in Music, The Book of Echo Songs, The Book of Call and Response Songs
	I can respond to a call and response activity	I can perform the response of a different pattern to my teacher's call	First Steps in Music, The Book of Echo songs, The Book of Call and response songs
	I can identify whether two musical patterns are the same or different from each other	I can use the words "same" and "different" to compare two musical patterns	First Steps in Music, The Book of Echo songs, The Book of Call and response songs
	I can follow along to an iconic listening	I can place my finger on	First Steps in Music, The

	map of same and different patterns	the picture that represents the pattern I hear	Book of Echo songs, The Book of Call and response songs Listening maps
	I can identify a piece of instrumental music by connecting the musical elements to a non-musical idea	I can use musical elements I hear to identify the corresponding animal of a Carnival of the Animals selection	First Steps in Music, The Book of Echo songs, The Book of Call and response songs Listening Maps

Unit Title:	
# FORM: Descriptive Music	
Relevant Standards: Bold indicates priority	
MU:Pr4.2.Ka - With guidance, explore and demonstrate awareness of music contrasts (such as high/low, loud/soft, same/different) in a variety of music selected for performance . **MU:Pr4.3.Ka - With guidance, demonstrate awareness of expressive qualities (such as voice quality, dynamics, and tempo) that support the creators' expressive intent.**	
Essential Question(s):	**Enduring Understanding(s):**
Pr4.2.Ka How does understanding the structure and context of musical works inform performance? **Pr4.3.Ka** How do performers interpret musical works?	**Pr4.2.Ka** Analyzing creators' context and how they manipulate elements of music provides insight into their intent and informs performance. **Pr4.3.Ka** Performers make interpretive decisions based on their understanding of context and expressive intent.
Demonstration of Learning:	**Pacing for Unit**
• Aural discrimination worksheets - Choose one from the drive • Demonstrating appropriate gross motor skills to a variety of musical selections	Trimesters 2 and 3
Family Overview (link below)	**Integration of Technology:**
Utilizing a repertoire of simple songs, games, iconic notation, non-linguistic representation, audio recordings, poems, and tunes, students will be expected to create with, perform with, and respond to same/different patterns.	Drag and drop images of Carnival of the animals into fast, slow, same, different, loud, soft, high, low categories
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**

Fast Slow Loud Soft Same Different	Music in Motion Carnival of the Animals coloring book, Teacher developed aural discrimination worksheets (to be stored on the shared drive), Picture book/CD
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Life science - animal life	Confusing low with quiet and high with loud
Connections to Prior Units:	**Connections to Future Units:**
Quiet/Loud, Fast/Slow, Same/Different	1st Grade Piano and Forte
Differentiation through Universal Design for Learning	
UDL Indicator	**Teacher Actions:**
7.2 Optimize relevance, value, and authenticity	• Design activities so that learning outcomes are authentic, communicate to real audiences, and reflect a purpose that is clear to the participants • Provide tasks that allow for active participation, exploration and experimentation
Supporting Multilingual/English Learners	
Related CELP standards:	**Learning Targets:**
K.1 I can construct meaning from oral presentations and literary and informational text (or music) through grade appropriate listening, reading, and viewing.	K1. I can, with prompting and supports, identify a few key words/attributes.

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
	I can listen attentively to a piece of instrumental music	I can demonstrate active listening expectations while a piece of instrumental music is played	Music in Motion Carnival of the Animals coloring book, Teacher developed aural discrimination worksheets (on the shared drive), Picture book/CD
	I can use movement to represent the instrumental music I hear	I can move my body high or low, loud or quiet, and fast or slow in response to selections from Carnival of the Animals	Music in Motion Carnival of the Animals coloring book, Teacher developed aural discrimination worksheets (on the shared drive), Picture book/CD
	I can use classroom materials and instruments to perform along to instrumental music	I can use materials similarly to the musical elements heard in	Music in Motion Carnival of the Animals coloring book, Teacher developed

		selections of Carnival of the Animals	aural discrimination worksheets (on the shared drive), Picture book/CD
	I can describe how high or low, loud or quiet, and fast or slow can connect to non-musical things	I can describe the animals from the Carnival of the Animals using our Kindergarten music vocabulary	Music in Motion Carnival of the Animals coloring book, Teacher developed aural discrimination worksheets (on the shared drive), Picture book/CD
	I can identify a piece of instrumental music by connecting the musical elements to a non-musical idea	I can use musical elements I hear to identify the corresponding animal of a Carnival of the Animals selection	Music in Motion Carnival of the Animals coloring book, Teacher developed aural discrimination worksheets (on the shared drive), Picture book/CD

Unit Title:	
TIMBRE: 4 Voices	
Relevant Standards: Bold indicates priority	
MU:Pr4.2.Ka - With guidance, explore and demonstrate awareness of music contrasts (such as high/low, loud/soft, same/different) in a variety of music selected for performance .	
Essential Question(s):	**Enduring Understanding(s):**
Pr4.2.Ka How does understanding the structure and context of musical works inform performance?	**Pr4.2.Ka** Analyzing creators' context and how they manipulate elements of music provides insight into their intent and informs performance.
Demonstration of Learning:	**Pacing for Unit**
Identify speaking, singing, whisper, and shout voices Perform speaking, singing, whisper, and shout voices Create speaking, singing, whisper, and shout voices	Year-long
Family Overview (link below)	**Integration of Technology:**
Utilizing their voice students will be expected to create, perform, and respond with appropriate vocal techniques.	Smartboard integration • Google Docs/Slides CD Player/Speakers

Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
• Poems, songs, finger plays, and chants using speaking, singing, whisper, and shout voices	Share the Music (K), First Steps in Music
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
ELA	- Students still learning to be comfortable in their singing voices may reduce to a whisper or a speaking voice - Students who are overly excited or confident may over-sing into a shouting voice - Shouting voice may be conflated with screaming, when it is simply a louder speaking voice.
Connections to Prior Units:	**Connections to Future Units:**
Same/Different	Melodic Contour, Dynamics, I Sing You Sing, One Voice or Many Voices
Differentiation through Universal Design for Learning	
UDL Indicator	**Teacher Actions:**
1.2 Offer alternatives to auditory information 3.1 Activate or supply background knowledge	1.2 Provide visual diagrams, charts, notations of music or sound 3.1 Anchor instruction by linking to and activating relevant prior knowledge of shouting, talking, and whispering
Supporting Multilingual/English Learners	
Related CELP standards:	**Learning Targets:**
K.2 I can participate in grade appropriate oral and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions.	K.2 I can, with prompting and supports, listen with occasional participation in short conversations using a limited number of words and phrases acquired in conversations and being read to. K2. I can, with prompting and supports, respond verbally and nonverbally to simple yes/no and some wh-questions.

Lesson Sequence	**Learning Target**	**Success Criteria/ Assessment**	**Resources**
	I can change my voice to a whisper, talk, shout or sing to echo my teacher's four voices	I can change my volume and pitch to match that of my teacher	First Steps in Music repertoire
	I can change my voice to a whisper, talk, shout or sing to perform appropriately to a song or poem	I can change my volume and pitch to appropriately perform a song or poem	First Steps in Music repertoire

	I can identify if the voice I hear is in a whisper, talk, shout, or singing voice	I can use the four voices vocabulary to describe the performing voice I hear	First Steps in Music repertoire

Unit Title:	
TIMBRE: One Voice or Many Voices	
Relevant Standards: Bold indicates priority	
MU:Pr4.2.Ka - With guidance, explore and demonstrate awareness of musical contrasts (such as high/low, loud/soft, same/different) in a variety of music selected for performance. **MU:Pr6.1.Kb** - Perform appropriately for the audience.	
Essential Question(s):	**Enduring Understanding(s):**
Pr4.2.Ka - How does understanding the structure and context of musical works inform performance? **Pr6.1.Kb** - How do context and the manner in which musical work is presented influence audience response?	**Pr4.2.Ka** - Analyzing creators' context and how they manipulate elements of music provides insight into their intent and informs performance. **Pr6.1.Kb** - Musicians judge performance based on criteria that vary across time, place, and cultures. The context and how a work is presented influence the audience response.
Demonstration of Learning:	**Pacing for Unit**
Identify one voice vs many voices Perform one voice vs many voices Create one voice vs many voices	Year-long
Family Overview (link below)	**Integration of Technology:**
Utilizing a repertoire of simple songs, games, audio recordings, and tunes, students will be expected to create with, perform with, and respond to the four voice types and solo/unison timbres.	Smartboard Various CDs Various DVDs
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Solo Unison Tutti	Share the Music (K), First Steps in Music

Opportunities for Interdisciplinary Connections:	Anticipated misconceptions:
ELA	Students can't wait for a turn Students misidentify solo vs tutti Students can't identify one voice vs many voices
Connections to Prior Units:	**Connections to Future Units:**
Same/Different 4 Voices	Melodic Contour, Dynamics, I Sing You Sing
Differentiation through Universal Design for Learning	
UDL Indicator	**Teacher Actions:**
Perception **1.2 Support multiple ways to perceive information**	**Provide visual diagrams, charts, or notations of music or sound.** **Provide visual and/or emotional description for musical interpretation.**
Interaction **4.1 Vary and honor the methods for response, navigation, and movement**	**Offer options for physically responding or indicating selections (e.g., alternatives to marking with pen and pencil, alternatives to mouse control).** **Offer options for physically interacting with materials by hand, voice, single switch, joystick, keyboard, or adapted keyboard.**
Expression & Communication **5.1 Use multiple media for communication**	**Solve problems using a variety of strategies.**
Supporting Multilingual/English Learners	
Related CELP standards:	**Learning Targets:**
K.1 I can construct meaning from oral presentations and literary and informational text (or music) through grade appropriate listening, reading, and viewing. K.2 I can participate in grade appropriate oral and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions.	K1. I can, with prompting and supports, identify a few key words/attributes. K.2 I can, with prompting and supports, listen with occasional participation in short conversations using a limited number of words and phrases acquired in conversations and being read to. K2. I can, with prompting and supports, respond verbally and nonverbally to simple yes/no and some wh-questions.

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
1	I can sing a song fragment as a solo	I can perform a song fragment by singing it as a solo	First Steps in Music repertoire
2	I can use the term unison to identify when many people sing the same thing	I can use the word unison when asked to describe a listening example featuring many people singing the same melody	First Steps in Music repertoire

3	I can use the term solo to identify when one person sings alone	I can use the word solo when asked to describe a listening example featuring a single person singing	First Steps in Music repertoire

Unit Title:	
# TIMBRE: How Do Instruments Sound?	
Relevant Standards: Bold indicates priority	
MU:Re7.1.K - With guidance, list personal interests and experiences and demonstrate why they prefer some music selections over others. **MU:Re8.1.K** - With guidance, demonstrate awareness of expressive qualities (such as dynamics and tempo) that reflect creators'/performers' expressive intent.	
Essential Question(s):	**Enduring Understanding(s):**
MU:Re7.1.K How do individuals choose music to experience? **Re8.1.K** How do we discern the musical creators' and performers' expressive intent?	**MU:Re7.1.K**: Individuals' selection of musical works is influenced by their interests, experiences, understandings, and purposes **Re8.1.K** Through their use of elements and structures of music, creators and performers provide clues to their expressive intent.
Demonstration of Learning:	**Pacing for Unit**
• Listening worksheet	Year-long
Family Overview (link below)	**Integration of Technology:**
Utilizing a repertoire of simple songs, games, audio recordings, and tunes, students will be expected to create with, perform with, and respond to the four voice types and solo/unison timbres.	Smartboard First Steps in Music CD's First Steps in Music DVD's
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Instrument Shake Hit Scrape Listen	First Steps in Music; Conversational Solfege; Other Kindergarten repertoire

Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Physical Education	• Students just stop. • Students don't perform at the correct time. • Students assume that since similar instruments are used, it's the same music • Confusing low with quiet and high with loud • Students do not use their instrument the correct way.
Connections to Prior Units:	**Connections to Future Units:**
Beat Dynamics Tempo Same/ Different Descriptive Music Four Voices	All future instrumental/performance units
Differentiation through Universal Design for Learning	
UDL Indicator	**Teacher Actions:**
Perception **1.2 Support multiple ways to perceive information**	**Provide visual diagrams, charts, or notations of music or sound.** **Provide visual and/or emotional description for musical interpretation.**
Interaction **4.1 Vary and honor the methods for response, navigation, and movement**	**Offer options for physically responding or indicating selections (e.g., alternatives to marking with pen and pencil, alternatives to mouse control).** **Offer options for physically interacting with materials by hand, voice, single switch, joystick, keyboard, or adapted keyboard.**
Expression & Communication **5.1 Use multiple media for communication**	**Solve problems using a variety of strategies.**
Supporting Multilingual/English Learners	
Related CELP standards:	**Learning Targets:**
K.1 An EL can construct meaning from oral presentations and literary and informational text through grade appropriate listening, reading, and viewing K.2: An EL can participate in grade appropriate oral and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions	K1. I can, with prompting and supports, identify a few key words/attributes. K.2 I can, with prompting and supports, listen with occasional participation in short conversations using a limited number of words and phrases acquired in conversations and being read to. K2. I can, with prompting and supports, respond verbally and nonverbally to simple yes/no and some wh-questions.

Lesson	**Learning Target**	**Success Criteria/**	**Resources**

Sequence		Assessment	
1	I can perform with classroom percussion	I can use my classroom percussion using the techniques shown by my teacher	First Steps in Music repertoire
2	I can listen to music featuring the percussion instruments used in class	I can actively listen to musical examples that feature percussion instruments used in class"	First Steps in Music repertoire
3	I can describe various classroom percussion instruments by comparing and contrasting its sound qualities	I can use descriptive words to compare the different sound qualities of classroom percussion instruments	First Steps in Music repertoire
4	I can aurally identify various classroom percussion instruments	I can name a classroom instrument I hear by noticing its different sound qualities	First Steps in Music repertoire

Unit Title:

LITERACY: Reading Left to Right

Relevant Standards: Bold indicates priority

MU:Cr1.1.Ka – With guidance, explore and experience music concepts (such as beat and melodic contour).

MU:Cr1.1.Kb – With guidance, generate musical ideas (such as movements or motives)

MU:Cr2.1.Ka – With guidance, demonstrate and choose favorite musical ideas

MU:Cr2.1.Kb – With guidance, organize personal musical ideas using iconic notation and/or recording technology

MU:Cr3.1.K – With guidance, apply personal, peer, and teacher feedback in refining personal musical ideas

MU:Cr3.2.K – With guidance, demonstrate a final version of personal musical ideas to peers

Essential Question(s):	Enduring Understanding(s):
Cr1.1.Ka How do musicians generate creative ideas? **Cr2.1.KaHow do musicians make creative decisions?** **Cr3.1.KHow do musicians improve the quality of their creative work?** **Cr3.2.KWhen is creative work ready to share?**	**Cr1.1.Ka**The creative ideas, concepts, and feelings that influence musicians' work emerge from a variety of sources **Cr2.1.Ka**How do musicians make creative decisions? **Cr3.1.K** Musicians evaluate, and refine their work through openness to new ideas, persistence, and the application of appropriate criteria **Cr3.2.K**Musicians' presentation of creative work is the

	culmination of a process of creation and communication
Demonstration of Learning:	**Pacing for Unit**
Perform Feierabend pitch pathway flashcards, track left to right Create and perform original pitch pathway, track left to right	year-long
Family Overview (link below)	**Integration of Technology:**
Utilizing iconic notation, listening maps, and non-linguistic representation, students will be expected to create with, perform with, and respond to melodic contour, steady beat, and same/different patterns.	Smartboard
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Pathway Left Right Start End	Feierabend pitch pathway flashcards Manipulatives for creating pathways (yarn, pipe cleaners, markers, etc.)
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
ELA	• Students move their voices in the wrong direction, with/without an example to follow • Students move their voices at random
Connections to Prior Units:	**Connections to Future Units:**
Melodic Contour Same/Different Descriptive Music I Sing, You Sing Four Voices	All future music literacy units
Differentiation through Universal Design for Learning	
UDL Indicator	**Teacher Actions:**
Perception **1.2 Support multiple ways to perceive information** **Interaction** **4.1 Vary and honor the methods for response, navigation, and movement**	**Provide visual diagrams, charts, or notations of music or sound.** **Provide visual and/or emotional description for musical interpretation.** **Offer options for physically responding or indicating selections (e.g., alternatives to marking with pen and pencil, alternatives to mouse control).** **Offer options for physically interacting with materials by hand, voice, single switch, joystick, keyboard, or adapted keyboard.**

Expression & Communication **5.1 Use multiple media for communication**	**Solve problems using a variety of strategies.**

Supporting Multilingual/English Learners	
Related CELP standards:	**Learning Targets:**
K.1 An EL can construct meaning from oral presentations and literary and informational text through grade appropriate listening, reading, and viewing K.2: An EL can participate in grade appropriate oral and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions	K1. I can, with prompting and supports, identify a few key words/attributes. K.2 I can, with prompting and supports, listen with occasional participation in short conversations using a limited number of words and phrases acquired in conversations and being read to. K2. I can, with prompting and supports, respond verbally and nonverbally to simple yes/no and some wh-questions.

Lesson Sequence	**Learning Target**	**Success Criteria/ Assessment**	**Resources**
1	I can echo my teacher's musical patterns	I can correctly perform a matching pattern to that of my teacher	First Steps in Music, The Book of Echo songs, The Book of Call and response songs
2	I can use my finger moving left to right to follow a listening map of a musical pattern	I can place my finger on the correct spot on the page as the pattern changes	First Steps in Music, The Book of Echo songs, The Book of Call and response songs
3	I can improvise and create a simple rhythm pattern that I can recall	I can clap an original rhythm pattern that I can remember and repeat	First Steps in Music, The Book of Echo songs, The Book of Call and response songs
4	I can use shapes to notate a simple rhythm pattern I create	I can sequence shapes from left to right to match my rhythm pattern	First Steps in Music, The Book of Echo songs, The Book of Call and response songs

Unit Title:
LITERACY: Tracking Top to Bottom (Melodic Contour)
Relevant Standards: Bold indicates priority
MU:Cr1.1.Ka - With guidance, explore and experience music concepts (such as beat and melodic contour). MU:Cr1.1.Kb - With guidance, generate musical ideas (such as movements or motives).

MU:Cr2.1.Kb - With guidance, organize personal musical ideas using iconic notation and/or recording technology.

MU:Cr3.1.Ka - With guidance, apply personal, peer, and teacher feedback in refining personal musical ideas.

MU:Cr3.2.Ka - With guidance, demonstrate a final version of personal musical ideas to peers.

MU:Pr4.2.Ka - With guidance, explore and demonstrate awareness of music contrasts (such as high/low, loud/soft, same/different) in a variety of music selected for performance.

MU:Pr5.1.Ka: With guidance, apply personal, teacher, and peer feedback to refine performances.

MU:Pr6.1.Kb - Perform appropriately for the audience.

MU:Re7.2.Ka - With guidance, demonstrate how a specific music concept (such as beat or melodic direction) is used in music.

MU:Cn10.1.Ka - Demonstrate how interests, knowledge, and skills relate to personal choices and intent when creating, performing, and responding to music.

Essential Question(s):	**Enduring Understanding(s):**
Cr1.1.Ka How do musician's generate creative ideas? **Cr2.1.Kb**How do musicians make creative decisions? **Cr3.1.Ka**How do musicians improve the quality of their creative work? **Cr3.2.Ka**When is creative work ready to share? **Pr4.2.Ka**How does understanding the structure and context of musical works inform performance? Pr5.1.KaHow do musicians improve the quality of their performance? **Pr6.1.Kb**When is a performance judged ready to present? How do context and the manner in which musical work is presented influence audience response? **Re7.2.Ka**How does understanding the structure and context of music inform a response? **Cn10.1.Ka**How do musicians make meaningful connections to creating, performing, and responding?	**Cr1.1.Ka**The creative ideas, concepts and feelings that influence musicians' work emerge from a variety of sources. **Cr2.1.Kb**Musicians' creative choices are influenced by their expertise, context, and expressive intent. **Cr3.1.Ka**Musicians evaluate, and refine their work through openness to new ideas, persistence, and the application of appropriate criteria. **Cr3.2.Ka**Musicians' presentation of creative work is the culmination of a process of creation and communication. **Pr4.2.Ka**Analyzing creators' context and how they manipulate elements of music provides insight into their intent and informs performance. Pr5.1.KaTo express their musical ideas, musicians analyze, evaluate, and refine their performance over time through openness to new ideas, persistence, and the application of appropriate criteria. **Pr6.1.Kb**Musicians judge performance based on criteria that vary across time, place, and cultures. The context and how a work is presented influence the audience response **Re7.2.Ka**Response to music is informed by analyzing context (social, cultural, and historical) and how creators and performers manipulate the elements of music. **Cn10.1.Ka**Musicians connect their personal interests, experiences, ideas, and knowledge to creating, performing, and responding.
Demonstration of Learning:	**Pacing for Unit**
Perform Feierabend pitch pathway flashcards, track top to bottom using high and low singing voices	Year Long

Create and perform original pitch pathway card, tracking top to bottom using their finger and high and low singing voice	
Family Overview (link below)	**Integration of Technology:**
Utilizing iconic notation, listening maps, and non-linguistic representation, students will be expected to create with, perform with, and respond to melodic contour and high/low sounds	Smartboard
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Pitch Pathway Melody Direction High Low Top Bottom Start End	Feierabend pitch pathway flashcards Feierabend pitch exploration stories Manipulatives for creating pathways (yarn, pipe cleaners, markers, etc.) Slide whistle
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
ELA	• Students just move their voices up and down at random, not following the direction of a contoured line • Students move their voices in the wrong direction, with/without an example to follow
Connections to Prior Units:	**Connections to Future Units:**
Melodic Contour Same/Different Descriptive Music I Sing, You Sing Four Voices Reading Left to Right	All future music literacy units
Differentiation through Universal Design for Learning	
UDL Indicator	**Teacher Actions:**
Optimize individual choice and autonomy (checkpoint7.1) Offer alternatives for visual information (checkpoint1.3) Vary the methods for response and navigation (checkpoint4.1)	7.1: Provide learners with as much discretion and autonomy as possible by providing choices in such things as: The level of perceived challenge The type of rewards or recognition available The context or content used for practicing and assessing skills The tools used for information gathering or production The color, design, or graphics of layouts, etc. The sequence or timing for completion of subcomponents of tasks

	Allow learners to participate in the design of classroom activities and academic tasks Involve learners, where and whenever possible, in setting their own personal academic and behavioral goals 1.3: Provide descriptions (text or spoken) for all images, graphics, video, or animations Use touch equivalents (tactile graphics or objects of reference) for key visuals that represent concepts Provide physical objects and spatial models to convey perspective or interaction Provide auditory cues for key concepts and transitions in visual information 4.1 Provide alternatives in the requirements for rate, timing, speed, and range of motor action required to interact with instructional materials, physical manipulatives, and technologies Provide alternatives for physically responding or indicating selections (e.g., alternatives to marking with pen and pencil, alternatives to mouse control) Provide alternatives for physically interacting with materials by hand, voice, single switch, joystick, keyboard, or adapted keyboard

Supporting Multilingual/English Learners

Related CELP standards:	**Learning Targets:**
K.1 An EL can construct meaning from oral presentations and literary and informational text through grade appropriate listening, reading, and viewing K.2: An EL can participate in grade appropriate oral and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions	K1. I can, with prompting and supports, identify a few key words/attributes. K.2 I can, with prompting and supports, listen with occasional participation in short conversations using a limited number of words and phrases acquired in conversations and being read to. K2. I can, with prompting and supports, respond verbally and nonverbally to simple yes/no and some wh-questions.

Lesson Sequence	**Learning Target**	**Success Criteria/ Assessment**	**Resources**
1	I can echo my teacher's melodic contour patterns	SC: I can correctly perform a matching melodic contour to that of my teacher	Feierabend Pitch Exploration Materials, Grade-level vocal repertoire
2	I can use my finger moving left to right and up and down to track the contour of a sound I hear	SC: I can trace my finger on the correct spot on the page as the pattern changes	Feierabend Pitch Exploration Materials, Grade-level vocal repertoire

3	I can perform a melodic contour using my high and low voice while following a pitch pathway map with my finger	SC: I can use a high or low voice as my finger changes up and down on a page.	Feierabend Pitch Exploration Materials, Grade-level vocal repertoire
4	I can improvise and create a simple melodic contour that I can recall	SC: I can use a siren voice to perform an original melodic contour that I can remember and repeat	Feierabend Pitch Exploration Materials, Grade-level vocal repertoire
5	I can use a moving line shape to notate a melodic contour I create	SC: I can change the height of my line on the page to show when my voice changes from high to low	Feierabend Pitch Exploration Materials, Grade-level vocal repertoire

Unit Title:

TECHNIQUE: Rest, Ready, Perform

Relevant Standards: Bold indicates priority

MU:Pr5.1.Ka - With guidance, apply personal, teacher, and peer feedback to refine performances

MU:Pr6.1.Ka - With guidance, perform music with expression.

MU:Pr6.1.Kb - Perform appropriately for the audience.

Essential Question(s):	**Enduring Understanding(s):**
(MU:Pr5.1.K) How do musicians improve the quality of their performance? (MU:Pr6.1.K) When is a performance judged ready to present? How do context and the manner in which musical work is presented influence audience response?	(MU:Pr5.1.K) To express their musical ideas, musicians analyze, evaluate, and refine their performance over time through openness to new ideas, persistence, and the application of appropriate criteria. (MU:Pr6.1.K) Musicians judge performance based on criteria that vary across time, place, and cultures.
Demonstration of Learning:	**Pacing for Unit**
Use of rest/ready/perform positions in performance Teacher assessed rest/ready/perform position checklist	Full year

Family Overview (link below)	**Integration of Technology:**
When utilizing their classroom instruments, students will be expected to perform with appropriate instrumental techniques, including adjusting to musical moments such as resting, readiness, and performing.	Smartboard
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Posture Rest position - "Backpack straps" or "Shoulder holders" - "Eggs by your legs, spoons in your bowl" Ready position - Pinch - wrap Perform position - "Handlebars" or "bicycle arms" - X shape	First Steps in Music, Conversational Solfege, other Kindergarten-level repertoire
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Physical Education	• Students don't know where to put their instruments/ mallets for rest position. • Students just stop. • Students go right from rest to perform. • Students do not rest at the correct time. • Students don't go into ready position at the correct time. • Students don't perform at the correct time. • Students don't know where to put their instruments/ mallets for ready position. • Students do not play their instrument with correct playing technique.
Connections to Prior Units:	**Connections to Future Units:**
Beat Dynamics Tempo Same/ Different Descriptive Music How Do Instruments Sound? Reading Left to Right Posture Matters	All future instrumental performance units
Differentiation through Universal Design for Learning	
UDL Indicator	**Teacher Actions:**
Optimize relevance, value, and authenticity (checkpoint7.2) Maximize transfer and generalization (checkpoint3.4)	7.2: Vary activities and sources of information so that they can be: Personalized and contextualized to learners' lives

Build fluencies with graduated levels of support for practice and performance (checkpoint5.3)	Culturally relevant and responsive Socially relevant Age and ability appropriate Appropriate for different racial, cultural, ethnic, and gender groups Design activities so that learning outcomes are authentic, communicate to real audiences, and reflect a purpose that is clear to the participants 3.4: Provide checklists, organizers, sticky notes, electronic reminders Prompt the use of mnemonic strategies and devices (e.g., visual imagery, paraphrasing strategies, method of loci, etc.) Incorporate explicit opportunities for review and practice Provide scaffolds that connect new information to prior knowledge (e.g., word webs, half-full concept maps) Embed new ideas in familiar ideas and contexts (e.g., use of analogy, metaphor, drama, music, film, etc.) 5.3: Provide differentiated models to emulate (i.e. models that demonstrate the same outcomes but use differing approaches, strategies, skills, etc.) Provide differentiated mentors (i.e., teachers/tutors who use different approaches to motivate, guide, feedback or inform) Provide scaffolds that can be gradually released with increasing independence and skills (e.g., embedded into digital reading and writing software) Provide differentiated feedback (e.g., feedback that is accessible because it can be customized to individual learners)
Supporting Multilingual/English Learners	
Related CELP standards:	**Learning Targets:**
K.1 An EL can construct meaning from oral presentations and literary and informational text through grade appropriate listening, reading, and viewing K.2: An EL can participate in grade appropriate oral and written exchanges of information, ideas, and analyses,	K1. I can, with prompting and supports, identify a few key words/attributes. K.2 I can, with prompting and supports, listen with occasional participation in short conversations using a limited number of words and phrases acquired in conversations and being read to. K2. I can, with prompting and supports, respond verbally and nonverbally to simple yes/no and some wh-

responding to peer, audience, or reader comments and questions	questions.

Lesson Sequence	Learning Target	Success Criteria/ Assessment	Resources
1	I can match my teacher's three body and hand positions when holding my classroom instrument	SC: I can quietly hold my instrument like my teacher during rest, I can quietly support my instrument like my teacher when ready, I can perform using a correct technique like my teacher	Grade-level vocal and instrumental repertoire
2	I can describe what my body should do at rest, ready, and perform positions	SC: I can describe that a rest body is quiet and still, a ready body holds the instrument quietly with a proper hold, and a performing body is steady using a proper hold	Grade-level vocal and instrumental repertoire
3	I can independently use a classroom instrument in the rest, ready, and perform positions when prompted	SC: I can use my classroom instrument appropriately in the rest, ready, and perform positions when prompted	Grade-level vocal and instrumental repertoire
4	I can independently use a classroom instrument in the rest, ready, and perform positions automatically	SC: I can use my classroom instrument appropriately and automatically in the rest, ready, and perform positions	Grade-level vocal and instrumental repertoire

Unit Title:
TECHNIQUE: Posture Matters!
Relevant Standards: Bold indicates priority
MU:Pr5.1.Ka - With guidance, apply personal, teacher, and peer feedback to refine performances MU:Pr6.1.Ka - With guidance, perform music with expression. **MU:Pr6.1.Kb - Perform appropriately for the audience.**

Essential Question(s):	**Enduring Understanding(s):**
Pr5.1.Ka How do musicians improve the quality of their performance? Pr6.1.KaWhen is a performance judged ready to present? How do context and the manner in which musical work is presented influence audience response?	**Pr5.1.Ka**To express their musical ideas, musicians analyze, evaluate, and refine their performance over time through openness to new ideas, persistence, and the application of appropriate criteria. Pr6.1.KaMusicians judge performance based on criteria that vary across time, place, and cultures.
Demonstration of Learning:	**Pacing for Unit**
Use of posture in performance Teacher assessed posture checklist (Yes/No)	Full year
Family Overview (link below)	**Integration of Technology:**
When utilizing their singing voice, students will be expected to perform with appropriate vocal techniques, including their physical posture.	Smartboard
Unit-specific Vocabulary:	**Aligned Unit Materials, Resources, and Technology (beyond core resources):**
Posture Criss cross Tall back	First Steps in Music, Conversational Solfege, other Kindergarten-level repertoire
Opportunities for Interdisciplinary Connections:	**Anticipated misconceptions:**
Physical Education	W sitting or heel sitting instead of criss crossed, weight placed on hands or elbows instead of being spine supported
Connections to Prior Units:	**Connections to Future Units:**
Melodic Contour Dynamics Tempo Same Different I Sing, You Sing Four Voices One Voice or Many Voices Tracking Top to Bottom Rest Ready Perform	All future vocal performance units
Differentiation through Universal Design for Learning	
UDL Indicator	**Teacher Actions:**
Optimize relevance, value, and authenticity (checkpoint7.2) Maximize transfer and generalization (checkpoint3.4) Build fluencies with graduated levels of support for practice and performance (checkpoint5.3)	7.2: Vary activities and sources of information so that they can be: Personalized and contextualized to learners' lives Culturally relevant and responsive Socially relevant Age and ability appropriate Appropriate for different racial, cultural, ethnic, and

	gender groups Design activities so that learning outcomes are authentic, communicate to real audiences, and reflect a purpose that is clear to the participants 3.4: Provide checklists, organizers, sticky notes, electronic reminders Prompt the use of mnemonic strategies and devices (e.g., visual imagery, paraphrasing strategies, method of loci, etc.) Incorporate explicit opportunities for review and practice Provide scaffolds that connect new information to prior knowledge (e.g., word webs, half-full concept maps) Embed new ideas in familiar ideas and contexts (e.g., use of analogy, metaphor, drama, music, film, etc.) 5.3: Provide differentiated models to emulate (i.e. models that demonstrate the same outcomes but use differing approaches, strategies, skills, etc.) Provide differentiated mentors (i.e., teachers/tutors who use different approaches to motivate, guide, feedback or inform) Provide scaffolds that can be gradually released with increasing independence and skills (e.g., embedded into digital reading and writing software) Provide differentiated feedback (e.g., feedback that is accessible because it can be customized to individual learners)

Supporting Multilingual/English Learners	
Related CELP standards:	**Learning Targets:**
K.1 An EL can construct meaning from oral presentations and literary and informational text through grade appropriate listening, reading, and viewing K.2: An EL can participate in grade appropriate oral and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions	K1. I can, with prompting and supports, identify a few key words/attributes. K.2 I can, with prompting and supports, listen with occasional participation in short conversations using a limited number of words and phrases acquired in conversations and being read to. K2. I can, with prompting and supports, respond verbally and nonverbally to simple yes/no and some wh-questions.

Lesson Sequence	**Learning Target**	**Success Criteria/ Assessment**	**Resources**
1	I can match my teacher's body position when sitting or standing to sing	SC: I can sit criss cross with a tall back and stand tall with my arms by my	Grade-level vocal repertoire

		sides	
2	I can describe what my body should do when sitting or standing to sing	SC: I can describe that a sitting body is criss-crossed with a tall back, and a standing body is tall with my arms by my sides	Grade-level vocal repertoire
3	I can independently sit or stand in a proper singing position when prompted	SC: I can sit criss cross with a tall back while singing when asked , and stand tall with my arms by my sides when asked	Grade-level vocal repertoire
4	I can independently sit or stand in a proper singing position automatically when performing	SC: I can sit criss cross with a tall back while singing at all times, and stand tall with my arms by my sides when singing at all times	Grade-level vocal repertoire