

**Califon Public School
Curriculum**



Subject: Science	Grade: 4th	Unit #: 1	Pacing: 10 days
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Unit Title: Erosion

OVERVIEW OF UNIT:

In this unit of study, students develop understandings of the effects of weathering and the rate of erosion by water, ice, wind, or vegetation. The crosscutting concepts of patterns and cause and effect are called out as organizing concepts. Students demonstrate grade-appropriate proficiency in planning and carrying out investigations and constructing explanations. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Big Ideas

- Cause-and-effect relationships are routinely identified, tested, and used to explain change.
- Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.
- Rainfall helps to shape the land and affects the types of living things found in a region.
- Living things affect the physical characteristics of their regions
- Science assumes consistent patterns in natural systems.
- Patterns can be used as evidence to support an explanation.
- 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.

Essential Questions

- What do the shapes of landforms and rock formations tell us about the past?
- How can evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation be observed or measured?
- What can rock formations tell us about the past?

Objectives

- Students will be able to explain what the shapes of landforms and rock formations tell us about the past.
- Students will be able to identify how to observe and measure the evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

Assessment

Formative Assessment:

- Labs

Benchmark:

- Unit Assessments

● Claim-Evidence- Reasoning ● Class Discussions	Alternative: ● Performance Assessments ● Projects ● Models ● Modified Tests Independently Developed by Teacher
Summative Assessment: ● Multiple Choice Assessment ● Open Ended Response ● Claim-Evidence- Reasoning	

Key Vocabulary

Weathering, Erosion, Fossil, Deposition, Water Cycle, Seasonal Cycle, Gravity, Sediment, Formation,

Resources & Materials

- STEMscopes
- [Glaciers, Water, and Wind, Oh My!](#)
- [Bill Nye Video-Erosion](#)
- [Gary's Sand Journal](#)
- [Explaining Glaciers, Accurately](#)

Technology Infusion

Teacher Technology:

- Chromebooks
- Stemsopes website
- Promethean Board

Student Technology:

- Chromebooks
- Stemsopes website

Activities:

- Students will use Chromebooks to access the Stemsopes website to: activate prior knowledge, build schema, watch videos, complete labs, take assessments and collect data.

Standard	Standard Description
8.1.5.DA.1	Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.5	Propose cause-and-effect relationships, predict outcomes, or communicate ideas using data.

Interdisciplinary Integration

Activities:

- Students will read informational text for knowledge and understanding.
- Students will synthesize and present new learning in oral, written and/or visual projects and/or presentations.

Resources:

- Teacher Vision Cross-Curricular Theme Map - <https://www.teachervision.com/teaching-methods/curriculum-planning/7167.html>
- Engineering Go For It! - <http://egfi-k12.org/>
- US Department of Education STEM - <http://www.ed.gov/stem>
- Intel STEM Resource - <http://www.intel.com/content/www/us/en/education/k12/stem.html>
- NASA STEM - <http://www.nasa.gov/audience/foreducators/expeditions/stem/#.VYrO2flViko>
- PBS STEM - <http://www.pbs.org/teachers/stem/#content>
- STEM Works - <http://stem-works.com/activities>
- [What Every Educator Should Know About Using Google](#) by Shell Education
- Promoting Literacy in all Subjects by Glencoe - http://www.glencoe.com/sec/teachingtoday/subject/promoting_literacy.phtml
- International Literacy Association Read Write Think - <http://www.readwritethink.org/>

Standard	Standard Description
NJSLS-ELA L.RF.4.4	Read with sufficient accuracy and fluency to support comprehension.
NJSLS-ELA W.IW.4.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
NJSLS-ELA W.WR.4.5	Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic.
NJSLS-ELA W.SE.4.6	Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources.
NJSLS-ELA W.RW.4.7	Write routinely over extended time frames (with time for research and revision) and shorter time frames (a single sitting) for a range of tasks, purposes, and audiences.
NJSLS-ELA SL.PI.4.4	Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

21st Century Life Skills Standards

Activities:

- Students will work both individually and in collaborative groups to research, collect and organize data, at times taking leadership roles to communicate project ideas and new learning to the whole class.

Standard	Student Learning Objectives
9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
9.4.5.CI.1	Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3, 7.1.NM.IPERS.6).
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).

Careers	
Activities: Create models and test variables that affect erosion.	
Practice	Description
Demonstrate creativity and innovation.	Students regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
Utilize critical thinking to make sense of problems and persevere in solving them.	Students readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of the problem and carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through this when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. Their own actions or the actions of others.
Work productively in teams while using cultural/global competence.	Students positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Standards			
Standard #	Standard Description	Student Learning Objective	Clarification Statement
4-ESS1-1	Earth's Place in the Universe	Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.	Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.] [Assessment Boundary: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers.

			Assessment is limited to relative time.]
4-ESS2-1	Earth's Systems	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.	Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]

Differentiation

Students with 504 plans

- Preferential seating
- Guided notes
- Extra time
- Teacher check-ins
- Use graphic organizers
- Redirect attention
- Prioritize tasks
- Small group testing
- Provide modifications & accommodations per individual student's 504 plan

Special Education

- Provide modifications & accommodations as listed in the student's IEP
- Position the student near a helping peer or have quick access to the teacher
- Modify or reduce assignments/tasks
- Reduce the length of the assignment for different modes of delivery
- Increase one-to-one time
- Prioritize tasks
- Use graphic organizers
- Use online resources for skill-building
- Provide teacher notes
- Use collaborative grouping strategies, such as small groups
- NJDOE resources - <http://www.state.nj.us/education/specialed/>

Response to Intervention (RTI)

- Tiered interventions following the RTI framework
- Effective RTI strategies for teachers - <http://www.specialeducationguide.com/pre-k-12/response-to-intervention/effective-rti-strategies-for-teachers/>
- Intervention Central - <http://www.interventioncentral.org/>

English Language Learners (ELL)

- Provide text-to-speech
- Use of a translation dictionary or software
- Provide graphic organizers
- NJDOE resources - <http://www.state.nj.us/education/aps/cccs/ELL.htm>

- Adapt a Strategy – Adjusting strategies for ESL students -
<http://www.teachersfirst.com/content/esl/adaptstrat.cfm>

Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
- Utilize project-based learning for greater depth of knowledge
- Utilize exploratory connections to higher-grade concepts
- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
- NJDOE resources

**Califon Public School
Curriculum**

Subject: Science	Grade: 4th	Unit #: 2	Pacing: 10 days
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Unit Title: Earth Processes**OVERVIEW OF UNIT:**

In this unit of study, students apply their knowledge of natural Earth processes to generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. In order to describe patterns of Earth's features, students analyze and interpret data from maps. The crosscutting concepts of patterns, cause and effect, and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations, analyzing and interpreting data, and constructing explanations and designing solutions. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Big Ideas

- Patterns can be used as evidence to support an explanation.
- Maps can help locate the different land and water features of Earth.
- 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.
- Cause-and-effect relationships are routinely identified, tested, and used to explain change.
- Engineers improve existing technologies or develop new ones to increase benefits, decrease known risks, and meet societal demands.
- A variety of hazards result from natural processes (e.g., earthquakes, floods, tsunamis, volcanic eruptions).
- Humans cannot eliminate the hazards, but they can take steps to reduce their impacts.
- Research on a problem should be carried out before beginning to design a solution.
- Testing a solution involves investigating how well it performs under a range of likely conditions.
- At whatever stage, communicating with peers about proposed solutions to a problem is an important part of the design process, and shared ideas can lead to improved designs.
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.
- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

- 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.

Essential Questions

- Is it possible to engineer ways to protect humans from natural Earth processes?
- What can maps tell us about the features of the world?
- In what ways can the impacts of natural Earth processes on humans be reduced?

Objectives

- Students will be able to evaluate if it is possible to engineer ways to protect humans from natural Earth.
- Students will be able to describe what maps tell us about the features of the world.
- Students will be able to identify and evaluate ways can the impacts of natural Earth processes on humans be reduced.

Assessment

Formative Assessment:

- Labs
- Claim-Evidence- Reasoning
- Class Discussions

Summative Assessment:

- Multiple Choice Assessment
- Open Ended Response
- Claim-Evidence- Reasoning

Benchmark:

- Unit Assessments

Alternative:

- Performance Assessments
- Projects
- Models
- Modified Tests Independently Developed by Teacher

Key Vocabulary

Topographic map, Earthquake, volcano, continental boundary, tsunami, flood, trench

Resources & Materials

- STEMscopes

Technology Infusion

Teacher Technology:

- Chromebooks
- Stemscopes website
- Promethean Board

Student Technology:

- Chromebooks
- Stemscopes website

Activities:

- Students will use Chromebooks to access the Stemsopes website to: activate prior knowledge, build schema, watch videos, complete labs, take assessments and collect data.

Standard	Standard Description
8.1.5.DA.1	Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.5	Propose cause-and-effect relationships, predict outcomes, or communicate ideas using data.

Interdisciplinary Integration**Activities:**

- Students will read informational text for knowledge and understanding.
- Students will synthesize and present new learning in oral, written and/or visual projects and/or presentations.

Resources:

- Teacher Vision Cross-Curricular Theme Map - <https://www.teachervision.com/teaching-methods/curriculum-planning/7167.html>
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- STEM Works - <http://stem-works.com/activities>
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21st Century Life Skills Standards**Activities:**

- Students will work both individually and in collaborative groups to research, collect and organize data, at times taking leadership roles to communicate project ideas and new learning to the whole class.

Standard	Student Learning Objectives
9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
9.4.5.CI.1	Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3, 7.1.NM.IPERS.6).
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).

Careers

Activities:

- Students will research regarding Earth's natural processes and create a PSA including causes, effects, measurement scales, and safety tips for each process.

Practice	Description
Demonstrate creativity and innovation.	Students regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
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Work productively in teams while using cultural/global competence.	Students positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Standards

Standard #	Standard Description	Student Learning Objective	Clarification Statement
4-ESS2-2	Earth's Systems	Analyze and interpret data from maps to describe patterns of Earth's features.	Maps can include topographic maps of Earth's land and ocean floor, as well

			as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]
4-ESS3-2	Earth and Human Activity	Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.	Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.] [Assessment Boundary: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.]
3-5-ETS1-2	Engineering Design	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	
3-5-ETS1-3	Engineering Design	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	

Differentiation
Students with 504 plans
• Preferential seating • Guided notes • Extra time • Teacher check-ins • Use graphic organizers • Redirect attention • Prioritize tasks • Small group testing • Provide modifications & accommodations per individual student's 504 plan
Special Education
• Provide modifications & accommodations as listed in the student's IEP • Position the student near a helping peer or have quick access to the teacher • Modify or reduce assignments/tasks

- Reduce the length of the assignment for different modes of delivery
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English Language Learners (ELL)

- Provide text-to-speech
- Use of a translation dictionary or software
- Provide graphic organizers
- NJDOE resources - <http://www.state.nj.us/education/aps/cccs/ELL.htm>
- Adapt a Strategy – Adjusting strategies for ESL students - <http://www.teachersfirst.com/content/esl/adaptstrat.cfm>

Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
- Utilize project-based learning for greater depth of knowledge
- Utilize exploratory connections to higher-grade concepts
- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
- NJDOE resources

**Califon Public School
Curriculum**



Subject: Science	Grade: 4th	Unit #: 3	Pacing: 15 days
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Unit Title: Structure and Function

OVERVIEW OF UNIT:

In this unit of study, students develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. The crosscutting concepts of systems and system models are called out as organizing concepts for this disciplinary core idea. Students are expected to demonstrate grade-appropriate proficiency in engaging in argument from evidence. Students are also expected to use this practice to demonstrate an understanding of the core idea.

Big Ideas

- A system can be described in terms of its components and their interactions.
- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

Essential Questions

- How do the internal and external parts of plants and animals support their survival, growth, behavior, and reproduction?

Objectives

- Students will be able to analyze how the internal and external parts of plants and animals support their survival, growth, behavior, and reproduction.

Assessment

Formative Assessment:

- Labs
- Claim-Evidence- Reasoning
- Class Discussions

Summative Assessment:

- Multiple Choice Assessment
- Open Ended Response
- Claim-Evidence- Reasoning

Benchmark:

- Unit Assessments

Alternative:

- Performance Assessments
- Projects
- Models
- Modified Tests Independently Developed by Teacher

Key Vocabulary

Body system, homeostasis ,reproduction, life cycle

Resources & Materials

- [Animal Mouth Structures](#)
- Human Body project & rubric
- Egg Incubation and monitoring

Technology Infusion

Teacher Technology:

- Chromebooks
- Stemsscopes website
- Promethean Board

Student Technology:

- Chromebooks
- Stemsscopes website

Activities:

- Students will use Chromebooks to access the Stemsscopes website to: activate prior knowledge, build schema, watch videos, complete labs, take assessments and collect data.

Standard	Standard Description
8.1.5.DA.1	Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.5	Propose cause-and-effect relationships, predict outcomes, or communicate ideas using data.

Interdisciplinary Integration

Activities:

- Students will read informational text for knowledge and understanding.
- Students will synthesize and present new learning in oral, written and/or visual projects and/or presentations.

Resources:

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21st Century Life Skills Standards

Activities:

- Students will work both individually and in collaborative groups to research, collect and organize data, at times taking leadership roles to communicate project ideas and new learning to the whole class.

Standard	Student Learning Objectives
9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
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9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).

Careers

Activities:

- Students will incubate and hatch chicken eggs.

Practice	Description
Demonstrate creativity and innovation.	Students regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
Utilize critical thinking to make sense of	Students readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of the problem and carefully consider the options to solve the problem. Once a solution is

problems and persevere in solving them.	agreed upon, they follow through to ensure the problem is solved, whether through this when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. Their own actions or the actions of others.
Work productively in teams while using cultural/global competence.	Students positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Standards			
Standard #	Standard Description	Student Learning Objective	Clarification Statement
4-LS1-1	From Molecules to Organisms: Structures and Processes	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

Differentiation
Students with 504 plans
• Preferential seating • Guided notes • Extra time • Teacher check-ins • Use graphic organizers • Redirect attention • Prioritize tasks • Small group testing • Provide modifications & accommodations per individual student's 504 plan
Special Education
• Provide modifications & accommodations as listed in the student's IEP • Position the student near a helping peer or have quick access to the teacher • Modify or reduce assignments/tasks • Reduce the length of the assignment for different modes of delivery • Increase one-to-one time • Prioritize tasks • Use graphic organizers • Use online resources for skill-building • Provide teacher notes • Use collaborative grouping strategies, such as small groups

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Response to Intervention (RTI)

- Tiered interventions following the RTI framework
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- Intervention Central - <http://www.interventioncentral.org/>

English Language Learners (ELL)

- Provide text-to-speech
- Use of a translation dictionary or software
- Provide graphic organizers
- NJDOE resources - <http://www.state.nj.us/education/aps/cccs/ELL.htm>
- Adapt a Strategy – Adjusting strategies for ESL students - <http://www.teachersfirst.com/content/esl/adaptstrat.cfm>

Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
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- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
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- NJDOE resources

**Califon Public School
Curriculum**



Subject: Science	Grade: 4th	Unit #: 4	Pacing: 10 days
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Unit Title: How Organisms Process Information

OVERVIEW OF UNIT:

In this unit of study, students are expected to develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. By developing a model, they describe that an object can be seen when light reflected from its surface enters the eye. The crosscutting concepts of cause and effect, systems and system models, and structure and function are called out as organizing concepts for these disciplinary core ideas.

Big Ideas

- A system can be described in terms of its components and its interactions.
- 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.
- Cause-and-effect relationships are routinely identified.
- An object can be seen when light reflected from its surface enters the eyes.

Essential Questions

- How do animals use their perceptions and memories to make decisions?
- How do animals receive and process different types of information from their environment in order to respond appropriately?
- What happens when light from an object enters the eye?

Objectives

- Students will be able to describe how animals use their perceptions and memories to make decisions.
- Students will be able to detail how animals receive and process different types of information from their environment in order to respond appropriately.
- Students will be able to describe what happens when light from an object enters the eye.
- Students will use a model to test interactions concerning the functioning of a natural system.

Assessment

Formative Assessment:

- Labs
- Claim-Evidence- Reasoning
- Class Discussions

Benchmark:

- Unit Assessments

Alternative:

- Performance Assessments

Summative Assessment:

- Multiple Choice Assessment
- Open Ended Response
- Claim-Evidence- Reasoning
- Projects
- Models
- Modified Tests Independently Developed by Teacher

Key Vocabulary

Brain processes, structure, function, reflection, refraction, receptors,

Resources & Materials

- [Pinhole Cameras and Eyes](#)
- [The Life of Environments](#)
- [Time to Think?](#)
- [Catch It!](#)

Technology Infusion**Teacher Technology:**

- Chromebooks
- Stemsscopes website
- Promethean Board

Student Technology:

- Chromebooks
- Stemsscopes website

Activities:

- Students will use Chromebooks to access the Stemsscopes website to: activate prior knowledge, build schema, watch videos, complete labs, take assessments and collect data.

Standard	Standard Description
8.1.5.DA.1	Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.5	Propose cause-and-effect relationships, predict outcomes, or communicate ideas using data.

Interdisciplinary Integration**Activities:**

- Students will read informational text for knowledge and understanding.
- Students will synthesize and present new learning in oral, written and/or visual projects and/or presentations.

Resources:

- Teacher Vision Cross-Curricular Theme Map - <https://www.teachervision.com/teaching-methods/curriculum-planning/7167.html>
- Engineering Go For It! - <http://egfi-k12.org/>

- US Department of Education STEM - <http://www.ed.gov/stem>
- Intel STEM Resource - <http://www.intel.com/content/www/us/en/education/k12/stem.html>
- NASA STEM - <http://www.nasa.gov/audience/foreducators/expeditions/stem/#.VYrO2flViko>
- PBS STEM - <http://www.pbs.org/teachers/stem/#content>
- STEM Works - <http://stem-works.com/activities>
- What Every Educator Should Know About Using Google by Shell Education
- Promoting Literacy in all Subjects by Glencoe - http://www.glencoe.com/sec/teachingtoday/subject/promoting_literacy.phtml
- International Literacy Association Read Write Think - <http://www.readwritethink.org/>

Standard	Standard Description
NJSLS-ELA L.RF.4.4	Read with sufficient accuracy and fluency to support comprehension.
NJSLS-ELA W.IW.4.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
NJSLS-ELA W.WR.4.5	Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic.
NJSLS-ELA W.SE.4.6	Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources.
NJSLS-ELA W.RW.4.7	Write routinely over extended time frames (with time for research and revision) and shorter time frames (a single sitting) for a range of tasks, purposes, and audiences.
NJSLS-ELA SL.PI.4.4	Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

21st Century Life Skills Standards

Activities:

- Students will work both individually and in collaborative groups to research, collect and organize data, at times taking leadership roles to communicate project ideas and new learning to the whole class.

Standard	Student Learning Objectives
9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
9.4.5.CI.1	Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3, 7.1.NM.IPERS.6).
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).

Careers

Activities:

- Students will create a visual representation of the human body systems, demonstrating how they work individually and interconnectedly.

Practice	Description
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Demonstrate creativity and innovation.	Students regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
Utilize critical thinking to make sense of problems and persevere in solving them.	Students readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of the problem and carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through this when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. Their own actions or the actions of others.
Work productively in teams while using cultural/global competence.	Students positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Standards			
Standard #	Standard Description	Student Learning Objective	Clarification Statement
4-LS1-2	From Molecules to Organisms: Structures and Processes	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.	Emphasis is on systems of information transfer.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]

Differentiation
Students with 504 plans
• Preferential seating • Guided notes • Extra time • Teacher check-ins • Use graphic organizers • Redirect attention • Prioritize tasks • Small group testing • Provide modifications & accommodations per individual student's 504 plan
Special Education

- Provide modifications & accommodations as listed in the student's IEP
- Position the student near a helping peer or have quick access to the teacher
- Modify or reduce assignments/tasks
- Reduce the length of the assignment for different modes of delivery
- Increase one-to-one time
- Prioritize tasks
- Use graphic organizers
- Use online resources for skill-building
- Provide teacher notes
- Use collaborative grouping strategies, such as small groups
- NJDOE resources - <http://www.state.nj.us/education/specialed/>

Response to Intervention (RTI)

- Tiered interventions following the RTI framework
- Effective RTI strategies for teachers - <http://www.specialeducationguide.com/pre-k-12/response-to-intervention/effective-rti-strategies-for-teachers/>
- Intervention Central - <http://www.interventioncentral.org/>

English Language Learners (ELL)

- Provide text-to-speech
- Use of a translation dictionary or software
- Provide graphic organizers
- NJDOE resources - <http://www.state.nj.us/education/aps/cccs/ELL.htm>
- Adapt a Strategy – Adjusting strategies for ESL students - <http://www.teachersfirst.com/content/esl/adaptstrat.cfm>

Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
- Utilize project-based learning for greater depth of knowledge
- Utilize exploratory connections to higher-grade concepts
- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
- NJDOE resources

**Califon Public School
Curriculum**



Subject: Science	Grade: 4th	Unit #: 5	Pacing: 15 days
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Unit Title: Transfer of Energy

OVERVIEW OF UNIT:

In this unit of study, fourth-grade students develop an understanding that energy can be transferred from place to place by sound, light, heat, and electrical currents. Students also obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment. The crosscutting concepts of cause and effect, energy and matter, and the interdependence of science, engineering, and technology, and influence of science, engineering, and technology on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in planning and carrying out investigations and obtaining, evaluating, and communicating information. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

Big Ideas

- Energy can be transferred in various ways and between objects.
- Energy can be moved from place to place through sound, light, or electric currents.
- Energy is present whenever there are moving objects, sound, light, or heat.
- Light also transfers energy from place to place.
- Energy can also be transferred from place to place by electric currents; the currents may have been produced to begin with by transforming the energy of motion into electrical energy.
- Cause-and-effect relationships are routinely identified and used to explain change.
- Knowledge of relevant scientific concepts and research findings is important in engineering.
- Over time, people's needs and wants change, as do their demands for new and improved technologies.
- Energy and fuels that humans use are derived from natural sources.
- The use of energy and fuels from natural sources affects the environment in multiple ways.
- Some resources are renewable over time, and others are not.

Essential Questions

- Where do we get the energy we need for modern life?
- How does energy move?
- From what natural resources are energy and fuels derived?
- In what ways does the human use of natural resources affect the environment?

Objectives

- Students will discuss where we get the energy we need for modern life.
- Students will describe how energy moves.

- Students will identify from what natural resources energy and fuels derived.
- Students will list the use of natural resources by humans to affect the environment.

Assessment

Formative Assessment:

- Labs
- Claim-Evidence- Reasoning
- Class Discussions

Summative Assessment:

- Multiple Choice Assessment
- Open Ended Response
- Claim-Evidence- Reasoning

Benchmark:

- Unit Assessments

Alternative:

- Performance Assessments
- Projects
- Models
- Modified Tests Independently Developed by Teacher

Key Vocabulary

energy, transfer, current, motion, sound, heat, light, fuel, renewable, non-renewable

Resources & Materials

- Switch Energy Project
 - <http://switchenergyproject.com/education/>
- Wind Generator
 - <https://learn.concord.org/resources/665/wind-generator>
- Thermal Energy Transfer
 - <https://nj.pbslearningmedia.org/resource/lsp07-sci-phys-thermalenergy/thermal-energy-transfer/>

Technology Infusion

Teacher Technology:

- Chromebooks
- Stemsscopes website
- Promethean Board

Student Technology:

- Chromebooks
- Stemsscopes website

Activities:

- Students will use Chromebooks to access the Stemsscopes website to: activate prior knowledge, build schema, watch videos, complete labs, take assessments and collect data.

Standard	Standard Description
8.1.5.DA.1	Collect, organize, and display data in order to highlight relationships or support a claim.

8.1.5.DA.5	Propose cause-and-effect relationships, predict outcomes, or communicate ideas using data.
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Interdisciplinary Integration

Activities:

- Students will read informational text for knowledge and understanding.
- Students will synthesize and present new learning in oral, written and/or visual projects and/or presentations.

Resources:

- Teacher Vision Cross-Curricular Theme Map - <https://www.teachervision.com/teaching-methods/curriculum-planning/7167.html>
- Engineering Go For It! - <http://egfi-k12.org/>
- US Department of Education STEM - <http://www.ed.gov/stem>
- Intel STEM Resource - <http://www.intel.com/content/www/us/en/education/k12/stem.html>
- NASA STEM - <http://www.nasa.gov/audience/foreducators/expeditions/stem/#.VYrO2flViko>
- PBS STEM - <http://www.pbs.org/teachers/stem/#content>
- STEM Works - <http://stem-works.com/activities>
- [What Every Educator Should Know About Using Google](#) by Shell Education
- Promoting Literacy in all Subjects by Glencoe - http://www.glencoe.com/sec/teachingtoday/subject/promoting_literacy.phtml
- International Literacy Association Read Write Think - <http://www.readwritethink.org/>

Standard	Standard Description
NJSLS-ELA L.RF.4.4	Read with sufficient accuracy and fluency to support comprehension.
NJSLS-ELA W.IW.4.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
NJSLS-ELA W.WR.4.5	Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic.
NJSLS-ELA W.SE.4.6	Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources.
NJSLS-ELA W.RW.4.7	Write routinely over extended time frames (with time for research and revision) and shorter time frames (a single sitting) for a range of tasks, purposes, and audiences.
NJSLS-ELA SL.PI.4.4	Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

21st Century Life Skills Standards

Activities:

- Students will work both individually and in collaborative groups to research, collect and organize data, at times taking leadership roles to communicate project ideas and new learning to the whole class.

Standard	Student Learning Objectives
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9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
9.4.5.CI.1	Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3, 7.1.NM.IPERS.6).
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).

Careers	
Activities: Students will plan and present lessons about an expert form of energy.	
Practice	Description
Demonstrate creativity and innovation.	Students regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
Utilize critical thinking to make sense of problems and persevere in solving them.	Students readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of the problem and carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through this when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. Their own actions or the actions of others.
Work productively in teams while using cultural/global competence.	Students positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Standards			
Standard #	Standard Description	Student Learning Objective	Clarification Statement
4-PS3-2		Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents	Assessment does not include quantitative measurements of energy
4-ESS3-1		Obtain and combine information to describe that energy and fuels are derived from natural resources and	

		their uses affect the environment.	
3-5-ETS1-1	Engineering Design	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	
3-5-ETS1-2	Engineering Design	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	
3-5-ETS1-3	Engineering Design	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	

Differentiation	
Students with 504 plans	
• Preferential seating • Guided notes • Extra time • Teacher check-ins • Use graphic organizers • Redirect attention • Prioritize tasks • Small group testing • Provide modifications & accommodations per individual student's 504 plan	
Special Education	
• Provide modifications & accommodations as listed in the student's IEP • Position the student near a helping peer or have quick access to the teacher • Modify or reduce assignments/tasks • Reduce the length of the assignment for different modes of delivery • Increase one-to-one time • Prioritize tasks • Use graphic organizers • Use online resources for skill-building • Provide teacher notes	

- Use collaborative grouping strategies, such as small groups
- NJDOE resources - <http://www.state.nj.us/education/specialed/>

Response to Intervention (RTI)

- Tiered interventions following the RTI framework
- Effective RTI strategies for teachers - <http://www.specialeducationguide.com/pre-k-12/response-to-intervention/effective-rti-strategies-for-teachers/>
- Intervention Central - <http://www.interventioncentral.org/>

English Language Learners (ELL)

- Provide text-to-speech
- Use of a translation dictionary or software
- Provide graphic organizers
- NJDOE resources - <http://www.state.nj.us/education/aps/cccs/ELL.htm>
- Adapt a Strategy – Adjusting strategies for ESL students - <http://www.teachersfirst.com/content/esl/adaptstrat.cfm>

Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
- Utilize project-based learning for greater depth of knowledge
- Utilize exploratory connections to higher-grade concepts
- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
- NJDOE resources

**Califon Public School
Curriculum**

Subject: Science	Grade: 4th	Unit #: 6	Pacing: 10-15 days
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Unit Title: Forces and Motion

OVERVIEW OF UNIT:

In this unit of study, students are able to use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object, and are expected to develop an understanding that energy can be transferred from object to object through collisions. The crosscutting concept of energy and matter is called out as an organizing concept. Students are expected to demonstrate grade-appropriate proficiency in asking questions, defining problems, and constructing explanations, and designing solutions. Students are also expected to use these practices to demonstrate an understanding of the core ideas.

Big Ideas

- Energy can be transferred in various ways and between objects.
- The faster a given object is moving, the more energy it possesses.
- Energy can be transferred in various ways and between objects.
- Energy can be moved from place to place by moving objects or through sound, light, or electric currents.
- 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.
- When objects collide, the contact forces transfer energy so as to change the objects' motions.

Essential Questions

- What is the relationship between the speed of an object and the energy of that object?
- What is the relationship between the speed of an object and its energy?
- In what ways does energy change when objects collide?

Objectives

- Students will be able to describe the relationship between the speed of an object and the energy of that object.
- Students will be able to explain the relationship between the speed of an object and its energy.
- Students will be able to list ways energy changes when objects collide.

Assessment

Formative Assessment:

- Labs
- Claim-Evidence- Reasoning

Benchmark:

- Unit Assessments

• Class Discussions	Alternative: • Performance Assessments • Projects • Models • Modified Tests Independently Developed by Teacher
Summative Assessment: • Multiple Choice Assessment • Open Ended Response • Claim-Evidence- Reasoning	

Key Vocabulary
Energy, energy transfer, speed, collision, heat, sound, current, gravity, force, motion,

Resources & Materials
• Spool Racers • http://www.scienceworld.ca/resources/activities/popcan-porsche • http://pbskids.org/designsquad/build/rubber-band-car/ • Force and Motion: • Advanced High-Powered Rockets:

Technology Infusion	
Teacher Technology: ● Chromebooks ● Stemscopes website ● Promethean Board	
Student Technology: ● Chromebooks ● Stemscopes website	
Activities: ● Students will use Chromebooks to access the Stemscopes website to: activate prior knowledge, build schema, watch videos, complete labs, take assessments and collect data.	
Standard	Standard Description
8.1.5.DA.1	Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.5	Propose cause-and-effect relationships, predict outcomes, or communicate ideas using data.

Interdisciplinary Integration
Activities: • Students will read informational text for knowledge and understanding. • Students will synthesize and present new learning in oral, written and/or visual projects and/or presentations.
Resources:

- Teacher Vision Cross-Curricular Theme Map - <https://www.teachervision.com/teaching-methods/curriculum-planning/7167.html>
- Engineering Go For It! - <http://egfi-k12.org/>
- US Department of Education STEM - <http://www.ed.gov/stem>
- Intel STEM Resource - <http://www.intel.com/content/www/us/en/education/k12/stem.html>
- NASA STEM - <http://www.nasa.gov/audience/foreducators/expeditions/stem/#.VYrO2flViko>
- PBS STEM - <http://www.pbs.org/teachers/stem/#content>
- STEM Works - <http://stem-works.com/activities>
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Standard	Standard Description
NJSLS-ELA L.RF.4.4	Read with sufficient accuracy and fluency to support comprehension.
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NJSLS-ELA W.WR.4.5	Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic.
NJSLS-ELA W.SE.4.6	Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources.
NJSLS-ELA W.RW.4.7	Write routinely over extended time frames (with time for research and revision) and shorter time frames (a single sitting) for a range of tasks, purposes, and audiences.
NJSLS-ELA SL.PI.4.4	Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

21st Century Life Skills Standards

Activities:

- Students will work both individually and in collaborative groups to research, collect and organize data, at times taking leadership roles to communicate project ideas and new learning to the whole class.

Standard	Student Learning Objectives
9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
9.4.5.CI.1	Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3, 7.1.NM.IPERS.6).
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).

Careers	
Activities: Students will design experiments to test the motion of energy.	
Practice	Description
Demonstrate creativity and innovation.	Students regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
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Work productively in teams while using cultural/global competence.	Students positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Standards			
Standard #	Standard Description	Student Learning Objective	Clarification Statement
4-PS3-1	Energy	Use evidence to construct an explanation relating the speed of an object to the energy of that object.	Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.
4-PS3-3	Energy	Ask questions and predict outcomes about the changes in energy that occur when objects collide.	Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.] [Assessment Boundary: Assessment does not include quantitative measurements of energy.
3-5-ETS1-1	Engineering Design	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	

3-5-ETS1-2	Engineering Design	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	
3-5-ETS1-3	Engineering Design	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	

Differentiation	
Students with 504 plans	
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Special Education	
• Provide modifications & accommodations as listed in the student's IEP • Position the student near a helping peer or have quick access to the teacher • Modify or reduce assignments/tasks • Reduce the length of the assignment for different modes of delivery • Increase one-to-one time • Prioritize tasks • Use graphic organizers • Use online resources for skill-building • Provide teacher notes • Use collaborative grouping strategies, such as small groups • NJDOE resources - http://www.state.nj.us/education/specialed/	
Response to Intervention (RTI)	
• Tiered interventions following the RTI framework • Effective RTI strategies for teachers - http://www.specialeducationguide.com/pre-k-12/response-to-intervention/effective-rti-strategies-for-teachers/ • Intervention Central - http://www.interventioncentral.org/	
English Language Learners (ELL)	
• Provide text-to-speech • Use of a translation dictionary or software	

- Provide graphic organizers
- NJDOE resources - <http://www.state.nj.us/education/aps/cccs/ELL.htm>
- Adapt a Strategy – Adjusting strategies for ESL students - <http://www.teachersfirst.com/content/esl/adaptstrat.cfm>

Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
- Utilize project-based learning for greater depth of knowledge
- Utilize exploratory connections to higher-grade concepts
- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
- NJDOE resources

**Califon Public School
Curriculum**

Subject: Science	Grade: 4th	Unit #: 7	Pacing: 10 days
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Unit Title: Using Engineering Design with Force and Motion Systems

OVERVIEW OF UNIT:

In this unit of study, students use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object. Students develop an understanding that energy can be transferred from place to place by sound, light, heat, and electrical currents or from objects through collisions. They apply their understanding of energy to design, test, and refine a device that converts energy from one form to another. The crosscutting concepts of energy and matter and the influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate grade-appropriate proficiency in asking questions and defining problems, planning and carrying out investigations, constructing explanations, and designing solutions. Students are also expected to use these practices to demonstrate their understanding of the core ideas.

Big Ideas

- Science affects everyday life.
- Most scientists and engineers work in teams.
- Engineers improve existing technologies or develop new ones.
- People's needs and wants change over time, as do their demands for new and improved technologies.
- Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.
- Energy can be transferred in various ways and between objects.
- 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.
- The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use.
- Possible solutions to a problem are limited by the available materials and resources (constraints).
- The success of a designed solution is determined by considering the desired features of a solution (criteria).
- Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account.
- Research on a problem should be carried out before beginning to design a solution.
- Testing a solution involves investigating how well it performs under a range of likely conditions.
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

Essential Questions

- How can scientific ideas be applied to design, test, and refine a device that converts energy from one form to another?

Objectives

- Students will be able to describe how scientific ideas be applied to design, test, and refine a device that converts energy from one form to another.

Assessment

Formative Assessment:

- Labs
- Claim-Evidence- Reasoning
- Class Discussions

Summative Assessment:

- Multiple Choice Assessment
- Open Ended Response
- Claim-Evidence- Reasoning

Benchmark:

- Unit Assessments

Alternative:

- Performance Assessments
- Projects
- Models
- Modified Tests Independently Developed by Teacher

Key Vocabulary

Energy transfer, problem, investigation, controlled variable, uncontrolled variable, prototype, model,

Resources & Materials

- [The Sound of Science](#)
- [Energy Makes Things Happen: The Boy Who Harnessed the Wind](#)
- [Light Your Way](#)
- <http://www.childrensengineering.org/technology/designbriefs.php>

Technology Infusion

Teacher Technology:

- Chromebooks
- Stemsopes website
- Promethean Board

Student Technology:

- Chromebooks
- Stemsopes website

Activities:

Students will use Chromebooks to access the Stemscores website to: activate prior knowledge, build schema, watch videos, complete labs, take assessments and collect data.	
Standard	Standard Description
8.1.5.DA.1	Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.5	Propose cause-and-effect relationships, predict outcomes, or communicate ideas using data.

Interdisciplinary Integration

Activities:

- Students will read informational text for knowledge and understanding.
- Students will synthesize and present new learning in oral, written and/or visual projects and/or presentations.

Resources:

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- NASA STEM - <http://www.nasa.gov/audience/foreducators/expeditions/stem/#.VYrO2flViko>
- PBS STEM - <http://www.pbs.org/teachers/stem/#content>
- STEM Works - <http://stem-works.com/activities>
- [What Every Educator Should Know About Using Google](#) by Shell Education
- Promoting Literacy in all Subjects by Glencoe - http://www.glencoe.com/sec/teachingtoday/subject/promoting_literacy.phtml
- International Literacy Association Read Write Think - <http://www.readwritethink.org/>

Standard	Standard Description
NJSLS-ELA L.RF.4.4	Read with sufficient accuracy and fluency to support comprehension.
NJSLS-ELA W.IW.4.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
NJSLS-ELA W.WR.4.5	Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic.
NJSLS-ELA W.SE.4.6	Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources.
NJSLS-ELA W.RW.4.7	Write routinely over extended time frames (with time for research and revision) and shorter time frames (a single sitting) for a range of tasks, purposes, and audiences.
NJSLS-ELA SL.PI.4.4	Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

21 st Century Life Skills Standards	
Activities: Students will work both individually and in collaborative groups to research, collect and organize data, at times taking leadership roles to communicate project ideas and new learning to the whole class.	
Standard	Student Learning Objectives
9.2.5.CAP.3	Identify qualifications needed to pursue traditional and non-traditional careers and occupations.
9.4.5.CI.1	Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions (e.g., W.4.6, 3.MD.B.3, 7.1.NM.IPERS.6).
9.4.5.CI.3	Participate in a brainstorming session with individuals with diverse perspectives to expand one's thinking about a topic of curiosity (e.g., 8.2.5.ED.2, 1.5.5.CR1a).

Careers	
Activities: Students will design, test, and refine a device that converts energy from one form to another.	
Practice	Description
Demonstrate creativity and innovation.	Students regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
Utilize critical thinking to make sense of problems and persevere in solving them.	Students readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of the problem and carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through this when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. Their own actions or the actions of others.
Work productively in teams while using cultural/global competence.	Students positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

Standards			
Standard #	Standard Description	Student Learning Objective	Clarification Statement
4-PS3-4	Energy	Apply scientific ideas to design, test, and refine a device that	Examples of devices could include electric circuits that convert electrical energy into

		converts energy from one form to another.	motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.] [Assessment Boundary: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.]
3-5-ETS1-1	Engineering Design	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	
3-5-ETS1-2	Engineering Design	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	
3-5-ETS1-3	Engineering Design	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	

Differentiation

Students with 504 plans

- Preferential seating
- Guided notes
- Extra time
- Teacher check-ins
- Use graphic organizers
- Redirect attention
- Prioritize tasks
- Small group testing
- Provide modifications & accommodations per individual student's 504 plan

Special Education

- Provide modifications & accommodations as listed in the student's IEP
- Position the student near a helping peer or have quick access to the teacher

- Modify or reduce assignments/tasks
- Reduce the length of the assignment for different modes of delivery
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- Use collaborative grouping strategies, such as small groups
- NJDOE resources - <http://www.state.nj.us/education/specialed/>

Response to Intervention (RTI)

- Tiered interventions following the RTI framework
- Effective RTI strategies for teachers - <http://www.specialeducationguide.com/pre-k-12/response-to-intervention/effective-rti-strategies-for-teachers/>
- Intervention Central - <http://www.interventioncentral.org/>

English Language Learners (ELL)

- Provide text-to-speech
- Use of a translation dictionary or software
- Provide graphic organizers
- NJDOE resources - <http://www.state.nj.us/education/aps/cccs/ELL.htm>
- Adapt a Strategy – Adjusting strategies for ESL students - <http://www.teachersfirst.com/content/esl/adaptstrat.cfm>

Enrichment

- Process should be modified: higher order thinking skills, open-ended thinking, discovery
- Utilize project-based learning for greater depth of knowledge
- Utilize exploratory connections to higher-grade concepts
- Contents should be modified: real-world problems, audiences, deadlines, evaluations, transformations
- Learning environments should be modified: student-centered learning, independence, openness, complexity, and groups should be varied
- NJDOE resources

**Califon Public School
Curriculum**

Subject: Science	Grade: 4th	Unit #: 8	Pacing: 10 days
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Unit Title: Waves and Information

OVERVIEW OF UNIT:

In this unit of study, students use a model of waves to describe patterns of waves in terms of amplitude and wavelength and to show that waves can cause objects to move. The crosscutting concepts of patterns; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these disciplinary core ideas. Students demonstrate grade-appropriate proficiency in developing and using models, planning and carrying out investigations, and constructing explanations, and designing solutions. Students are also expected to use these practices to demonstrate their understanding of the core ideas.

Big Ideas

- Science findings are based on recognizing patterns.
- Similarities and differences in patterns can be used to sort and classify natural phenomena.
- 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.
- Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks)
- Similarities and differences in patterns can be used to sort and classify designed products.
- Knowledge of relevant scientific concepts and research findings is important in engineering.
- Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.
- 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—that is, convert it from digitized form to voice and vice versa.
- Different solutions need to be tested in order to determine which of them best solve the problem, given the criteria and the constraints.
- Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions.
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs.
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved.

Essential Questions

- How can we use waves to gather and transmit information?

- If a beach ball lands in the surf, beyond the breakers, what will happen to it?
- Which team can design a way to use patterns to communicate with someone across the room?

Objectives

- Students will be able to describe how we use waves to gather and transmit information.
- Students will be able to infer if a beach ball lands in the surf, beyond the breakers, what will happen to it.
- Students will be able to design a way to use patterns to communicate with someone across the room.

Assessment

Formative Assessment:

- Labs
- Claim-Evidence- Reasoning
- Class Discussions

Summative Assessment:

- Multiple Choice Assessment
- Open Ended Response
- Claim-Evidence- Reasoning

Benchmark:

- Unit Assessments

Alternative:

- Performance Assessments
- Projects
- Models
- Modified Tests Independently Developed by Teacher

Key Vocabulary

Waves, wavelength, amplitude, communication, technology

Resources & Materials

- STEMScopes

Technology Infusion

Teacher Technology:

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- Stemsopes website
- Promethean Board

Student Technology:

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Activities:

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Standard

8.1.5.DA.1

Standard Description

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- STEM Works - <http://stem-works.com/activities>
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Careers	
Activities: Students will design a way to use patterns to communicate with someone across the room.	
Practice	Description
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Standards			
Standard #	Standard Description	Student Learning Objective	Clarification Statement
4-PS4-1	Waves and their Applications in Technologies for Information Transfer	Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.	Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.] [Assessment Boundary: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or

			quantitative models of amplitude and wavelength.]
4-PS4-3	Waves and their Applications in Technologies for Information Transfer	Generate and compare multiple solutions that use patterns to transfer information.	Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.]
3-5-ETS1-1	Engineering Design	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	
3-5-ETS1-2	Engineering Design	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	
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