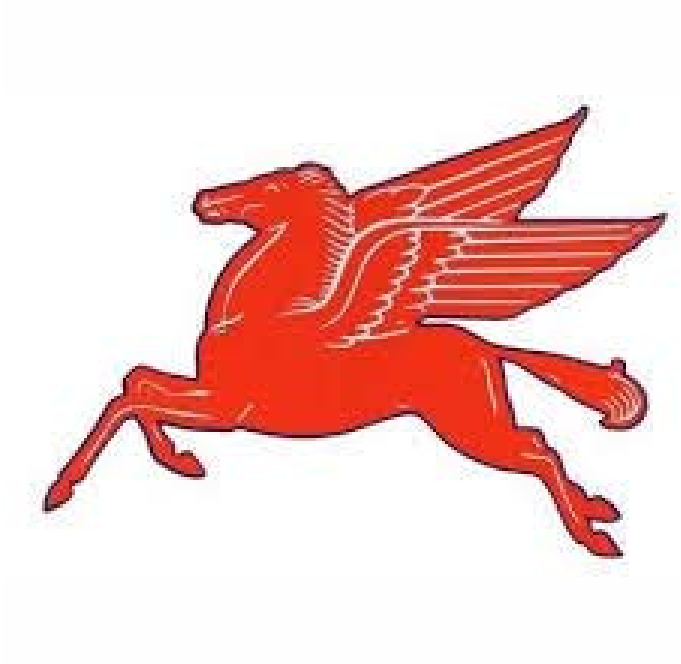
Curriculum Management System

PAULSBORO PUBLIC SCHOOLS



Science Curriculum- Fourth Grade

UPDATED JUNE 2016

For adoption by all regular education programs as specified and
for adoption or adaptation by all Special Education Programs in
accordance with Board of Education Policy.

Board Approved: September 2016

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Paulsboro Public Schools

Mission Statement

The mission of the Paulsboro School District is to provide each student the educational opportunities to assist in attaining their full potential in a democratic society. Our instructional programs will take place in a responsive, community based school system that fosters respect among all people. Our expectation is that all students will achieve the New Jersey Core Curriculum Content Standards (NJCCCS) at every grade level.

New Jersey State Department of Education
21st Century College and Career Readiness Standards

The 12 Career Ready Practices

These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.

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.

Reading Unit	Reading Standards	Writing Unit	Writing Standards	Speaking & Listening Standards	Language Standards	Foundational Skills Standards
Building a Reading Life	RL.4.1, RL.4.2, RL.4.3, RI.4.1	Launching Writing Workshop	W.4.3, W.4.4	SL.4.1, SL.4.4	L.4.2	FS.4.3, FS.4.4
Following Characters into Meaning	RL.4.1, RL.4.2, RL.4.3, RL.4.4, RL.4.6	Narrative: The Art of Stories	W.4.3 W.4.4	SL.4.1, SL.4.4	L.4.2	FS.4.3, FS.4.4
Nonfiction Reading: Using Text Structure	RI.4.1, RI.4.2, RI.4.3, RI.4.4RI.4.5, RI.4.8	Information Writing	W.4.2a, W.4.2b, W.4.2e, W.4.5, W.4.7	SL.4.2, SL.4.6	L.4.1, L.4.4	FS.4.3, FS.4.4
Nonfiction Reading: Using Text Structure	RI.4.2, RI.4.3, RI.4.4RI.4.5, RI.4.8	Informational Books	W.4.2, W.4.5, W.4.6, W.4.7	SL.4.2, SL.4.5, SL.4.6	L.4.1, L.4.4	FS.4.3, FS.4.4
Nonfiction Research Projects	RI.4.6, RI.4.7	Opinion: Personal & Persuasive Essays	W.4.1, W.4.4, W.4.6, W.4.7, W.4.8	SL.4.3, SL.4.5	L.4.3	FS.4.3, FS.4.4
Historical Fiction Book Clubs	RL.4.5, RL.4.7, RL.4.9, RL.4.10	Opinion; Personal & Persuasive Essays	W.4.1, W.4.4, W.4.6	SL.4.1, SL.4.4, SL.4.6	L.4.4, L.4.5	FS.4.3, FS.4.4
Information Reading: Research in the Content Areas	RI.4.9, RL.4.4.4, RL. 4.10	Writing About Reading: Nonfiction	W.4.1, W.4.6, W.4.9	SL.4.2, SL.4.6	L.4.3, L.4.5	FS.4.3, FS.4.4
Test Preparation	RI.4.2, RL.4.10	Test Preparation	W.4.1, W.4.10	SL.4.1	L.4.6	FS.4.3, FS.4.4
Social Issues Book Clubs	RI.4.4, RI.4.8, RI.4.10	Writing About Reading: Fiction	W.4.2, W.4.6	SL.4.2, SL.4.6	L.4.6	FS.4.3, FS.4.4

MODIFICATIONS

Special Education:
Students Hands on activity, cooperative learning, peer tutoring, extended time, reteach in utilizing various methods. Utilize remediation resources which include assessment and intervention, in planning and instruction.

English Language Learners:
Provide hands-on activities and explanations. Use reduced text, so that print is not so dense. Assess comprehension through demonstration or other alternative means (gestures, drawings). Give instructions/directions in writing and orally. Use of translation dictionaries to locate words in the native language.
Use English Learners resources such as study guides, assessments and a visual glossary.

At-Risk Students:
Hands on activities cooperative learning, reteach using various methods. Make use of remediation lessons and quizzes when appropriate.

Gifted and Talented Students:
Utilize Pre-AP Resources such as the pacing, assignment and best practices guide.

Scope and Sequence

Quarter 1 – Grade _4_

Big Idea: Weathering and Erosion - 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. (NJ DOE Unit 1)	**Big Idea: Earth Processes** - 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. (NJ DOE Unit 2)

Scope and Sequence

Quarter 2 – Grade _4_

Big Idea: Structures and Functions- 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 understanding of the core idea. (NJ DOE Unit 3)

Big Idea: How organisms Process Information - 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. Students are expected to demonstrate grade-appropriate proficiency in *developing and using models*. Students are expected to use these practices to demonstrate understanding of the core ideas. (NJ DOE Unit 4)

Scope and Sequence	
Quarter 3 – Grade _4_	
Big Idea: Transfer of Energy - 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 understanding of the core ideas. (NJ DOE Unit 5)	**Big Idea: Force and Motion-** 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 understanding of the core ideas. (NJ DOE Unit 6)

Scope and Sequence

Quarter 4 – Grade _4_

Big Idea: Using Engineering Design with Force and Motion Systems-

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

Big Idea: Waves and Information-

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. (NJ DOE Unit 8)

demonstrate their understanding of the core ideas. (NJ DOE Unit 7)	

QUARTER 1 – 10 days
Big Idea: Weathering and Erosion
Topic: Understanding how landforms and rock formations tell us about the past.

Standards:

Science:

Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.] **(4-ESS2-1)**

Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. [Clarification Statement: 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-ESS1-1)**

GOAL

Students will develop understandings of the effects of weathering and the rate of erosion by water, ice, wind, or vegetation.

Essential Questions

1. How can evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation be observed or measured?
2. What can rock formations tell us about the past?

Assessments

Formative: participation in team activities, research, verbal response, observations, experiments, interactive notebooks

Summative/Topic Assessment: Interactive Science assessments, formal lab sheets, experiments

Enduring Understanding

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

Resources

Interactive Science Series
Trade Books/Classroom Library
Assorted Manipulatives
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NGSS www.nextgenerationsicence/org/
NSTA www.nsta.org

ESS2.A: Earth Materials and Systems 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) **ESS2.E: Biogeology** Living things affect the physical characteristics of their regions. (4-ESS2-1) **ESS1.C: The History of Planet Earth** 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) **Math:** Reason abstractly and quantitatively. (4-ESS2-1), (4-ESS1-1) **MP.2** Model with mathematics. (4-ESS2-1), (4-ESS1-1) **MP.4** Use appropriate tools strategically. (4-ESS2-1) **MP.5** Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. (4-ESS2-1), (4-ESS1-1) **4.MD.A.1** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. (4-ESS2-1) **4.MD.A.2** **English Language Arts:** Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-ESS1-1) **W.4.7** Recall relevant information from experiences or gather relevant information from print and digital sources; take	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.	

notes and categorize information, and provide a list of sources. (4-ESS2-1),(4-ESS1-1)**W.4.8** Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-ESS1-1) **W.4.9** **Career Ready Practices:** **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. **CRP11**. Use technology to enhance productivity. **CRP12.** Work productively in teams while using cultural global competence.		

QUARTER 1 – 10 days

Big Idea: Earth Processes

Topic: Understanding if it is possible to engineer ways to protect humans from natural Earth.

Standards:

Science:

Analyze and interpret data from maps to describe patterns of Earth's features. *[Clarification Statement: 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-ESS2-2)**

Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.* *[Clarification Statement: 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.] **(4-ESS3-2)**

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)

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)

GOAL

Students will apply their knowledge of natural Earth processes to generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Essential Questions

1. What can maps tell us about the features of the world?
2. In what ways can the impacts of natural Earth processes on humans be reduced?

Assessments

Formative: participation in team activities, research, verbal response, observations, experiments, interactive notebooks

Summative/Topic Assessment: Interactive Science assessments, formal lab sheets, experiments

Enduring Understanding

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

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ETS1.B: Developing Possible Solutions Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2) At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2) Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3) **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. (3-5-ETS1-3) English Language Arts: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-ESS3-2) **RI.4.1** Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. (4-ESS2-2) **RI.4.7** Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. (4-ESS2-2) **W.4.7** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-ESS3-2) **RI.4.9** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (3-5-ETS1-2) **RI.5.1** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (3-5-ETS1-2) **RI.5.1** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (3-5-ETS1-2) **RI.5.9**	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.	

Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (3-5-ETS1-3) **W.5.7** Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (3-5-ETS1-3) **W.5.8** Draw evidence from literary or informational texts to support analysis, reflection, and research. (3-5-ETS1-3) **W.5.9** **Math:** Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. 4-ESS2-2) **4.MD.A.2** Reason abstractly and quantitatively. (4-ESS3-2), (3-5-ETS1-2),(3-5-ETS1-3) **MP.2** Model with mathematics. (4-ESS3-2), (3-5-ETS1-2),(3-5-ETS1-3) **MP.4** Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (4-ESS3-2) **4.OA.A.1** Use appropriate tools strategically. (3-5-ETS1-2),(3-5-ETS1-3) **MP.5** Operations and Algebraic Thinking (3-ETS1-2) **3-5.OA** **Career Ready Practices:** **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. **CRP11**. Use technology to enhance productivity. **CRP12.** Work productively in teams while using cultural global competence.		

QUARTER 2 – 10 days

Big Idea: Structures and Functions

Topic: Understanding how the internal and external parts of plants and animals support their survival, growth, behavior, and reproduction.

Standards:

Science:

Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.] (4-LS1-1)

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)

English Language Arts:

Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1) **W.4.1**

Math:

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

Career Ready Practices:

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.

GOAL

Students will develop an understanding that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Essential Questions

1. How do internal and external parts of plants and animals help them to survive, grow, behave, and reproduce?

Assessments

Formative: participation in team activities, research, verbal response, observations, experiments, interactive notebooks

Summative/Topic Assessment:
Interactive Science assessments, formal lab sheets, experiments

Enduring Understanding

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.

Resources

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CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. **CRP11**. Use technology to enhance productivity. **CRP12.** Work productively in teams while using cultural global competence.		

QUARTER 2 – 10 days

Big Idea: How Organisms Process Information

Topic: Understanding how animals use their perceptions and memories to make decisions.

Standards:

Science:

Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. [Clarification Statement: Emphasis is on systems of information transfer.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.] **(4-LS1-2)**

Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. [Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.] **(4-LS4-2)**

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)**

PS4.B: Electromagnetic Radiation

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

English Language Arts:

Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. (4-LS1-2),(4-LS4-2) **SL.4.5**

Math:

Model with mathematics. (4-PS4-2) **MP.4**

GOAL

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.

Essential Questions

1. How do animals receive and process different types of information from their environment in order to respond appropriately?
2. What happens when light from an object enters the eye?

Assessments

Formative: participation in team activities, research, verbal response, observations, experiments, interactive notebooks

Summative/Topic Assessment:
Interactive Science assessments, formal lab sheets, experiments

Enduring Understanding

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.

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Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-2) **4.G.A.1** **Career Ready Practices:** **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. **CRP11**. Use technology to enhance productivity. **CRP12.** Work productively in teams while using cultural global competence.		

QUARTER 3– 15 days

Big Idea: Transfer of Energy

Topic: Understanding the ways that we get the energy we need for modern life.

Standards:

Science:

Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. [Assessment Boundary: Assessment does not include quantitative measurements of energy.] (4-PS3-2)

Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. [Clarification Statement: Examples of renewable energy resources could include wind energy, water behind dams, and sunlight; non-renewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.] (4-ESS3-1)

PS3.A: Definitions of Energy

Energy can be moved from place to place by moving objects or through sound, light, or electric currents. (4-PS3-2)

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)

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

GOAL

Students will develop an understanding that energy can be transferred from place to place by sound, light, heat, and electrical currents.

Essential Questions

1. How does energy move?
2. From what natural resources are energy and fuels derived? In what ways does the human use of natural resources affect the environment?

Assessments

Formative: participation in team activities, research, verbal response, observations, experiments, interactive notebooks

Summative/Topic Assessment: Interactive Science assessments, formal lab sheets, experiments

Enduring Understanding

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

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to begin with by transforming the energy of motion into electrical energy. (4-PS3-2) **English Language Arts:** Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-2),(4-ESS3-1) **W.4.7** Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-2),(4-ESS3-1) **W.4.8** Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-ESS3-1) **W.4.9** **Math:** Reason abstractly and quantitatively. (4-ESS3-1) **MP.2** Model with mathematics. (4-ESS3-1) **MP.4** Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. (4-ESS3-1) **4.OA.A.1** **Career Ready Practices:** **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. **CRP11**. Use technology to enhance productivity. **CRP12.** Work productively in teams while using cultural global competence.	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.	

QUARTER 3 – 10 days

Big Idea: Force and Motion

Topic: Understanding the relationship between the speed of an object and the energy of that object.

Standards:

Science:

Use evidence to construct an explanation relating the speed of an object to the energy of that object. [Assessment Boundary: Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.] **(4-PS3-1)**

Ask questions and predict outcomes about the changes in energy that occur when objects collide. [Clarification Statement: 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.] **(4-PS3-3)**

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-PS3-3)

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-PS3-3)

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)

English Language Arts:

GOAL

Students will be 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.

Essential Questions

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

Assessments

Formative: participation in team activities, research, verbal response, observations, experiments, interactive notebooks

Summative/Topic Assessment: Interactive Science assessments, formal lab sheets, experiments

Enduring Understanding

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

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Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. (4-PS3-1) **RI.4.1** Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text. (4-PS3-1) **RI.4.3** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS3-1) **RI.4.9** Write informative/explanatory texts to examine a topic and convey ideas and information clearly. (4-PS3-1) **W.4.2** Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-3) **W.4.7** Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-1),(4-PS3-3) **W.4.8** Draw evidence from literary or informational texts to support analysis, reflection, and research. (4-PS3-1) **W.4.9** **Career Ready Practices:** **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. **CRP11**. Use technology to enhance productivity. **CRP12.** Work productively in teams while using cultural global competence.	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.	

QUARTER 4 – 15 days

Big Idea: Using Engineering Design with Force and Motion Systems

Topic: Understanding the scientific ideas applied to design, test, and refine a device that converts energy from one form to another.

Standards:

Science:

Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.* [Clarification Statement: Examples of devices could include electric circuits that convert electrical energy into 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.] (4-PS3-4)

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-ETS1-1)

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-ETS1-2)

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. (3-5-ETS1-3)

English Language Arts:

Conduct short research projects that build knowledge through investigation of different aspects of a topic. (4-PS3-4) **W.4.7**

Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-PS3-4) **W.4.8**

GOAL

Students will use evidence to construct an explanation of the relationship between the speed of an object and the energy of that object.

Essential Questions

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

Assessments

Formative: participation in team activities, research, verbal response, observations, experiments, interactive notebooks

Summative/Topic Assessment: Interactive Science assessments, formal lab sheets, experiments

Enduring Understanding

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

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Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (3-5-ETS1-2) **RI.5.1** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (3-5-ETS1-2) **RI.5.1** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (3-5-ETS1-2) **RI.5.9** Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (3-5-ETS1-1),(3-5-ETS1-3) **W.5.7** Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources. (3-5-ETS1-1),(3-5-ETS1-3) **W.5.8** Draw evidence from literary or informational texts to support analysis, reflection, and research. (3-5-ETS1-1),(3-5-ETS1-3) **W.5.9** **Career Ready Practices:** **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. **CRP11**. Use technology to enhance productivity. **CRP12.** Work productively in teams while using cultural global competence.	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 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.	

QUARTER 4 – 15 days

Big Idea: Waves and Information

Topic: Understanding how we can use waves to gather and transmit information.

Standards:

Science:

Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. [Clarification Statement: 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-PS4-1)

Generate and compare multiple solutions that use patterns to transfer information. [Clarification Statement: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.] (4-PS4-3)

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-EST-1-2)

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. (3-5-ETS-1-3)

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; there is no net motion in the direction of the wave

GOAL

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.

Essential Questions

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

Assessments

Formative: participation in team activities, research, verbal response, observations, experiments, interactive notebooks

Summative/Topic Assessment: Interactive Science assessments, formal lab sheets, experiments

Enduring Understanding

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

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except when the water meets a 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) **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) **ETS1.B: Developing Possible Solutions** Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2) At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2) Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3) 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. (3-5-ETS1-3) English Language Arts: Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably. (4-PS4-3) **RI.4.9** Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. *(4-PS4-1)* **SL.4.5** Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (3-5-ETS1-2) **RI.5.1** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (3-5-ETS1-2) **RI.5.9** Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic. (3-5-ETS1-3) **W.5.7** Recall relevant information from experiences or gather relevant information from print and digital sources;	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.	

summarize or paraphrase information in notes and finished work, and provide a list of sources. (3-5-ETS1-3) **W.5.8** Draw evidence from literary or informational texts to support analysis, reflection, and research. (3-5-ETS1-3) **W.5.9** **Math:** Reason abstractly and quantitatively. (3-5-ETS1-2),(3-5-ETS1-3) **MP.2** Model with mathematics. (4-PS4-2),(3-5-ETS1-2),(3-5-ETS1-3) **MP.4** Use appropriate tools strategically. (3-5-ETS1-2),(3-5-ETS1-3) **MP.5** Operations and Algebraic Thinking (3-ETS1-2) **3-5.OA** Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (4-PS4-2) **4.G.A.1** **Career Ready Practices:** **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. **CRP11**. Use technology to enhance productivity. **CRP12.** Work productively in teams while using cultural global competence.		
