

Brigantine Public School District

Science Curriculum

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

Curriculum Design

Content Area: Science

Course Title: General Science

Grade Level: 6

Matter/Scientific Method

7 Weeks

Electricity

5 Weeks

Forms of Energy/Forces/Motion

6 Weeks

Genetics

5 Weeks

**Body Systems/
Digestive/Circulatory/Respiratory
Systems**

6 Weeks

Solar System/Astronomy

6 Weeks

Date Created: July 2011

Board Approved on: August 25, 2011

Unit Overview

Content Area: Physical Science

Unit Title: Matter/Scientific Method

Target Course/Grade Level: 6th Grade

Unit Summary

- Substances can undergo physical or chemical changes to form new substances. Each change involves energy.
- All objects and substances in the natural world are composed of matter. Matter has two fundamental properties: matter takes up space, and matter has inertia.

Primary interdisciplinary connections:

21st century themes: 9.1- This unit will also infuse the 21st Century Life & Careers standard 9.1, strands A-D. These strands include: Critical Thinking and Problem Solving; Creativity and Innovation; Collaboration, Teamwork and Leadership and Cross Cultural Understanding and Interpersonal Communication.

Learning Targets

Standards: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.

5.1.A.B.C.D Science Practices: This unit will infuse the four strands of the Science Practices standard. These focus on understanding scientific explanations; generating scientific evidence through active investigation; reflecting on scientific knowledge; and participating productively in science.

Content Statements

- The volume of some objects can be determined using liquid (water) displacement.
- The density of an object can be determined from its volume and mass.
- Pure substances have characteristic intrinsic properties, such as density, solubility, boiling point, and melting point, all of which are independent of the amount of the sample.
- All matter is made of atoms. Matter made of only one type of atom is called an element.
- All substances are composed of one or more of approximately 100 elements.
- The Periodic Table organizes the elements into families of elements with similar properties.
- Elements are a class of substances composed of a single kind of atom.

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- Compounds are substances that are chemically formed and have physical and chemical properties that differ from the reacting substances.
- Substances are classified according to their physical and chemical properties.
- Acids are a class of compounds that exhibit common chemical properties, including a sour taste, characteristic color changes with litmus and other acid/base indicators, and the tendency to react with bases to produce a salt and water.
- When a new substance is made by combining two or more substances, it has properties that are different from the original substances.
- When substances undergo chemical change, the number and kinds of atoms in the reactants are the same as the number and kinds of atoms in the products. The mass of the reactants is the same as the mass of the products.

CPI #	Cumulative Progress Indicator (CPI)
5.2.6.A.1	Determine the volume of common objects using water displacement methods.
5.2.6.A.2	Calculate the density of objects or substances after determining volume and mass.
5.2.6.A.3	Determine the identity of an unknown substance using data about intrinsic properties.
5.2.8.A.1	Explain that all matter is made of atoms, and give examples of common elements.
5.2.8.A.2	Analyze and explain the implications of the statement “all substances are composed of elements.”
5.2.8.A.4	Predict the physical and chemical properties of elements based on their positions on the Periodic Table.
5.2.8.A.5	Identify unknown substances based on data regarding their physical and chemical properties.
5.2.8.A.7	Determine the relative acidity and reactivity of common acids, such as vinegar or cream of tartar, through a variety of student-designed investigations.
5.2.6.B.1	Compare the properties of reactants with the properties of the products when two or more substances are combined and react chemically.
5.2.8.B.1	Explain, using an understanding of the concept of chemical change, why the mass of reactants and the mass of products remain constant.
Unit Essential Questions <ul style="list-style-type: none"> • How do the properties of materials determine their use? • How does conservation of mass apply to the interaction of materials in a closed system? 	Unit Enduring Understandings <ul style="list-style-type: none"> • The structures of materials determine their properties. • When materials interact within a closed system, the total mass of the system remains the same.

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Evidence of Learning

Suggested Summative Assessment

- NJ ASK 8
- Unit exam

Formative Assessments

- www.njcccs.org Classroom Application Docs
- Hands-on activities
- Chapter tests
- Performance assessments
- Quizzes
- Lab reports

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Unit Overview

Content Area: Physical Science

Unit Title: Electricity

Target Course/Grade Level: 6th Grade

Unit Summary

- The conservation of energy can be demonstrated by keeping track of familiar forms of energy as they are transferred from one object to another.

Primary interdisciplinary connections:

21st century themes: 9.1- This unit will also infuse the 21st Century Life & Careers standard 9.1, strands A-D. These strands include: Critical Thinking and Problem Solving; Creativity and Innovation; Collaboration, Teamwork and Leadership and Cross Cultural Understanding and Interpersonal Communication.

Learning Targets

Standards: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.

5.1.A.B.C.D Science Practices: This unit will infuse the four strands of the Science Practices standard. These focus on understanding scientific explanations; generating scientific evidence through active investigation; reflecting on scientific knowledge; and participating productively in science.

Content Statements

- The flow of current in an electric circuit depends upon the components of the circuit and their arrangement, such as in series or parallel. Electricity flowing through an electrical circuit produces magnetic effects in the wires.

CPI #

Cumulative Progress Indicator (CPI)

5.2.6.D.1

Use simple circuits involving batteries and motors to compare and predict the current flow with different circuit arrangements.

Unit Essential Questions

- How can energy be transferred from one material to another?
- What happens to a material when energy is transferred to it?

Unit Enduring Understandings

- Changes take place because of the transfer of energy. Energy is transferred to matter through the action of forces. Different forces are responsible for the transfer of the different forms of energy.

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Evidence of Learning

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Unit Overview

Content Area: Life Science

Unit Title: Forms of Energy/Forces/Motion

Target Course/Grade Level: 6th Grade

Unit Summary

- Knowing the characteristics of familiar forms of energy, including potential and kinetic energy, is useful in coming to the understanding that, for the most part, the natural world can be explained and is predictable.
- It takes energy to change the motion of objects. The energy change is understood in terms of forces.

Primary interdisciplinary connections:

21st century themes: 9.1- This unit will also infuse the 21st Century Life & Careers standard 9.1, strands A-D. These strands include: Critical Thinking and Problem Solving; Creativity and Innovation; Collaboration, Teamwork and Leadership and Cross Cultural Understanding and Interpersonal Communication.

Learning Targets

Standards: 5.2 Physical Science: All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.

5.1.A.B.C.D Science Practices: This unit will infuse the four strands of the Science Practices standard. These focus on understanding scientific explanations; generating scientific evidence through active investigation; reflecting on scientific knowledge; and participating productively in science.

Content Statements

- Light travels in a straight line until it interacts with an object or material.
- Light can be absorbed, redirected, bounced back, or allowed to pass through. The path of reflected or refracted light can be predicted.
- Visible light from the Sun is made up of a mixture of all colors of light. To see an object, light emitted or reflected by that object must enter the eye.
- An object's position can be described by locating the object relative to other objects or a background. The description of an object's motion from one observer's view may be different from that reported from a different observer's view.
- Magnetic, electrical, and gravitational forces can act at a distance.
- Friction is a force that acts to slow or stop the motion of objects.
- Sinking and floating can be predicted using forces that depend on the relative densities of objects and materials.

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CPI #	Cumulative Progress Indicator (CPI)				
5.2.6.C.1	Predict the path of reflected or refracted light using reflecting and refracting telescopes as examples.				
5.2.6.C.2	Describe how to prisms can be used to demonstrate that visible light from the Sun is made up of different colors.				
5.2.6.E.1	Model and explain how the description of an object’s motion from one observer’s view may be different from a different observer’s view.				
5.2.6.E.2	Describe the force between two magnets as the distance between them is changed.				
5.2.6.E.3	Demonstrate and explain the frictional force acting on an object with the use of a physical model.				
5.2.6.E.4	Predict if an object will sink or float using evidence and reasoning.				
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:50%;">Unit Essential Questions</th> <th style="width:50%;">Unit Enduring Understandings</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;"> <ul style="list-style-type: none"> • How do we know that things have energy? • How can energy be transferred from one material to another? What happens to a material when energy is transferred to it? </td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> • Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy), and types of energy associated with the position of mass and with energy fields (potential energy). • Changes take place because of the transfer of energy. Energy is transferred to matter through the action of forces. Different forces are responsible for the transfer of the different forms of energy. </td> </tr> </tbody> </table>		Unit Essential Questions	Unit Enduring Understandings	<ul style="list-style-type: none"> • How do we know that things have energy? • How can energy be transferred from one material to another? What happens to a material when energy is transferred to it? 	<ul style="list-style-type: none"> • Energy takes many forms. These forms can be grouped into types of energy that are associated with the motion of mass (kinetic energy), and types of energy associated with the position of mass and with energy fields (potential energy). • Changes take place because of the transfer of energy. Energy is transferred to matter through the action of forces. Different forces are responsible for the transfer of the different forms of energy.
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Unit Overview

Content Area: Life Science

Unit Title: Genetics

Target Course/Grade Level: 6th Grade

Unit Summary

- Living organisms are composed of cellular units (structures) that carry out functions required for life. Cellular units are composed of molecules, which also carry out biological functions.
- Organisms reproduce, develop, and have predictable life cycles. Organisms contain genetic information that influences their traits, and they pass this on to their offspring during reproduction.

Primary interdisciplinary connections:

21st century themes: 9.1- This unit will also infuse the 21st Century Life & Careers standard 9.1, strands A-D. These strands include: Critical Thinking and Problem Solving; Creativity and Innovation; Collaboration, Teamwork and Leadership and Cross Cultural Understanding and Interpersonal Communication.

Learning Targets

Standards: 5.3 Life Science: All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the order of natural systems can be modeled and predicted through the use of mathematics.

5.1.A.B.C.D Science Practices: This unit will infuse the four strands of the Science Practices standard. These focus on understanding scientific explanations; generating scientific evidence through active investigation; reflecting on scientific knowledge; and participating productively in science.

Content Statements

- Essential functions of plant and animal cells are carried out by organelles.
- All organisms are composed of cell(s). In multicellular organisms, specialized cells perform specialized functions. Tissues, organs, and organ systems are composed of cells and function to serve the needs of cells for food, air, and waste removal.
- During the early development of an organism, cells differentiate and multiply to form the many specialized cells, tissues, and organs that compose the final organism. Tissues grow through cell division.
- Reproduction is essential to the continuation of every species.

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- Variations exist among organisms of the same generation (e.g., siblings) and of different generations (e.g., parent to offspring).
- Traits such as eye color in human beings or fruit/flower color in plants are inherited.
- Some organisms reproduce asexually. In these organisms, all genetic information comes from a single parent. Some organisms reproduce sexually, through which half of the genetic information comes from each parent.
- The unique combination of genetic material from each parent in sexually reproducing organisms results in the potential for variation.

CPI #	Cumulative Progress Indicator (CPI)				
5.3.6.A.2	Model and explain ways in which organelles work together to meet the cell's needs.				
5.3.8.A.1	Compare the benefits and limitations of existing as a single-celled organism and as a multicellular organism.				
5.3.8.A.2	Relate the structures of cells, tissues, organs, and systems to their functions in supporting life.				
5.3.6.D.1	Predict the long-term effect of interference with normal patterns of reproduction.				
5.3.6.D.2	Explain how knowledge of inherited variations within and between generations is applied to farming and animal breeding.				
5.3.6.D.3	Distinguish between inherited and acquired traits/characteristics.				
5.3.8.D.1	Defend the principle that, through reproduction, genetic traits are passed from one generation to the next, using evidence collected from observations of inherited traits.				
5.3.8.D.2	Explain the source of variation among siblings.				
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Unit Overview

Content Area: Life Science

Unit Title: Body Systems - Digestive/Circulatory/Respiratory Systems

Target Course/Grade Level: 6th Grade

Unit Summary

- Living organisms are composed of cellular units (structures) that carry out functions required for life. Cellular units are composed of molecules, which also carry out biological functions.

Primary interdisciplinary connections:

21st century themes: 9.1- This unit will also infuse the 21st Century Life & Careers standard 9.1, strands A-D. These strands include: Critical Thinking and Problem Solving; Creativity and Innovation; Collaboration, Teamwork and Leadership and Cross Cultural Understanding and Interpersonal Communication.

Learning Targets

Standards: 5.3 Life Science: All students will understand that life science principles are powerful conceptual tools for making sense of the complexity, diversity, and interconnectedness of life on Earth. Order in natural systems arises in accordance with rules that govern the physical world, and the order of natural systems can be modeled and predicted through the use of mathematics.

5.1.A.B.C.D Science Practices: This unit will infuse the four strands of the Science Practices standard. These focus on understanding scientific explanations; generating scientific evidence through active investigation; reflecting on scientific knowledge; and participating productively in science.

Content Statements

- Systems of the human body are interrelated and regulate the body’s internal environment.
- Essential functions of the human body are carried out by specialized systems:
 - Digestive
 - Circulatory
 - Respiratory
 - Nervous
 - Skeletal
 - Muscular
 - Reproductive

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CPI #	Cumulative Progress Indicator (CPI)
5.3.6.A.1	Model the interdependence of the human body’s major systems in regulating its internal environment.
5.3.4.A.3	Describe the interactions of systems involved in carrying out everyday life activities.
Unit Essential Questions <ul style="list-style-type: none">• What do all living things have in common?	Unit Enduring Understandings <ul style="list-style-type: none">• Living organisms have a variety of observable features that enable them to obtain food and reproduce.
Evidence of Learning	
Suggested Summative Assessment <ul style="list-style-type: none">• NJ ASK 8• Unit exam	
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Unit Overview

Content Area: Earth Science

Unit Title: Solar System/Astronomy

Target Course/Grade Level: 6th Grade

Unit Summary

- Our universe has been expanding and evolving for 13.7 billion years under the influence of gravitational and nuclear forces. As gravity governs its expansion, organizational patterns, and the movement of celestial bodies, nuclear forces within stars govern its evolution through the processes of stellar birth and death. These same processes governed the formation of our solar system 4.6 billion years ago.

Primary interdisciplinary connections:

21st century themes: 9.1- This unit will also infuse the 21st Century Life & Careers standard 9.1, strands A-D. These strands include: Critical Thinking and Problem Solving; Creativity and Innovation; Collaboration, Teamwork and Leadership and Cross Cultural Understanding and Interpersonal Communication.

Learning Targets

Standards: 5.4 Earth Systems Science: All students will understand that Earth operates as a set of complex, dynamic, and interconnected systems, and is a part of the all-encompassing system of the universe.

5.1.A.B.C.D Science Practices: This unit will infuse the four strands of the Science Practices standard. These focus on understanding scientific explanations; generating scientific evidence through active investigation; reflecting on scientific knowledge; and participating productively in science.

Content Statements

- The height of the path of the Sun in the sky and the length of a shadow change over the course of a year.
- Earth's position relative to the Sun, and the rotation of Earth on its axis, result in patterns and cycles that define time units of days and years.
- The Sun's gravity holds planets and other objects in the solar system in orbit, and planets' gravity holds moons in orbit.
- The Sun is the central and most massive body in our solar system, which includes eight planets and their moons, dwarf planets, asteroids, and comets.

CPI #

Cumulative Progress Indicator (CPI)

5.4.6.A.1

Generate and analyze evidence (through simulations) that the Sun's apparent motion across the sky changes over the course of a year.

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5.4.6.A.2	Construct and evaluate models demonstrating the rotation of Earth on its axis and the orbit of Earth around the Sun.
5.4.6.A.3	Predict what would happen to an orbiting object if gravity were increased, decreased, or taken away.
5.4.6.A.4	Compare and contrast the major physical characteristics (including size and scale) of solar system objects using evidence in the form of data tables and photographs.
Unit Essential Questions <ul style="list-style-type: none">• What predictable, observable patterns occur as a result of the interaction between the Earth, Moon, and Sun?• What causes these patterns?	Unit Enduring Understandings <ul style="list-style-type: none">• Observable, predictable patterns of movement in the Sun, Earth, Moon system occur because of gravitational interaction and energy from the Sun.
Evidence of Learning	
Suggested Summative Assessment <ul style="list-style-type: none">• NJ ASK 8• Unit exam	
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