

Middle School Science	Boardworks Middle School Presentations
Earth Science	
A. Materials and Processes That Shape A Planet	
GRADE 6	
2. Cite evidence to demonstrate and explain that physical weathering and chemical weathering cause changes to Earth materials.	
a. Identify examples of physical weathering, such as the effect of wind, ice, etc. and describe the changes caused in each.	Physical Weathering
b. Describe the changes in materials caused by each of the chemical weathering processes listed: <ul style="list-style-type: none"> • Rusting/tarnishing • Dissolving by acid rain 	Chemical Weathering Acid Rain
c. Compare physical and chemical weathering and provide examples of changes caused in Earth materials or features by each of these processes.	Physical Weathering Chemical Weathering
4. Differentiate among sedimentary, igneous, and metamorphic rocks based upon the processes by which they are formed.	
a. Identify and describe the processes that form sedimentary rock. <ul style="list-style-type: none"> • Deposition • Compaction • Cementation 	Sedimentary Rocks
b. Identify and describe the processes that form igneous rocks <ul style="list-style-type: none"> • Volcanic eruptions • Igneous intrusions 	Igneous Rocks
c. Identify and describe the processes that form metamorphic rocks. <ul style="list-style-type: none"> • High temperature • Pressure 	Metamorphic Rocks
d. Cite features that can be used as evidence to distinguish among the three types of rocks and relate these features to the processes that form each rock type.	Sedimentary Rocks Igneous Rocks Metamorphic Rocks Different Types of Rocks Using Rocks
e. Describe the processes that change one form of rock into another (rock cycle).	The Rock Cycle
B. Earth History	

GRADE 8	
1. Explain how sedimentary rock is formed periodically, embedding plant and animal remains and leaving a record of the sequence in which the plants and animals appeared and disappeared.	
a. Explain how sedimentary rock buried deep enough may be reformed by pressure and heat and these re-formed rock layers may be forced up again (uplift) to become land surface and even mountains.	Sedimentary Rocks
b. Cite evidence to confirm that thousands of layers of sedimentary rock reveal the long history of the changing surface of the Earth	Sedimentary Rocks
c. <i>Explain why some fossils found in the top layers of sedimentary rock are older than those found beneath in lower layers.</i> <ul style="list-style-type: none"> • <i>Folding</i> • <i>Breaking</i> • <i>Uplift</i> • <i>Faulting</i> • <i>Tilting</i> 	-
2. Recognize and explain that fossils found in layers of sedimentary rock provide evidence of changing life forms.	
a. Recognize how different types of fossils are formed, such as petrified remains, imprints, molds and casts.	Sedimentary Rocks
b. Recognize and explain that the fossil record of plants and animals describes changes in life forms over time.	Evolution
C. Plate Tectonics	
GRADE 6	
1. Recognize and describe the internal and external structure of the Earth.	
a. Recognize and describe that the Earth's mantle <ul style="list-style-type: none"> • Lies between the core and the crust • Is very hot • Has properties of both solids and liquid 	The Structure of the Earth
b. Recognize and describe that the Earth's core <ul style="list-style-type: none"> • Is at the center of the Earth • Is very hot • Is dense and metallic 	The Structure of the Earth

c. Identify and describe the Earth's crust. <ul style="list-style-type: none"> • The solid crust consists of separate plates • The plates constantly move in different directions due to convection currents • The plates interact with one another as a result of plate motion. 	The Structure of the Earth What is Plate Tectonics?
2. Recognize and explain how major geologic events are a result of the movement of Earth's crustal plates.	
a. Recognize and describe the evidence for plate movement. <ul style="list-style-type: none"> • Shape of continents • Continuity of geologic features and fossils on the continents • Ocean rifts, seafloor spreading • Global patterns of earthquakes and volcanoes 	What is Plate Tectonics? Plate Boundaries
b. Recognize and explain that major geologic events (earthquakes, volcanic activity, sea floor spreading) occur along crustal plate boundaries.	Plate Boundaries
D Astronomy	
GRADE 6	
1. Recognize that objects of our solar system are interrelated.	
a. Recognize that Earth and its closest star, the sun, are part of a disk-shape galaxy of stars and that our galaxy is one of billions of galaxies.	The Solar System
b. Construct models with accurate scale that represent the position of the Earth relative to the sun and to other planets.	The Solar System
c. Identify and describe the general pattern of movement of all objects in our solar system.	The Solar System Gravity
d. Recognize that the pull of gravity causes the pattern of motion of celestial objects.	Gravity
GRADE 8	
1. Identify and describe the components of the universe.	
a. Recognize that a galaxy contains billions of stars that cannot be distinguished by the unaided eye because of their great distance from Earth, and that there are billions of galaxies.	The Solar System
b. Identify that our solar system is a component of the Milky Way Galaxy.	The Solar System
c. <i>Identify and describe the various types of galaxies</i>	–
d. Identify and describe the type, size, and scale, of the Milky Way Galaxy.	The Solar System
2. Identify and explain celestial phenomena using the regular and predictable motion of objects in the solar system.	
a. Identify and describe the relationships among the period of revolution of a planet, the length of its solar year, and its distance from the sun.	The Solar System

b. Identify and explain the relationship between the rotation of a planet or moon on its axis and the length of the solar day for that celestial object.	Days, Years and Seasons
c. Identify and explain the cause of the phases of the moon.	The Earth, Moon and Sun
d. Describe how lunar and solar eclipses occur.	The Earth, Moon and Sun
e. <i>Identify and describe how the shape and location of the orbits of asteroids and comets affect their periods of revolution.</i>	–
3. Recognize and explain the effects of the tilt of Earth's axis.	
a. Recognize and describe that Earth's axis is tilted about 23° from vertical with respect to the plane of its orbit and points in the same direction during the year.	Days, Years and Seasons
b. Recognize and describe that as Earth orbits the sun, the tilt of Earth's axis causes <ul style="list-style-type: none"> • Changes in the angle of the sun in the sky during the year • Seasonal differences in the northern and southern latitudes 	Days, Years and Seasons
c. Recognize and describe how the tilt of Earth's axis affects the climate in Maryland.	What is Weather?
4. Recognize and explain how the force of gravity causes the tides.	
a. <i>Identify and describe the cause of high and low tides.</i>	–
E. Interactions of Hydrosphere and Atmosphere	
GRADE 8	
1. Cite evidence to explain the relationship between the hydrosphere and atmosphere.	
a. Describe the composition of the atmosphere and hydrosphere.	The Atmosphere The Water Cycle
b. Recognize and describe the water cycle as the distribution and circulation of Earth's water through the glaciers, surface water, groundwater, oceans, and atmosphere.	The Water Cycle
c. Identify and describe how the temperature and precipitation in a geographic area are affected by surface features and changes in atmospheric and ocean content. <ul style="list-style-type: none"> • Relative location of mountains • Volcanic eruptions • Proximity (closeness) to large bodies of water • Heat energy of ocean currents 	Wind and Ocean Currents Precipitation
2. Recognize and describe the various factors that affect climate.	
a. Identify and describe how the temperature and precipitation of an area are affected by surface and ocean features. <ul style="list-style-type: none"> • Relative location of mountains • Proximity (closeness) to large bodies of water • Warm and cold ocean currents 	Precipitation Wind and Ocean Currents
b. Recognize and describe the global effects of volcanic eruptions, greenhouse gases, and El Nino.	Greenhouse Gases

3. Identify and describe the atmospheric and hydrospheric conditions related to weather systems.	
a. Identify and describe weather patterns associated with high and low pressure systems and the four frontal systems using appropriate data displays including weather maps.	What is Weather?
b. Identify and describe the atmospheric and hydrospheric conditions associated with the formation and development of hurricanes, tornadoes, and thunderstorms.	Hurricanes Tornados
c. <i>Identify and describe how various tools are used to collect weather data and forecast weather conditions: barometer, thermometer, anemometer and psychromet.</i>	–
Life Science	
A. Diversity of Life	
GRADE 7	
1. Compile evidence to verify the claim of biologists that the features of organisms connect or differentiate them—these include external and internal structures (features) and processes.	
a. Provide examples and explain that organisms sorted into groups share similarities in external structures as well as similarities in internal anatomical structures and processes which can be used to infer the degree of relatedness among organisms <ul style="list-style-type: none"> • Vascular – non-vascular plants • Closed – open circulatory systems • Asexual – sexual reproduction • Respiration (lungs-gills-skin) • Digestion 	Classifying Organisms
b. Identify general distinctions among organisms that support classifying some things as plants, some as animals, and some that do not fit neatly into either group. <ul style="list-style-type: none"> • Animals consume food • Plants make food 	Classifying Organisms Feeding Types
c. <i>Use analogies, models, or drawings to represent that animals and plants have a great variety of body plans and internal structures that define the way they live, grow, survive, and reproduce.</i>	–
B. Cells	
GRADE 7	
1. Gather and organize data to defend or argue the proposition that all living things are cellular (composed of cells) and that cells carry out the basic life functions.	

<p>a. Use microscopes or other magnifying instruments to observe, describe, and compare the cellular composition of different body tissues and organs in a variety of organisms (animals and plants).</p>	<p>–</p>
<p>b. Based on data from readings and designed investigations, cite evidence to illustrate that the life functions of multicellular organisms (plant and animal) are carried out within complex systems of different tissues, organs and cells.</p> <ul style="list-style-type: none"> • Extracting energy from food • Getting rid of wastes • Making new materials 	<p>Cells to Organisms Releasing Energy</p>
<p>c. Based on research and examples from video technology explain that the repeated division of cells enables organisms to grow and make repairs.</p>	<p>Where Do Cells Come From?</p>
<p>d. Collect data from investigations using single celled organisms, such as yeast or algae to explain that a single cell carries out all the basic life functions of a multicellular organism.</p> <ul style="list-style-type: none"> • Reproducing • Extracting energy from food • Getting rid of wastes 	<p>What Are Microbes?</p>
<p>e. Based on data compiled from a number of lessons completed, take and defend a position on the statement “The way in which cells function is the same in all organisms.”</p>	<p>Animal and Plant Cells</p>
<p>2. Recognize and provide examples that human beings, like other organisms have complex body systems of cells, tissues and organs that interact to support an organism’s growth and survival.</p>	<p style="background-color: #cccccc;"></p>
<p>a. Describe and explain that the complex set of systems found in multicellular organisms are made up of different kinds of tissues and organs which are themselves composed of differentiated cells.</p>	<p>Cells to Organisms</p>
<p>b. Select several body systems and explain the role of cells, tissues and organs that effectively carry out a vital function for the organism, such as</p> <ul style="list-style-type: none"> • Obtaining food and providing energy (digestive, circulatory, respiratory) • Defense (nervous, endocrine, circulatory, muscular, skeletal, immune) • Reproduction (reproductive, endocrine, circulatory) • Waste removal (excretory, respiratory, circulatory). • Breathing (respiratory, circulatory) 	<p>Chemical Digestion Digestion The Respiratory System Respiration and the Circulatory System The Nervous System The Endocrine System The Musculoskeletal System Human Sex Cells and Systems Fighting Disease</p>

c. Develop a response that explains the meaning of the statement, “The specialization of cells serves the operation of the organs, and the organs serve the needs of the cells.”	Cells to Organisms Animal and Plant Cells Releasing Energy
d. Investigate ways in which the various organs and tissues function to serve the needs of cells for food, air, and waste removal.	Releasing Energy The Respiratory System Respiration and the Circulatory System
C. Genetics	
GRADE 7	
1. Explain the ways that genetic information is passed from parent to offspring in different organisms.	
a. Investigate and explain that in some kinds of organisms, all the genes come from a single parent, whereas in organisms that have sexes, typically half of the genes come from each parent.	Types of Reproduction
b. Investigate and explain that in sexual reproduction, a single specialized cell from a female (egg) merges with a specialized cell from a male (sperm) and the fertilized egg now has genetic information from each parent, that multiplies to form the complete organism composed of about a trillion cells, each of which contains the same genetic information..	Human Sex Cells and Systems Causes of Variation
c. Investigate organisms that reproduce asexually to identify what traits they receive from the parent.	Types of Reproduction
d. Use information about how the transfer of traits from parent or parents to offspring occurs, to explain how selective breeding for particular traits has resulted in new varieties of cultivated plants and domestic animals.	Inheritance Causes of Variation Selecting Characteristics
e. Identify evidence to support the idea that there is greater variation among offspring of organisms that reproduce sexually than among those that reproduce asexually.	Causes of Variation
D. Evolution	
GRADE 6	
1. Explain that in any particular environment, the growth and survival of organisms and species depend on the physical conditions.	
a. Cite examples and describe that small differences between parents and offspring can accumulate (through selective breeding) in successive generations so that descendants are very different from their ancestors.	Evolution Selecting Characteristics
b. Explain that in all environments freshwater, marine, forest, desert, grassland, mountain, and others organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter.	Competition

c. Explain that in any particular environment individual organisms with certain traits are more likely than others to survive and have offspring.	Evolution
d. Explain, with examples, ways that people control some characteristics of plants and animals they raise by selective breeding.	Selecting Characteristics
e. Describe ways in which changes in environmental conditions can affect the survival of individual organisms and entire species.	Environmental Change Evolution
f. Describe how sediments of sand and smaller particles (sometimes containing the remains of organisms) are gradually buried and are cemented together by dissolved minerals to form solid rock; and describe that such fossils provide evidence for the long history of changing life forms whose remains are found in the rocks.	Sedimentary Rocks Evolution
g. Explain that the more recently deposited rock layers are likely to contain fossils resembling existing species.	Sedimentary Rocks Evolution
GRADE 8	
1. Recognize and describe that evolutionary change in species over time occurs as a result of natural variation in organisms and environmental changes.	
a. Recognize and describe that gradual (climatic) and sudden (floods and fires) changes in environmental conditions affect the survival of organisms and populations.	Environmental Change Evolution Weather Hazards
b. Recognize that adaptations may include variations in structures, behaviors, or physiology, such as spiny leaves on a cactus, birdcalls, and antibiotic resistant bacteria.	Adaptations Animal Behavior
c. Recognize and describe that adaptation and speciation involve the selection of natural variations in a population.	Adaptations Evolution
d. Recognize and describe that extinction occurs when the adaptive traits of a population do not support its survival.	Evolution
e. Recognize that evolution accounts for the diversity of species.	Evolution
E. Flow of Matter and Energy	
GRADE 7	
1. Explain that the transfer and transformation of matter and energy links organisms to one another and to their physical setting.	
a. Cite evidence from research and observations that food provides molecules that serve as fuel and building materials for all organisms.	Releasing Energy
b. Cite evidence from research and observations that organisms that eat plants or animals break down what they have consumed (food) to produce the materials and energy they need to survive or store for later use.	Pyramids of Number and Biomass What is Photosynthesis? Releasing Energy

c. Investigate and describe the processes that enable plants to use the energy from light to make sugars (food) from carbon dioxide and water.	What is Photosynthesis?
d. Provide evidence from research to explain how plants can use the food they make immediately for fuel or stored for later use.	What is Photosynthesis? Leaves and Glucose
e. Ask and seek answers to questions about the fact that transfer of matter between organisms continues indefinitely because organisms are decomposed after death to return food materials to the environment.	Recycling Nutirents
f. Provide evidence that supports the premise "In the flow of matter system the total amount of matter remains constant even though its form and location change." • Carbon cycle • Nitrogen cycle • Food chains and food webs	What is Energy? Recycling Nutrients
F. Ecology	
GRADE 6	
1. Give reasons supporting the fact that the number of organisms an environment can support depends on the physical conditions and resources available.	
a. Explain that populations increase or decrease relative to the availability of resources and the conditions of the environment.	Feeding Types Environmental Change Competition
b. Identify and describe factors that could limit populations within any environment, such as disease, introduction of a nonnative species, depletion of resources, etc.	Environmental Change Competition
c. Explain that within any environment organisms with similar needs may compete with one another for resources.	Competition
d. Cite examples to illustrate that competition is reduced when organisms use different sets of resources, such as birds in a forest eat different kinds and sizes of seeds.	Evolution
Chemistry	
A. Structure of Matter	
GRADE 7	
1. Cite evidence to support the fact that all matter is made up of atoms, which are far too small to see directly through a microscope.	
a. Recognize and describe that the atoms of each element are alike but different from atoms of other elements.	Atomic Structure Elements and Compounds
b. Recognize and describe that different arrangements of atoms into groups compose all substances.	What Are Atoms?

c. Provide evidence from the periodic table, investigations and research to demonstrate that elements in the following groups have similar properties. <ul style="list-style-type: none"> • Highly reactive metals, such as magnesium and sodium • Less-reactive metals, such as gold and silver • Highly reactive non-metals, such as chlorine, fluorine, and oxygen • Almost non-reactive gases, such as helium and neon 	The Periodic Table Metals and Nonmetals
d. Provide examples to illustrate that elements are substances that do not breakdown into smaller parts during normal investigations involving heating, exposure to electric current or reactions with acids.	–
e. Cite evidence to explain that all living and non-living things can be broken down into elements.	–
GRADE 8	
1. Provide evidence to explain how compounds are produced. (No electron transfer)	
a. Describe how elements form compounds and molecules.	Elements and Compounds
b. Investigate and describe what happens to the properties of elements when they react chemically with other elements.	Making Compounds Making Gases Types of Chemical Reactions
c. Based on data from investigations and research compare the properties of compounds with those of the elements from which they are made.	Elements and Compounds Making Compounds
B. Conservation of Matter	
GRADE 8	
1. Provide evidence to support the fact that the idea of atoms explains conservation of matter.	
a. Use appropriate tools to gather data and provide evidence that equal volumes of different substances usually have different masses.	–
b. Cite evidence from investigations that the total mass of a system remains the same throughout a chemical reaction because the number of atoms of each element remains the same.	Conservation of Mass
c. Give reasons to justify the statement, “If the number of atoms stays the same no matter how the same atoms are rearranged, then their total mass stays the same.”	Conservation of Mass
C. States of Matter	
GRADE 6	
1. Provide evidence and examples illustrating that many substances can exist as a solid, liquid, or gas depending on temperature.	
a. Use evidence from investigations to describe the effect that adding heat energy to different types of matter has on changing matter from one state to another.	Changes of Matter Changing State

b. Based on data from investigations describe the effect that removing heat energy from different types of matter has on changing matter from one state to another.	Changes of Matter Changing State
c. Analyze data gathered and formulate a conclusion on the effects of temperature change on most substances.	Changes of Matter Changing State
GRADE 8	
1. Describe how the motion of atoms and molecules in solids, liquids, and gases changes as heat energy is increased or decreased.	
a. <i>Based on data from investigations and video technology, describe and give reasons for what happens to a sample of matter when heat energy is added to it (most substances expand).</i>	–
b. Describe what the temperature of a solid, or a liquid, or a gas reveals about the motion of its atoms and molecules.	Particles in Action
c. Formulate an explanation for the different characteristics and behaviors of solids, liquids, and gases using an analysis of the data gathered on the motion and arrangement of atoms and molecules.	Particles in Action Changing State
D. Physical and Chemical Changes	
GRADE 6	
1. Cite evidence to support the fact that some substances can be separated into the original substances from which they were made.	
a. <i>Investigate and identify ways to describe and classify mixtures using the observable and measurable properties of their components.</i> • Magnetism • Boiling point • Solubility in water.	–
b. Based on data gathered, identify and describe various processes used to separate mixtures. • Filtration • Evaporation • Paper chromatography	Separating Mixtures Chromatography
c. Use data gathered to provide a reasonable explanation for the idea that the mass of a mixture is equal to the sum of the masses of its components.	Solutions
GRADE 8	
1. Compare compounds and mixtures based on data from investigations and research.	
a. Cite evidence from investigations to explain how the components of mixtures can be separated.	Separating Mixtures Chromatography

b. Use evidence from data gathered to explain why the components of compounds cannot be separated using physical properties.	Making Compounds
c. Analyze the results of research completed to develop a comparison of compounds and mixtures.	Elements and Compounds
2. Cite evidence and give examples of chemical properties of substances.	
a. <i>Based on data from investigations and research, identify and describe chemical properties of common substances.</i> <ul style="list-style-type: none"> • <i>Reacts with oxygen (rusting/tarnishing and burning)</i> • <i>Reacts with acids (dissolves metal)</i> • <i>Reacts with bases (forms soap)</i> 	-
b. Use information gathered from investigations using indicators and the pH scale to classify materials as acidic, basic, or neutral.	What Are Acids and Alkalis? What Are Indicators? The pH Scale
3. Provide evidence to support the fact that common substances have the ability to change into new substances.	
a. Investigate and describe the occurrence of chemical reactions using the following evidence: <ul style="list-style-type: none"> • Color change • Formation of a precipitate or gas • Release of heat or light 	Types of Chemical Reactions Making Gases Energy Changes
b. Use evidence from observations to identify and describe factors that influence reaction rates. <ul style="list-style-type: none"> • Change in temperature • Acidity 	Solutions
c. Identify the reactants and products involved in a chemical reaction given a symbolic equation, a word equation, or a description of the reaction.	Naming Compounds Formulae of Compounds
d. Provide data from investigations to support the fact that energy is transformed during chemical reactions.	What is Energy? Energy Changes
e. Provide examples to explain the difference between a physical change and a chemical change.	Types of Chemical Reactions
Physics	
A. Mechanics	
GRADE 8	
1. Develop an explanation of motion using the relationships among time, distance, velocity, and acceleration.	

a. Observe, describe, and compare the motions of objects using position, speed, velocity, and the direction.	Distance, Time and Speed
b. Based on data given or collected, graph and calculate average speed using distance and time.	Graphing Speed
c. Compare accelerated and constant motions using time, distance, and velocity.	Distance, Time and Speed
d. Describe and calculate acceleration using change in the speed and time.	Distance, Time and Speed
2. Identify and relate formal ideas (Newton's Laws) about the interaction of force and motion to real world experiences.	
a. Investigate and explain the interaction of force and motion that causes objects that are at rest to move.	What Are Forces?
b. Demonstrate and explain, through a variety of examples, that moving objects will stay in motion at the same speed and in the same direction unless acted on by an unbalanced force.	What Are Forces? Calculating Resultant Forces
<i>c. Investigate and collect data from multiple trials, about the motion that explain the motion that results when the same force acts on objects of different mass; and when different amounts of force act on objects of the same mass.</i>	–
<i>d. Based on data collected and organized, explain qualitatively the relationship between net force applied to an object and its mass for a given acceleration.</i>	–
<i>e. Calculate the net force given the mass and acceleration.</i>	–
3. Recognize and explain that every object exerts gravitational force on every other object.	
a. Explain the difference between mass and weight. • Mass is a measure of inertia • Weight is a measure of the force of gravity	Gravity
b. Describe the relationship between the gravitational force and the masses of the attracting objects.	Gravity
c. Describe the relationship between the gravitational force and the distance between the attracting objects.	Gravity
d. Recognize and cite examples showing that mass remains the same in all locations while weight may vary with a change in location (weight on Earth compared to weight on moon).	Gravity
e. Recognize that gravity is the force that holds planets, moons, and satellites in their orbits.	Gravity
4. Recognize and explain that energy can neither be created nor destroyed; rather it changes form or is transferred through the action of forces.	

a. <i>Observe and describe the relationship between the distance an object is moved by a force and the change in its potential energy or kinetic energy, such as in a slingshot, in mechanical toys, the position of an object and its potential energy.</i>	–
b. <i>Identify the relationship between the amount of energy transferred (work) to the product of the applied force and the distance moved in the direction of that force.</i>	–
c. Identify and describe that simple machines (levers and inclined planes) may reduce the amount of effort required to do work. <ul style="list-style-type: none"> • Calculate input and output work using force and distance • Demonstrate that input work is always greater than output work 	Moments Moment Calculations
B. Thermodynamics	
GRADE 8	
1. Describe and cite evidence that heat can be transferred by conduction, convection and radiation.	
a. Based on observable phenomena, identify and describe examples of heat being transferred through conduction and through convection.	Conduction and Convection
b. Based on observable phenomena, identify examples to illustrate that radiation does not require matter to transfer heat energy.	Radiation
c. Research and identify the types of insulators that best reduce heat loss through conduction, convection, or radiation.	Conduction and Convection Radiation
2. Identify and explain that heat energy is a product of the conversion of one form of energy to another.	
a. Identify and describe the various forms of energy that are transformed in order for systems (living and non-living) to operate. <ul style="list-style-type: none"> • Chemical - Flashlight battery-Light • Mechanical – Pulleys-Motion • Solar/Radiant - Solar calculator • Chemical - Plant cells 	What is Energy? How is Electrical Energy Useful?
b. Explain that some heat energy is always lost from a system during energy transformations.	Energy Efficiency
C. Electricity and Magnetism	
GRADE 6	
2. Cite evidence supporting that electrical energy can be produced from a variety of energy sources and can itself be transformed into almost any other form of energy.	

<p>a. Research and identify various energy sources and the energy transforming devices used to produce electrical energy</p> <ul style="list-style-type: none"> • Wind (generators, wind mills) • Sun (solar cells) • Water(turbines) • Fossil fuels (engines) 	<p>Renewable Energy Nonrenewable Energy Resources Fossil Fuels</p>
<p>b. Cite examples that demonstrate the transformation of electrical energy into other forms of energy.</p>	<p>Energy Efficiency How is Electrical Energy Useful?</p>
<p>c. Investigate and describe that some materials allow the quick, convenient, and safe transfer of electricity (conductors), while others prevent the transfer of electricity (insulators).</p>	<p>Conduction and Convection</p>
<p>d. Identify and describe the energy transformations in simple electric circuits.</p>	<p>Energy Transfer in Circuits How is Electrical Energy Useful? What are Circuits?</p>
<p>3. Identify and describe magnetic fields and their relationship to electric current.</p>	
<p>a. Investigate and describe the magnetic fields surrounding various types of magnets using materials, such as iron filings and small compasses.</p> <ul style="list-style-type: none"> • A single bar magnet • Two bar magnets with like poles facing • Two bar magnets with opposite poles facing • A horseshoe magnet 	<p>Magnetic Materials Magnetic Fields</p>
<p>b. Investigate and explain ways to change the strength of a simple electromagnet by varying the number of coils wrapped, the amount of electricity in the wire, the number of batteries used, and whether or not an iron core is used.</p>	<p>Electromagnets</p>
<p>c. Describe how the electromagnet demonstrates the relationship of magnetism and electricity and identify common devices that demonstrate application of this relationship.</p> <ul style="list-style-type: none"> • Electric motors (fans, hair dryers, can openers) • Electrical generators (turbine) 	<p>Uses of Electromagnets</p>
<p>d. Based on investigations describe that electricity moving through a wire produces a magnetic force on materials placed near the wire.</p> <ul style="list-style-type: none"> • Iron filings • Compasses 	<p>Electromagnets</p>
<p>D. Wave Interactions</p>	
<p>GRADE 6</p>	
<p>1. Identify and describe the relationships among the various properties of waves.</p>	

a. Cite examples to show that waves transfer energy from one place to another. • Light • Sound • Earthquake waves	What is Light? What is Sound? Electromagnetic Waves
b. Measure and describe the wavelength, frequency, and amplitude of waves using: • Water • Ropes • Springs.	What is Sound?
c. Measure and describe the relationship between the frequency and the wavelength of a wave.	What is Sound? Electromagnetic Waves
2. Provide evidence to demonstrate the relationship among the properties of waves using sound.	
a. Investigate and describe that the pitch of sounds can be varied by changing the rate of vibration.	What is Sound?
b. Identify and describe the relationship among frequency, wavelength, and pitch.	What is Sound?
c. Observe and describe the relationship between amplitude and loudness.	What is Sound?
d. Cite evidence that sound waves transfer energy using observation of sympathetic tuning forks, tuned guitar strings, etc.	What is Sound?
3. Investigate and cite the rules that govern behaviors of light.	
a. Based on data generalize the law of reflection.	Reflection
b. Cite evidence from observations and research to support the fact that something can be “seen” when light waves emitted or reflected by it enter the eye.	What is Light?
c. Based on observations predict the change in the direction (refraction) of light as it travels from one material to another.	Refraction
d. Cite evidence that the amount of light energy absorbed or reflected depends on the color of the object illuminated.	Color
Environmental Science	
A. Natural Resources and Human Means	
GRADE 6	
1. Recognize and compare how different parts of the world have varying amounts and types of natural resources and how the use of those resources impacts environmental quality.	

<p>a. Identify and describe natural resources as</p> <ul style="list-style-type: none"> • Land • Fossil fuels • Forests • Water • Wind • Minerals • Wildlife 	<p>Fossil Fuels Renewable Energy Nonrenewable Energy Resources</p>
<p><i>b. Identify and describe the distribution of natural resources around the Earth</i></p>	<p>–</p>
<p>c. Identify and describe how the natural change processes may be affected by human activities.</p> <ul style="list-style-type: none"> • Agriculture • Beach preservation • Mining • Development/construction • Stream/river alteration. 	<p>Flooding Greenhouse Gases Environmental Change Using Rocks</p>
<p>d. Identify and describe problems associated with obtaining, using, and distributing natural resources.</p>	<p>Flooding Greenhouse Gases Environmental Change Using Rocks</p>
<p>e. Identify possible solutions to problems associated with obtaining, using, and distributing natural resources.</p>	<p>Reducing Our Energy Bills Energy Resources for the Future</p>
<p>GRADE 7</p>	
<p>1. Recognize and explain the impact of a changing human population on the use of natural resources and on environmental quality.</p>	
<p><i>a. Based on data identify and describe the positive and negative impacts of an increasing human population on the use of natural resources</i></p>	<p>–</p>
<p><i>b. Recognize and describe the decreasing dependence on local resources due to the impact of available transportation.</i></p>	<p>–</p>
<p>B. Environmental Issues</p>	
<p>GRADE 6</p>	
<p>1. Recognize and explain that humancaused changes have consequences for Maryland’s environment as well as for other places and future times.</p>	
<p>a. Identify and describe a range of local issues that have an impact on people in other places.</p>	<p>Acid Rain</p>

b. Recognize and describe how environmental change in one part of the world can have consequences for other parts of the world.	Environmental Change
c. Identify and describe that ecosystems can be impacted by human activities. <ul style="list-style-type: none"> • Protection of the Chesapeake Bay watershed • Resource acquisition and use • Land use decisions (agriculture, mining, and development) • Recycling • Use and disposal of toxic substances 	Environmental Change Acid Rain
GRADE 7	
1. Recognize and describe that environmental changes can have local, regional, and global consequences.	
a. Identify and describe a local, regional, or global environmental issue.	Acid Rain Environmental Change Greenhouse Gases
<i>b. Identify and describe that different individual people or groups of people are affected by an issue in different ways.</i>	–
GRADE 8	
1. Recognize and explain how human activities can accelerate or magnify many naturally occurring changes.	
a. Based on data from research identify and describe how natural processes change the environment. <ul style="list-style-type: none"> • Cyclic climate change • Sedimentation in watersheds • Population cycles • Extinction 	Greenhouse Gases Evolution Feeding Types
b. Identify and describe how human activities produce changes in natural processes: <ul style="list-style-type: none"> • Climate change • Loss of habitat due to construction • Hunting and fishing • Introduction of nonnative species • Cycling of matter 	Greenhouse Gases Evolution Environmental Change Recycling Nutrients