



TRINITY CATHOLIC ACADEMY

SCIENCE CURRICULUM

Trinity Catholic Academy Brockton follows the Massachusetts Science Curriculum Frameworks.

STRAND: EARTH AND SPACE SCIENCE

PK-8	PreK–2	Grades 3–5	Grades 6–8
Energy in the Earth System	<p>3. Weather changes from day to day and over the seasons.</p> <p>4. The sun supplies heat and light to the earth and is necessary for life.</p>	<p>6. Air temperature, moisture, wind speed and direction, and precipitation make up the weather in a particular place and time.</p> <p>7. Various forms of precipitation are connected to the weather in a particular place and time.</p> <p>8. Global patterns influence local weather, which can be measured.</p> <p>9. Weather is different from climate.</p>	<p>3. Radiation, conduction, and convection transfer heat through the earth's system.</p> <p>4. Energy provided by the sun, global patterns of atmospheric movement, and temperature differences among water, land, and atmosphere are related.</p> <p>11. Earth's tilt and its revolution around the sun result in uneven heating, causing the seasons.</p>
Materials and Energy Resources	<p>1. Water, rocks, soil, and living organisms are found on the earth's surface.</p> <p>2. Air is a mixture of gases all around us and wind is moving air.</p>	<p>1. What a mineral is.</p> <p>2. Physical properties of minerals and tests for those.</p> <p>5. The properties of soil include color, texture, and the abilities to retain water and support the growth of plants.</p>	
Earth Processes and Cycles		<p>3. The three categories of rocks and the processes that create them.</p> <p>4. Soil is formed by the weathering of rock and decomposition of plant and animal remains.</p> <p>10. Water on earth cycles in different forms and locations.</p> <p>11. Cycling of water, both in and out of the atmosphere, has an effect on climate.</p>	<p>6. Earth's surface is built up and torn down by natural processes.</p>
Structure of the Earth		<p>12. Earth's surface changes due to slow processes such as erosion and weathering, and rapid processes such as landslides, volcanic eruptions, and earthquakes.</p>	<p>1. Earth's common physical features can be represented with models and maps.</p> <p>2. Layers of the earth include the lithosphere, mantle, and core.</p> <p>5. Movement of the earth's crustal plates causes both slow and rapid changes in the earth's surface.</p> <p>7. Physical evidence supports theories that the earth has evolved over geologic time.</p>
Earth in the Solar System	<p>5. Events around us have repeating patterns, including the seasons of the year, day, and night.</p>	<p>13. Earth is a part of the "solar system" that includes the sun, planets, and many moons. Earth is the third planet from the sun.</p> <p>14. Earth orbits the sun in a year's time and rotates on its axis in approximately 24 hours. The rotation of the earth, day/night, and apparent movements of the sun, moon, and stars are connected.</p> <p>15. Changes occur in the observable shape of the moon over a month.</p>	<p>8. Gravity is a force that pulls all things toward the center of the earth. Gravity influences the formation and movement of the planets, stars, and solar system.</p> <p>9. Lunar and solar eclipses, moon phases, and tides are related to relative positions of the earth, moon, and sun.</p> <p>10. Properties and conditions of objects in the solar system and those on Earth.</p>
Origin and Evolution of Earth			<p>12. The universe contains many billions of galaxies and each galaxy contains many billions of stars.</p>

STRAND: LIFE SCIENCE (BIOLOGY)

PK-8	PreK–2	Grades 3–5	Grades 6–8
Characteristics of Living Things	<ol style="list-style-type: none"> 1. Animals and plants are living things that grow, reproduce, & need food, air, & water. 2. Characteristics of living and nonliving things. 3. Plants and animals have life cycles that vary. 	<ol style="list-style-type: none"> 1. Physical characteristics of plants and animals 3. Plants and animals go through predictable life cycles, including birth, growth, development, reproduction, and death. 4. Major life cycle stages of the frog and butterfly. 	<ol style="list-style-type: none"> 1. Organisms are classified into kingdoms.
Structure and Function of Cells			<ol style="list-style-type: none"> 2. Organisms are composed of cells, and many organisms are single-celled, where one cell must carry out all basic functions of life. 3. Plant and animal cells have similarities and differences in their major organelles. 4. Basic functions of living organisms are carried out in cells.
Systems in Living Things		<ol style="list-style-type: none"> 2. Structures in plants that are responsible for food production, support, water transport, reproduction, growth, and protection. 	<ol style="list-style-type: none"> 5. Multicellular organisms can be hierarchically organized from cells to tissues to organs to systems to organisms. 6. General functions of the major systems of the human body, and the interactions of these systems.
Heredity	<ol style="list-style-type: none"> 4. Plants and animals closely resemble their parents in observed appearance. 	<ol style="list-style-type: none"> 5. Observed characteristics of plants and animals can be fully inherited or they can be affected by the climate or environment. 	<ol style="list-style-type: none"> 7. Every organism requires a set of instructions that specifies its traits. Heredity is the passage of these instructions from one generation to another. 8. Hereditary information is contained in genes located in the chromosomes of each cell. 9. Sexual reproduction and asexual reproduction.
Evolution and Biodiversity	<ol style="list-style-type: none"> 5. Fossils provide us with information about living things that inhabited the earth years ago. 	<ol style="list-style-type: none"> 6. Inherited characteristics may change over time as adaptations to changes in the environment enable organisms to survive. 7. Changes in the environment have caused some plants and animals to die or move to new locations. 	<ol style="list-style-type: none"> 10. Genetic variation and environmental factors are causes of evolution and the diversity of organisms. 11. Evidence drawn from multiple sources provides the basis of the theory of evolution. 12. Extinction of species is related to a mismatch of adaptation and environment. 17. Ecosystems have changed through geologic time in response to various influences. 18. Biological evolution accounts for species diversity developed over generations.

Living Things and Their Environments

- 6. People and other animals interact with the environment through their senses.
- 7. Animals and plants go through changes in appearance as the seasons change.
- 8. An organism's habitat provides for its basic needs.

- 8. Organisms meet needs by using behaviors in response to information from the environment. Some behaviors are instinctive and others learned.
- 9. Plants have characteristic behaviors. Plants and animals can survive harsh environments via seasonal behaviors.
- 10. Organisms can cause changes in their environment to ensure survival, which may affect the ecosystem.
- 11. Energy derived from the sun is used by plants to produce sugars and is transferred with-in a food chain from producers to consumers to decomposers.

- 13. Organisms interact and have different functions within an ecosystem that enable the ecosystem to survive.
- 14. Roles & relationships among producers, consumers, and decomposers in the process of energy transfer in a food web.
- 15. Dead plants and animals are broken down by other living organisms, which contributes to the system as a whole.
- 16. Producers use energy from sunlight to make sugars through photosynthesis, which can be used immediately, stored for later use, or used by other organisms.

STRAND: PHYSICAL SCIENCES (CHEMISTRY)

	PreK–2	Grades 3–5	Grades 6–8
Properties of Materials and Matter	1. Observable properties of objects include size, shape, color, weight, and texture.	1. Properties of objects and materials.	2. Volume and mass are distinct components of density. 3. Appropriate tools and use of significant digits are needed to measure volume and mass. 4. Mass is conserved in a closed system.
States of Matter, Kinetic Molecular Theory, and Thermochemistry	2. Objects and materials are solid, liquid, or gas. Solids have a definite shape; liquids and gases take the shape of their container.	2. Solids, liquids, and gases have distinct properties. 3. Water can be changed from one state to another by adding or taking away heat.	9. A substance has a melting point and a boiling point, both independent of the amount of the sample. 10. Physical changes and chemical changes. 15. The effect of heat on particle motion during a change in phase.
Forms of Energy		4. Basic forms of energy, which cause motion or create change. 5. Energy can be transferred from one form to another.	13. Kinetic energy is transformed into potential energy & vice versa. 14. Temperature change results from adding or taking away heat energy from a system. 16. Heat moves in predictable ways, from warmer to cooler objects until reaching equilibrium.
Elements, Compounds and Mixtures; Atomic Structure and Nuclear Chemistry			5. Many elements combine in a multitude of ways to produce compounds that make up living and nonliving things. 6. Differences between an atom and a molecule. 7. Basic examples of elements and compounds. 8. Differences between mixtures and pure substances.

STRAND: PHYSICAL SCIENCES (INTRODUCTORY PHYSICS)

PK-8	PreK–2	Grades 3–5	Grades 6–8
Position and Motion of Objects	<p>3. Objects can move in various ways.</p> <p>4. Change the motion of an object by applying a force. The greater the force, the greater the change in motion.</p> <p>5. Objects can be balanced under some conditions.</p>		<p>1. Weight is the amount of gravitational pull on an object and is distinct from mass.</p> <p>11. An object's motion can be described by its position, direction of motion, and speed.</p> <p>12. Distance vs. time graphs for constant speed.</p>
Forms of Energy		<p>4. Basic forms of energy, which cause motion or create change.</p> <p>5. Energy can be transferred from one form to another.</p>	<p>13. Kinetic energy can be transformed into potential energy and vice versa.</p>
States of Matter	<p>2. Objects and materials are solid, liquid, or gas. Solids have a definite shape; liquids and gases take the shape of their container.</p>	<p>2. Solids, liquids, and gases have distinct properties.</p> <p>3. Water can be changed from one state to another by adding or taking away heat.</p>	<p>9. A substance has a melting point and a boiling point, both independent of the amount of the sample.</p>
Heat Energy			<p>14. Temperature change results from adding or taking away heat energy from a system.</p> <p>15. The effect of heat on particle motion during a change in phase.</p> <p>16. Heat moves in predictable ways, moving from warmer to cooler objects until reaching equilibrium.</p>
Electrical and Magnetic Energy		<p>6. Electricity in circuits requires a complete loop for an electrical current. Electricity can produce light, heat, and sound.</p> <p>7. Objects and materials can be conductors or insulators of electricity.</p> <p>8. Making and using electromagnets.</p> <p>9. Magnets have poles that repel and attract each other.</p> <p>10. A magnet will attract some objects and materials but not others.</p>	
Sound and Light Energy		<p>11. Sound is produced by vibrating objects and travels through a medium. The rate of vibration is related to the pitch of the sound.</p> <p>12. Light travels in a straight line until it strikes an object or travels from one medium to another. Light can be reflected, refracted, and absorbed.</p>	

STRAND: TECHNOLOGY/ENGINEERING

	PreK–2	Grades 3–5	Grades 6–8
Materials, Tools, and Machines	<p>1.1 Characteristics of natural and human-made materials.</p> <p>1.2 Possible uses for natural and human-made materials.</p> <p>1.3 Safe and proper use of tools and materials to construct simple structures.</p>	<p>1.1 Materials used to accomplish a design task based on specific properties.</p> <p>1.2 Appropriate materials and tools to construct a prototype safely.</p> <p>1.3 Differences between simple and complex machines.</p>	<p>1.1 Appropriate materials for design tasks based on specific properties and characteristics.</p> <p>1.2 Appropriate tools used to hold, lift, carry, fasten, and separate, and their safe and proper uses.</p> <p>1.3 Safe and proper use of tools and machines needed to construct a prototype.</p>
Engineering Design	<p>2.1 Tools and simple machines used for a specific purpose.</p> <p>2.2 Human beings and animals use parts of the body as tools.</p>	<p>2.1 Problems that reflect the need for shelter, storage, or convenience.</p> <p>2.2 Different ways a problem can be represented.</p> <p>2.3 Relevant design features for building a prototype of a solution to a problem.</p> <p>2.4 Natural and mechanical systems are designed to serve similar purposes.</p>	<p>2.1 Steps of the engineering design process.</p> <p>2.2 Methods of representing solutions to a design problem.</p> <p>2.3 The purpose of a prototype.</p> <p>2.4 Appropriate materials, tools, and machines to construct a prototype.</p> <p>2.5 Design features and cost limitations affect the construction of a prototype.</p> <p>2.6 The five elements of a universal systems model.</p>
Communication			<p>3.1 Components of a communication system.</p> <p>3.2 Appropriate tools, machines, and electronic devices used to produce and/or reproduce design solutions.</p> <p>3.3 Communication technologies and systems.</p> <p>3.4 How symbols and icons are used to communicate a message.</p>
Manufacturing			<p>4.1 Manufacturing systems of custom and mass production.</p> <p>4.2 Impacts of interchangeable parts, components of mass-produced products, and the use of automation.</p> <p>4.3 Manufacturing organization.</p> <p>4.4 Basic processes in manufacturing systems.</p>
Construction			<p>5.1 Parts of a structure.</p> <p>5.2 Three major types of bridges and their appropriate uses.</p> <p>5.3 The forces of tension, compression, torsion, bending, and shear affect the performance of bridges.</p> <p>5.4 Effects of load and structural shape on bridges.</p>
Transportation			<p>6.1 Transportation systems and devices that operate on or in land, air, water, and space.</p> <p>6.2 Possible solutions to transportation problems, using the universal systems model.</p> <p>6.3 Three subsystems of a transportation vehicle or device.</p> <p>6.4 Lift, drag, friction, thrust, and gravity in a vehicle or device.</p>
Bio-engineering			<p>7.1 Adaptive and assistive devices.</p> <p>7.2 Adaptive and assistive bioengineered products.</p>

Massachusetts Curriculum Frameworks

Department of Education Appendix II

Additional Learning Activities

for Grade PreK through Grade 8

This appendix presents suggestions for additional activities to enhance the grades PreK through 8 learning standards in Earth and Space Science, Life Science, and Physical Sciences.

Activities printed in regular type are Ideas for Developing Investigations and Learning Experiences. Those in *italics* are *Suggested Extensions to Learning in Technology/Engineering* and, at grades PreK–2 and 3–5, reference the related Technology/Engineering standards.

Earth and Space Science Grades PreK–2

Standard #1

- Use a hand lens to observe and describe the components and properties of a sample of soil (e.g., color, texture, presence or absence of clumps). Extend the examination to moist topsoil.
- For grades 1–2, conduct the experiment above with thoroughly wet soil and sand. Observe again after all of the samples dry over night.

Standard #2

- *Design and build a simple vehicle system that uses an air-filled, nonlatex balloon as an engine. Distinguish between naturally occurring and human-made materials on the vehicle. (T/E 1.2, 1.3) Safety note: Grades PreK–1 students should **not** be allowed to inflate balloons themselves.*
- *Teacher demonstration: Hold a strip of paper in various positions around a fan to determine patterns in air movement. (T/E 1.1, 1.2)*

Standard #4

- Record the outdoor temperatures in a sunny location and in a shady location. Discuss the reason for the difference in temperatures.
- Grade 2: Conduct the above activity on a sunny day and then repeat on a cloudy day at the same times and locations.

Standard #5

- Observe, record, and discuss seasonal changes as they occur.
- *Design and build a “Rube Goldberg” type of machine that works in a loop, repeating the pattern. (T/E 1.3, 2.1)*

Earth and Space Science Grades 3–5

Standard #1

- Observe and describe the differences between quartz and mica.
- With a hand lens, examine a sample of coarse sand containing many kinds of grains. Also examine a collection of local rocks. Observe that rocks usually contain grains of many different minerals and that sand grains can be pure minerals (e.g., quartz, mica).
- Show examples of items made from minerals (e.g., jewelry, aluminum foil, cans, glass bottles).
- *Visit a glass factory, or an aluminum or tin production plant. (T/E 1.1, 1.2)*
- *Arrange a visit with experts who work with minerals (e.g., gemologist). (T/E 1.1, 1.2)*
- *Discuss how minerals are used in industry/technology (e.g., diamonds for drilling). (T/E 1.1)*

Standard #2

- Acquire a collection of minerals that includes (a) duplicates of the same mineral that are somewhat different in appearance (size, shape, exact color) and (b) samples of minerals that look similar but are actually different. Sort as accurately as possible. Test all samples using three field tests: magnetism, streak, and hardness. Sort the minerals again if this new information changes prior conclusions about which samples are identical.
- Use a field guide to identify the minerals that you have described above. Compare your list of physical properties with those given in the guide.

Standard #3

- Approximate the role of heat in the formation of metamorphic rocks. Use dry cereal, marshmallows, and chocolate chips to represent three different minerals. Study and record the properties of each “mineral.” Combine and bake. Study properties of the “rocks” and new “minerals” formed by heat. Contrast to preexisting “minerals.”
- Approximate the role of pressure in the formation of metamorphic rocks. Snap wooden toothpicks in half, leaving them connected. Make similar piles of these “mineral grains” side by side on a tray. Place large books on top of one pile and press. Observe differences in the “rocks” brought about by pressure.
- Explain how the toothpick activity can also be used to represent the role of pressure in forming sedimentary rocks. Now the uncompacted toothpicks represent fresh grains of sediment.
- Illustrate the growth of crystals (important in forming both igneous and sedimentary rocks). Make concentrated solutions of various salts. Allow them to evaporate slowly and observe the formation of crystals. Commonly used salts include table salt (sodium chloride), alum, and Epsom salt.
- *Visit a facility that utilizes rocks and minerals in construction materials. (T/E 1.1, 1.2)*

Standard #4

- Engage in composting (worm farms).
- *Construct a mini-landfill. Unearth and observe decomposition of buried waste (e.g., food, paper, plastic, metal). (T/E 2.1, 2.2, 2.3)*

Standard #5

- Prepare different soil mixes using commercial potting soil, worm compost, and sand. Compare growth of plants in the different mixes.
- Fill clear jars half full with soil samples, then fill with water, shake, let settle, and observe the layers.

Standard #7

- Watch national/international weather broadcasts. Discuss the relationships among precipitation, temperature, and location on the globe.

Standard #8

- Create weather maps, using basic symbols showing weather patterns, precipitation, etc. Ask students to present their own weather reports to the class.
- Grade 3: Watch local weather reports on television and in the newspaper.
- Grades 4–5: Attempt to forecast the weather for the next day and explain reasons for the forecast.

Standard #10

- Demonstrate in the classroom evaporation, condensation, and precipitation.
- Show on a diagram of the water cycle the effects of regional weather events, such as heavy rainstorms, heavy winter snow totals, and droughts.
- Have students brainstorm and act out the water cycle (see Incredible Journey/Project WET in “Selected Websites for Science and Technology/Engineering Education,” page 153 of this *Framework*).
- Place white flowers (e.g., carnation, rose) in a vase that contains water with food coloring added. Observe the change in flower color and relate observations to the uptake of pollution by plants.
- *Create a simple presentation showing the water cycle. (T/E 2.2)*

Standard #12

- Visit local sites that show examples of the earth changing due to slow processes (e.g., schoolyard, coastline, erosion at Walden Pond) and rapid processes (e.g., localized erosion at Nauset Beach after a large storm). Document the changes using newspaper photographs.
- Visit local sites that show the effects of glacial advance or retreat on the landscape (e.g., drumlins, kettle ponds).
- Observe the effect of winter weathering on roads.
- *Discuss the scales used to measure earth events (e.g., the Richter Scale). (T/E 2.2)*
- *Compare a beaver dam with a human-made dam. What effects on the environment does each have? (T/E 2.4)*

Standard #14

- *Create a model of the solar system and, using a flashlight, demonstrate the effects of Earth’s rotation and revolution. (T/E 2.2, 2.3)*

Standard #15

- Demonstrate the various phases of the moon using a model (light source and sphere).

Grades 6–8

Standard #1

- Obtain a topographic relief map and a corresponding paper contour map of a coastal area (preferably in Massachusetts). Use both maps to demonstrate the changes in the coastline that would occur if the sea level were to rise by various amounts.
- Use topographic maps to explain an environmental problem, its location, its cause, and a proposed solution.
- Construct a clinometer. If suitable terrain is available, use a clinometer to determine the height of geologic features, the slope of surface features, and the slope of layers of strata. Substitute heights of architectural features and slopes of ramps if necessary.
- From a contour map, build a model that shows the physical features of a selected area and the locations of wildlife/plants.
- Use maps from different time periods to observe changes in landscape.

Standard #3

- Using a thermometer, compare levels of heat absorption for white and black cans.
- Investigate heat transfer by placing plastic, metal, and wooden spoons in hot water and determining how quickly they heat up (conduction).
- Investigate heat transfer *from* a room by adding 50 ml of cold water to a cup or beaker. Stir it and record its temperature changes every few minutes over a ten-minute period.
- Investigate heat transfer *to* a room by adding 50 ml of warm water to a cup or beaker. Stir and record temperature changes every few minutes over a ten-minute period.

Standard #6

- Look at maps and photos to observe coastal changes.

Standard #7

- Study the local landscape and, if possible, an unbuilt terrain (e.g., a state park) for signs of glaciation (e.g., eskers, drumlins, kettle holes). Discuss whether any of these features give evidence as to which way the glacier that formed them was moving.

Standard #8

- Explain how a clinometer uses gravity to find the center of the earth, and puts that knowledge to use. Explain how part of this function could be carried out using a spirit level.

Standard #9

- Model solar and lunar eclipses using a dim bulb and two balls.
- If possible, put out tide stakes covered in chalk to observe and measure the height of the tide. Observe changes over time and correlate to the phases of the moon.

Standard #10

- Model day and night using a dim bulb and a ball.
- Use binoculars and telescopes to observe planets and the moon. Estimate the diameter of the largest and smallest craters you observe on the moon. Explain what you measured and how you calculated your answer.
- Observe Mars, Venus, and Jupiter. Compare their observed color and brightness. Did you observe any moons accompanying any of these planets? Explain why or why not.
- Record the location of the moon, Mars, Venus, and Jupiter relative to a nearby bright star. Repeat after about one week and one month. Explain the changes.

Life Science (Biology)

Grades PreK–2

Standard #1

- Using string, mark out a circle of about two meters in diameter in the schoolyard or a nearby park. Have students survey the biodiversity of the circle. Younger students can look for leaves of different shapes and older students can find out how many different types of plants and animals are found in the circle. Ask how the living things in the circle might be different in different seasons, then test predictions by going out to see.
- *Design and build several cardboard boxes, each of which has a small round opening at a different location on the box. Cover newly germinating seeds with the various boxes and observe how the stems grow toward the light that comes through the openings. (T/E 2.3)*

- *Build a terrarium containing plants and small animals (e.g., earthworms, other soil organisms, insects). Discuss the needs of living things and let the students participate in maintenance of the terrarium. (T/E 1.1, 1.2, 1.3)*

Standard #2

- Examine a variety of nonliving and living things. Describe differences among them.
- Sort and sub-sort pictures of living things into groups based on characteristics that you can see.

Standard #3

- Observe the changes in physical characteristics during the life cycle of a chick. Note: it is important to provide adequate incubation equipment, space, and housing facilities for the chicks.
- *Compare a bicycle wheel and other cycles in machinery. (T/E 2.2)*

Standard #6

- *Examine and compare human-made objects that are engineered to enhance the senses or to protect parts of bodies that are centers of the senses (e.g., hearing aids, gloves, glasses, ear plugs). (T/E 1.2, 2.2)*

Standard #7

- Discuss animals that hibernate. Some examples from Massachusetts are the garden snail, box turtle, chipmunk, woodchuck, black bear, and bat.
- In the fall, collect samples of the food items (seeds, nuts, grains) that a local chipmunk would store to eat while hibernating. Keep in a dry place over the winter. Notice that these foods do not spoil. Notice that they cannot be found outdoors in the winter. Discuss the high nutritional value of these foods for animals.
- Discuss how animals' fur changes to prepare for winter and compare with what humans do to prepare for winter.
- Compare winter adaptations of wild mammals native to the area (e.g., squirrels, woodchucks, mice, raccoon, deer, bats, coyotes).
- Discuss what happens to leaves that fall in the woods each year (decomposition).
- *Explore objects and technologies used to make human life comfortable during the four seasons and bring examples or pictures of examples from home (e.g., air conditioner, fan, winter coat, wool hat). (T/E 1.1, 2.1)*

Standard #8

- Observe and discuss animals in their natural habitats.
- Observe and record the names of plants and animals in your neighborhood or on a field trip, then prepare a field guide that describes these animals.
- Choose an animal and provide students with a list of its habitat needs. Allow the students to imagine that they are that animal. Can they find what they need to survive (i.e., food, water, shelter/space)?
- *Explain how tools of technology such as glue, scissors, tape, ruler, paper, toothpicks, straws, spools, and other mechanical fasteners can be used to make or build animal habitats. (T/E 1.2, 1.3)*
- *Using pencil and paper or graph paper as tools, sketch a drawing of the front view of an animal habitat made by humans. (T/E 1.3)*

Life Science (Biology) Grades 3–5

Standard #2

- Observe the cross-sections of various trees. Determine the age of each tree, and relate the variation in distance between the circles of the cross-section to the variation in climate from year to year.
- *Compare the physical properties of hard and soft woods (density, hardness, knots) and relate those properties to the use of each type of wood in construction. (T/E 1.1)*
- *Use magnifying glasses and/or microscopes to observe plant structures. (T/E 1.2)*

Standard #3

- Follow the complete life cycle of a metamorphic organism such as a frog or a moth. Draw pictures of the organism at various stages of development.
- Explore through pictures or videos the life cycle of a nonmetamorphic animal.

Standard #5

- Sort pictures of fish of the same species, noticing which traits vary (e.g., color pattern, size) and which do not (e.g., shape, number of fins).

Standard #6

- Build a human skeleton using found or recycled materials.
- Compare heads, bodies, and tails of different types of fish. Explain how these adaptations help each type of fish survive.

Standard #7

- Discuss the challenges of living in a coastal environment. What are the environmental stresses facing plants and animals, and how do they adapt?

Standard #9

- Observe the ability of a sunflower or tulip to sense light intensity.
- Observe plants' responses to stresses in their environment (e.g., changes in salinity levels or flooding in the salt marsh).

Standard #11

- Compare a coastal food chain to an inland food chain.

Grades 6–8**Standard #12**

- Discuss possible reasons for the extinction of dinosaurs (Sudden change in climate? Drought? Catastrophic geological events?).

Standard #13

- Discuss the dispersal of pollen by bees and other insects and how it enables the reproduction and propagation of plants.
- Investigate the interactions of organisms in a local environment.
- In a wooded area, observe the ecosystem contained in the leaf litter and discuss how it sustains the larger ecosystem of the forest.

Standard #15

- Observe and document the effects of decay on materials (e.g., fruits) left to rot.
- Establish a compost bin. Analyze the decay of the contents and the gradual appearance of various organisms over time.
- Investigate wetland soil. Discuss how organic material is broken down more slowly in anaerobic conditions.

Standard #17

- Research natural and human-caused changes in some of the large-scale ecosystems (biomes) on earth.
- Use computer simulations to model the growth of plants on a plot of land, or a sand dune, or after a volcanic eruption.
- Review the data (on websites) gathered by scientists who are conducting long-term ecological research. How are they monitoring rising sea levels?
- Observe seasonal movement of barrier beaches. Compare jettied and non-jettied beaches.
- Investigate the effects of a tidal restriction on a salt marsh.
- Compare ecosystems with low and high biodiversity (e.g., salt marsh has low biodiversity, rainforest has high biodiversity). Discuss the timeframes in which species have adapted to their environment.

Physical Sciences**Grades PreK–2****Standard #1**

- *Group a variety of objects according to the characteristics that they share (e.g., height, shape, hardness). (T/E 1.1)*
- *Mystery Tactile Box; 20 Questions about the objects in the box. (T/E 1.1)*

Standard #2

- Choose six small transparent closed containers. In each of three, put a different small solid object (e.g., marble, screw, eraser). Partly fill each of the three remaining containers with a different liquid (e.g., water, oil, honey). Close all six containers and shake them. Note that all the solids share a property of definite shape, while liquids do not maintain their shape.
- Observe water as it changes from a solid (ice) to a liquid (water).

- *Using a piece of paper, design a container that can be filled with water. Explore how many times the container can be filled with water before it falls apart. Discuss why some designs may be more effective than others. (T/E 1.1, 1.2)*

Standard #3

- Use solid objects such as a ball, a cube, and a cone. First try to roll each object on a hard smooth level surface. Observe and describe its motion and the path it takes. Next, tilt the surface, place each object on it at the center and release the object. Observe and describe its motion and the path it takes. Repeat using various surfaces (e.g., rough, soft).
- *Design a simple structure that will roll (e.g., cylinder) using simple classroom tools and materials (e.g., construction paper, glue, paste, scissors, tape, straws). Change the design so that the structure will roll in a different direction. (T/E 1.3, 2.1)*

Standard #4

- Measure the distance that objects move on a hard, smooth surface after being pushed or pulled with different force. Repeat using various surfaces (e.g., rough, soft).
- Manipulate various objects. Observe the different methods (forces) that you can use to make objects move. Include pushing with a stick, pulling with a string, and pushing by blowing on a light object.

Standard #5

- Balance a large block of wood on a smaller one (fulcrum). Observe that adding some weight to one end of the large block will unbalance it. Find ways to keep it balanced by using two weights, one on each side of the fulcrum.

Grades 3–5

Standard #1

- Using a variety of objects, identify at least the main material the object is made of (e.g., wood, metal, paper, pottery/ceramic, plastic, glass). Discuss the function of the object and its parts. Discuss how the properties of the material(s) used are suited to the function of the overall object or some part of it.
- *Discuss the different materials that several common objects are made of, and the reasons that those specific materials may have been used. (T/E 1.1)*

Standard #6

- *Design and build a simple game using simple circuits. (T/E 1.2, 2.2)*

Standard #8

- *Design and construct a simple game or toy (prototype) that works because of electromagnets. (T/E 1.1, 1.2, 2.2, 2.3)*

Standard #9

- Provide sealed field detectors (iron filings confined between sheets of plastic or iron filings sealed in oil). Use to show and draw magnetic fields in two and three dimensions.

Standard #12

- *Design and build a periscope from cardboard and mirrors. (T/E 1.1, 1.2, 2.3)*
- *Design and build a pinhole camera. Test the effects of light on light sensitive paper. (T/E 1.2, 2.3)*

Grades 6–8

Standard #3

- Use measurements of weight and volume to find out if several solid metal objects are made of the same metal or different metals. Explain why some of your conclusions may be more definite than others. Give reasons based on accuracy of measurements and on the physical properties of metals, where applicable.

Standard #4

- Carry out a chemical reaction. Determine the masses of all reactants and all products. Discuss whether results support the conservation of mass, taking into account the sensitivity and accuracy of measuring equipment used.