# Egg Harbor City

# Public Schools

## Science Curriculum

## Grades K-5

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**Nature of Science**

The nature of science is complex and multidisciplinary. From research about how scientists work, we know that scientists do not work in isolation in their own house of physics, or biology or chemistry but they reach out and create networks of scientists within and across disciplines
who can contribute understanding, share ideas, and critique evidence and explanations. As we see in the science of global climate change, scientists work across the fields of geology, physics, and biology to provide evidence, plan investigations, and develop models to represent new ways to think about Earth systems. Important practices like engaging in argument from evidence, modeling, and communicating information do not occur in isolation but rely on feedback from within and across scientific communities and disciplines. Basing the middle school model curriculum in an integrated model where the students are engaged with a variety of topics at each grade, focused on the connection of ideas across the domains, enhances the interdisciplinary nature of science.

**Learning Theory**

In the elementary years, students build their understandings of core concepts across all three domains of science: physical, life and Earth and space. Continuing this model in grades 6-8 better supports student learning in that there will not be a large gap of time in which a student does not engage in a specific discipline. This model takes advantage of current research which recognizes that there is variation across children at a given age and that thinking does not develop along a preset roadmap for each student. It allows middle school students to build on what they know and think they understand from their elementary years with the goal in middle school of helping students to revise their knowledge and understanding about those core ideas. Learning theory research shows expert knowledge base develops better through interdisciplinary real-world connections then through isolated content. This is especially important in middle school where motivation is critical to learning. An integrated and better articulated middle school model science curriculum that reflects what we know currently about how children learn science and how their mastery develops over time promotes deeper learning in science. As we know and understand about how students develop understanding while learning content, it informs teachers' practice; if teachers understand where their students are in their understanding of core ideas, and anticipate what students' misconceptions and struggles may be, they

are better able to differentiate instruction and provide scaffolding that allows students to develop an integrated and deeper understanding of the science.

**Research Based Science Instruction and Curriculum**

Effective science instruction can take many forms but includes similar components. According to the Center on Instruction's 2010 report, *Effective Science Instruction: What does the Research Tell Us?*, research-based effective practices of curriculum and instruction important to science learning are: Motivation, Eliciting Students' Prior Knowledge, Intellectual Engagement; Use of Evidence to Critique Claims, and Sense-Making. The integrated model may be better able to support some of these instructional practices especially if it frames curriculum around engaging, relevant, and real-world interdisciplinary questions that will increase student motivation, intellectual engagement and sense-making. Effective science instruction helps middle school
students build their understandings and practices, makes connections among and between core concepts and practices, and links to their prior knowledge. Students in grades 6-8 come to understand the natural world in a more scientifically accurate way and understand the nature of science.

**Conclusion**

Science curriculum should be thematic with a focus on connections among and between core concepts and practices. This approach reinforces the interdisciplinary nature of science and allows for a sequential progression of skills and concepts. This supports developmentally appropriate teaching and assessments. Each grade level has its own specific standards from each science domain that are seen as stepping stones in the progression of learning about a core idea and that meet a specific level of understanding. The idea is to embed technology and engineering in this interdisciplinary progression which would also be coordinated with the Common Core State Standards. The model science curriculum for grades K-8 provides a common pathway that mitigates some of the challenges a student experiences when they transfer between schools or districts in the state. The model also allows educators from multiple districts in a region to align teaching and learning; assessments; and professional development. Districts retain their local control over the

implementation of a common curriculum. The day to day decisions about how best to meet the specific needs of a student still rest with the local teacher of science and school. The common model for local curriculum development allows school districts to share science curriculum resources, formative and summative assessment items, teacher professional development, and other tools.

## Curriculum Design:

**Addressing Grade Level Expectations –**

Highlighted within the Lesson (Unit) Plan

→ Select Standards
→ State the Rationale (Goal)
→ Describe the Context (Objective)
→ Address a Timeframe
→ Identify Instructional Strategies
→ Present an Overview
→ Devise Essential and Guiding Questions
→ Determine Exit Outcomes and Indicators
→ Devise Learning Opportunities
→ Develop Assessment Opportunities
→ Use Data to Drive Instruction
→ Provide appropriate Accommodations/Modifications
→ Address Cross-Curricular Connections
→ Integrate Technology and Career Readiness Skills
→ Incorporate LGBTQ+ and Disabilities Awareness
→ Reflect on Teaching Practices

## Accommodations/Modifications:

**Overview –**
Accommodations Versus Modifications

Accommodations:
→ Are changes to how the content is:
1) Taught
2) Made Accessible
3) Assessed
→ Do not change what the student is expected to master.
→ Maintain the objectives of the course.

Modifications:
→ Are changes to what a student learns or is expected to do.

→ May be incorporated to assist students who are behind grade level.

→ Could take the form of an alternative assessment.

**Special Education Students** (IEP –Individualized Education Program) –

- Implemented by Special Education Self-Contained Teachers
- Implemented by Special Education In-Class Resource Teachers
- Implemented by General Education Teachers (Supplemental Instruction) ● Implemented by Special Area Teacher (as per discipline area)
- Accommodation and Modification Options Chart

| | | |
|---|---|---|
| Visual Reinforcement | Use Manipulatives | Multi-Sensory Approach |
| Repeat Instructions | Review Directions | Visual Reminders |
| Modified Tests | Oral Testing | Scribe |
| On Computer | Preferential Seating | Study Carrel |
| Avoid placing student under pressure of time or completion | Post Assignments | Assignment Pad |
| Limited Multiple Choice | Prior Notice of Test | Test Setting: Administer tests in small group and/or in a separate room |
| Check Work in Progress | Immediate Feedback | Have Student Restate Information |
| Support Auditory Presentations with Visuals | Repeat Directions Quietly | Provide Extra Assignment Time |
| Highlight Key Words | Have the student repeat and explain directions | Modified Homework |
| Clean Work Area | Test Scheduling: Adding time as needed, providing frequent breaks | Test Study Guides |
| Concrete Examples | Extra Response Time | Extra Time Tests |

| | | |
|---|---|---|
| Provide Models | Extra Drill/Practice | Monitor Assignments |
| Recognize and Give Credit for Oral Participation | No Handwriting Penalty | Post Routines |
| Extra Time - Written Work | Positive Reinforcement | Mindfulness Activities |

**504 Plan Students** –

- Implemented by General Education Teachers
- Implemented by Special Area Teacher (as per discipline area)
- Accommodation and Modification Options Chart

| | | |
|---|---|---|
| Visual Reinforcement | Use Manipulatives | Multi-Sensory Approach |
| Repeat Instructions | Review Directions | Visual Reminders |
| Modified Tests | Oral Testing | Scribe |
| On Computer | Preferential Seating | Study Carrel |
| Avoid placing student under pressure of time or completion | Post Assignments | Assignment Pad |
| Limited Multiple Choice | Prior Notice of Test | Test Setting: Administer tests in small group and/or in a separate room |
| Check Work in Progress | Immediate Feedback | Have Student Restate Information |
| Support Auditory Presentations with Visuals | Repeat Directions Quietly | Provide Extra Assignment Time |
| Highlight Key Words | Have the student repeat and explain directions | Modified Homework |
| Clean Work Area | Test Scheduling: Adding time as needed, providing frequent breaks | Test Study Guides |
| Concrete Examples | Extra Response Time | Extra Time Tests |
| Provide Models | Extra Drill/Practice | Monitor Assignments |
| Recognize and Give Credit for Oral Participation | No Handwriting Penalty | Post Routines |
| Extra Time - Written Work | Positive Reinforcement | Mindfulness Activities |

**English Language Learners** –

- Implemented by ESL Teacher
- Implemented by General Education Teachers
- Implemented by Special Area Teacher (as per discipline area)
- Accommodation and Modification Options Chart

- Accommodation and Modification Options Chart

| | | |
|---|---|---|
| Visual Reinforcement | Use Manipulatives | Multi-Sensory Approach |
| Repeat Instructions | Review Directions | Visual Reminders |
| Modified Tests | Oral Testing | Scribe |
| On Computer | Preferential Seating | Study Carrel |

| | | |
|---|---|---|
| Avoid placing student under pressure of time or completion | Post Assignments | Assignment Pad |
| Limited Multiple Choice | Prior Notice of Test | Test Setting: Administer tests in small group and/or in a separate room |
| Check Work in Progress | Immediate Feedback | Have Student Restate Information |
| Support Auditory Presentations with Visuals | Repeat Directions Quietly | Provide Extra Assignment Time |

| | | |
|---|---|---|
| Highlight Key Words | Have the student repeat and explain directions | Modified Homework |
| Clean Work Area | Test Scheduling: Adding time as needed, providing frequent breaks | Test Study Guides |
| Concrete Examples | Extra Response Time | Extra Time Tests |
| Provide Models | Extra Drill/Practice | Monitor Assignments |
| Recognize and Give Credit for Oral Participation | No Handwriting Penalty | Post Routines |
| Extra Time - Written Work | Positive Reinforcement | Mindfulness Activities |

**Basic Skills Instruction Students or Students at Risk of School Failure** (IPP –Individualized Program Plan) –

- Implemented by Special Education In-Class Resource Teachers
- Implemented by General Education Teachers
- Implemented by Special Area Teacher (as per discipline area)
- Accommodation and Modification Options Chart

| | | |
|---|---|---|
| Visual Reinforcement | Use Manipulatives | Multi-Sensory Approach |
| Repeat Instructions | Review Directions | Visual Reminders |
| Modified Tests | Oral Testing | Scribe |
| On Computer | Preferential Seating | Study Carrel |
| Avoid placing student under pressure of time or completion | Post Assignments | Assignment Pad |
| Limited Multiple Choice | Prior Notice of Test | Test Setting: Administer tests in small group and/or in a separate room |
| Check Work in Progress | Immediate Feedback | Have Student Restate Information |
| Support Auditory Presentations | Repeat Directions Quietly | Provide Extra Assignment Time |

| | | |
|---|---|---|
| with Visuals | | |
| Highlight Key Words | Have the student repeat and explain directions | Modified Homework |
| Clean Work Area | Test Scheduling: Adding time as needed, providing frequent breaks | Test Study Guides |
| Concrete Examples | Extra Response Time | Extra Time Tests |
| Provide Models | Extra Drill/Practice | Monitor Assignments |
| Recognize and Give Credit for Oral Participation | No Handwriting Penalty | Post Routines |
| Extra Time - Written Work | Positive Reinforcement | Mindfulness Activities |

**Gifted and Talented Students** –

- Implemented by General Education Teachers
- Implemented by Special Education In-Class Resource Teachers
- Implemented by Special Area Teacher (as per discipline area)
- Accommodation and Modification Options Chart

| | | |
|---|---|---|
| Encourage students to explore concepts in depth and encourage independent studies or investigations. | Use thematic instruction to connect learning across the curriculum. | Encourage creative expression and thinking by allowing students to choose how to approach a problem or assignment. |

| | | |
|---|---|---|
| Expand students' time for free reading. | Invite students to explore different points of view on a topic of study and compare the two. | Provide learning centers where students are in charge of their learning. |
| Brainstorm with gifted children on what types of projects they would like to explore to extend what they're learning in the classroom. | Determine where students' interests lie and capitalize on their inquisitiveness. | Refrain from having them complete more work in the same manner. |
| Employ differentiated curriculum to keep interest high. | Avoid drill and practice activities. | Ask students' higher level questions that require students to look into causes, experiences, and facts to draw a conclusion or make connections to other areas of learning. |
| If possible, compact curriculum to allow gifted students to move more quickly through the material | Encourage students to make transformations- use a common task or item in a different way. | Allow for choice. |

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

Asian American & Pacific Islander Inclusion S3764
**https://makeusvisible.wixsite.com/newjersey**
Requires school districts to provide instruction on history and contributions of Asian Americans and Pacific Islanders as part of implementation of New Jersey Student Learning Standards in Social Studies.

LGBTQ+ & Disabilities Awareness:
Instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum are in place as part of the district's implementation of the New Jersey Student Learning Standards. Materials used come form a variety of sources that are diverse and inclusive.

Diversity, Equity, and Inclusion:
Instruction on the contributions of a diverse population of people, that may include, LGBTQ+, Asian American & Pacific Islanders, persons with disabilities, to the growth of science knowledge and practices over the years is discussed throughout the curriculum and are included in lessons and the variety of resources used.

Resources-

Resources-

Virginia Commonwealth University provides resources for teaching about individuals with disabilities.

National Parks Service Disability History series brings attention to some of the many disability stories interwoven across the National Park Service's 400+ units and its programs. "Disability stories" refer to the array of experiences by, from, and about people with disabilities represented across our nation.

Respect Ability website contains a wealth of educational resources as well as profiles of individuals with disabilities of different ethnicities as well as women and LGBT.

Asian American Scientists Learn about Asian and Pacific Islander American scientists who have helped change the world

Diverse Scientists Explore scientists that come from diverse backgrounds and their impact they are making on the world

Additional resources:
https://sites.udel.edu/seli-ud/famous-scientists-with-disabilities/
https://iscrm.uw.edu/celebrating-asian-american-and-native-hawaiian-pacific-islander-scientists/
https://www.discovery.com/science/LGBT-Scientists-Who-Changed-World

## Assessments:

**Formative** – (Refer to **Tools for Formative Assessment** on the Google Team Drive in the Staff Resources Folder under the Formative Assessment Folder for list of techniques to check for understanding and how to utilize each.)

- Analyzing Student Work (Homework, Classwork, Tests, Quizzes)
- Observation
- Smart Responders
- Round Robin Charts
- Strategic Questioning
- 3-Way Summaries
- Think-Pair-Share.
- 3,2,1 Countdown
- Classroom Polls
- Exit Slips
- Admit Slips
- One Minute Papers
- Thumbs Up and Thumbs Down
- Extended Projects
- Self-Assessment
- Peer-Assessment
- Portfolio Check
- Journal Entry
- Choral Response
- Story Map
- Quizlet
- LinkIt Standards Based Assessments

**Summative** –
- End of Unit Assessment
- End of Chapter Test
- LinkIt Benchmark Assessments
- Project Based Assignments
- LinkIt PSI Assessments

**Benchmark** –

● Grade-Level Fall Science Benchmark
● Grade-Level

Spring Science

Benchmark

**Alternative -**

- Projects
- Contests
- Student Centered Assessments
- Presentations
- Mini Quizzes
- Performance Tasks
- Google Forms

## Instructional Materials (various levels of texts at each grade level)

| **Science** | | |
|---|---|---|
| Grade K-4 | Core Text | Publisher |
| | Supplemental text or materials | Publisher |
| | Progressive Science Initiative | Center for Teaching and Learning |
| Earth Science 5-8 (*full year course or equivalent*) | Core Text | Publisher |
| | Earth In Space | Carolina Biological Supply Co. |
| | Supplemental text or materials | Publisher |
| | Progressive Science Initiative | Center for Teaching and Learning |
| Physics 5-8 | Core Text | Publisher |
| | Energy, Machines, and Motion | Carolina Biological Supply Co. |

| | | |
|---|---|---|
| (*full year course or equivalent*) | Supplemental text or materials | Publisher |

| Progressive Science Initiative | Center for Teaching and Learning |
|---|---|

## Pacing Guide:

- Refer to Matrix (where identified)
- Refer to Unit Plan Time Frames
- Identified on Lesson Plan

| Kindergarten | | | | First Grade | | | | Second Grade | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **PSI-EIE Units** | **NGSS** | **Number of Days** | | **PSI-EIE Units** | **NGSS** | **Number of Days** | | **PSI-EIE Units** | **NGSS** | **Number of Days** |
| Weather | K-ESS2- 1, ETS1-1, ETS1-2, ETS1-3 | 15 | | Our Sky | 1-ESS1- 1, 1-ESS1-2, ETS1-1, ETS1-2, ETS1-3 | 12 | | Earth's Surface | 2-ESS2- 2, 2-ESS2-3, ETS1-1, ETS1-2, ETS1-3 | 13 |
| Severe Weather | K-ESS3- 2, ETS1-1, ETS1-2, ETS1-3 | 12 | | Sound Waves and Light Waves | 1-PS4-1, 1-PS4-2, 1-PS4-3, 1-PS4-4, ETS1-1, ETS1-2, ETS1-3 | 19 | | Changes to Earth's Surface | 2-ESS1- 1, 2-ESS2-1, ETS1-1, ETS1-2, ETS1-3 | 13 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| The Sun's Heat | K-PS3-1, K-PS3-2, ETS1-1, ETS1-2, ETS1-3 | 13 | | Animals | 1-LS1-1, ETS1-1, ETS1-2, ETS1-3 | 13 | | Matter | 2-PS1-1, 2-PSI-2, 2-PSI-3, 2-PSI-4, ETS1-1, ETS1-2, | 12 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | ETS1-3 | |
| Forces and Motion | K-PS2-1, K-PS2-2, ETS1-1, ETS1-2, ETS1-3 | 9 | | Animal Families | 1-LS1-2, 1-LS3-1, ETS1-1, ETS1-2, ETS1-3 | 15 | | Biodiversit y | 2-LS4-1, ETS1-1, ETS1-2, ETS1-3 | 20 |
| Reduce, Reuse & Recycle | K-ESS2- 2, K ESS3-3, ETS1-1, ETS1-2, ETS1-3 | 10 | | Plants | 1-LS1-1, 1-LS1-2, 1-LS3-1, ETS1-1, ETS1-2, ETS1-3 | 15 | | Plants | 2-LS2-1, 2-LS2-2, ETS1-1, ETS1-2, ETS1-3 | 12 |
| Plants and Animals | K-ESS2- 2, K ESS3-1, K-LS1-1, | 20 | | | | | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ETS1-1, ETS1-2, ETS1-3 | | | | | | | | | |

| Third Grade | | | | Fourth Grade | | | | Fifth Grade | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **PSI-EIE Units** | **NGSS DCI** | **Number of Days** | | **PSI-EIE Units** | **NGSS DCI** | **Number of Days** | | **PSI-EIE Units** | **NGSS DCI** | **Number of Days** |
| Growth & Dev. of Organisms | LS1.B | 19 | | Energy | PS3.A, PS3.B, PS3.C | 17 | | Matter and Its Interactions | PS1.A, PS1.B | 15 |
| Inheritance of Traits | LS3.A, LS3.B | 10 | | Waves, Light & Information | PS4.A, PS4.B, PS4.C, ETS1.C | 18 | | Forces | PS2.B | 16 |
| Ecosystems Group Behavior | LS2.D | 17 | | Plant & Animal Structures & Processes | LS1.A, LS11.D | 19 | | Energy in Organisms | LS1.C, PS3.D | 13 |
| Biological Evolution | LS2.C, LS4.A, B,C, D | 22 | | History of Planet Earth | ESS1.C, ESS2.B | 17 | | Ecosystem Dynamics | LS2.A, LS2.B | 14 |
| Weather & Climate | ESS2.D | 20 | | Earth's Systems | ESS2.A, ESS2.E | 18 | | Earth's Systems | ESS2.A, ESS2.C | 16 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Natural Hazards | ESS3.B | 11 | | Energy & Natural Resources | ESS3.A, PS3.D, ETS1.A | 17 | | Human Impacts on Earth | ESS3.C | 23 |
| Motion and Stability | PS2.A, PS2.B | 21 | | Natural Hazards | ESS3.B, ETS1.B | 21 | | Earth and the Universe | ESS1.A, ESS1.B | 16 |
| | | | | | | | | | | |

## Interdisciplinary Connections:

**Identified on Lesson Plan –**

Interdisciplinary learning develops real-world, multi-faceted knowledge. Integration identifies logical connections between and among the content and learning experiences in all areas of the curriculum. Integrating and connecting various content areas improves learning outcomes and provides more authentic and relevant experiences for students. Interdisciplinary connections
both enrich and extend learning. Interdisciplinary connections are studies that cross the boundaries of two or more district disciplines such as mathematics and art or literature and science. By purposefully looking for "essential concepts" and "big ideas," we purposefully design deliberate integration of the various content areas whenever appropriate. This includes, but is not limited to, examining how curriculum themes, project based learning, understanding by design essential questions, inquiry approaches, curriculum mapping, and the standards merge, while always keeping student best interests at the heart of this work.

The following areas are integrated into all areas of the instructional program:

**Reading**
Key Ideas and Details:
CCSS.ELA-LITERACY.CCRA.R.1 - Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
*Use of non-fiction texts, lab reports, word problems, STEM activities, problem-based learning, data analysis*
CCSS.ELA-LITERACY.CCRA.R.2 - Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
*Use of non-fiction texts, word problems*

CCSS.ELA-LITERACY.CCRA.R.3 - Analyze how and why individuals, events, or ideas develop and interact over the course of a text.
*Use of non-fiction texts*

Craft and Structure:

CCSS.ELA-LITERACY.CCRA.R.4 - Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

*Use of non-fiction texts, science-specific vocabulary*

CCSS.ELA-LITERACY.CCRA.R.5 - Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.

*Use of non-fiction texts, science-specific vocabulary*

CCSS.ELA-LITERACY.CCRA.R.6 - Assess how point of view or purpose shapes the content and style of a text.

*Use of non-fiction texts, science-specific vocabulary*

Integration of Knowledge and Ideas:

CCSS.ELA-LITERACY.CCRA.R.7 - Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

*Use of non-fiction texts, science-specific vocabulary, data analysis, lab reports, STEM activities, problem-based learning*

CCSS.ELA-LITERACY.CCRA.R.8 - Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.

*Use of non-fiction texts, science-specific vocabulary, data analysis, lab reports, research based assignments, STEM activities,*

*problem-based learning*

CCSS.ELA-LITERACY.CCRA.R.9 - Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. *Use of non-fiction texts, science-specific vocabulary, data analysis, lab reports, research based assignments, STEM activities,*

*problem-based learning*

Range of Reading and Level of Text Complexity:
CCSS.ELA-LITERACY.CCRA.R.10 - Read and comprehend complex literary and informational texts independently and proficiently.

*Use of non-fiction texts, science-specific vocabulary, research-based assignments, STEM activities, problem-based learning*

**Writing**

Text Types and Purposes:

CCSS.ELA-LITERACY.CCRA.W.1 - Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence. *Use of non-fiction texts, science-specific vocabulary, data analysis, lab reports, research based assignments, STEM activities,*

*problem-based learning*

CCSS.ELA-LITERACY.CCRA.W.2 - Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

*Use of non-fiction texts, science-specific vocabulary, data analysis, lab reports, research based assignments, STEM activities, problem-based learning*

CCSS.ELA-LITERACY.CCRA.W.3 - Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details and well-structured event sequences. *Use of non-fiction texts, science-specific vocabulary, data analysis, lab reports, research based assignments, STEM activities, problem-based learning*

Production and Distribution of Writing:

CCSS.ELA-LITERACY.CCRA.W.4 - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. *Use of non-fiction texts, science-specific vocabulary, data analysis, lab reports, research based assignments, STEM activities, problem-based learning*

CCSS.ELA-LITERACY.CCRA.W.5 - Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
*Use of non-fiction texts, science-specific vocabulary, data analysis, lab reports, research based assignments, STEM activities, problem-based learning*

CCSS.ELA-LITERACY.CCRA.W.6 - Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.
*Use of non-fiction media, science-specific vocabulary, data analysis, lab reports, research-based assignments, word processing, online spreadsheet tools, STEM activities, problem-based learning*

Research to Build and Present Knowledge:

CCSS.ELA-LITERACY.CCRA.W.7 - Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. *Use of non-fiction media, science-specific vocabulary, data analysis, lab reports, research-based assignments, word processing, online spreadsheet tools, STEM activities, problem-based learning*

CCSS.ELA-LITERACY.CCRA.W.8 - Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
*Use of non-fiction media, science-specific vocabulary, data analysis, lab reports, research-based assignments, word processing, online spreadsheet tools, STEM activities, problem-based learning*

CCSS.ELA-LITERACY.CCRA.W.9 - Draw evidence from literary or informational texts to support analysis, reflection, and research.
*Use of non-fiction media, science-specific vocabulary, data analysis, lab reports, research-based assignments, word processing, online spreadsheet tools, STEM activities, problem-based learning*

**Speaking and Listening:**

Comprehension and Collaboration:

CCSS.ELA-LITERACY.CCRA.SL.1 - Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

*Use of non-fiction media, science-specific vocabulary, data analysis, lab activities, research-based assignments, word processing, online spreadsheet tools, STEM activities, problem-based learning, stations*

CCSS.ELA-LITERACY.CCRA.SL.2 - Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

*Use of non-fiction media, science-specific vocabulary, data analysis, lab activities, research-based assignments, word processing, online spreadsheet tools, STEM activities, problem-based learning, stations*

CCSS.ELA-LITERACY.CCRA.SL.3 - Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric.

*Use of non-fiction media, science-specific vocabulary, data analysis, lab activities, research-based assignments, word processing, online spreadsheet tools, STEM activities, problem-based learning*

Presentation of Knowledge and Ideas:

CCSS.ELA-LITERACY.CCRA.SL.4 - Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

*Use of non-fiction media, science-specific vocabulary, data analysis, lab activities, research-based assignments, word processing, online spreadsheet tools, STEM activities, problem-based learning*

CCSS.ELA-LITERACY.CCRA.SL.5 - Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.

*Use of non-fiction media, science-specific vocabulary, data analysis, lab activities, research-based assignments, word processing, online spreadsheet tools, STEM activities, problem-based learning*

CCSS.ELA-LITERACY.CCRA.SL.6 - Adapt speech to a variety of contexts and communicative tasks, demonstrating command of formal English when indicated or appropriate. *Use of non-fiction media, science-specific vocabulary, lab reports, research-based assignments, word processing, STEM activities, problem-based learning*

**Language:**

Conventions of Standard English:

CCSS.ELA-LITERACY.CCRA.L.1 - Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

*Use of non-fiction media, science-specific vocabulary, lab reports, research-based assignments, word processing, STEM activities, problem-based learning*

CCSS.ELA-LITERACY.CCRA.L.2 - Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

*Use of non-fiction media, science-specific vocabulary, lab reports,*

*research-based assignments, word processing, STEM activities, problem-based learning*

Knowledge of Language:

CCSS.ELA-LITERACY.CCRA.L.3 - Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

*Use of non-fiction media, science-specific vocabulary, lab reports, research-based assignments, word processing, STEM activities, problem-based learning*

Vocabulary Acquisition and Use:

CCSS.ELA-LITERACY.CCRA.L.4 - Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.

*Use of non-fiction media, science-specific vocabulary, lab reports, research-based assignments, word processing, STEM activities, problem-based learning*

CCSS.ELA-LITERACY.CCRA.L.5 - Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

*Use of non-fiction media, science-specific vocabulary, lab reports, research-based assignments, word processing, STEM activities, problem-based learning*

CCSS.ELA-LITERACY.CCRA.L.6 - Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression.

*Use of non-fiction media, science-specific vocabulary, lab reports, research-based assignments, word processing, STEM activities, problem-based learning*

**Mathematics:**

The Standards for Mathematical Practice describe varieties of expertise that educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" that help develop an understanding of the importance of mathematics education. The incorporation of these standards into the science classroom provide students with a "real world" application of their mathematics skills.

These standards are:

1. Make sense of problems and persevere in solving them
2. Reason abstractly and quantitatively
3. Construct viable arguments and critique the reasoning of others
4. Model with mathematics
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning

**Social Studies:**

Social studies education provides learners with the knowledge, skills, attitudes, and perspectives needed to become active, informed, and contributing members of local, state, national, and global communities. The incorporation of social studies principles into the science curriculum allows students to understand the lasting effects of human interaction with each other and with the natural world.
Relevant Disciplinary Concepts include, but are not limited to:

<u>Geography, People and the Environment:</u>

- *Spatial Views of the World*: Spatial views of the world focus on the creation of maps and use of geospatial technologies. Creating maps and other geographical representations is an essential and enduring part of seeking new geographic knowledge that is personally and socially useful and that can be applied in making decisions and solving problems. Once maps or other representations are created, it prompts new questions concerning the locations, spaces, and patterns portrayed.

- *Human Population Patterns*: Human population, patterns and movement focus on the size, composition, distribution, and movement of human populations and how they are fundamental and active features on Earth's surface. This includes understanding that the expansion and redistribution of the human population affects patterns of settlement, environmental changes, and resource use. Patterns and movements of population also relate to physical phenomena including climate variability, landforms, and locations of various natural hazards and their effects on population size, composition, and distribution

- *Human Environment Interaction*: Human-environment interactions are essential aspects of human life in all societies and they occur at local-to-global scales. Human environment interactions happen both in specific places and across broad regions. Culture influences the locations and the types of interactions that occur. Earth's human systems and physical systems are in constant interaction and have reciprocal influences flowing among them. These interactions result in a variety of spatial patterns that require careful observation, investigation, analysis, and explanation.

- *Global Interconnections*: Global interconnections occur in both human and physical systems. Earth is a set of interconnected ecosystems of which humans are an influential part. Many natural phenomena have no perceptible boundaries. For example, the oceans are one dynamic system. The atmosphere covers the entire planet. Land and water forms shift over geological eons. Many life forms diffuse from place to place and bring environmental changes with them. Humans have spread across the planet, along with their cultural practices, artifacts, languages, diseases, and other attributes. All of these interconnections create complex spatial patterns at multiple scales that continue to change over time.

**Computer Science & Design Thinking:**

New approaches necessary for solving the critical challenges that we face as a society will require harnessing the power of technology and computing. Rapidly changing technologies and the proliferation of digital information have permeated and radically transformed learning, working, and everyday life. To be well-educated, global-minded individuals in a computing intensive world, students must have a clear understanding of the concepts and practices of computer science. As education systems adapt to a vision of students who are not just computer users but also computationally literate creators who are proficient in the concepts and practices
of computer science and design thinking, engaging students in computational thinking

and human-centered approaches to design through the study of computer science and technology serves to prepare students to ethically produce and critically consume technology.

Computing Systems:
People interact with a wide variety of computing devices that collect, store, analyze, and act upon information in ways that can affect human capabilities both positively and negatively. The physical components (hardware) and instructions (software) that make up a computing system communicate and process information in digital form.

Networks and the Internet:
Computing devices typically do not operate in isolation. Networks connect computing devices to share information and resources and are an increasingly integral part of computing. Networks and communication systems provide greater connectivity in the computing world.

Data & Analysis:
Computing systems exist to process data. The amount of digital data generated in the world is rapidly expanding, so the need to process data effectively is increasingly important. Data is collected and stored so that it can be analyzed to better understand the world and make more accurate predictions.

Algorithms & Programming:
An algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are translated into programs, or code, to provide instructions for computing devices. Algorithms and programming control all computing systems, empowering people to communicate with the world in new ways and solve compelling problems.

Engineering Design:
People design for enjoyment and to solve problems, extend human capabilities, satisfy needs and wants, and improve the human condition. Engineering Design, a systematic approach to creating solutions to technological problems and finding ways to meet people's needs and desires, allows for the effective and efficient development of products and systems.

Interaction of Technology and Humans:
Societies influence technological development. Societies are characterized by common elements such as shared values, differentiated roles, and cultural norms, as well as by entities such as community institutions, organizations, and businesses. Interaction of Technology and Humans concerns the ways society drives the improvement and creation of new technologies, and how technologies both serve and change society.

Nature of Technology:
Human population, patterns and movement focus on the size, composition, distribution, and movement of human populations and how they are fundamental and active features on Earth's surface. This includes understanding that the expansion and redistribution of the human population affects patterns of settlement, environmental changes, and resource use. Patterns and movements of population also relate to physical phenomena including climate variability,
landforms, and locations of various natural hazards and their effects on population size, composition, and distribution.

Effects of Technology on the Natural World:
Many of engineering and technology's impacts on society and the environment are

widely regarded as desirable. However, other impacts are regarded as less desirable. Effects of Technology on the Natural World concerns the positive and negative ways that technologies affect the natural world.

Ethics & Culture:
Ethics and Culture concerns the profound effects that technologies have on people, how those effects can widen or narrow disparities, and the responsibility that people have for the societal consequences of their technological decisions.

**Visual and Performing Arts:**

1.1 The Creative Process: All students will demonstrate an understanding of the elements and principles that govern the creation of works of art in dance, music, theater, and visual art. *Design process principles, waves (sound and light), visible light spectrum*

**Health and Physical Education:**

Standard 2.1 Wellness: All students will acquire health promotion concepts and skills to support a healthy, active lifestyle.
*Organic molecules, the human body and its systems, reproduction and heredity, cells, macromolecules, calories and energy*

Standard 2.2 Integrated Skills: All students will develop and use personal and interpersonal skills to support a healthy, active lifestyle.
*Organic molecules, the human body and its systems, reproduction and heredity, cells, macromolecules, calories and energy*

Standard 2.3 Drugs and Medicines: All students will acquire knowledge about alcohol, tobacco, other drugs, and medicines and apply these concepts to support a healthy, active lifestyle. *The human body and its systems, energy, nutrition, illnesses and treatments, genetic disorders*

Standard 2.4 Human Relationships and Sexuality: All students will acquire knowledge about the physical, emotional, and social aspects of human relationships and sexuality and apply these concepts to support a healthy, active lifestyle.
*The human body and its systems, reproduction and heredity*

Standard 2.5 Motor Skill Development: All students will utilize safe, efficient, and effective movement to develop and maintain a healthy, active lifestyle.
*Organic molecules, the human body and its systems, reproduction and heredity, cells, macromolecules, calories and energy, lab experiments and lab safety*

Standard 2.6 Fitness: All students will apply health-related and skill-related concepts and skills to develop and maintain a healthy, active lifestyle.
*Organic molecules, the human body and its systems, reproduction and heredity, cells, macromolecules, calories and energy, needs of living things*

## Integration of 21st Century Skills through NJSLS 9 and Career Education: **Identified on Lesson Plan –** In the 21st century, life and work are conducted in a dynamic context that includes:

• A global society facing complex political, economic, technological, and environmental challenges
• A service economy driven by information, knowledge, and innovation
• Diverse communities and workplaces that rely on cross-cultural collaborative relationships and virtual social networks
• An intensely competitive and constantly changing worldwide marketplace

Providing our students with the life and career skills needed to function optimally within this dynamic context is a critical focus and organizing principle of public education. We have both an obligation to prepare our young people to thrive in this environment, and a vested economic interest in grooming an engaged citizenry made up of productive members of a global workforce that rewards innovation, creativity, and adaptation to change.

**Mission:**

21st-century life and career skills enable students to make informed decisions that prepare them to engage as active citizens in a dynamic global society and to successfully meet the challenges and opportunities of the 21st-century global workplace.

**Vision:**

The systematic integration of 21st-century life and career skills across the K-8 curriculum fosters a population that:

• Applies critical thinking and problem-solving skills to make reasoned decisions at home, in the workplace, and in the global community.
• Uses effective communication, communication technology, and collaboration skills to interact with cultural sensitivity in diverse communities and to work in cross-cultural teams in the multinational workplace. • Is financially literate and financially responsible at home and in the broader community.
• Demonstrates creative and entrepreneurial thinking by recognizing and acting on promising opportunities while accepting responsibility for possible risks.
• Is knowledgeable about careers and can plan, execute, and alter career goals in response to changing societal and economic conditions.
• Produces community, business, and political leaders who demonstrate core ethical values, including the values of democracy and free enterprise, during interactions with the global community.

**Intent and Spirit of the 21st-Century Life and Career Standards:**

Through instruction in life and career skills, all students acquire the knowledge and skills needed to prepare for life as citizens and workers in the 21st century.

• In grades K-5, students are introduced to 21st-century life skills that are critical for personal, academic, and social development. They are also introduced to career awareness information and to basic personal financial literacy skills.

**Standards:**

**Standard 9.1 21st-Century Life and Career Skills**: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

Standard 9.1 describes skills that prepare students to fully engage in civic and work life. The standard includes six strands, which reflect the Framework for 21st Century Learning:

- Critical Thinking and Problem Solving
- Creativity and Innovation
- Collaboration, Teamwork, and Leadership
- Cross-Cultural Understanding and Interpersonal Communication
- Communication and Media Fluency
- Accountability, Productivity, and Ethics

(Full list of standards may be found here)

**Standard 9.2 Personal Financial Literacy**: All students will develop skills and strategies that promote personal and financial responsibility related to financial planning, savings, investment, and charitable giving in the global economy.
Standard 9.2 describes skills that prepare students for personal and civic financial literacy. The inclusion of Personal Financial Literacy as a standard, rather than as a strand, reflects the growing need for 21st Century citizens to be financially literate, particularly in light of the increasing number of financial choices they face due to the global economy. Financial literacy includes the application of knowledge, skills, and ethical values when making consumer and financial decisions that impact the self, the family, and the local and global communities.

Standard 9.2 is broken into the following strands:

- Strand A: Income and Careers
- Strand B: Money Management
- Strand C: Credit and Debt Management
- Strand D: Planning, Saving, and Investing
- Strand E: Becoming a Critical Consumer
- Strand F: Civic Financial Responsibility
- Strand G: Insuring and Protecting

(Full list of standards may be found here)

These topics will be present through:

- STEM activities with monetary constraints
- Mathematical computation with money
- Career and income research

**Standard 9.3 Career Awareness, Exploration, and Preparation**: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Standard 9.3 is broken into the following strands:

- Strand A: Career Awareness (met by Grade 4)

▪ Strand B: Career Exploration (met by Grade 8)
(Full list of standards may be found here)

Not only will math-based careers be highlighted during instruction, but an annual career fair will be held.

## Technology through NJSLS and Career Education:
**Identified on Lesson Plan –**

**Mission:**

Readiness in this century demands that students actively engage in critical thinking, communication, collaboration, and creativity. Technology empowers students with real-world data, tools, experts and global outreach to actively engage in solving meaningful problems in all areas of their lives. The power of technology discretely supports all curricular areas and multiple levels of mastery for all students.

**Vision:**

The design process builds in our students the recognition that success is not merely identifying a problem but working through a process and that failure is not an end but rather a point for reevaluation. Whether applied as a skill in product development, in the learning environment, in daily life, in a local or more global arena, the design process supports students in their paths to becoming responsible, effective citizens in college, careers and life. Computational thinking provides an organizational means of approaching life and its tasks. It develops an understanding of technologies and their operations and provides students with the abilities to build and create knowledge and new technologies.

**Standards:**

Technology Standard 8.1: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.

*Use of non-fiction media, science-specific vocabulary, data analysis, lab reports, research-based assignments, word processing, online spreadsheet tools, STEM activities, problem-based learning*

Technology Standard 8.2: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

*Problem-based learning, STEM activities, use of non-fiction media, solving real-world science-based issues (ex. global warming, filtration, alternate fuels, etc), engineering activities (particularly civil engineering), projects with constraints*

**Implementation During Instruction:**

→ Webquests
→ Demos Activities
→ Classroom Responders
→ Chromebooks
→ Online Progress Monitoring Tools
→ Online Assessments
→ Online Word Processing
→ Let's Go Learn
→ LinkIt

**Additional Content-Specific Information/Resources –**

- National / International Technology Student Standards
  - 8.1 Educational Technology
    - International Society for Technology in Education (ISTE) Standards for Student
    - American Association of School Librarians (AASL) Student Standards for the 21st-Century Learner
    - Common Sense Student Standards Alignment in the K-12 Digital Citizenship Curriculum
  - 8.2 Technology Education, Engineering, Design and Computational Thinking - Programming
    - K12 Computer Science Student Framework Statements by Grade Band
    - International Technology and Engineering Educators Association Standards for Technological Literacy

## Crosscutting Concepts:

### Patterns

Observed patterns of forms and events guide organization and classification, and they prompt questions

about relationships and the factors that influence them.

### Cause and Effect: Mechanism and Explanation

Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is

investigating and explaining causal relationships and the mechanisms by which they are mediated. Such

mechanisms can then be tested across given contexts and used to predict and explain events in new

contexts.

### Scale, Proportion, and Quantity

In considering phenomena, it is critical to recognize what is relevant at different measures of size, time,
and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or

performance.

### Systems and System Models

Defining the system under study—specifying its boundaries and making explicit a model of that system—

provides tools for understanding and testing ideas that are applicable throughout science and engineering.

### Energy and Matter

Flows, Cycles, and Conservation Tracking fluxes of energy and matter into, out of, and within systems

helps one understand the systems' possibilities and limitations.

Structure and Function

The way in which an object or living thing is shaped and its substructure determine many of its properties

and functions.

Stability and Change

For natural and built systems alike, conditions of stability and determinants of rates of

change or evolution of a system are critical elements of study.

## Career Education:

**Identified on Lesson Plan –**

- Integrated into 21st Century Skills (NJSLS 9) and Technology (NJSLS 8)
- Annual Career Fair
- Career Ready Practices
    - CRP1. Act as a responsible and contributing citizen and employee
    - CRP2. Apply appropriate academic and technical skills.
    - CRP3. Attend to personal health and financial well-being.
    - CRP4. Communicate clearly and effectively and with reason.
    - CRP5. Consider the environmental, social and economic impacts of decisions.
    - CRP6. Demonstrate creativity and innovation.
    - CRP7. Employ valid and reliable research strategies.
    - CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
    - CRP9. Model integrity, ethical leadership and effective management.
    - CRP10. Plan education and career paths aligned to personal goals.
    - CRP11. Use technology to enhance productivity.
    - CRP12. Work productively in teams while using cultural global competence.

**Integration and Focus -**

**● Our career programs are focused on STEM based practices, meaning all lessons are hands-on and introduce students to high interest, STEM-based career**
**● With our career programs, students learn how the concepts and topics they learn in school are related to the real world. And, all lessons are experiential and use simple supplies, no text book or handout is used.**
**● The career programs will utilize videos, magazines, presenters, internet search engines, hands on projects, and experiments that focus on topics that link student learning to various career options.**

## Integration of 21st Century Skills through NJSLS 9:

New Jersey's Standard 9 is composed of the Career Readiness, Life Literacies, and Key Skills

● Mission- Career readiness, life literacies, and key skills education provides students with the necessary skills to make informed career and financial decisions, engage as responsible community members in a digital society, and to successfully meet the challenges and opportunities in an interconnected global economy.

● This standard will be addressed via researching and presenting information, working collaboratively with partners or small groups, using technology like Google Suite on a regular basis, grounding reading, writing, and speaking in evidence from text, both literary and informational, building knowledge through content rich non-fiction, inferencing, identifying main idea and theme, sequence of events, cause and effect, vocabulary, problem and solution, point of view, and by evaluating various forms of media and formats.

● **Vision- An education in career readiness, life literacies, and key skills fosters a population that:**
Continually self-reflects and seeks to improve the essential life and career practices that lead to success;
Uses effective communication and collaboration skills and resources to interact with a global society; Possesses financial literacy and responsibility at home and in the broader community; Plans, executes, and alters career goals in response to changing societal and economic conditions; and seeks to attain skill and content mastery to achieve success in a chosen career path.

**9.1 Financial Literacy Themes**
- Civic Financial Responsibility
- Financial Institutions
- Financial Psychology
- Planning and Budgeting
- Risk Management
- Economic and Government Influences
- Credit Profile

**9.2 Career Awareness, Exploration, Preparation and Training Themes** ● Career Awareness and Planning

**9.4 Life Literacies and Key Skills Themes**

- Creativity and Innovation
- Critical Thinking and Problem Solving
- Digital Citizenship
- Global and Cultural Awareness
- Information and Media Literacy
- Technology Literacy
- Career Readiness, Life Literacy, and Key Skills Practices

NJSLS Standard 9 is integrated across the K-8 curriculum in various subject areas, where appropriate. Lessons could include:

- working collaboratively to solve problems
- comparing and contrasting
- classroom debates and negotiations
- speaking and listening skills
- networking
- customizing resumes and references
- questioning techniques
- communicating clearly and effectively, with reason
- employ valid and reliable research strategies
- accept and integrating criticism and feedback
- utilize critical thinking to make sense of problems and persevere in solving them ● use technology to enhance productivity
- In addition, a yearly career fair will be conducted.

The integration of 21st century skills will be identified on lesson plans.

**Career Readiness, Life Literacies, and Key Skills**

- Act as a responsible and contributing community members and employee. ● Attend to financial well-being
- Consider the environmental, social and economic impacts of decisions ● Demonstrate creativity and innovation.
- Utilize critical thinking to make sense of problems and persevere in solving them. ● Model integrity, ethical leadership and effective management.
- Plan education and career paths aligned to personal goals.
- Use technology to enhance productivity, increase collaboration and communicate effectively. ● Work productively in teams while using cultural/global competence.

**Standards in Action:** Climate Change

- The NJSLS-CLKS includes the skills, knowledge and practices necessary for success in an increasingly complex world and changing natural environment. Climate change is included in these standards. Collaborating to solve a problem, approaching a solution with innovation, and determining the validity of a source of information are all essential skills required in the standards and necessary for students to maintain awareness of and successfully address climate change. Climate change can be integrated into the teaching

of these standards in a few ways. For example, middle school students could develop a plan for implementing an environmentally focused project in the local community such as protecting a wetland or developing an urban greenway along a stream. The plan would include goals, priorities and necessary resources. In a career and technical education program, as a part of a green building design integrated project, students could explore various sustainable and reclaimed products used for construction. After researching several sources, students would create a collage of information, share with their classmates and take notes on new products and ideas. Students could also compare and contrast actions being taken in different countries to combat Climate Change.

**New Jersey's Standard 9.1 Financial Literacy**

● This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. ● Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers. ● This standard would be addressed via read alouds, STEAM and problem solving activities, by having a classroom economy, the use of school-wide currency, higher order thinking and questioning strategies, and by hosting a career fair each year. ● Resources-My Classroom Economy link

- ○ Free Experiential learning / Financial Literacy
- ○ My Classroom Economy Resource

**New Jersey's Standard 9.2 Career Awareness, Exploration, and Preparation**

- ● This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.
- ● This standard would be addressed via researching and presenting information, working collaboratively with partners or small groups, using technology like Google Suite on a regular basis, grounding reading, writing, and speaking in evidence from text, both literary and informational, building knowledge through content rich non-fiction, inferencing, identifying main idea and theme, sequence of events, cause and effect, vocabulary, problem and solution, point of view, and by evaluating various forms of media and formats. Students would also have the opportunity to examine career paths available in different countries and communities, and increase awareness of the concept of working abroad.

**New Jersey's Technology Standard 9.3 Career and Technical Education**

- ● All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Standard 9.3 is broken into the following strands:

- Strand A: Career Awareness (met by Grade 4)
- Strand B: Career Exploration (met by Grade 8)

● This standard would be addressed via researching and presenting information, working collaboratively with partners or small groups, using technology like Google Suite on a regular basis, grounding reading, writing, and speaking in evidence from text, both literary and informational, building knowledge through content rich non-fiction, inferencing, identifying main idea and theme, sequence of events, cause and effect, vocabulary, problem and solution, point of view, and by evaluating various forms of media and formats. Students would also have the opportunity to examine career paths available in different countries and communities, and increase awareness of the concept of working abroad.

**Standard 9.4 Life Literacies and Key Skills.**

● This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

## Personal Financial Literacy:

● New Jersey's Standard 9.1 Personal Financial Literacy
  ● This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance.
  ● Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.

<u>Theme 1: Civic Financial Responsibility</u>

● This idea will be addressed via read alouds, researching various civic duties and responsibilities, delineating classroom jobs, project based learning activities on volunteering and giving back to the community

<u>Theme 2: Financial Institutions</u>

● This standard will be addressed via read alouds, researching the American banking and credit system, STEAM and problem solving activities, analysis of informational text (primary and secondary)

<u>Theme 3: Financial Psychology</u>

● This standard will be addressed via STEAM and problem solving activities, having a classroom token economy, personal reflections on spending habits and emotional well-being

<u>Theme 4: Planning and Budgeting</u>

● This standard will be addressed via STEAM and problem solving activities, by having a classroom economy, the use of school-wide

currency, analysis of informational texts regarding savings accounts

Theme 5: Risk Management

- This standard will be addressed via the use of read alouds regarding insurance, higher order thinking and questioning techniques regarding when insurance is needed

Theme 6: Economic and Government Influences (Grades 5- 8)

- This standard will be addressed via read alouds, research and debates on taxation, research on the history of taxation, defining trade practices throughout American history, determining state and federal financial laws.

Theme 7: Credit Profile (Grades 5th- 8th)

- This standard will be addressed via read alouds, analysis of informational texts, compare and contrasting product prices, classroom discussions on credit score

## Career Awareness, Exploration and Preparation

**New Jersey's Standard 9.2 Career Awareness, Exploration, and Preparation**

- This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.
- This standard would be addressed via researching and presenting information, working collaboratively with partners or small groups, using technology like Google Suite on a regular basis, grounding reading, writing, and speaking in evidence from text, both literary and informational, building knowledge through content rich non-fiction, inferencing, identifying main idea and theme, sequence of events, cause and effect, vocabulary, problem and solution, point of view, and by evaluating various forms of media and formats.

Theme 1: Career Awareness and Planning

- This standard will be addressed via the use of read alouds regarding occupations, defining individual skills, training, and knowledge required for various occupations and higher education, determining incomes associated with various careers, compare and contrast of public, private and entrepreneurial occupations. Students would also have the opportunity to examine career paths available in different countries and communities, and increase awareness of the concept of working abroad.

## Career Readiness, Life Literacies, and Key Skills

**Standard 9.4 Life Literacies and Key Skills.**

- This standard outline key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy* that are critical for students to develop to live and work in an interconnected global economy.

Theme 1: Creativity and Innovation

- This standard will be addressed via read alouds, project based learning assignments, think-a-louds, classroom collaboration activities, perspective- taking assignments, and problem solving assignments as they relate to career readiness

Theme 2: Critical thinking and problem solving

- This standard will be addressed via read alouds, project based learning assignments, research assignments, compare and contrast activities, multi-solution project based learning assignments, local, national, and global research projects based on current events

Theme 3: Digital Citizenship

- This standard will be addressed via read alouds, project based learning assignments, research assignments, primary and secondary resource analysis, citation assignments,
  online safety and research assignments, student presentations, collaborative activities, outcome based assignments regarding technology safety

Theme 4: Global and Cultural Awareness

- This standard will be addressed via diverse read alouds and author spotlights, project based learning assignments, research assignments, classroom discussions, and cultural awareness activities.

Theme 5: Information and Media Literacy

- This standard will be addressed via read alouds, project based learning assignments, research assignments, classroom discussions, Google Scholar assignments, Google Suite activities, and analysis of media bias assignments.

Theme 6: Technology Literacy

- This standard will be addressed via read alouds, project based learning assignments, research assignments, classroom discussions, use of Google Docs and Microsoft Word assignments, Google Suite Slides and Microsoft Powerpoint assignments, Google Sheets and Microsoft Excel assignments, and current events assignments.

## Career Ready Practices:

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of Study.

**Integration and Focus -**

- Our career programs are focused on STEAM based practices, meaning all lessons are hands-on and introduce students to high interest, STEM-based careers.
- With our career programs, students learn how the concepts and topics they learn in school are related to the real world. And, all lessons are experiential and use simple supplies, no text book or handout is used.

- The career programs will utilize videos, magazines, presenters, internet search engines, hands on projects, and experiments that focus on topics that link student learning to various career options.

## Technology through NJSLS and Career Education:

**Identified on Lesson Plan –**

**Mission:**
Readiness in this century demands that students actively engage in critical thinking, communication, collaboration, and creativity. Technology empowers students with real-world data, tools, experts and global outreach to actively engage in solving meaningful problems in all areas of their lives. The power of technology discretely supports all curricular areas and multiple levels of mastery for all students.

**Vision:** The design process builds in our students the recognition that success is not merely identifying a problem but working through a process and that failure is not an end but rather a point for reevaluation. Whether applied as a skill in product development, in the learning environment, in daily life, in a local or more global arena, the design process supports students in their paths to becoming responsible, effective citizens in college, careers and life. Computational thinking provides an organizational means of approaching life and its tasks. It develops an understanding of technologies and their operations and provides students with the abilities to build and create knowledge and new technologies.

**Standards:**

Technology Standard 8.1: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.

*Use of non-fiction media, world language- specific vocabulary, data analysis, research-based assignments, word processing, online spreadsheet tools, STEM activities, problem-based learning*

Technology Standard 8.2: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

*Problem-based learning, STEM activities, use of non-fiction media, solving real-world world language -based issues, projects with constraints*

**Implementation During Instruction:**

→ Webquests
→ Demos Activities
→ Classroom Responders
→ Chromebooks
→ Online Progress Monitoring Tools
→ Online Assessments
→ Online Word Processing
→ Let's Go Learn
→ LinkIt

**Additional Content-Specific Information/Resources –**

1. National / International Technology Student Standards
    1. 8.1 Educational Technology
        1. International Society for Technology in Education (ISTE) Standards for Student
        2. American Association of School Librarians (AASL) Student Standards for the 21st-Century Learner
        3. Common Sense Student Standards Alignment in the K-12 Digital Citizenship Curriculum
    2. 8.2 Technology Education, Engineering, Design and Computational Thinking - Programming
        1. K12 Computer Science Student Framework Statements by Grade Band
        2. International Technology and Engineering Educators Association Standards for Technological Literacy

## Career Education:

**Identified on Lesson Plan –**

- Integrated into 21st Century Skills (NJSLS 9) and Technology (NJSLS 8) ● Annual Career Fair
- Career Ready Practices
    - CRP1. Act as a responsible and contributing citizen and employee
    - CRP2. Apply appropriate academic and technical skills.
    - CRP3. Attend to personal health and financial well-being.
    - CRP4. Communicate clearly and effectively and with reason.
    - CRP5. Consider the environmental, social and economic impacts of decisions. ○ CRP6. Demonstrate creativity and innovation.
    - CRP7. Employ valid and reliable research strategies.
    - CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
    - CRP9. Model integrity, ethical leadership and effective management.
    - CRP10. Plan education and career paths aligned to personal goals.
    - CRP11. Use technology to enhance productivity.
    - CRP12. Work productively in teams while using cultural global competence. **Integration and Focus -**

- Our career programs are focused on STEM based practices, meaning all lessons are hands-on and introduce students to high interest, STEM-based careers.
- With our career programs, students learn how the concepts and topics they learn in school are related to the real world. And, all lessons are experiential and use simple supplies, no text book or handout is used.

- The career programs will utilize videos, magazines, presenters, internet search engines, hands on projects, and experiments that focus on topics that link student

learning to various career options.

## LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35

A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36). A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

**Standards in Action: Climate Change:** Earth's climate is now changing faster than at any point in the history of modern civilization, primarily as a result of human activities. Global climate change has already resulted in a wide range of impacts across New Jersey and in many sectors of its economy. The addition of academic standards that focus on climate change is important so that all students will have a basic understanding of the climate system, including the natural and human-caused factors that affect it. The underpinnings of climate change span across physical, life, as well as Earth and space sciences. The goal is for students to understand climate science as a way to inform decisions that improve quality of life for themselves, their community, and globally and to know how engineering solutions can allow us to mitigate impacts, adapt practices, and build resilient systems.

The topic of climate change can easily be integrated into science classes. At each grade level in which systems thinking, managing uncertainty, and building arguments based on multiple lines of data are included, there are opportunities for students to develop essential knowledge and skills that will help them understand the impacts of climate change on humans, animals, and the environment. For example, in the earlier grades, students can use data from first hand investigations of the school-yard habitat to justify recommendations for design improvements to the school-yard habitat for plants, animals, and humans. In the middle grades, students use resources from New Jersey Department of Environmental Protection, the National Oceanic and Atmospheric Administration (NOAA), and National Aeronautics and Space Administration
(NASA), to inform their actions as they engage in designing, testing, and modifying an engineered solution to mitigate the impact of climate change on their community. In high school, students can construct models they develop of a proposed solution to mitigate the negative health effects of unusually high summer temperatures resulting from heat islands in cities across the globe and share in the appropriate setting.

Curriculum & Design Standards in Science

Unit plans can also be found on www.njctl.org

# Grade K Overview

**Refer to District PMI Units for the Following:**

**Materials**

**Assessments**

**Modifications**

## CTL Kindergarten PSI Year Long Plan

| **Weather (15 Days)** |
| --- |
| K-ESS2-1: Use and share observations of local weather conditions to describe patterns over time.<br>● DCI: Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time.<br>K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem.<br>K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.<br>K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **Severe Weather (12 Days)** |
| K-ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather. |

- DCI: Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events.

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.
- DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.
- DCI: Before beginning to design a solution, it is important to clearly understand the problem.

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

**The Sun's Heat (13 Days)**

K-PS3-1: Make observations to determine the effect of sunlight on Earth's surface. ● DCI: Sunlight warms Earth's Surface

K-PS3-2: Use tools and materials provided to design and build a structure that will reduce the warming effect of sunlight on Earth's surface.

- DCI: Sunlight warms Earth's Surface

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.
- DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.
- DCI: Before beginning to design a solution, it is important to clearly understand the problem.

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

**Forces and Motion (9 Days)**

K-PS2-1: Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. ● DCI: Pushes and pulls can have different strengths and directions. ● DCI: Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.

- ● DCI: When objects touch or collide, they push on one another and can change motion.
- ● DCI: A bigger push or pull makes things speed up or slow down more quickly.

K-PS2-2: Analyze data to determine if a design solution works as intended to change the speed or direction of an object.

- ● DCI: Pushes and pulls can have different strengths and directions. ● DCI: Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.
- ● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions.

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- ● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.
- ● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.
- ● DCI: Before beginning to design a solution, it is important to clearly understand the problem.

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

**Reduce, Reuse, & Recycle (10 Days)**

K-ESS2-2: Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. ● DCI: Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.

K-ESS3-3: Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.

- ● DCI: Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things.

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.
- DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.
- DCI: Before beginning to design a solution, it is important to clearly understand the problem.

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

**Plants & Animals (20 Days)**

K-LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive.

- DCI: All animals need food in order to live and grow. They obtain their food from plants or from other animals. Plants need water and light to live and grow. K-ESS2-2: Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. ● DCI: Plants and animals can change their environment.

K-ESS3-1: Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.

- DCI: Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.
- DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.
- DCI: Before beginning to design a solution, it is important to clearly understand the problem.

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

| Kindergarten Weather Unit Plan | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 15 Days |
| **Grade:** | Kindergarten | **School:** | |
| **Subject:** | Science: | | |

**Next Generation Science Standards**

| | |
|---|---|
| **K-ESS2-1** | Use and share observations of local weather conditions to describe patterns over time. ● Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time. |
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |
| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |

**NJS LS: Computer Science & Design Thinking**

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| 8.1.2.IC.1 | Compare how individuals live and work before and after the implementation of new computing technology. |

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|---|---|
| 8.1.2.DA.1 | Collect and present data, including climate change data, in various visual formats. |

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|---|---|
| 8.1.2.DA.3 | Identify and describe patterns in data visualizations. |
| 8.1.2.DA.4 | Make predictions based on data using charts or graphs. |
| 8.1.2.AP.1 | Model daily processes by creating and following algorithms to complete tasks. |
| 8.2.2.ED.1: | Communicate the function of a product or device. |
| 8.2.2.ED.2: | Collaborate to solve a simple problem, or to illustrate how to build a product using the design process. |
| 8.2.2.ED.3: | Select and use appropriate tools and materials to build a product using the design process. |
| 8.2.2.ED.4: | Identify constraints and their role in the engineering design process. |
| 8.2.2.ITH.1: | Identify products that are designed to meet human wants or needs. |
| 8.2.2.ITH.2: | Explain the purpose of a product and its value. |
| 8.2.2.ITH.3: | Identify how technology impacts or improves life. |
| 8.2.2.ITH.4: | Identify how various tools reduce work and improve daily tasks. |
| 8.2.2.ITH.5: | Design a solution to a problem affecting the community in a collaborative team and explain the intended impact of the solution. |
| 8.2.2.NT.1: | Model and explain how a product works after taking it apart, identifying the relationship of each part, and putting it back together. |
| 8.2.2.NT.2: | Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem. |
| 8.2.2.EC.1: | Identify and compare technology used in different schools, communities, regions, and parts of the world. |

**Essential Questions**

1. What are the different types of weather?
2. What is temperature and what tool do we use to measure the temperature?
3. Why do we dress differently for different weather?
4. What kind of pattern does the weather where we live follow?
5. How can we track the weather?

**Knowledge & Skills**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● The different types of weather; sunny, cloudy, rainy, windy and snowy.<br>● Temperature is the measure of how warm or cold the air is.<br>● A thermometer is used to measure the temperature.<br>● How to dress appropriately for different weather conditions.<br>● Weather follows patterns over time.<br>● How to track weather over a period of time. | ● Describe the different types of weather; sunny, cloudy, rainy, windy and snowy.<br>● Use a thermometer to describe the temperature.<br>● Dress appropriately for the weather<br>● Track the weather using a weather chart. ● Predict what the weather will be like during different seasons. |

**Unit Plan**

| Essential Questions | Lessons | Classroom Activities |
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|---|---|---|
| What is Weather? | Sunny | Sunny Day Favorite Activity |

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|---|---|---|
| | Cloudy | Cloudy Day Favorite Activity |
| | Rainy | Rainy Day Favorite Activity<br>How Do Clouds Make Rain Investigation |
| | Windy | Windy Day Favorite Activity<br>Snowy Day Favorite Activity<br>Water Thermometer Investigation Temperature Investigation<br>Thermometer Coloring<br>What Should I Wear Matching<br>Engineering Worksheet<br>Rain Shelter Engineering Lab |
| | | |

| **Kindergarten Severe Weather Unit Plan** | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 12 Days |
| **Grade:** | Kindergarten | **School:** | |
| **Subject:** | Science: | | |

**Next Generation Science Standards**

| | |
|---|---|
| **K-ESS3-2** | Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.<br>● Some kinds of severe weather are more likely than others in a given region. Weather scientists forecast severe weather so that the communities can prepare for and respond to these events. |
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |
| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |

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| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |

**NJSLS: Computer Science & Design Thinking**

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**Assessment**

● Performance based assessment (End of Unit Booklet)

**Unit Sequence**

| Essential Questions | Lessons | Practice Sheets/Activities |
|---|---|---|
| What is severe weather? | Thunderstorms | Thunderstorm Craft |
| | | Safe Shelter |
| | Hurricanes | Hurricane Craft |
| | | Hurricane Safety Coloring |
| | Tornados | Tornado Craft |
| | | Where to Go in a Tornado |
| | Blizzards | Blizzard Craft |
| | | Dressing for a Blizzard |
| | Predicting Storms | Weather Tools Matching |

| | | |
|---|---|---|
| | | Engineering Lab<br>Engineering Worksheet |
| | | |

| Kindergarten The Sun's Heat Unit Plan | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 13 Days |
| **Grade:** | Kindergarten | **School:** | |
| **Subject:** | Science | | |

**Next Generation Science Standards**

| | |
|---|---|
| **K-PS3-1** | Make observations to determine the effect of sunlight on Earth's surface.<br>● DCI: Sunlight warms Earth's Surface |
| **K-PS3-2** | Use tools and materials provided to design and build a structure that will reduce the warming effect of sunlight on Earth's surface.<br>● DCI: Sunlight warms Earth's Surface |
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |
| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |

**NJSLS: Computer Science & Design Thinking**

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**Essential Questions**

1. What are the characteristics of the sun?
2. What does the sun do for the earth?
3. Does the sun warm different surfaces the same?
4. Does the sun warm water or sand more?
5. What is shade?
6. How can we reduce the warming effect of the sun?
7. How does the sun give us daytime?

**Knowledge & Skills**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● The sun is a star.<br>● The sun is very hot.<br>● The sun warms Earth's surfaces different amounts.<br>● Shade is an area where the sun is blocked. ● It is cooler in the shade than in the sun. ● Earth spins which gives us night and day. | •Identify 3 characteristics of the sun.<br>•Identify that the sun gives us heat and light.<br>•Identify which surfaces warm more than others.<br>•Identify and describe shade.<br>•Build a structure that provides shade.<br>•Describe why we have day and night. |

**Unit Plan**

| Essential Questions | Lessons | Practice Sheets/Activities |
|---|---|---|
| What is the Sun? | The Sun Gives Us Heat<br>- | Ice Cube Investigation<br>Sun's Heat Investigation<br>Sun Art |
| | | Lab: What Melts in the Sun?<br>Lab Worksheet |
| | | The Sun's Heat on Sand and Grass Investigation |

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| | | The Sun's Heat on Sidewalks<br>Sidewalk Water Painting Investigation<br>Discovery Table Water Painting |

| | | |
|---|---|---|
| | | The Sun's Heat at the Beach<br>- Water vs. Sand Investigation |
| How does the Sun gives us daytime and shade? | Shade | I Need Shade Engineering Lesson |
| | | Engineering Worksheet |
| | | - Globe Investigation |
| | | |

| **Forces and Motion Unit Plan** | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 9 Days |
| **Grade:** | Kindergarten | **School:** | |
| **Subject:** | Science | | |
| **Next Generation Science Standards** | | | |
| **K-PS2-1** | Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object. ● DCI: Pushes and pulls can have different strengths and directions. ● DCI: Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it.<br>● DCI: When objects touch or collide, they push on one another and can change motion.<br>● DCI: A bigger push or pull makes things go faster. | | |
| **K-PS2-2** | Analyze data to determine if a design solution works as intended to change the direction of an object with a push or pull.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. | | |
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. | | |

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| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **NJSLS: Computer Science & Design Thinking** | |
| | |
| | |
| | |
| **Essential Questions** | |
| 1. Can pushes and pulls have different strengths and directions?<br>2. Can we change speed and direction of an object by pushing or pulling it? 3. What happens when objects touch or collide?<br>4. What does a bigger push or pull do to an object?<br>5. What tools can we use to increase the speed of an object or make the object turn? | |

| **Knowledge & Skills** | |
|---|---|
| By the end of this unit, students will know:<br>· Force is a push or a pull.<br>· All objects need a force to move.<br>· Pushes and pulls can have different strengths and directions.<br>· Pushing or pulling on an object can change the speed or direction of its motion and start or stop it.<br>· When objects touch or collide, they push on one another and can change motion.<br>· A larger push or pull makes things go faster.<br>· A smaller push or pull makes things go slower.<br>· Friction is when two object push against each other. | By the end of this unit, students will be able to:<br>● Identify if an object is being pushed or pulled.<br>● Identify if there is a lot or little bit of friction between two objects.<br>● Explain what happens when two objects collide. |
| **Assessment** | |

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|---|
| ● Performance based assessment (booklet) |

| Unit Sequence | | |
|---|---|---|
| **Essential Questions** | **Lessons** | **Practice Sheets/Activities** |
| What is movement? | Movement | Movement Investigation<br>Playground Worksheet |
| What is force? | Force | Tower Knock Down<br>Push & Push Sorting Sheet |
| | Speed | Speed Investigation<br>Speed Exploration<br>Optional: Box Races<br>Speed Comparison Sheet |
| | Collisions | Friction Exploration<br>Race Track Engineering Lab<br>Engineering Worksheet |

| Kindergarten Reduce, Reuse & Recycle Unit Plan | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 10 Days |
| **Grade:** | Kindergarten | **School:** | |
| **Subject:** | Science | | |

**Next Generation Science Standards**

| | |
|---|---|
| **K-ESS3-2** | Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.<br>● DCI: Things that people do to live comfortably can affect the world around them. But they can make choices that reduce their impacts on the land, water, air, and other living things. |
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |

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| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **NJSLS: Computer Science & Design Thinking** | |
| | |
| **Essential Questions** | |
| 1. What are natural resources?<br>2. How can we reduce our waste?<br>3. What does it mean to reuse?<br>4. How can we reuse materials?<br>5. What is recycle?<br>6. What can we recycle? | |

| **Knowledge & Skills** | |
|---|---|
| By the end of this unit, students will know:<br>● Natural resources are found in nature and made by the earth.<br>● Humans are using too many natural resources to make their life easier.<br>● We can reduce our waste to help the Earth by turning off water, electricity, and not many stuff we don't need.<br>● We can reuse products to prevent them from going into a landfill.<br>● Recycle means to break down a product to make sure new from it.<br>● Recycling reduces the amount of trash thrown into a landfill. | By the end of this unit, students will be able to:<br>● Describe natural resources.<br>● Explain what it means to reduce, reuse and recycle.<br>● Identify ways that they can help keep the Earth healthy. |
| **Assessment** | |
| ● Performance based assessment (End of Unit Booklet) | |
| **Unit Sequence** | |

| Essential Questions | Lessons | Practice Sheets/Activities |
|---|---|---|
| What does it mean to have a healthy Earth? | A Healthy Earth | Earth Watercolor Craft |
| How can you reduce, reuse, and recycle? | Reduce<br>Reuse<br>Recycle | A New Toy Engineering Lab<br>Reuse Animal Craft<br>Engineering Worksheet<br>Recycle Craft<br>Recycle Sorting Sheet |

| Kindergarten Plants & Animals Unit Plan | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 20 Days |
| **Grade:** | Kindergarten | **School:** | |
| **Subject:** | Science | | |

**Next Generation Science Standards**

| | |
|---|---|
| **K-LS1-1** | Use observations to describe patterns of what plants and animals (including humans) need to survive.<br>● DCI: All animals need food in order to live and grow. They obtain their food from plants and other animals. Plants need water and light to live and grow. |
| **K-ESS2-2** | Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.<br>● DCI: Plants and animals can change their environment. |
| **K-ESS3-1** | Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.<br>● DCI: Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do. |
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |
| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **NJSLS: Computer Science & Design Thinking** | |
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| **Essential Questions** | |

1. How can you tell is something is living or nonliving?
2. What do plants need to survive?
3. What do animals need to survive?
4. What is a habitat?
5. What is the forest habitat like?
6. What is hibernation?
7. What is the desert habitat like?
8. What is the polar habitat like?
9. What is the wetland habitat like?
10. How can plants and animals change the land?

**Knowledge & Skills**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● All living things breathe, reproduce, move, & grow.<br>● Plants need air, water, light and space to survive.<br>● Animals need air, water, food, and a home (shelter) to survive.<br>● A habitat is where an animal lives.<br>● Animals live in an area where all of their needs can be met.<br>● Plants and animals can change the land to meet their needs. | • Identify living and nonliving things.<br>• Name the needs of plants and animals.<br>• Explain what a habitat is.<br>• Describe three different habitats and why certain animals live there.<br>• Describe how plants and animals change the land. |

**Assessment**

Performance based assessment booklet

**Unit Sequence**

| Essential Questions | Lessons | Practice Sheets/Activities |
|---|---|---|
| What is the difference between living and Nonliving? | Living and Nonliving | Sorting Activity<br>Living and Nonliving Drawing |
| What do plants need? | What Plants Need | What Plants Need Lab |
| | | Plant Needs Cut & Paste |
| What do animals need? | What Animals Need | Animal Food Matching Worksheet |
| | | What Animals Need Part 2 Worksheet |
| How are habitats around the world | The Forest Habitat/Weather<br>Desert Habitat<br>Polar Habitat | Forest Living Things Booklet |

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| different? | Wetlands Habitat | |

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|---|---|---|
| | | Building a Nest Engineering Lab<br>Worksheet Owl Nest Engineering Lab<br>Forest Weather-Where Animals Hibernate Desert Living Booklet<br>Polar Habitat Worksheet<br>Wetlands Worksheet |
| How do humans change the environment ? | Changing the Environment - Nature Walk | Nature Walk Observation Sheet |
| | | |
| | | |

# Grade 1 Overview

**Refer to District PMI Units for the Following:**

**Materials**

**Assessments**

**Modifications**

## NJCTL First Grade PSI Year Long Plan

| Our Sky (12 Days) |
|---|
| 1-ESS1-1: Use observations of the sun, moon, and stars to describe patterns that can be predicted.<br>● DCI: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted.<br>1-ESS1-2: Make observations at different times of year to relate the amount of daylight to the time of year.<br>● DCI: Seasonal patterns of sunrise and sunset can be observed, described, and predicted.<br>K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.
K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

**Sound Waves and Light Waves (21 Days)**

1-PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

- DCI: Sound can make matter vibrate, and vibrating matter can make sound. 1-PS4-2: Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated.
- DCI: Objects can be seen if light is available to illuminate them or if they give off their own light.

1-PS4-3: Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light.

- DCI: Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam.

1-PS4-4: Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.

- DCI: People also use a variety of devices to communicate (send and receive information) over long distances.

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.
- DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.
- DCI: Before beginning to design a solution, it is important to clearly understand the problem.

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.
K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

**Animals (13 Days)**

1-LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. ● DCI: All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. ● DCI: Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.
- DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.
- DCI: Before beginning to design a solution, it is important to clearly understand the problem.

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

**Animal Families (15 Days)**

1-LS1-2: Read texts and use media to determine patterns in behavior in parents and offspring that help offspring survive.

- DCI: Adult plants and animals can have young. In many kinds of animals, parents and offspring themselves engage in behaviors that help the offspring to survive. 1-LS3-1: Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
- DCI: Young animals are very much, but not exactly like their parents. Plants also are very much, but not exactly, like their parents.
- DCI: Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.
- DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.
- DCI: Before beginning to design a solution, it is important to clearly understand the problem.

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

**Plants (15 days)**

1-LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. ● DCI: All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. ● DCI: Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs.

1-LS1-2: Read texts and use media to determine patterns in behavior in parents and offspring that help offspring survive.

- DCI: Adult plants and animals can have young. In many kinds of animals, parents and offspring themselves engage in behaviors that help the offspring to survive. 1-LS3-1: Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.

- DCI: Young animals are very much, but not exactly like their parents. Plants also are very much, but not exactly, like their parents.
- DCI: Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways.

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.
- DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.
- DCI: Before beginning to design a solution, it is important to clearly understand the problem.

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

| **Our Sky Unit Plan** | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 12 Days |
| **Grade:** | First | **School:** | |
| **Subject:** | Science | | |
| **Next Generation Science Standards** | | | |
| **1-ESS1-1** | Use observations of the sun, moon, and stars to describe patterns that can be predicted. ● DCI: Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. | | |
| **1-ESS1-2** | Make observations at different times of year to relate the amount of daylight to the time of year.<br>● DCI: Seasonal patterns of sunrise and sunset can be observed, described, and predicted. | | |

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| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |
| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **NJSLS: Computer Science & Design Thinking** | |
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| | |

**Essential Questions**

1. What is the pattern of the sun's location?
2. Can the patterns of the day sky be predicted?
3. What creates day and night?
4. What are the four seasons?
5. What patterns can be predicted with the seasons?
6. How does the amount of daylight change with the seasons?
7. Does the Moon create its own light?
8. How does the Moon's appearance change over time?
9. Why can we only see stars at night?

**Knowledge & Skills**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| · The sun rises in the morning and sets in the evening.<br>· Day and night is caused by the Earth's rotation.<br>· How the Sun appears to travel across the sky and that this is due to the Earth's motion, not the Sun's.<br>· There are four seasons.<br>· Summer has the longest amount of daylight and winter has the least amount of daylight.<br>· At night, you can see the Moon and stars. · The Moon does not shine.<br>· The Moon appears to grow and shrink in the sky based on how much reflected sunlight | ● Make predictions about the Sun's location at various times of the day.<br>● Make predictions about the Moon's phases.<br>● Explain how the Earth's rotation creates day and night.<br>● Explain how the Sun's presence during the day keeps other stars from being seen.<br>● Compare and contrast the four seasons, in particular the amount of sunlight, during the summer and winter months. |

| | |
|---|---|
| we can see. | |

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|---|---|
| · Because the Sun is so close, its brightness keeps us from seeing other stars during the day. | |

**Assessment**

- Performance based assessment

**Unit Sequence**

| Essential Questions | Lessons | Practice Sheets/Activities |
|---|---|---|
| What does the daytime sky look like? | The Daytime Sky<br>The Sun's Location | Daytime Sky Drawing<br>Sun's Location Drawings |
| What is the difference between day and night sky? | Day and Night<br>The Nighttime Sky | Day and Night Practice Sheet<br>Class Demonstration: Earth's Rotation Class Demonstration: The Moon's Surface<br>Nighttime Sky Drawing |
| What are the seasons? | The Seasons | Seasons Practice Sheet |
| What are the phases of the moon? | The Phases of the Moon | Phases of the Moon Cut & Paste<br>Oreo Activity Sheet<br>Phases of the Moon Oreo Investigation |
| | The Stars | Star Observation Worksheet<br>Where Do the Stars Go? Investigation |
| | | Engineering Lab Worksheets<br>Rocket Building Engineering Lab |

| Sound Waves and Light Waves Unit Plan | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 20 Days |
| **Grade:** | First | **School:** | |

| **Subject:** | Science |
|---|---|
| **Next Generation Science Standards** | |
| **1-PS4-1** | Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. [Clarification Statement: Examples of vibrating materials that make sound could include tuning forks and plucking a stretched string. Examples of how sound can make matter vibrate could include holding a piece of paper near a speaker making sound and holding an object near a vibrating tuning fork.] |

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| | ● DCI: Sound can make matter vibrate, and vibrating matter can make sound. |
| **1-PS4-2** | Make observations to construct an evidence-based account that objects in darkness can be seen only when illuminated. [Clarification Statement: Examples of observations could include those made in a completely dark room, a pinhole box, and a video of a cave explorer with a flashlight. Illumination could be from an external light source or by an object giving off its own light.]<br>● DCI: Objects can be seen if light is available to illuminate them or if they give off their own light. |
| **1-PS4-3** | Plan and conduct investigations to determine the effect of placing objects made with different materials in the path of a beam of light. [Clarification Statement: Examples of materials could include those that are transparent (such as clear plastic), translucent (such as wax paper), opaque (such as cardboard), and reflective (such as a mirror).] [Assessment Boundary: Assessment does not include the speed of light.]<br>● DCI: Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) |
| **1-PS4-4** | Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.<br>● DCI: People use a variety of devices to communicate over long distances. |
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |
| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a |

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| | problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **NJSLS: Computer Science & Design Thinking** | |
| | |
| **Essential Questions** | |
| 1. What is sound and how does it travel?<br>2. What causes different sounds?<br>3. Can we see more with or without light? | |

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|---|---|
| 4. What happens when an object is in the light path?<br>5. What is a shadow and what causes a shadow?<br>6. What is the difference between transparent, translucent, opaque and reflective surfaces? 7. How does light react to different surfaces?<br>8. What is communication?<br>9. How do we use lights and sound to communicate?<br>10. What types of devices do we use to communicate? | |
| **Knowledge & Skills** | |
| By the end of this unit, students will know:<br>· Vibrations cause sounds.<br>· Sound can make objects vibrate.<br>· We need light to see objects around us. · Light can pass through transparent objects.<br>· Some light can pass through translucent objects.<br>· No light can pass through opaque objects.<br>· Light bounces off of reflective surfaces.<br>· Shadows are caused by opaque objects blocking the light source.<br>· We use lights and sound to communicate.<br>· We use a variety of devices to communicate. | By the end of this unit, students will be able to: ● Explain how sound is created.<br>● Explain what causes different sounds. ● Explain that we need a light source in order to see objects around us.<br>● Define and explain the differences between opaque, transparent, translucent, and reflection.<br>● Explain what causes shadows.<br>● Identify different ways we use lights and sound to communicate.<br>● Explain why it is important to communicate in different ways.<br>● Identify different devices we use to communicate. |
| **Assessment** | |
| ● Performance based assessment | |
| **Unit Sequence** | |

| Essential Questions | Lessons | Practice Sheets/Activities |
|---|---|---|
| Where does sound come from? | What Do You Hear?<br>Where Does Sound Come From? | What Do You Hear? Recording Sheet |
| What causes different sounds? | Sound Pitch | Where Does Sound Come From? Practice Sheet<br>Glove-A-Sound Lab<br>Sound Pitch Practice Sheet<br>Seeing Sound Waves Lab<br>Seeing Sounds Lab Worksheet |
| | | Building Instruments<br>Engineering Lab Engineering Lab Worksheets |
| What Happens When Light Hits Certain Objects ? | What Can You See? | What Can You See? Practice Sheet |

| | | |
|---|---|---|
| | | What Happens When Light Hits Certain Objects? Practice Sheet<br>Light Investigation |
| | Shadows | Shadows Practice Sheet<br>Shadow Investigation |
| How do we use lights and sound to communic ate ? | Communicating with Light | Communicating with Sound Practice Sheet Communicating with Sound<br>String Phone Lab<br>Communicating with Light Practice Sheet |
| What is commun icati on? | Morse Code<br>Communication Devices | Morse Code Worksheet<br>Communication Hunt |
| | | Engineering Worksheet<br>Get Us Out Engineering Lab |
| | | |
| **Extension Activities** | | |
| These activities can be used as additional lessons for districts that have more science periods than our units. | | |

| Activity | Suggested Placement |
|---|---|
| Light Cave Explorer Investigation | After What Can You See? |
| Marine Mammal Communication Activity | After Communicating with Sound |

| Animals Unit Plan | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 13 Days |
| **Grade:** | First | **School:** | |
| **Subject:** | Science | | |
| **Next Generation Science Standards** | | | |
| **1-LS1-1** | Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.<br>● DCI: All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.<br>● DCI: Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. | | |
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. | | |
| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. | | |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a | | |

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| | problem, it is useful to compare and test designs. |
| **NJSLS: Computer Science & Design Thinking** | |
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| **Essential Questions** |
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| 1. What is a living thing?<br>2. Why do animals have different eyes and ears?<br>3. What do animals use their hands for?<br>4. Why do animals have different types of feet?<br>5. What do animal mouths tell us about an animal?<br>6. How do different animals move?<br>7. How do animals use their bodies to protect themselves?<br>8. How do humans mimic animals? |

| **Knowledge & Skills** | |
|---|---|
| By the end of this unit, students will know: · Plants and animals are living things. · All living things have external parts. · Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves and survive.<br>· Humans mimic how animals use their bodies.<br>· Animals respond to their environments. | By the end of this unit, students will be able to:<br>● Describe the function of each animal body part.<br>● Describe/list external parts of an animal.<br>● Explain how animals respond to their environment to help them survive. |
| **Assessment** | |
| ● Performance based assessment (booklet) | |
| **Unit Sequence** | |

| **Essential Questions** | **Lessons** | **Practice Sheets/Activities** |
|---|---|---|
| What is living and nonliving? | Living and Nonliving | Functions Worksheet<br>Function Investigation |

| | | |
|---|---|---|
| | Animal Eyes<br>Ears<br>Mouths<br>Hands<br>Feet<br>Animals on the Move<br>Protection | What If I Had Animal Eyes Worksheet<br>What If I Had Animal Ears Worksheet Bird Beaks<br>Animal Hands Worksheet<br>What If I Had Animal Feet Worksheet How Animals Move<br>Matching Worksheet<br>Animal Protection Worksheet |
| What Would An Animal Do? | Animal Responses | Engineering Lab Worksheet<br>What Would An Animal Do Engineering Lab<br>Senses Worksheet |
| | | Sequencing with Scrat (CS&DT Mandate) |
| | | |

| **Extension Activities** | |
|---|---|
| These activities can be used as additional lessons for districts that have more science periods than our units. | |
| **Activity** | **Suggested Placement** |
| Build a Monster | After Protection |

| **Animal Families Unit Plan** | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 15 Days |
| **Grade:** | First | **School:** | |
| **Subject:** | Science | | |
| **Next Generation Science Standards** | | | |
| **1-LS1-2** | Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.<br>● DCI: Adult plants and animals can have young. In many kinds of animals, parents and offspring themselves engage in behaviors that help the offspring to survive. | | |

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| **1-LS3-1** | Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.<br>● DCI: Young animals are very much, but not exactly like their parents. Plants also are very much, but not exactly, like their parents.<br>● DCI: Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. |
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |
| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **NJSLS: Computer Science & Design Thinking** | |
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| **Essential Questions** | |
| 1. What is an offspring?<br>2. How are offspring similar to their parents?<br>3. How are offspring different than their parents? | |

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| 4. What is an inherited behavior?<br>5. What is a learned behavior?<br>6. How do animal parents care for their young? |

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| **Knowledge & Skills** |

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| By the end of this unit, students will know: · Animal have offspring.<br>· Animal can give live birth or lay eggs.<br>· Animals protect their young before they are born.<br>· Animal babies are similar but not exactly like their parents.<br>· Animals have inherited and learned behaviors.<br>· Most animal parents provide their offspring with food, shelter, protection and education. | By the end of this unit, students will be able to: ● Describe what an offspring is.<br>● Identify similarities and differences between animal parents and offspring. ● Describe how animal parents care for their offspring. |

**Assessment**

● Performance based assessment (booklet)

**Unit Sequence**

| Essential Questions | Lessons | Practice Sheets/Activities |
|---|---|---|
| What is an offspring? | Animal Offspring | Parent/Offspring Labeling Worksheet Born From an Egg Lab |
| | | Engineering Worksheet Protecting an Egg Engineering Lab |
| What are physical differences? | Physical Traits<br>Offspring Differences<br>My Family | Physical Traits Worksheet Swan Similarities and Differences Worksheet My Family Worksheet |
| What are inherited and learned behaviors? | Inherited Behaviors<br>Learned Behaviors | Inherited and Learned Behaviors Sorting Worksheet |
| | | Programming with Angry Birds (CS&DT Mandate) |
| How do parents take care of their young? | Parental Care & Shelters<br>Protecting Their Young<br>Feeding Time<br>Learning Time | Elephant Parental Care Research Worksheet |

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| Plants Unit Plan | | | |
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| **Teacher:** | | **Time Frame:** | 15 Days |
| **Grade:** | First | **School:** | |
| **Subject:** | Science | | |

| Next Generation Science Standards | |
|---|---|
| **1-LS1-1** | Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.<br>● DCI: All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.<br>● DCI: Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. |
| **1-LS1-2** | Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.<br>● DCI: Adult plants and animals can have young. In many kinds of animals, parents and offspring themselves engage in behaviors that help the offspring to survive. |
| **1-LS3-1** | Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.<br>● DCI: Young animals are very much, but not exactly like their parents. Plants also are very much, but not exactly, like their parents.<br>● DCI: Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. |
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |

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| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **NJSLS: Computer Science & Design Thinking** | |
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**Essential Questions**

1. What is a plant?
2. What are the different parts of a plant?
3. What is the function of the stem, leaves, and roots?
4. What is a seed?
5. How does a seed grow?
6. How are parent plants and offspring similar?
7. How do plants change as they grow?
8. How do plants respond to their environment?

**Knowledge & Skills**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| · What a plant is.<br>· Plants have different parts that help them survive and grow.<br>· A plant grows from a seed.<br>· Parent plants and offspring are similar but not exactly the same.<br>· Plants respond to their environments. | ● List parts of a plant (roots, stems, leaves, flower and fruit).<br>● Describe the function of each part of a plant.<br>● Explain how parent plants and offspring look similar.<br>● Explain how plants respond to their environment to help them survive. |

**Assessment**

● Performance based assessment (booklet)

**Unit Sequence**

| Essential Questions | Lessons | Practice Sheets/Activities |
|---|---|---|
| What is a | Plants | Plant Illustration |

| | | |
|---|---|---|
| plant? | | |
| What are the parts of a plant? | External Parts of a Plant<br>Stems<br>Leaves<br>Roots | Colorful Flower Hunt<br>Worksheet Colorful Flower Hunt<br>Stem Investigation Worksheet<br>Leaf Label Worksheet<br>Walking Field Trip Worksheet |

| | | |
|---|---|---|
| | | Walking Field Trip: Plant Parts Root Protection Engineering Lab |
| What is a seed? | Seeds<br>Seedlings | Dissecting a Seed Lab<br>Engineering Worksheet<br>Seeds Worksheet<br>Lab Worksheet<br>Seedling Worksheet |
| How are parent plants and offspring similar? | Parent Plants & Offspring<br>Similarities Growing Offspring | Similarities Worksheet<br>Cut & Paste Plant Ordering |
| | | |

# Grade 2 Overview

**Refer to District PMI Units for the Following:**

**Materials**

**Assessments**

**Modifications**

## CTL 2nd Grade PSI Year Long Plan

| Unit 1: Earth's Surface (13 Days) |
|---|

2-ESS2-2: Develop a model to present the shapes and kinds of land and bodies of water in an area.

- DCI: Maps show where things are located. One can map the shapes and kinds of land and water in an area.

2-ESS2-3: Obtain information to identify where water is found on Earth and that it can be solid or liquid.

- DCI: Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form.

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.
- DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.
- DCI: Before beginning to design a solution, it is important to clearly understand the problem.

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

**Unit 2: Changes to Earth's Surface (13 Days)**

2-ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

- DCI: Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe.

2-ESS2-1: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.

- DCI: Wind and water can change the shape of the land.

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.
- DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.
- DCI: Before beginning to design a solution, it is important to clearly understand the problem.

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

**Unit 3: Matter (12 Days)**

2-PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

- DCI: Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties.

2-PSI-2: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. ● DCI: Different properties are suited to different purposes.

2-PSI-3: Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. ● DCI: Different properties are suited to different purposes.

- DCI: A great variety of objects can be built up from a small set of pieces.

2-PSI-4: Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

- DCI: Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
- DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.
- DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.
- DCI: Before beginning to design a solution, it is important to clearly understand the problem.

K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.

K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs.

**Unit 4: Biodiversity (20 days)**

2-LS4-1: Make observations of plants and animals to compare the diversity of life in different habitats.

- DCI: There are many different kinds of living things in any area, and they exist in different places on land and in water.

K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

- DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.
- DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.

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| ● DCI: Before beginning to design a solution, it is important to clearly understand the problem.<br>K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.<br>K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **Unit 5: Plants (12 Days)** |
| 2-LS2-1: Plan and conduct an investigation to determine if plants need sunlight and water to grow.<br>● DCI: Plants depend on water and light to grow.<br>2-LS2-2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.<br>● DCI: Plants depend on animals for pollination or to move their seeds around.<br>K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem.<br>K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.<br>K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |

## Second Grade Earth's Surface Unit Plan

| | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 13 days |
| **Grade:** | 2nd Grade | **School:** | |
| **Subject:** | Science: Earth's Surface | | |

| Next Generation Science Standards | |
|---|---|
| **2-ESS2-2** | Develop a model to present the shapes and kinds of land and bodies of water in an area. ● DCI: Maps show where things are located. One can map the shapes and kinds of land and water in an area. |
| **2-ESS2-3** | Obtain information to identify where water is found on Earth and that it can be solid or liquid. ● DCI: Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. |
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |
| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **NJSLS: Computer Science & Design Thinking** | |
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| Essential Questions |
|---|
| 1. Where is water found on Earth?<br>2. How can we find water on earth?<br>3. In what forms does water exist?<br>4. Can you think of different forms of land?<br>5. How can maps help us?<br>6. What are the differences and similarities between oceans, rivers, lakes and ponds? |

| Knowledge & Skills | |
|---|---|
| By the end of this unit, students will know:<br>● Water is found in oceans, rivers, lakes, and ponds.<br>● Water exists in liquid or ice forms.<br>● Different landforms exist on Earth. Some of them are mountains, hills, valley, plains and islands.<br>● We can use a map to find where water and landforms are located on Earth. | By the end of this unit, students will be able to:<br>● Describe some of the distinguishing characteristics of oceans, rivers, lakes, and ponds.<br>● Recognize and name different bodies of water in pictures and on maps.<br>● Describe where water may exist as a liquid or as a sold (ice).<br>● Identify and describe characteristics of |

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|---|---|
| | mountains, hills, valleys, plains, and islands. |

| **Assessment** |
|---|
| ● Performance based assessment |

**Unit Sequence**

| Essential Questions | Lessons | Practice Sheets/Activities |
|---|---|---|
| Where is water found on Earth? | Earth's Water | Earth's Water Practice Sheet 1 & 2<br>Land vs. Water Investigation |
| What Kind of Water is That? | Types of Water<br>Water as a Solid | What Kind of Water is That?<br>Investigation States of Water Lab<br>Water as a Solid Practice Sheet 1 |
| What is a landform? | Landforms<br>Maps | Landforms Practice Sheet 1 (picture books or internet needed for this sheet)<br>Three Billy Goats Gruff<br>Engineering Lab Maps Practice Sheet 1 & 2<br>My Very Own Island Activity |

**Extension Activities**

These activities can be used as additional lessons for districts that have more science periods than our units. **Activity Suggested Placement**

Bodies of Water Demo and Venn Diagram After Earth's Water

| **Second Grade Changes to Earth's Surface Unit Plan** | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 13 Days |
| **Grade:** | 2 | **School:** | |
| **Subject:** | Science: Changes to Earth's Surface | | |

| **Next Generation Science Standards** | |
|---|---|
| **2-ESS1-1** | Use information from several sources to provide evidence that Earth events can occur quickly or slowly.<br>● DCI: Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. |
| **2-ESS-2-1** | Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.<br>● DCI: Wind and water can change the shape of the land. |

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| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |
| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **NJSLS: Computer Science & Design Thinking** | |
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**Essential Questions**

1. What causes Earth's surface to weather?
2. How can the shape of the Earth change?
3. What is erosion?
4. How does erosion effect Earth's surface?
5. What can be done to reduce erosion?
6. How are dams like seawalls and levees? How are they different?
7. What type of events on Earth happen very quickly?

8. What types of events on Earth happen very slowly?

**Knowledge & Skills**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| · Weathering is the breaking down of Earth's surface.<br>· Erosion is when rocks and soil are carried away.<br>· Water, wind and ice cause weathering and erosion.<br>· Erosion cannot be prevented but it can be reduced.<br>· Some events change Earth's surface very slowly while other occur very quickly. | ● Describe weathering and erosion. ● Identify and describe causes of erosion.<br>● Identify ways to reduce erosion.<br>● Identify and describe events that happen quickly. |

| Assessment | | |
|---|---|---|
| • Performance based assessment | | |
| **Unit Sequence** | | |
| **Essential Questions** | **Lessons** | **Practice Sheets/Activities** |
| What causes Earth's surface to weather? | Weathering | Lift Flap Book<br>Weathering Investigation |
| What is erosion? | Water Erosion<br>Wind Erosion<br>Glacial Erosion | Lift Flap Book<br>Water Erosion Lab<br>Water Erosion Lab Worksheet<br>Wind Erosion Lab<br>Lift Flap Book<br>Weathering and Erosion Practice Sheet Wind Erosion Lab Worksheet<br>Glacial Erosion Demonstration<br>Lift Flap Book<br>Erosion and Weathering Practice Sheet |
| What is the impact of erosion?<br>How can we reduce erosion? | The Impact of Erosion<br>Reducing Erosion<br>Sudden Events that Change the Earth | Impact of Erosion Practice Sheet<br>Reducing Erosion Riddle Sheet<br>Sudden Events Practice Sheets 1 & 2 Earthquake Shake Engineering Lab |
| | | |

| Second Grade Matter Unit Plan | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 12 days |
| **Grade:** | 2 | **School:** | |
| **Subject:** | Science: Matter | | |
| **Next Generation Science Standards** | | | |
| **2-PS1-1** | Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.<br>● DCI: Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. | | |
| **2-PS1-2** | Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.<br>● DCI: Different properties are suited to different purposes. | | |

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| **2-PSI-3** | Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.<br>● DCI: Different properties are suited to different purposes.<br>● DCI: A great variety of objects can be built up from a small set of pieces. |
| **2-PSI-4** | Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.<br>● DCI: Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. |
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |
| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **NJSLS: Computer Science & Design Thinking** | |
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| | |

**Essential Questions**

1. What are the different states of matter?
2. How can we sort and classify matter?
3. What materials are best suited for different purposes?
4. What are the differences between a solid, a liquid and a gas?
5. How can matter change states?
6. Are changes to substances reversible or permanent?
7. Do liquids, solids and gases have volume and weight?

**Knowledge & Skills**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● Properties of different materials such as strength, hardness, flexibility and texture.<br>● What materials are best suited for different purposes.<br>● An object built out of a small set of pieces can be deconstructed and built into a different object.<br>● Properties of solids, liquids, and gas.<br>● Some substances can experience reversible changes and some cannot. | ● Determine different properties of objects.<br>● Group objects according to their properties.<br>● Construct an object out of a small set of pieces.<br>● Conduct experiments to change the state of liquids and solids. |

**Assessment**

● Performance based assessment

| Unit Sequence | | |
|---|---|---|
| **Essential Questions** | **Lessons** | **Practice Sheets/Activities** |
| What is Matter and properties of matter? | Matter and Properties of Matter<br><br>Materials of Matter | Matter and Properties of Matter Worksheets 1 & 2<br>Classifying Objects Investigation<br>Materials of Matter Worksheets 1 & 2 |
| What is the difference between a solid, liquid, and gas? | Solids<br>Liquids<br>Gases<br>States of Matter Review | Solids Worksheet<br>Liquids Worksheet<br>Gases Worksheet<br>Class Demonstration: Solids<br>Class Demonstration: Liquids<br>Class Demonstration: Gases |
| How does the state of matter change? | Changing States of Matter with Heat<br>Changing States of Matter by Cooling | States of Matter Worksheet<br>Balloon States of Matter Investigation<br>Heat Worksheet<br>Class Investigation: Snowman Matter<br>Changing States of Matter by Cooling Worksheet<br>Class Investigation: State of Matter in a Baggie |
| | Types of Changes to Matter | Types of Changes to Matter Worksheet<br>The Three Little Pigs Engineering Lab |
| | | |

| Extension Activities | |
|---|---|
| These activities can be used as additional lessons for districts that have more science periods than our units. | |
| **Activity** | **Suggested Placement** |
| Texture Investigation | After Matter and Properties of Matter |
| Absorbency Lab | After Materials of Matter |
| Ball Bounce Lab | After Materials of Matter |
| Boat Design Challenge Lab | After Materials of Matter |
| Humpty Dumpty Engineering Lab | After Materials of Matter |
| Molecules and States of Matter Investigation | After States of Matter Review |
| Inflate a Balloon Lab | After States of Matter Review |
| What is Goop? Lab | After States of Matter |
| Ice Cream Investigation | After Changing States of Matter by Cooling |
| Melting Crayons Investigation | Types of Changes to Matter |
| Cinderella Literacy Connection | Literacy Center Time |

## Second Grade Biodiversity Unit Plan

| | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 20 days |
| **Grade:** | 2nd Grade | **School:** | |
| **Subject:** | Science | | |

| **Next Generation Science Standards** | |
|---|---|
| **2-LS4-1** | Make observations of plants and animals to compare the diversity of life in different habitats.<br>● DCI: There are many different kinds of living things in any area, and they exist in different places on land and in water. |
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |
| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **NJSLS: Computer Science & Design Thinking** | |
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| | |

**Essential Questions**

1. What is biodiversity?
2. What is the difference between invertebrates and vertebrates?
3. What is a habitat?
4. What plants and animals live in the rainforest?
5. What plants and animals live in the desert?
6. What plants and animals live in the coral reef?
7. What plants and animals live in the woodlands?

**Knowledge & Skills**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● The meaning of biodiversity.<br>● Identify different types of animals.<br>● Different habitats have a variety of plants and animals. | ● Explain what biodiversity means.<br>● Distinguish between invertebrates and vertebrates.<br>● Define and identify habitats.<br>● Identify plants and animals that live in different habitats. |

**Assessment**

- Performance based assessment

| Unit Sequence | | |
|---|---|---|
| **Essential Questions** | **Lessons** | **Practice Sheets/Activities** |
| What is biodiversity? | Biodiversity | Biodiversity Collage |
| What is the difference between invertebrates and vertebrates? | Types of Animals | Types of Animal Worksheet |
| What is a habitat? | Habitats<br>The Rainforest<br>Rainforest Biodiversity<br>The Desert<br>The Coral Reef<br>The Woodlands | Animal Lists Worksheet<br>Layers Worksheet<br>Rainforest Research<br>Desert Animals Coloring Sheet<br>Desert Research<br>Animal Names Worksheet<br>Habitat Engineering Lab |
| | | Loops with Scrat (CS&DT Mandate) |

| Second Grade Plants Unit Plan | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 12 days |
| **Grade:** | 2nd Grade | **School:** | |
| **Subject:** | Plants | | |
| **Next Generation Science Standards** | | | |
| **2-LS2-1** | Plan and conduct an investigation to determine if plants need sunlight and water to grow.<br>● DCI: Plants depend on water and light to grow. | | |
| **2-LS2-2** | Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.<br>● DCI: Plants depend on animals for pollination or to move their seeds around. | | |

| | |
|---|---|
| **K-2-ETS1-1** | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem. |
| **K-2-ETS1-2** | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. |
| **K-2-ETS1-3** | Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |
| **NJSLS: Computer Science & Design Thinking** | |
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**Essential Questions**

1. What resources are needed for plants to grow?
2. Why is photosynthesis important for plants and people?
3. How does pollination occur?
4. How does seed dispersal occur?

**Knowledge & Skills**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● The characteristics of plants.<br>● The needs of plants.<br>● The inputs and outputs of photosynthesis.<br>● How pollination occurs.<br>● How dispersal occurs. | •Plan and conduct an investigation that determines plants need sunlight and water to grow.<br>•Describe what plants need to survive.<br>•Describe photosynthesis.<br>•Develop a simple model to show how animals disperse seeds or pollinate plants. |

**Assessment**

- Performance based assessment

**Unit Sequence**

| Essential Questions | Lessons | Practice Sheets/Activities |
|---|---|---|
| What are plants? | What are plants? | What Are Plants? Practice Sheet<br>Start Lab: What Do Plants Need to Grow? |
| What is photosynthesis? | Photosynthesis | Photosynthesis Practice Sheet 1<br>Photosynthesis Practice Sheet 2 |
| What is pollination? | Pollination | What is Pollination Practice Sheet<br>Animal Pollination Practice Sheet<br>Design a Pollinator Engineering Lab |

| | | |
|---|---|---|
| How does seed dispersal occur? | Dispersal | Dispersal Practice Sheet<br>Lab: What do Plants Need to Grow? Conclusion |
| | | Programming with Harvester (CS&DT Mandate) |

**Extension Activities**

These activities can be used as additional lessons for districts that have more science periods than our units.

| Activity | Suggested Placement |
|---|---|
| Why Are Plants Important? Lesson | After What is a Plant Lesson |
| Napkin Nursery | After Photosynthesis Lesson |
| Types of Pollinators Lesson | After Animal Pollinators Lesson |
| How Do Seeds Travel Lab | After Dispersal Lesson |

| **Engineering is Elementary Suggested Unit<br>Insect, The Best of Bugs: Designing Hand Pollinators (10 Days)** |
| --- |
| 2-LS2-2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.<br>● DCI: Plants depend on animals for pollination or to move their seeds around.<br>K-2-ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.<br>● DCI: A situation that people want to change or create can be approached as a problem to be solved through engineering.<br>● DCI: Asking questions, making observations, and gathering information are helpful in thinking about problems.<br>● DCI: Before beginning to design a solution, it is important to clearly understand the problem.<br>K-2-ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.<br>● DCI: Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people.<br>K-2-ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.<br>● DCI: Because there is always more than one possible solution to a problem, it is useful to compare and test designs. |

# Grade 3 Overview

**Refer to District PMI Units for the Following:**

**Materials**

**Assessments**

**Modifications**

# CTL 3rd Grade PSI Year Long Plan

| Unit 1: Growth and Development of Organisms | Unit 2: Inheritance of Traits |
|---|---|
| **LS1.B: Growth and Development of Organisms**<br>▪ Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1) | **LS3.A: Inheritance of Traits**<br>▪ Many characteristics of organisms are inherited from their parents. (3-LS3-1)<br>▪ Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3-LS3-2)<br>**LS3.B: Variation of Traits**<br>▪ Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)<br>▪ The environment also affects the traits that an organism |
| **Unit 3: Ecosystems: Group Behavior** | **Unit 4: Biological Evolution** |
| **LS2.D: Social Interactions and Group Behavior**<br>▪ Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size (Note: Moved from K–2). (3-LS2-1) | **LS2.C: Ecosystem Dynamics, Functioning, and Resilience**<br>▪ When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. (secondary to 3-LS4-4)<br>**LS4.A: Evidence of Common Ancestry and Diversity**<br>▪ Some kinds of plants and animals that once lived on Earth are no longer found anywhere. (Note: moved from K-2) (3-LS4-1)<br>▪ Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)<br>**LS4.B: Natural Selection**<br>▪ Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)<br>**LS4.C: Adaptation**<br>▪ For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)<br>**LS4.D: Biodiversity and Humans**<br>▪ Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4) |
| **Unit 5: Weather and Climate** | **Unit 6: Natural Hazards** |
| **ESS2.D: Weather and Climate**<br>▪ Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)<br>▪ Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2) | **ESS3.B: Natural Hazards**<br>▪ A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) (Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.) |
| **Unit 7: Motion & Stability** | |
| **PS2.A: Forces and Motion**<br>▪ Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative addition of forces are used at this level. (3-PS2-1)<br>▪ The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.) (3-PS2-2)<br>**PS2.B: Types of Interactions**<br>▪ Objects in contact exert forces on each other. (3-PS2-1)<br>▪ Electric, and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3),(3-PS2-4) | |

| Unit Lesson Plan – Growth and Development of Organisms | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 19 days |
| **Grade:** | **3** | **School:** | |
| **Subject:** | **PSI Elementary School Science** | | |
| **Next Generation Science Standards** | | | |

| | |
|---|---|
| **NGSS DCI**<br>**LS1.B: Growth and Development of Organisms** | **Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)**<br><br>http://www.nextgenscience.org/3ls1-molecules-organisms-structures-processes |
| **Instructional Objective:**<br>**3-LS1-1** | **Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.** |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |

| **NJSLS: Computer Science & Design Thinking** | | | |
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| **Essential Questions** | | | |
| **(What questions will the student be able to answer as a result of the instruction?)** | | | |
| 1. What is a life cycle?<br>2. What changes do organisms go through during their life cycle?<br>3. How do plants reproduce?<br>4. How is a plant life cycle similar to an animal's life cycle? How is it different?<br>5. Why do organisms reproduce?<br>6. What are different patterns of animal development? | | | |
| **Knowledge & Skills** | | | |
| **(What skills are needed to achieve the desired results?)** | | | |
| By the end of this unit, students will know:<br><br>● The pattern of life cycles include birth, growth, reproduction, and death.<br>● Reproduction is essential for a living thing to continue to exist over time. | By the end of this unit, students will be able to:<br><br>● Create a model of flowering plant life cycle.<br>● Create a model of an animal life cycle, including direct development, incomplete | | |

| | | | |
|---|---|---|---|
| ● Plant structures involved in plant reproduction.<br>● The steps of plant reproduction.<br>● The different patterns of animal development: direct development, complete metamorphosis, incomplete metamorphosis. | metamorphosis and complete metamorphosis.<br>● Compare and contrast the life cycles of plants and animals. | | |

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Quiz 1: Life Cycles

Lab: Germination

Lab: Seed Dissection
Lab: Pumpkin Seed

Quiz 2: Plant Life Cycles

Lab: Egg Membrane

Quiz 3: Animal Life Cycles

Life Cycles Research Project

Unit Test

## Unit Plan

| Essential Questions | Lessons | Suggested Activities | | | |
|---|---|---|---|---|---|
| What is the plant life cycle? | Plant Life Cycles | Set up: Germination Lab<br>Germination Lab Analysis<br>Seed Dissection Lab<br>Pumpkin Seed Lab | | | |
| What is an animal life cycle? | Animal Life Cycles | Set up Egg Membrane Lab | | | |
| What is the different patterns of animal development: direct development, complete metamorphosis, | Life Cycles | Research day for Life Cycles Research Project | | | |

| | | | | | |
|---|---|---|---|---|---|
| incomplete metamorphosis? | | | | | |

*While there are many slides for each topic, several slides within the notebook are hidden and won't be used during instructional time.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.
***Pacing guides are based on 40 minute periods, you may need to adjust based on your school's schedule.

| **Unit Lesson Plan – Inheritance of Traits** | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 10 days |
| **Grade:** | **3** | **School:** | |
| **Subject:** | **PSI Elementary School Science** | | |
| **NGSS DCI:**<br>**LS3.A: Inheritance of Traits**<br><br>**LS3.B: Variation of Traits** | **Many characteristics of organisms are inherited from their parents. (3-LS3-1)**<br>**Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3- LS3-2)**<br>**Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)**<br>**The environment also affects the traits that an organism develops. (3-LS3-2)**<br>http://www.nextgenscience.org/3ls3-heredity-inheritance-variation-traits | | |
| **Instructional Objective: 3-LS3-1** | **Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.** | | |
| **Instructional Objective: 3-LS3-2** | **Use evidence to support the explanation that traits can be influenced by the environment.** | | |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** | | |
| **3-5-ETS1-3** | **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** | | |
| **NJSLS: Computer Science & Design Thinking** | | | |
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**Essential Questions**

**(What questions will the student be able to answer as a result of the instruction?)**

1. What is the difference between inherited traits and environmental effects?
2. Why do offspring look similar to their parents?
3. Why is there variation between offspring?
4. How does the environment affect genetic inheritance?

**Knowledge & Skills**

**(What skills are needed to achieve the desired results?)**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● Offspring inherit traits from their parents.<br>● Variation occurs due to different combinations of inherited traits being passed on to offspring.<br>● Conditions of the environment can alter inherited traits.<br>● Environmental effects are not inherited or passed on to future offspring. | ● Determine the difference between inherited traits and environmental effects.<br>● Identify variation.<br>● Explain why variation occurs.<br>● Describe how environmental effects can change inherited traits. |

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Activity: Bearded Wormfly
Lab: Pothos Plant
Quiz: Inherited Traits and Variation
Unit Test
PBA

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| Essential Questions | Lessons | Suggested Activities |
|---|---|---|
| What is the difference between inherited traits and environmental effects? | Inherited Traits & Variation; Environmental Effects | Pothos Plant Lab Set-Up And Analysis |

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|---|---|---|
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*While there are many slides for each topic, several slides are interrelated and support each topic.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.
***The pacing guide is based on 40 minute class periods, you may need to adjust based on your school's schedule.

| **Unit Lesson Plan – Ecosystems: Group Behavior** | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 17 Days |
| **Grade:** | **3** | **School:** | |
| **Subject:** | **PSI Elementary School Science** | | |
| **Next Generation Science Standards** | | | |

| | |
|---|---|
| **NGSS/DCI**<br>**LS2.D: Social Interactions and Group Behavior** | **Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size *(Note: Moved from K–2)*. (3-LS2-1)**<br><br>**http://www.nextgenscience.org/3ire-interdependent-relationships-ecosystems** |
| **Instructional Objective:**<br>**3-LS2-1** | **Construct an argument that some animals form groups that help members survive.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |
| **NJSLS: Computer Science & Design Thinking** | |

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| **Essential Questions** |
|---|
| **(What questions will the student be able to answer as a result of the instruction?)** |
| 1. How do solitary and group animals differ?<br>2. What are the advantages of group living?<br>3. What are the disadvantages of group living?<br>4. How do animal groups differ from one another? |

| **Knowledge & Skills** | |
|---|---|
| **(What skills are needed to achieve the desired results?)** | |
| By the end of this unit, students will know:<br><br>● Animals either live solitary or in groups.<br>● Animals cannot spend their entire lives alone; they need each other in order to breed.<br>● Living in a group has advantages (gathering food, defense, adjusting to changes).<br>● Living in a group has disadvantages (competition for food, spread of disease).<br>● Animal groups form for different reasons. | By the end of this unit, students will be able to:<br><br>● Understand advantages of group living through experience working in a group.<br>● Understand disadvantages of group living through experience working in a group or observing others work in a group.<br>● Compare and contrast different animal groups. |

| **Assessment** |
|---|
| **(What is acceptable evidence to show desired results (rubrics, exam, etc.)?** |
| During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of classwork/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class.<br><br>Activity: Paper Building Challenge<br><br>Lab: Who Has the Advantage? Part I<br><br>Lab: Who Has the Advantage? Part II<br><br>Quiz 1<br><br>Lab: Who Has the Advantage? Part III<br><br>Activity: Tag – You're Sick! |

Quiz 2

Unit Test

Performance Based Assessment

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| Essential Questions | Lessons | Suggested Activities |
|---|---|---|
| How do solitary and group animals differ? | Lesson 1:How do Animals Live? | Activity: Paper Building Challenge<br>Lab: Who Has the Advantage Part I<br>Finish Analysis Questions<br>Lab: Who Has the Advantage? Part II |
| What are the advantages of group living?<br>What are the disadvantages of group living? | | |
| How do Animals Live?/Gathering Food/Defense? | Lesson 2:Gathering Food<br>Lesson 3:Defense<br>Lesson 4: Adjusting to Changes | |
| | Lesson 5: Illness<br>Lesson 6: Adjusting to Changes/Illness | Activity: Tag – You're Sick! |

*While there are many slides for each topic, several slides are interrelated and support each topic.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned

| **Unit 5 Lesson Plan – Biological Evolution** | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 22 days |
| **Grade:** | **3** | **School:** | |
| **Subject:** | PSI Third Grade, Unit 5 | | |
| **Next Generation Science Standards** | | | |

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|---|---|
| **3-LS4-1** | Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago.<br>● When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. LS2.C |

| | |
|---|---|
| | ● Some kinds of plants and animals that once lived on Earth are no longer found anywhere. LS2.C<br>● Fossils provide evidence about the types of organisms that lived long ago and also about the nature of either environments. |
| **3-LS4-2** | Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing<br>● Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. |
| **3-LS4-3** | For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.<br>● For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. |
| **3-LS4-4** | Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.<br>● Populations live in a variety of habitats and change in those habitats affects the organisms living there. |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| **NJSLS: Computer Science & Design Thinking** | |
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**Essential Questions**

**(What questions will the student be able to answer as a result of the instruction?)**

1. How and why a habitat of an organism can affect its survival over time?
2. What is the difference between biotic and abiotic factors?
3. What are examples of adaptations to increase survival?
4. What happens to a species if it cannot survive changes in the environment?

5. How can we study extinct species?
6. What information about the environment can we learn from fossils?
7. What are examples of environmental disturbances?
8. What are some positive and negative impacts humans have on the environment?

**Knowledge & Skills**

**(What skills are needed to achieve the desired results?)**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● Habitats include biotic and abiotic factors<br>● Fossils indicate changes of environments on Earth<br>● Adaptations help organisms survive.<br>● Environmental changes affect an organism's survival. | ● Identify biotic and abiotic factors in the environment.<br>● Analyze and interpret data to understand what has lived on Earth over time.<br>● Identify and explain specific causes of environmental change; and the direct implications for species in that environment.<br>● Define a problem and propose solutions for an environmental issue. |

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Camouflage Lab

Quiz 1: Habitats & Adaptations

Make a Fossil Activity

Fossilization Activity

Constructing a Fossil Map Activity

Quiz 2: Fossils

Small Change, Big Range Activity

Compost Time Capsule Activity

Unit Test

PBA

**Unit Plan**

| Essential Questions: | Lessons | Suggested Activities |
|---|---|---|
| How and why a habitat of an organism can affect its survival over time? | Lesson 1:Habitats<br>Lesson 2:Adaptations<br>Lesson 3:Habitats/Adaptations | Set up Compost Time Capsule<br>Camouflage Lab |

| | | |
|---|---|---|
| How do fossils indicate changes of environments on Earth? | Lesson 4: Fossils | Make a Fossil Activity<br>Fossilization Activity |
| | Lesson 5: Fossils/ Disturbances | Dinosaur Extinction Handout<br>Small Change, Big Range Activity<br>Compost Time Capsule |
| | | |

*While there are many slides for each topic, several slides are interrelated and support each topic.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.

| **Unit Lesson Plan – Weather & Climate** | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 20 days |
| **Grade:** | **3** | **School:** | |
| **Subject:** | **PSI Elementary School Science** | | |
| **Next Generation Science Standards** | | | |

| | |
|---|---|
| **3-ESS2-1 Weather and Climate** | **ESS2.D: (3-ESS2-1) Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.**<br><br>**(3-ESS2-2)Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.** |
| **Instructional Objective: 3-ESS2-1** | **Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.** |
| **Instructional Objective: 3-ESS2-2:** | **Obtain and combine information to describe climates in different regions of the world.** |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a** |

| | |
|---|---|
| | **solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |
| **NJSLS: Computer Science & Design Thinking** | |
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| **Essential Questions** |
|---|
| **(What questions will the student be able to answer as a result of the instruction?)** |
| 1. What factors affect daily weather?<br>2. What factors affect an area's climate?<br>3. How can data be used to determine the climate of various regions? |

| **Knowledge & Skills** | |
|---|---|
| **(What skills are needed to achieve the desired results?)** | |
| By the end of this unit, students will know:<br><br>● Weather includes temperature, precipitation, and wind on a day to day basis.<br>● Climate is the typical weather patterns over many years.<br>● How to use tools such as a thermometer, rain gauge, and wind vane to collect weather data.<br>● Climates vary around the world due to different amounts of rain, varying temperatures, and wind patterns. | By the end of this unit, students will be able to:<br><br>● Predict weather conditions based on information collected.<br>● Analyze and interpret data to understand what is the climate in different parts of the world<br>● Ask questions about what caused changes in weather patterns.<br>● Collect data using tools such as thermometers, rain gauge, and a wind vane. |

| **Assessment** |
|---|
| **(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy** |
| During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.<br><br>Activity: Collecting Weather Data<br><br>Activity: Thermometer<br><br>Demo: Water Cycle in a Jar<br><br>Demo: Cloud in a Jar<br><br>Quiz 1: Temperature and Precipitation<br><br>Demo: Toasty Wind |

Demo: Convection

Analyzing Weather Data

Quiz 2: Wind and Weather Prediction

Climate Zone Project

Unit Test

PBA

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| Essential Questions | Lessons | Suggested Activities |
|---|---|---|
| What factors affect daily weather? | Intro to Weather & Climate | ;<br>Collecting Weather Data<br>Activity: Thermometer<br>Demo: Water Cycle in a Jar<br>Demo: Cloud in a Jar<br>Demo: Toasty Wind<br>Demo: Convection |
| What factors affect an area's climate? | Intro to Climate<br>Temperature<br>Precipitation<br>Wind<br>Weather Prediction | |
| How can data be used to determine the climate of various regions? | Weather Prediction | Activity: Analyzing Weather Data<br>Climate Zone Project |

*While there are many slides for each topic, several slides are interrelated and support each topic.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.

| Unit Lesson Plan – Natural Hazards | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 11 days |
| **Grade:** | **3** | **School:** | |
| **Subject:** | **PSI Elementary School Science** | | |
| **Next Generation Science Standards** | | | |

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|---|---|
| **NGSS/DCI**<br><br>**ESS3.B Natural Hazards** | **A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.** |
| **Instructional Objective:**<br>**3-ESS3-1** | **Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.** |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| NJSLS: Computer Science & Design Thinking | |
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| | |
| **Essential Questions** | |
| **(What questions will the student be able to answer as a result of the instruction?)** | |

1. What is a natural hazard?
2. How can damage from natural hazards be minimized?

**Knowledge & Skills**

**(What skills are needed to achieve the desired results?)**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● A natural hazard is an extreme event that occurs from natural processes.<br>● Natural hazards cannot be prevented.<br>● The damage from natural hazards can be minimized. | ● Describe different natural hazards.<br>● Analyze methods for reducing damage caused by natural hazards. |

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Activity: Making Lightning

Activity: Analyzing Levees

Activity: The Fire Triangle

RAFT: Be Prepared Activity

PBA

**Unit Plan**

| Essential Questions | Lessons | Suggested Activities |
|---|---|---|
| What is a natural hazard? | Lesson 1:Natural Hazards<br>Lesson 2:Lightning<br>Lesson 3:Floods<br>Lesson 4:Wildfires | Activity: Making Lightning<br>Activity: Analyzing Levees Set up Riverbed<br>Activity: The Fire Triangle |
| How can damage from natural hazards be minimized? | Natural Hazards | RAFT: Be Prepared Activity |

*While there are many slides for each topic, several slides are interrelated and support each topic.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.

| Unit Lesson Plan – Motion and Stability | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 21 days |
| **Grade:** | **3** | **School:** | |
| **Subject:** | **PSI Elementary School Science** | | |

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| **NGSS/DCI**<br>**PS2.A: Forces and Motion**<br><br>**PS2.B: Types of Interactions** | **Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object's speed or direction of motion. (3-PS2-1)**<br><br>**The patterns of an object's motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (3-PS2-2)**<br><br>**Objects in contact exert forces on each other. (3-PS2-1)**<br><br>**Electric, and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3),(3-PS2-4)**<br>http://www.nextgenscience.org/3ps2-motion-stability-forces-interactions |
| **3-PS2-1** | **Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.** |
| **3-PS2-2** | **Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.** |
| **3-PS3-3** | **Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.** |
| **3-PS3-4** | **Define a simple design problem that can be solved by applying scientific ideas about magnets.** |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| NJSLS: Computer Science & Design Thinking | |
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**Essential Questions**

**(What questions will the student be able to answer as a result of the instruction?)**

1. How and why do objects move?

**Knowledge & Skills**

**(What skills are needed to achieve the desired results?)**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● Forces are pushes and pulls<br>● Motion occurs in predictable patterns<br>● The cause and effect relationships of electric interactions<br>● The cause and effect relationships of magnetic interactions<br>● Magnets can be used to solve design problems | ● Plan and conduct investigations about forces<br>● Make observations and measurements of motion<br>● Ask questions about electric and magnetic interactions<br>● Define a problem that can be solved with magnets |

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Lab 1: Distance, Time Speed

Quiz #1

Lab 2: Balanced & Unbalanced Forces

Quiz #2

Lab 3: Predicting Motion

Quiz #3

Lab 4: Magnetic Interactions

Lab 5: Magnetic Racing Lab

Quiz #4

Lab 6: Electricity

Lab 7: Building with Magnets Lab

Unit Test

| Performance Based Assessment | | |
|---|---|---|
| **Unit Plans** | | |
| **Essential Questions** | **Lessons** | **Suggested Activities** |
| How and why do objects move? | Lesson 1-5:Forces and Motion Review<br><br>Lesson 6-8: Balanced and Unbalanced Forces<br><br>Lesson 9-11:Motion Prediction from patterns<br><br>Lesson 12-14 Magnetism<br><br>Lesson 15-17 Electric Force<br><br>Lesson 18-21 Building with Magnets | Lab: Distance, Time and Speed<br><br>Lab:Balanced and Unbalanced Forces<br><br>Lab: Predicting Motion<br><br>Magnetic Interactions Lab<br><br>Magnetic Racing Lab<br><br>Electricity Lab<br><br>Building with Magnets Lab |

*While there are many slides for each topic, several slides within the notebook are hidden and won't be used during instructional time.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.

# Grade 4 Overview

**Refer to District PMI Units for the Following:**

**Materials**

**Assessments**

**Modifications**

## CTL 4th Grade PSI Year Long Plan

| Unit 1: The History of Planet Earth | Unit 2: Earth's Systems |
|---|---|
| **ESS1.C: The History of Planet Earth**<br>▪ Local, regional, and global patterns of rock formations reveal | **ESS2.A: Earth Materials and Systems**<br>▪ Rainfall helps to shape the land and affects the types of living |

changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)

**ESS2.B: Plate Tectonics and Large-Scale System Interactions**

- The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2)

things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)

**ESS2.E: Biogeology**

- Living things affect the physical characteristics of their regions. (4- ESS2-1)

## Unit 3: Energy

**PS3.A: Definitions of Energy**

- The faster a given object is moving, the more energy it possesses. (4- PS3-1)
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2),(4-PS3-3)

**PS3.B: Conservation of Energy and Energy Transfer**

- Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2),(4-PS3-3)
- Light also transfers energy from place to place. (4-PS3-2)
- Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2),(4- PS3-4)

**PS3.C: Relationship Between Energy and Forces**

- When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3-3)

## Unit 4: Waves, Light & Information

**PS4.A: Wave Properties**

- Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; it does not move in the direction of the wave except when the water meets the beach. (Note: This grade band endpoint was moved from K–2). (4-PS4-1)
- Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)

**PS4.B: Electromagnetic Radiation**

- An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)

**PS4.C: Information Technologies and Instrumentation**

- Digitized information transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)

**ETS1.C: Optimizing The Design Solution**

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (secondary to 4-PS4-3)

## Unit 5: Energy & Natural Resources

**ESS3.A: Natural Resources**

- Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)

**PS3.D: Energy in Chemical Processes and Everyday Life**

- The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)

**ETS1.A: Defining Engineering Problems**

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria).Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (secondary to 4-PS3-4)

## Unit 6: Natural Hazards

**ESS3.B: Natural Hazards**

- A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2) (Note: This Disciplinary Core Idea can also be found in 3.WC.)

**ETS1.B: Designing Solutions to Engineering Problems**

- Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2)

## Unit 7: Molecules to Organisms

**LS1.A: Structure and Function**

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

**LS1.D: Information Processing**

- Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)

**Unit Lesson Plan – Energy**

**NJCTL Document**

| | | | |
|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 17 Days |
| **Grade:** | **4** | **School:** | |
| **Subject:** | **PSI – Progressive Science Initiative®** | | |

| | |
|---|---|
| **NGSS/DCI**<br>**PS3.A: Definitions of Energy**<br><br>**PS3.B: Conservation of Energy and Energy Transfer**<br><br>**PS3.C: Relationship Between Energy and Forces**<br><br>**PS3.D: Energy in Chemical Processes and Everyday Life** | **The faster a given object is moving, the more energy it possesses. (4-PS3-1)**<br><br>**Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2) (4-PS3-3)**<br><br>**Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. (4-PS3-2) (4-PS3-3)**<br><br>**Light also transfers energy from place to place. (4-PS3-2)**<br><br>**Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. (4-PS3-2) (4-PS3-4)**<br><br>**When objects collide, the contact forces transfer energy so as to change the objects' motions. (4-PS3- 3)**<br><br>**The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)**<br><br>**http://www.nextgenscience.org/4e-energy** |
| **Instructional Objective:**<br>**4-PS3-1** | **Use evidence to construct an explanation relation the speed of an object to the energy of that object.** |
| **4-PS3-2** | **Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents.** |
| **4-PS3-3** | **Ask questions and predict outcomes about the changes in energy that occur when objects collide.** |
| **4-PS3-4** | **Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.** |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired** |

| | |
|---|---|
| | **features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | ● **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| **NJSLS: Computer Science & Design Thinking** | |
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**Essential Questions**

**(What questions will the student be able to answer as a result of the instruction?)**

1. What is energy?
2. What is the difference between kinetic and potential energy?
3. When do objects have more or less energy?
4. What are the various forms of energy?
5. How does energy shift between kinetic and potential?
6. How does energy transfer among the various forms of energy?
7. How does a collision transfer energy or force?
8. What is the law of conservation of energy?
9. What is force and how does it relate to energy?
10. What is direct and indirect force?

**Knowledge & Skills**

**(What skills are needed to achieve the desired results?)**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● Energy is an objects' ability to do work.<br>● Energy can be kinetic or potential, and has many different forms.<br>● Energy shifts between kinetic and potential.<br>● Energy is not created or destroyed. | ● Predict how changes in speed affect an object's energy.<br>● Observe how energy can be transferred among its various forms and explain what is happening using scientific vocabulary. |

| | |
|---|---|
| • Energy is transferred among its various forms.<br>• Force is a way that energy can be transferred. | • Predict changes in energy that will occur as a result of objects colliding.<br>• Test and refine devices that convert energy from one form to another. |

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Lab 1: Pendulum

Quiz 1: Energy

Lab 2: Energy Transfer

Quiz 2: Conservation of Energy and Energy Transfer

Lab 3: Heat Transfer

Quiz 3: Energy and Force

Performance Based Assessment

Unit Test

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| Essential Questions | Lessons | Suggested Activities |
|---|---|---|
| What is energy? | What is Energy, Kinetic and Potential Energy | Pendulum Lab Notebook<br>Build a Pendulum<br><br>Pendulum Lab Part A<br><br>Pendulum Lab Part B<br>Pendulum Lab Part C & Conclusion Questions<br>Pendulum Lab Part C & Conclusion Questions |
| | | |
| How does energy transfer among the various forms of energy? | Conservation of Energy and Energy Transfer; Energy and Force | Energy Transfer Lab<br>Complete Energy Transfer Lab;<br>Energy Transfer Worksheet<br><br>Heat Transfer Lab (Part 1)<br>Lab Questions<br>Heat Transfer Lab (Parts 2 & 3) |

*While there are many slides for each topic, several slides are interrelated and support each topic.

**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.

***Quiz 2 can be fit in between days 7 and 11, whenever it will work best.

| Unit Lesson Plan – Waves, Light, & Information | | | |
|---|---|---|---|
| NJCTL Document | | | |
| **Teacher:** | | **Time Frame:** | 18 Days |
| **Grade:** | **4** | **School:** | |
| **Subject:** | **PSI Elementary School Science** | | |

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| **NGSS/DCI**<br>**PS4.A: Wave Properties**<br><br>**PS4.B: Electromagnetic Radiation**<br><br>**PS4.C: Information Technologies and Instrumentation**<br><br>**ETS1.C: Optimizing The Design Solution** | **Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. (4-PS4-1)**<br><br>**Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). (4-PS4-1)**<br><br>**An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)**<br><br>**Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. (4-PS4-3)**<br><br>**Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. *(secondary to 4-PS4-3)***<br><br>**http://www.nextgenscience.org/4w-waves**<br>**http://www.nextgenscience.org/3sfip-stucture-function-information-processing** |
| **Instructional Objective:**<br>**4-PS4-1** | **Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.** |
| **4-PS4-2** | **Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.** |

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| **4-PS4-3** | **Generate and compare multiple solutions that use patterns to transfer information.** |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | ● **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| **NJSLS: Computer Science & Design Thinking** | |
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| **Essential Questions** | |
| **(What questions will the student be able to answer as a result of the instruction?)** | |
| 1. What are waves and what are they caused by?<br>2. What words do scientists use to describe waves?<br>3. What are longitudinal waves and what causes them?<br>4. What are transverse waves and what causes them?<br>5. How are longitudinal and transverse waves different?<br>6. How does light allow us to see?<br>7. Why do we see colors?<br>8. How do plane mirrors reflect light and objects?<br>9. How is light refracted? | |

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| 10. How do modern ways of communication utilize patterns to transfer information? | |

| **Knowledge & Skills** | |
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| **(What skills are needed to achieve the desired results?)** | |
| By the end of this unit, students will know:<br><br>● Waves are regular patterns of motion caused by a disturbance.<br>● In longitudinal waves, particles move in the same or opposite direction of the wave.<br>● In transverse waves, particles move up or down as the wave moves right or left.<br>● In order for us to see, light must reflect off of objects.<br>● We see colors when they are reflected and other colors are absorbed. When we see white, we are seeing all the colors reflected. When we see black, all the colors were absorbed.<br>● A plane mirror reflects light at the same angle it hits it and reflects an object the same distance away as it is from the mirror.<br>● Light bends as it passes from one material to another.<br>● Computers communicate using Binary, converting information into a list of 1's and 0's that relay information. | By the end of this unit, students will be able to:<br><br>● Create a wave and explain how to manipulate various characteristics of the wave (like amplitude or wavelength)<br>● Create a simple device to transfer sound waves and explain why it can do so.<br>● Relate amplitude and wavelength to volume and pitch.<br>● Model changes in amplitude and wavelength on a one-string guitar.<br>● Explain how mirrors reflect objects and light.<br>● Use patterns to create a code to transfer information.<br>● Decode a set of digitized information. |

| **Assessment** |
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| **(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy** |
| During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of classwork/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class.<br><br>Lab 1: Paper Wave<br><br>Quiz 1: What are Waves? and Describing Waves<br><br>Lab 2: Sound Cup<br><br>Lab 3: One-String Guitar<br><br>Quiz 2: Sight and Color |

Lab 4: Plane Mirror

Lab 5: Light Reflection

Quiz 3: Mirrors and Refraction

Lab 6: Binary Code

Quiz 4: Digitized Information

Performance Based Assessment

Unit Test

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| Essential Questions | Lesson | Suggested Activities |
|---|---|---|
| What are Waves? and Describing Waves; Sound | Lesson 1-4:What are Waves?<br>Lesson 5-7: Describing Waves<br>Lesson 8-9: Sound | Paper Wave Lab |
| How do plane mirrors reflect light and objects? | Lesson 10-11:Mirrors | ;<br>Plane Mirror Lab<br>Light Reflection Lab |
| How is light refracted? | Lesson 12-17:Mirrors; Refraction | Binary Code Lab |
| | | |

*While there are many slides for each topic, several slides are interrelated and support each topic.

**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned

| **Unit Lesson Plan – Plant & Animal Structures and Processes** | | | |
|---|---|---|---|
| **NJCTL Document** | | | |
| **Teacher:** | | **Time Frame:** | 19 days |
| **Grade:** | 4 | **School:** | |
| **Subject:** | PSI Elementary School Science | | |

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| **NGSS/DCI**<br>**LS1.A: Structure & Function**<br><br>**LS1.D: Information Processing** | Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)<br><br>Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2) |
| **Instructional Objective:**<br>**4-LS1-1**<br><br>**4-LS1-2** | Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.<br><br>Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | ● **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| **Essential Questions** |
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| **(What questions will the student be able to answer as a result of the instruction?)** |
| 1. How does an organism's structure fit its function?<br>2. How do internal and external structures function to support the survival of plants and animals?<br>3. How do senses function to help an animal's survival?<br>4. How do animals react to their environments?<br>5. How do plants react to their environments? |

| **NJSLS: Computer Science & Design Thinking** | |
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| **Knowledge & Skills** |
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| (What skills are needed to achieve the desired results?) | |
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| By the end of this unit, students will know:<br>● The core 4 functions of organisms: growth, survival, behavior and reproduction.<br>● Examples of how plant and animal structures, both internally and externally, function to fulfill the core functions.<br>● How senses benefit animals in respect to how they respond to their environment.<br>● How animals use information processing and memory to guide their actions.<br>● How plants respond to their environments via tropisms. | By the end of this unit, students will be able to:<br>● Analyze a plant or animal and explain how the internal and external features support their survival.<br>● Model information processing and understand how it helps animals to respond to their environments.<br>● Explain how information processing and memory guide the actions of animals.<br>● Describe several different tropisms through which plants react to their environments. |

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Activity: Bite Into Structure & Function
Activity: Squid Exploration
Lab: Are Leaves Important
Lab: Gas Exchange in Leaves
Quiz 1: Structure and Function
Demo: What is That?
Activity: Clicker Training

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| Essential Questions | Lessons | Suggested Questions | |
|---|---|---|---|
| How does an organism's structure fit its function? | Lab Setup<br>Structure and Function<br>Animal Structures | Set up Lab: Are Leaves Important?<br>Activity: Bite Into Structure & Function<br>Activity: Squid Exploration<br><br>Lab: Are Leaves Important Analysis<br>Lab: Gas Exchange in Leaves Lab Set up<br>Activity: Clicker Training<br>Lab: Gas Exchange in Leaves Analysis | |
| How do internal and external structures function to support the survival of plants and animals? | Plant Structures<br>Structure and Function;<br>Information Processing | | |
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*While there are many slides for each topic, several slides are interrelated and support each topic.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.

| Unit Lesson Plan – The History of Planet Earth | | | |
|---|---|---|---|
| NJCTL Document | | | |
| **Teacher:** | | **Time Frame:** | 17 Days |
| **Grade:** | **4** | **School:** | |
| **Subject:** | **PSI Elementary School Science** | | |

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| **NGSS/DCI**<br>**ESS1.C: The History of Planet Earth**<br><br>**ESS2.B: Plate Tectonics and Large-Scale System Interactions** | **Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)**<br><br>**The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. (4-ESS2-2)**<br><br>**http://www.nextgenscience.org/4ess1-earth-place-universe**<br>**http://www.nextgenscience.org/4ess2-earth-systems** |
| **Instructional Objective: 4-ESS1-1** | **Identify evidence from patterns in rock formations and fossils in rock layers for changes in a landscape over time to support an explanation for changes in a landscape over time.** |
| **Instructional Objective: 4-ESS2-2** | **Analyze and interpret data from maps to describe patterns of Earth's features.**<br><br>**Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.** |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |

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| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | ● **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| **NJSLS: Computer Science & Design Thinking** | |
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**Essential Questions**

**(What questions will the student be able to answer as a result of the instruction?)**

1. What can rock formations teach about the history of Earth?
2. How can fossils help determine the age of rocks and rock layers?
3. What are tectonic plates?
4. What causes many of Earth's surface features and where do these features tend to exist?

**Knowledge & Skills**

**(What skills are needed to achieve the desired results?)**

By the end of this unit, students will know:

- The layer of Earth that tells us the most about Earth's history is the crust.
- Sedimentary rocks form in layers and fossils in these layers can help geologists determine how old the rocks are relative to one another.
- Earth's crust is made up of tectonic plates that float on the mantle and interact at their boundaries.
- Many of the features on Earth's surface exist at tectonic plate boundaries.

By the end of this unit, students will be able to:

- Create a model of sedimentary rock formation.
- Create a model of fossils in sedimentary rock layers.
- Identify rock layers in a sedimentary rock model and use this information to determine the step-by-step process of rock formation.
- Determine what the youngest and oldest layer of a rock is based on the Law of Superposition.
- Collaborate to build a model of one type of plate boundary.
- Map earthquakes and plate boundary locations and determine the connections between their locations.

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of classwork/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class.

Lab 1: Rock Layers

Quiz 1: Rock Layers

Activity 1: Sediment Fossil Surprise

Activity 2: Relative Age with Edible Rocks

Quiz 2: Fossils

Quiz 3: Earth Forces and Plates

Activity 3: Where Plates Meet

Activity 4: Finding Plates by Mapping Quakes

Quiz 4: Surface Features and Patterns

Performance Assessment Task

Unit Test

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

<table>
<tr><th>Essential Questions</th><th>Lesson</th><th colspan="2">Suggested Activities</th></tr>
<tr><td>What can rock formations teach about the history of Earth?</td><td>The Structure of Earth & Rock Layers</td><td colspan="2" rowspan="4">Lab: Rock Layers<br><br>Student lab sheet<br>(day 1 observations)<br><br>Activity: Sediment Fossil Surprise<br><br>Activity: Relative Age with Edible Rocks<br><br>Activity: Where Plates Meet<br><br>Finding Plates by Mapping Quakes</td></tr>
<tr><td>How can fossils help determine the age of rocks and rock layers?</td><td>Fossils and Relative Time</td></tr>
<tr><td>What are tectonic plates?</td><td>Earth Forces & Tectonic Plates</td></tr>
<tr><td>What causes many of Earth’s surface features and where do these features tend to exist?</td><td>Earth’s Visible Features</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

*While there are many slides for each topic, several slides within the notebook are hidden and won’t be used during instructional time.

**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned. A guide is provided above.

| Unit Lesson Plan – Earth Systems | | | |
|---|---|---|---|
| NJCTL Document | | | |
| **Teacher:** | | **Time Frame:** | 18 Days |
| **Grade:** | **4** | **School:** | |
| **Subject:** | **PSI Elementary School Science** | | |

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| **NGSS/DCI**<br>**ESS1.C: The History of Planet Earth**<br><br>**ESS2.B: Plate Tectonics and Large-Scale System Interactions** | **Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)**<br><br>**Living things affect the physical characteristics of their regions. (4-ESS2-1)**<br><br>**http://www.nextgenscience.org/4-ess2-1-earths-systems** |
| **Instructional Objective:**<br>**4-ESS2-1** | **Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.** |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | ● **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| NJSLS: Computer Science & Design Thinking | |
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**Essential Questions**

**(What questions will the student be able to answer as a result of the instruction?)**

1. What is mechanical and chemical weathering and how does it affect the environment?
2. What is erosion and how does it affect the environment?
3. How do living things affect their environments?
4. How does rainfall affect the environment?

**Knowledge & Skills**

**(What skills are needed to achieve the desired results?)**

By the end of this unit, students will know:

- Earth has four systems the work together.
- Earth's four systems are the atmosphere, biosphere, geosphere, and hydrosphere.
- Weathering is the break down or dissolving of rocks on Earth's surface.
- Mechanical weathering is when physical processes break down rock.
- Chemical weathering is when chemicals change the materials that make up a rock.
- Erosion is the movement of broken down rocks.
- All living things affect the physical characteristics of their environment.
- Rainfall impacts what an environment is like and what organisms live there.

By the end of this unit, students will be able to:

- Create a model of ice weathering a rock and relate it to weathering in nature.
- Create a model of water weathering a rock and relate it to weathering in nature.
- Create a model of erosion and relate it to erosion in nature.
- Create a model of weathering and erosion and relate it to weathering and erosion in nature.
- Identify chemical versus mechanical weathering.
- Distinguish weathering and erosion.
- Identify the affects of weathering and erosion in the environment around their school.

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of classwork/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class.

Quiz 1: Earth Systems

Lab 1: Ice Breaks Rocks

Lab 2: Water Weathers

Activity 1: Modeling Chemical Weathering

Lab 3: Chemical Weathering

Quiz 2: Weathering

Lab 4: Erosion

Lab 5: Weathering and Erosion

Quiz 3: Erosion

Activity 2: Earth's Systems Walk

Quiz 4: Biogeology

Unit Test

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| Essential Questions | Lessons | Suggested Activities |
|---|---|---|
| What is mechanical and chemical weathering and how does it affect the environment? | Earth's Systems<br>Mechanical Weathering<br>Chemical Weathering | Lab 1 Ice Breaks Rocks: Day 1<br><br>Lab 2 Water Weathers |
| | | Loops with Laurel (CS&DT Mandate) |
| What is erosion and how does it affect the environment? | Erosion | Lab 4 Erosion<br>Lab Questions<br><br>Lab 5 Weathering and Erosion;<br>Lab Questions & Conclusion Questions<br>Study for Quiz<br><br>Activity 2 Earth System's Walk |
| How do living things affect their environments? | Biogeology | |
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*The Chemical Weathering lab takes two class days to complete, but needs three days in between those class periods. The lab and activities can be switched around to best fit a teacher's schedule.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned. A guide is provided above.

**Unit 5 Lesson Plan – Energy and Natural Resources**

**NJCTL Document**

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|---|---|---|---|
| **Teacher:** | | **Time Frame:** | 17 Days |
| **Grade:** | **4** | **School:** | |
| **Subject:** | **PSI Elementary School Science** | | |

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| **NGSS/DCI**<br>**ESS3.A: Natural Resources**<br><br>**PS3.D: Energy in Chemical Processes and Everyday**<br><br>**ETS1.A: Defining Engineering Problems** | **Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. (4-ESS3-1)**<br><br>**The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. (4-PS3-4)**<br><br>**Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (secondary to 4-PS3-4)**<br><br>**http://www.nextgenscience.org/4e-energy** |
| **Instructional Objective:**<br>**4-ESS3-1**<br><br>**4-PS3-4** | **Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.**<br><br>**Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | ● **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| **NJSLS: Computer Science & Design Thinking** | |
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| **Essential Questions** | |

| **(What questions will the student be able to answer as a result of the instruction?)** | |
|---|---|
| 1. Where do humans derive energy from?<br>2. What does it mean to produce energy?<br>3. How can energy be converted from one form to another?<br>4. What is renewable energy?<br>5. What is non-renewable energy?<br>6. How does human energy use impact the environment? | |

| **Knowledge & Skills** | |
|---|---|
| **(What skills are needed to achieve the desired results?)** | |
| By the end of this unit, students will know:<br><br>● Humans use energy and fuels derived from natural sources.<br>● Producing energy refers to converting energy from one form to another so that it can be used for practical purposes.<br>● Devices must be designed, tested, and refined in order to convert energy.<br>● Renewable energy is energy that comes from a source that replenishes quickly and will not be used up before more is created.<br>● Non-renewable energy is energy that comes from a source that is very slow to replenish and can be used up.<br>● Human energy use has many impacts on the environment. | By the end of this unit, students will be able to:<br><br>● Build a device that converts energy from one form to another by following instructions.<br>● Design and build a simple device that converts energy from one form to another.<br>● Define a simple engineering problem related to constraints due to materials, cost, or time.<br>● Explain one energy type in depth, including where the energy is found, what it is used for, and how it impacts the environment.<br>● Analyze a combination of information they have collected about one type of energy. |

| **Assessment** |
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| **(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy** |
| During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of classwork/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class.<br><br>Quiz 1: Human Energy Use<br><br>Quiz 2: Renewable & Non-Renewable Energy<br><br>Activity 1: Solar Collector<br><br>Activity 2: Solar Sunflower |

Lab 1: Design an Energy Device

Quiz 3: Environmental Impacts

Research Project

Performance Based Assessment (optional)

Unit Test

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| **Essential Questions** | **Lessons** | **Suggested Activities** |
|---|---|---|
| Where do humans derive energy from? | Human Energy Use | Review Solar Collector Activity; Complete Before You Begin section<br><br>Solar Collector Activity; Activity Questions<br>Activity 2: Solar Sunflower<br>Lab 1: Design an Energy Device<br>Research Project (notes, sources, research) |
| What does it mean to produce energy? | Renewable Energy<br>Human Energy Use | |
| What is renewable energy? What is non-renewable energy? | Renewable and Nonrenewable energy | |
| How does human energy use impact the environment? | Environmental Impacts<br>Research Project | |
| | | Looking Ahead with Minecraft (CS&DT Mandate) |
| | | |

*While there are many slides for each topic, several slides are interrelated and support each topic.

**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned

| **Unit 6 Lesson Plan – Natural Hazards** | | | |
|---|---|---|---|
| **NJCTL Document** | | | |
| **Teacher:** | | **Time Frame:** | 21 Days |
| **Grade:** | **4** | **School:** | |
| **Subject:** | **PSI Elementary School Science** | | |

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| **NGSS/DCI**<br>**ESS3.B: Natural Hazards**<br><br>**ETS1.B: Designing Solutions to Engineering Problems** | **A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. (4-ESS3-2)**<br><br>**Testing a solution involves investigating how well it performs under a range of likely conditions. (secondary to 4-ESS3-2)** |
| **Instructional Objective:**<br>**4-ESS3-2** | **Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | ● **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| **NJSLS: Computer Science & Design Thinking** | |
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| **Essential Questions** | |
| **(What questions will the student be able to answer as a result of the instruction?)** | |
| 1. What is a natural hazard?<br>2. Can natural hazards be prevented?<br>3. How do earthquakes, volcanoes and tsunamis form?<br>4. How are earthquakes, volcanoes and tsunamis monitored?<br>5. How does earthquake engineering create earthquake resistant buildings? | |

| **Knowledge & Skills** |
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| **(What skills are needed to achieve the desired results?)** |

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● Natural hazards result from natural processes.<br>● Natural hazards cannot be prevented but their damage can be minimized.<br>● How plate tectonics lead to earthquakes, volcanoes and tsunamis.<br>● How scientists monitor and/or predict earthquakes, volcanoes and tsunamis.<br>● Building techniques that enable buildings to resist earthquake and tsunami damage. | ● Describe natural hazards.<br>● Explain how earthquakes, volcanoes and tsunamis form.<br>● Describe the tools used to monitor earthquakes.<br>● Explain how a seismograph works.<br>● Describe how seismic, gas and ground deformation monitoring helps scientists to monitor/predict volcanoes.<br>● Describe how the DART system enables scientists to detect potential tsunamis.<br>● Design an earthquake resistant building. |

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of classwork/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class.

Design Challenge: Seismograph

Quiz 1: Natural Hazards & Earthquakes

Demo: Hotspots

Lab: Tsunami

Quiz 2: Volcanoes & Tsunamis

Lab: Shake It Up

Design Challenge: Earthquake Resistant Building

Unit Test

Performance Based Assessment (optional)

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| Essential Questions | Lessons | Suggested Activities |
|---|---|---|
| What is a natural hazard? | Natural Hazards | Design Challenge: Seismograph<br><br>Demo: Hotspots<br><br>Lab: Tsunami<br>Begin Lab: Shake It Up<br>Design Challenge: Earthquake Resistant Building |
| How do earthquakes, volcanoes and tsunamis form? | Earthquakes<br>Volcanoes<br>Natural Hazards<br>Tsumanis | |

| | | |
|---|---|---|
| How does earthquake engineering create earthquake resistant buildings? | Minimizing Damage | |
| | | |

*While there are many slides for each topic, several slides are interrelated and support each topic.

**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned

# Grade 5 Overview

### Refer to District PMI Units for the Following:

### Materials

### Assessments

### Modifications

## CTL 5th Grade PSI Year Long Plan

| Unit 1: Matter and Its Interactions | Unit 2:Energy in Organisms |
|---|---|
| **PS1.A: Structure and Properties of Matter**<br>▪ Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model shows that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon; the effects of air on larger particles or objects. (5-PS1-1)<br>▪ The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)<br>▪ Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3)<br>**PS1.B: Chemical Reactions**<br>▪ When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)<br>▪ No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5-PS1-2) | **LS1.C: Organization for Matter and Energy Flow in Organisms**<br>▪ Plants acquire their material for growth chiefly from air and water. (5-LS1-1)<br>**PS3.D: Energy in Chemical Processes and Everyday Life**<br>▪ The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1)<br>**LS1.C: Organization for Matter and Energy Flow in Organisms**<br>▪ Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1) |
| **Unit 3: Ecosystem Dynamics** | **Unit 4: Earth's Systems** |
| **LS2.A: Interdependent Relationships in Ecosystems**<br>▪ The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, | **ESS2.A: Earth Materials and Systems**<br>▪ Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to |

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| break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)<br>**LS2.B: Cycles of Matter and Energy Transfer in Ecosystems**<br>▪ Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1) | affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)<br>**ESS2.C: The Roles of Water in Earth's Surface Processes**<br>▪ Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2) |
| **Unit 5: Human Impacts on Earth** | **Unit 6: Forces** |
| **ESS3.C: Human Impacts on Earth Systems**<br>▪ Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's | **PS2.B: Types of Interactions**<br>▪ The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1) |

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| **Unit 7: Earth and the Universe** | |
| **ESS1.A: The Universe and its Stars**<br>▪ The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)<br>**ESS1.B: Earth and the Solar System**<br>▪ The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2) | |

| **Unit Lesson Plan – Matter and Its Interactions** | | | |
|---|---|---|---|
| **NJCTL Document** | | | |
| **Teacher:** | | **Time Frame:** | 15 Days |
| **Grade:** | **5** | **School:** | |
| **Subject:** | **PSI Middle School Science** | | |

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| **NGSS/DCI**<br>**PS1.A: Structure and Properties of Matter** | **Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain** |

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| **PS1.B: Chemical Reactions** | **many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1)**<br><br>**The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)**<br><br>**Measurements of a variety of properties can be used to identify materials. (5-PS1-3)**<br><br>**When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)**<br><br>**No matter what reaction or change in properties occurs, the total weight of the substances does not change. (5-PS1-2)**<br>**http://www.nextgenscience.org/5ps1-matter-interactions** |
| **Instructional Objective: 5-PS1-1** | **Develop a model to describe that matter is made of particles too small to be seen.** |
| **Instructional Objective: 5-PS1-2** | **Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.** |
| **Instructional Objective: 5-PS1-3** | **Make observations and measurements to identify materials based on their properties.** |
| **Instructional Objective: 5-PS1-4** | **Conduct an investigation to determine whether the mixing of two or more substances results in new substances.** |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | ● **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| **NJSLS: Computer Science & Design Thinking** | |
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| **Essential Questions** | |
| **(What questions will the student be able to answer as a result of the instruction?)** | |

1. What is matter and what is it made of?
2. What happens to the mass of matter as goes through its different forms (solid, liquid, gas)?
3. What are the identifiable properties of a substance?
4. When two substances are mixed together, is something completely new and different always made?

## Knowledge & Skills

**(What skills are needed to achieve the desired results?)**

By the end of this unit, students will know:

- Matter is a term that applies to all of the stuff around us and it is made of particles that are too small to see.
- When substances are heated, cooled, or mixed the total weight before and after is always the same.
- Substances can be identified based on observable and measureable properties.
- Sometimes when two substances are mixed, each of the substances keeps its original properties and sometimes a new substance is formed.

By the end of this unit, students will be able to:

- Give an examples of what is matter
- Describe how gases are made from matter particles that are too small to be seen. (Ex: an inflated balloon)
- Measure and graph the weights of matter before and after being heated, cooled, or mixed.
- Identify materials based on various observable properties.
- Determine whether the mixing of two substances always results in the formation of new substances or not and provide examples.
- Identify the differences between soluble and insoluble solutions.

## Assessment

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class.
Lab 1: Mass of Air

Quiz 1: What is Matter?

Lab 2: Changing States of Matter

Quiz 2: Conservation of Mass

Lab 3: Describing Matter

Lab 4: Identifying Mystery Substances

Quiz 3: Observable Properties of Matter

Lab 5: Solutions

Lab 6: Conservation of Mass in Solutions

Optional Demonstration: Chemical Reaction Demonstration

Lab 7: Conservation of Mass in Chemical Reactions

Optional Quiz 4: Mixing Substances

Unit Test

| (What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)? | | |
|---|---|---|
| **Essential Questions** | **Lessons** | **Suggested Activities** |
| What is matter and what is it made of? | What is Matter?<br>Mass<br>Properties of…. | Lab 1: Mass of Air<br><br>Lab 2: Changing States of Matter<br><br>Lab 3 Describing Matter<br><br>Lab 4 Identifying Mystery Substances,<br><br>Lab 5 Solutions,<br><br>Lab 6 Conservation of Mass in Solutions<br>*Optional – Demonstration Chemical Reactions<br>Lab 7 Conservation of Mass in Chemical Reactions, |
| When two substances are mixed together, is something completely new and different always made? | Mixing Substances<br><br>Solutions<br><br>Conservation of Mass in Chemical Reactions | |
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*While there are many slides for each topic, several slides within the notebook are hidden and won't be used during instructional time.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned. A guide is provided above.

| **5th Grade, Unit 6 Lesson Plan – Forces** | | | |
|---|---|---|---|
| **NJCTL Document** | | | |
| **Teacher:** | | **Time Frame:** | 16 Days |
| **Grade:** | **5th** | **School:** | |
| **Subject:** | **PSI Science** | | |

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| **NGSS/DCI**<br><br>**5-PS2 Motion and Stability: Forces and Interactions** | **The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1)** |
| **Instructional Objective:**<br>**PS2.B:** | **Support an argument that the gravitational force exerted by Earth on objects is directed down.** |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems** |

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| | ● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | ● **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| **NJSLS: Computer Science & Design Thinking** | |
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**Essential Questions**

**(What questions will the student be able to answer as a result of the instruction?)**

- How is motion measured?
- How is speed calculated?
- What are contact forces (applied, frictional and normal)?
- What are non-contact forces?
- How do you know if forces are balanced or unbalanced?
- How do magnetic fields work?
- How do electrical fields work?
- How did scientists learn about gravitational force?
- When objects are dropped, which object will hit the ground first?
- How does increasing the distance between two objects change the force of gravity between those objects?
- How does changing the mass of two objects change the force of gravity between those objects?

**Knowledge & Skills**

**(What skills are needed to achieve the desired results?)**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● How motion and speed are measured and calculated<br>● The difference between contact and non-contact forces<br>● The forces that act on a falling object<br>● The history of our understanding of gravity<br>● The relationship between mass and distance and how they relate to the force of gravity<br>● An object's mass does not influence the force of Earth's gravity on it | ● Calculate speed, distance and time<br>● Differentiate between contact and non-contact forces<br>● Describe contact forces – applied, frictional and normal<br>● Describe non-contact forces – magnetic, electrical and gravitational<br>● Explain how the concept of gravity was observed throughout history<br>● Form hypotheses about the rate at which objects will fall when dropped |

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| | • Explain how mass and distance relate to the strength of gravity |

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Lab: Electric Field Hockey

Quiz 1: Motion & Forces

Lab: Race to the Bottom

Lab: Gravity Simulation

Quiz 2: Gravity

Unit Test

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| Essential Questions | Lessons | Suggested Activities |
|---|---|---|
| How is motion measured? How is speed calculated? | Motion | Lab: Electric Field Hockey<br>Lab: Race to the Bottom<br>Gravity Simulation |
| What are contact forces (applied, frictional and normal)? What are non-contact forces? | Forces | |
| How did scientists learn about gravitational force? | Gravity | |
| | | |

*While there are many slides for each topic, several slides within the notebook are hidden and won't be used during instructional time.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.

| Unit Lesson Plan – Energy in Organisms | | | |
|---|---|---|---|
| NJCTL Document | | | |
| **Teacher:** | | **Time Frame:** | **13 days** |
| **Grade:** | **5** | **School:** | |
| **Subject:** | **Science** | | |

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| **NGSS DCI**<br>**PS3.D: Energy in Chemical Processes and Everyday Life**<br><br>**LS2.C: Organization for Matter and energy Flow in Organisms** | **The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1)**<br><br>**Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1)**<br><br>**Plants acquire their material for growth chiefly from air and water. (5-LS1-1)**<br><br>http://www.nextgenscience.org/5ps3-energy<br>http://www.nextgenscience.org/5ls1-molecules-organisms-structures-processes |
| **Instructional Objective:**<br>**5-PS3-1** | **Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. [Clarification Statement: Examples of models could include diagrams, and flow charts.]** |
| **Instructional Objective:**<br>**5-LS1-1** | **Support an argument that plants get the materials they need for growth chiefly from air and water. [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]** |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>**.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | ● **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| NJSLS: Computer Science & Design Thinking | |
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**Essential Questions**

**(What questions will the student be able to answer as a result of the instruction?)**

1. What is the flow of energy?
2. What does the sun contribute to the energy cycle?
3. How is the sun's energy made usable?
4. Where do plants get the materials they need for growth and development?
5. What is photosynthesis?
6. What happens to food once it is consumed?
7. Where did the energy in food come from?
8. How do animals use the energy they get from food?

**Knowledge & Skills**

**(What skills are needed to achieve the desired results?)**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● The sun is the primary source of energy for both plants and animals.<br>● Plants get the materials they need for growth from the air and water<br>● Food that animals consume provides energy for body growth, body repair, motion, and warmth.<br>● The process of photosynthesis is a chemical process that converts the energy of the sun into food for plants and animals. | ● Describe/chart the flow of energy from the sun, through plants, and animals.<br>● Explain that without the sun's energy animal growth, and body repair would not be possible.<br>● Identify the properties of the sun and how they affect both plants and animals.<br>● Explain how plants convert energy from the sun into food for plants and animals. |

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class.

Lab activity 1: Examining Plant Growth

Quiz 1: Energy use in Animals

Lab activity 2:Pigments in Plants

Quiz 2: Energy in Plants

Lab Activity 3: Photosynthesis & Cellular Respiration

Quiz 3: Energy Flow

Unit Test: Energy in Organisms

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| Essential Questions | Lessons | Suggested Activities | |
|---|---|---|---|
| What is the flow of energy? | Energy Use in Animals & Plants<br>Energy Flow | Lab 1<br><br>Lab 2<br>Lab 3 | |
| What is photosynthesis? | Photosynthesis | | |
| | | | |

*While there are many slides for each topic, several slides within the notebook are hidden and won't be used during instructional time.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.
***Pacing guide is based on 40minute class periods, you may need to adjust based on your school's schedule.

| Unit Lesson Plan – Ecosystem Dynamics | | | |
|---|---|---|---|
| NJCTL Document | | | |
| **Teacher:** | | **Time Frame:** | 14 days |
| **Grade:** | **5th Grade** | **School:** | |
| **Subject:** | **PSI Middle School Science** | | |
| **NGSS/DCI**<br><br>**5-LS2.A: Interdependent Relationships in Ecosystems** | **The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)**<br><br>http://www.nextgenscience.org/5ls2-ecosystems-interactions-energy-dynamics | | |
| **5-LS2.B: Cycles of Matter and Energy Transfer in Ecosystems** | **Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)** | | |
| **Instructional Objective: 5-LS2-1** | **Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.** | | |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** | | |

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| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | ● **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| **NJSLS: Computer Science & Design Thinking** | |
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**Essential Questions**

**(What questions will the student be able to answer as a result of the instruction?)**

1. How can a food web be used to help observe interactions between organisms in an environment?
2. What are the roles of producers, consumers and decomposers and the Sun in an ecosystem?
3. How is matter transferred through an ecosystem?
4. How can an organism maintain its population in an ecosystem? What factors can threaten a species?

**Knowledge & Skills**

**(What skills are needed to achieve the desired results?)**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● All food webs rely on the sun for its energy source and producers to create their own food.<br>● Energy and mass are transferred from one organism to the next as it is eaten.<br>● Decomposers take dead material and recycle it back into usable material.<br>● Ecosystems are very fragile and require a perfect balance of predator and prey. | ● Create a food web.<br>● Explain the importance of producers, consumers and decomposers in an ecosystem.<br>● Observe and analyze factors that aid decomposition.<br>● Describe the flow of energy and mass through a food web.<br>● Make conclusions about an ecosystem's chances for survival based on factors such as overpopulation or overhunting. |

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Class work and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Activity 1: Build a Food Web

Quiz 1: Food Webs

Creating a Compost Bin Activity (Optional)

Lab: Decomposition

Quiz 2: Cycles of Matter Quiz

Unit Test

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| Essential Questions | Lessons | Suggested Activities | |
|---|---|---|---|
| How can a food web be used to help observe interactions between organisms in an environment? | Food Webs<br>Building a Food Web | Build the Food Web Activity<br>Decomposition Lab<br>Magic School Bus Activity; | |
| What are the roles of producers, consumers and decomposers and the Sun in an ecosystem? | Decomposers | | |
| How is matter transferred through an ecosystem? | Cycles of Matter | | |
| How can an organism maintain its population in an ecosystem? What factors can threaten a species? | Cycles of Matter<br>Maintaining an Ecosystem<br>Cane Toads in Australia | | |

**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.
***Pacing guides are based on 40minute periods, you may need to adapt based on your school's schedule.

| **Unit Lesson Plan – Earth's Systems** | | | |
|---|---|---|---|
| **NJCTL Document** | | | |
| **Teacher:** | | **Time Frame:** | 16 days |
| **Grade:** | **5** | **School:** | |
| **Subject:** | **PSI Middle School Science** | | |

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| **NGSS/DCI**<br><br>**5-ESS2-A: Earth Materials and Systems** | **Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans).**<br><br>**These systems interact in multiple ways to affect Earth's surface** |

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| **5-ESS2.C: The Roles of Water in Earth's Surface Processes** | **materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)**<br><br>**Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)**<br><br>http://www.nextgenscience.org/5ess2-earth-systems |
| **Instructional Objective: 5-ESS2-1:** | **Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.** |
| **Instructional Objective: 5-ESS2-2:** | **Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.** |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | ● **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| **NJSLS: Computer Science & Design Thinking** | |
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**Essential Questions**

**(What questions will the student be able to answer as a result of the instruction?)**

1. What are the four major systems that make up our Earth and how do they interact?
2. What are the four layers of the Earth and what are the characteristics of each?
3. What are the components of our atmosphere and how is the atmosphere affected by animals and plants?
4. Where is the water on Earth located? How much of this water is usable by humans?
5. What effect does ocean water have on the nearby land?

**Knowledge & Skills**

**(What skills are needed to achieve the desired results?)**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● Earth is a nonliving object that is made up of four major systems.<br>● The Earth's geosphere is composed of four distinct layers.<br>● Animals and plants rely on each other to create the gases needed for survival.<br>● The ozone layer protects us from the Earth's harmful UV rays.<br>● The vast majority of water on Earth is salt water and unusable. Most of the water that is usable is trapped in glaciers.<br>● Areas that are near water will have milder climate changes because the ocean will slowly absorb and release heat. | ● Explain the four major systems of the Earth.<br>● Differentiate between the different layers of the Earth based on distinct characteristics.<br>● Explain the relationship between plants and animals when it comes to the production of oxygen and carbon dioxide.<br>● Describe how life on Earth would be different if the ozone layer continues to be depleted.<br>● Interpret and create graphs that represent the location of both salt and fresh water on Earth.<br>● Analyze lab results that suggest that areas near water will see milder temperature fluctuations than areas that are further inland. |

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class.

Quiz 1 – Geosphere
Quiz 2 – Atmosphere
Activity – Graphing Water
Lab – Water's Effect on the Environment
Quiz 3 – Hydrosphere
Activity – Sphere Interactions
Quiz 4 - Biosphere
Unit Test

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| **Essential Questions** | **Lessons** | **Suggested Activities** |
|---|---|---|
| What are the four major systems that make up our Earth and how do they interact? | Geosphere<br>Atmosphere<br>Hydrosphere<br>Biosphere | Begin Activity – Graphing Water<br><br>Lab: Water's Effect on the Environment<br><br>Activity – Sphere Interactions |

*While there are many slides for each topic, several slides within the notebook are hidden and won't be used during instructional time.
**HW Problems are currently not scaffolded from least to most difficult, but are instead listed in order of topic. Teacher should pay special attention at the end of each class period when assigning HW so that only problems related to the topic that was taught are being assigned.
***Pacing guide is based on 40 minute class periods, you may need to adjust based on your school's schedule.

| Unit Lesson Plan – Human Impacts on Earth | | | |
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| **Teacher:** | | **Time Frame:** | 23 days |
| **Grade:** | **5th** | **School:** | |
| **Subject:** | **PSI Science** | | |

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| **NGSS/DCI**<br>**ESS3.C: Human Impacts on Earth Systems** | **Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)**<br><br>**http://www.nextgenscience.org/5ess3-earth-human-activity** |
| **Instructional Objective:**<br>**5-ESS3-1** | **Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.** |

| **NJSLS: Computer Science & Design Thinking** | |
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**Essential Questions**

**(What questions will the student be able to answer as a result of the instruction?)**

1. What impacts, both positive and negative, do humans have on the Earth?
2. What is Global Change?
3. How can humans reduce their impacts on Earth?

**Knowledge & Skills**

**(What skills are needed to achieve the desired results?)**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● How humans negatively impact Earth systems.<br>● How humans positively impact Earth systems.<br>● The impacts of human activities and consumption of natural resources | ● Describe humans' impact on Earth systems<br>● Explain the impact that increasing human populations have on natural resources.<br>● Identify changes humans can make to lessen their impact on the Earth's systems. |

**Assessment**

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class and misconceptions will be addressed by the teacher prior to the formal evaluations listed below.

Activity: Anthropocene Timeline

Activity: Ecological Footprint

Quiz 1: Human Impacts & Importance of the Environment

Activity: Carrying Capacity

Activity: Water Pollution

Lab: Greenhouse Effect

Activity: Biosphere

Quiz 2: Negative Impacts

Activity: Upcycling

Lab: Recycling

Quiz 3: Positive Impacts & Methods of Reduction

Unit Test

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| Essential Questions | Lessons | Suggested Activities |
|---|---|---|
| What impacts, both positive and negative, do humans have on the Earth? | Humans Impact on Earth | Anthropocene Timeline<br>Ecological Footprint Worksheet<br>Ecological Footprint Activity<br>Finish Ecological Footprint Activity;<br>Carrying Capacity Activity<br>Water Pollution Activity<br>Greenhouse Effect Lab<br>Biodiversity Activity<br>Upcycling Activity<br>Recycling Lab |
| What is Global Change? How can humans reduce their impacts on Earth? | Ecological Footprints<br>Negative Human Impacts<br>Negative Human Impacts: Land and Water | |
| | Biosphere | |
| How can humans reduce their impacts on Earth? | Positive Human Impacts | |

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**Unit Lesson Plan – Earth and the Universe**

**NJCTL Document**

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| **Teacher:** | | **Time Frame:** | 16 days |
| **Grade:** | **5** | **School:** | |
| **Subject:** | **Science** | | |

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| **NGSS/DCI:**<br><br>**ESS1.A: The Universe and its Stars**<br><br>**ESS1.B: Earth and the Solar System** | The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth. (5-ESS1-1)<br><br>The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. These include day and night; daily changes in the length and direction of shadows; and different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2) |
| **Instructional Objective: 5-ESS1-1** | Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth. |
| **Instructional Objective: 5-ESS1-2** | Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky. |
| **3-5-ETS1-1** | **Defining and Delimiting Engineering Problems**<br>● **Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.** |
| **3-5-ETS1-2** | **Developing Possible Solutions**<br>● **Research on a problem, such as climate change, should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.**<br>● **At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.** |
| **3-5-ETS1-3** | ● **Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.** |

| **NJSLS: Computer Science & Design Thinking** | |
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| **Essential Questions** | |
| **(What questions will the student be able to answer as a result of the instruction?)** | |

1. How does relative distance affect the brightness of a star?
2. What causes night and day?
3. Why are some constellations only visible during certain times of the year?
4. Why do shadows appear larger at certain times of the day, and shorter at other times?

## Knowledge & Skills

**(What skills are needed to achieve the desired results?)**

| By the end of this unit, students will know: | By the end of this unit, students will be able to: |
|---|---|
| ● That a star's distance from Earth affects how bright it appears to be.<br>● That the length of shadows decrease during the day until they reach a certain point, then the shadows gradual start to get larger.<br>● That the rotation of Earth causes night and day.<br>● That the path of the sun changes from month to month.<br>● That the location of constellations change due to the rotation and revolution of Earth. | ● Create an argument that relative brightness of the Sun compared to other stars is a function of the distance to those stars.<br>● Explain how day turns into night<br>● Explain why the sun casts different sized shadows.<br>● Explain that the location of constellation in the night sky appear in different locations due to the rotation and revolution of Earth. |

## Assessment

**(What is acceptable evidence to show desired results (rubrics, exam, etc.)? Attach Copy**

During the Smart Notebook lesson designed to introduce concepts, students will be continually questioned on these concepts using a combination of class work/homework questions and the SMART Response system. Classwork and Homework questions will be discussed as a class.

Lab 1: Luminosity

Activity 1: Galaxy Sorting

Activity 2: Light-Years

Quiz 1: The Universe and the Sun

Lab 2: Observing Shadows

Activity 3: Hide-and-Seek Stars

Activity 4: Big Dipper Clock

Quiz 2: Earth and Observable Patterns

Unit Test

**(What is the sequence of activities, learning experiences, etc, that will lead to desired results (the plan)?**

| Essential Questions | Lessons | Suggested Activities |
|---|---|---|

| | | |
|---|---|---|
| How does relative distance affect the brightness of a star?<br>What causes night and day? | The Universe<br>The Sun<br>The Earth | Activity: Galaxy Sorting<br>Activity Analysis<br>Lab 1: Luminosity<br>Activity: Light-Years<br>Lab 2: Observing Shadows<br>Hide-and-Seek Stars Activity<br>Activity: Big Dipper Clock |
| Why are some constellations only visible during certain times of the year? | Observable Patterns | |
| | | |

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***Lessons are based on 40minute periods and may need to be adjusted to fit the schedule of your school.