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| **Honor 8th Grade****Core** | **Take Away** | **Honors Curriculum** |
| **STANDARD I:****Students will understand the nature of changes in matter.** |
| **Objective 1:** Describe the chemical and physical properties of various substances. |
| 1. Differentiate between chemical and physical properties.
 | * Physical Prop
* Physical properties identify the observable characteristics of a substance: For example: density, mass, color, shape, phase, texture, volume, conductivity
* Identification of physical properties
* Methods of separating mixtures:

 filtering, changing phase, physical separation, magnetism Chemical Prop* Chemical properties describe potential chemical reactions and observations or the ability to react chemically of a substance. For example: flammability or the ability to rust
 | An elements position on the periodic table informs the physical and chemical properties of an element. For example trends of chemical reactivity, density, mass, and number of protons . |
| 1. Classify substances based on their chemical and physical properties (e.g., reacts with water, does not react with water, flammable or nonflammable, hard or soft, flexible or nonflexible, evaporates or melts at room temperature).
 | * Chemical properties are the ways in which substances change into new substances
* Observations of Chemical Reactions, color change, gas taking in and given off, absorption and release of heat, production of a solid (Precipitate)
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| 1. Investigate and report on the chemical and physical properties of a particular substance.
 | * Using chalk as a main ingredient to perform tests to understand physical and chemical properties
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| **Objective 2:** Observe and evaluate evidence of chemical and physical change. |
| 1. Identify observable evidence of a physical change (e.g., change in shape, size, phase)
 | * The identity of the substance does not change
* Evidence that a physical change has taken place include changes in shape, size or phase
 |  |
| 1. Identify observable evidence of a chemical change (e.g., color change, heat or light given off, change in odor, gas given off).
 | * The identity of the substance changes
* Evidence that a chemical reaction has taken place include; color change, gas given off, and heat or light given off or absorbed
* Reaction of Baking soda with vinegar
 |  |
| 1. Observe and describe chemical reactions involving atmospheric oxygen (e.g., rust, fire, respiration, photosynthesis).
 | * Atmospheric oxygen is a part of many everyday life important reactions
* Difference between reactions involving atmospheric Oxygen

 * 8th_oxygen_new.gif
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| 1. Investigate the effects of chemical change on physical properties of substances (e.g., cooking a raw egg, iron rusting, polymerization of a resin).
 | * The physical properties of a substance may change if the substance has undergone chemical and/or physical change.
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| **Objective 3:** Investigate and measure the effects of increasing or decreasing the amount of energy in a physical or chemical change, and relate the kind of energy added to the motion of the particles. |
| 1. Identify the kinds of energy (e.g., heat, light, sound) given off or taken in when a substance undergoes a chemical or physical change.
 | * Energy may either be taken in or given off by the chemical reaction.
	+ Exothermic and Endothermic energy
* Energy involved in a chemical reaction may be in the form of heat light, motion, or sound
* Phase changes require energy.
 | Additional vocabulary: activation energy, catalyst |
| 1. Relate the amount of energy added or taken away from a substance to the motion of molecules in the substance.
 | * When there is an increase of energy (ex. thermal energy) the molecules of a substance move faster and get farther apart.
* When there is a decrease of energy (ex. thermal energy) the molecules of a substance move slower and get closer together.
 |  |
| 1. Measure and graph the relationship between the states of water and changes in its temperature
 | *
* Students should be able to identify the temperature changes that occur during a phase change (physical change)
* The animations to the right show the motion of the molecules of the three different states of water:
* Using these animations students should recognize that the motion of a solid is slower and increases thorough the liquid and then the gas phase.
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| 1. Cite evidence showing that heat may be given off or taken in during a chemical change (e.g., striking a match, mixing vinegar and antacid, mixing ammonium chloride and water).
 | * Be able to interpret data to show when the energy change occurred during the chemical reaction
* Example:
* In the reaction below at what time did the chemical reaction occurred. State your evidence using the change in temperature of the substance.
*
 | Create a graph during a lab illustrating exothermic and endothermic reactions. |
| 1. Plan and conduct an experiment, and report the effect of adding or removing energy on the chemical and physical changes.
 | * Students will need to be able to interpret data sets from example experiments. Students must practice creating and interpreting data sets in class.
* Example; In experiment 1, the reaction is completed in a beaker at room temperature. In experiment 2, the reaction was completed in a beaker on a hot plate. Describe how adding thermal energy affected the chemical reaction rate

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| Exp. 1 | Exp 2 |
| Time( s ) | **Temp****( C )** | **Obsv.**  | **Time****( s )**  | **Temp****( C )** | **Obsv.**  |
| 0 | 20 |  | 0 | 35 |  |
| 10 | 20 |  | 10 | 40 | Reaction completed |
| 20 | 20 |  | 20 | 40 |  |
| 30 | 20 | Reaction completed | 30 | 40 |  |

 | See above |
| **Objective 4:** Identify the observable features of chemical reactions. |
| 1. Identify the reactants and products in a given chemical change and describe the presence of the same atoms in both the reactants and products.
 | * In a chemical equation the reactants are on the left and the products are on the right. Reactants --> Products
* The Law of Conservation of Matter states that the matter can neither created or destroyed. In a chemical reaction the same number and kinds of atoms are present in the products as in the reactants. The atoms in the reactants are rearranged into new substances in the products.
 |  |
| 1. Cite examples of common significant chemical reactions (e.g., photosynthesis, respiration, combustion, rusting) in daily life.
 | * Photosynthesis: water + carbon dioxide --> oxygen + sugar
* Respiration: oxygen + sugar --> water + carbon dioxide + energy
* Combustion : fuel combining with oxygen making oxides
* Rusting: iron + water + oxygen --> Iron oxide

 Example; Baking soda (sodium bicarbonate) + vinegar (acetic acid) --> sodium acetate + carbon dioxide + water |  |
| 1. Demonstrate that mass is conserved in a chemical reaction (e.g., mix two solutions that result in a color change or formation of a precipitate and weigh the solutions before and after mixing).
 | * Law of conservation of matter states that matter can either be created or destroyed.
* Students will need to be able to interpret data sets from example experiments. Students must practice creating and interpreting data sets in class.

 Ex. In rust reaction below, what occurs to the reactants compared the products.

|  |  |  |
| --- | --- | --- |
| Before Reaction Iron | Before Reaction Oxygen | After ReactionIron Oxide |
| 10 g | 5 g | 15 g |

 | Balancing simple equations. Also include photosynthesis and respiration. Additional vocabulary: coefficients, subscripts.  |
| 1. Experiment with variables affecting the relative rates of chemical changes (e.g., heating, cooling, stirring, crushing, concentration).
 | * Changing the temperature, surface area and/or concentration of reactants changes the rates of chemical and physical reactions
* An increase of surface area (crushing) increases the reaction rate.
* An increase of concentration increases and reaction rate.
* An increase in temperature increases reaction rate.
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| 1. Research and report on how engineers have applied principles of chemistry to an application encountered in daily life (e.g., heat-resistant plastic handles on pans, rust-resistant paints on highway bridges).
 | * Chemical reactions are necessary to daily life
* Research and report the applications of Chemistry in everyday life
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| **STANDARD II:****Students will understand that energy from sunlight is changed to chemical energy in plants, transfers between living organisms, and that changing the environment may alter the amount of energy provided to living organisms.** |
| **Objective 1:** Compare ways that plants and animals obtain and use energy. |
| 1. Recognize the importance of photosynthesis in using light energy as part of the chemical process that builds plant materials.
 | * Plants store captured light energy as chemical energy in sugars through the process of photosynthesis.
* The reactants of photosynthesis are Water and Carbon Dioxide.
* The products of photosynthesis are Oxygen and Sugar.
* solar-->chemical-->mechanical & heat

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| 1. Explain how respiration in animals is a process that converts food energy into mechanical and heat energy.
 | * Animals eat plants to obtain the energy and matter that they need.
* Animals use respiration to convert the energy stored in the food(chemical)into a form that their bodies can use (mechanical)
* The energy from food is used for mechanical and heat energy.
* The matter is used to build the cells of the organism.
* **http://t3.gstatic.com/images?q=tbn:ANd9GcTc-naBrsdbXGnnaOMVGR6S7sQGCjLTxn2_Q3rRuheszgyqsjxElQ:chsweb.lr.k12.nj.us/mstanley/outlines/respiration/image150.gif**
 |  |
| 1. Trace the path of energy from the sun to mechanical energy in an organism (e.g., sunlight – light energy to plants by photosynthesis to sugars - stored chemical energy to respiration in muscle cell - usable chemical energy to muscle contraction- mechanical energy).
 | * Energy is produced in the Sun through Nuclear fusion, sunlight – light energy to plants by photosynthesis to sugars - stored chemical energy to respiration in muscle cell - usable chemical energy to muscle contraction- mechanical energy
* The sun is the source for essentially all biological energy.
* 10% of the energy available at any tropic level is passed to the next tropic level.
 |  |
| **Objective 2:** Generalize the dependent relationships between organisms. |
| 1. Categorize the relationships between organisms (i.e., producer/consumer, predator/prey, mutualism, parasitism) and provide examples of each.
 | * Producers-change the energy available in their environment into food energy.

Photosynthesis (sun for energy)Chemosynthesis (chemicals for energy)* Consumers-cannot make their own food and get energy by eating other organisms.

HerbivoreOmnivoreCarnivoreDetritivore (decomposer)* Symbiotic Relationships-close and often long-term interaction between two or more different species where at least 1 benefits

Mutualism +/+ (ruminant)Parasitism +/- (tick)ParasiteHostCommensalism +/0 (normal flora)Give examples* Predator/Prey- occurs when one organism (the predator) feeds on another (the prey).
 |  |
| 1. Use models to trace the flow of energy in food chains and food webs.
 | * Food chains and food webs are models used to show the transfer of energy and matter among organisms.
* Food Chain Food Web - several interconnecting food chains

Energy pyramids arrows point in the direction of energy flow* Food webs start with producers
 |  |
| 1. Formulate and test a hypothesis on the effects of air, temperature, water, or light on plants (e.g., seed germination, growth rates, seasonal adaptations).
 | * Understand common plant responses to stimuli
* Experimental variables:
1. independent is the one you are changing/testing
2. dependent changes due to independent

 control used to compare* quantitative data = numbers at least 3 trials and average
 |  |
| 1. Research multiple ways that different scientists have investigated the same ecosystem.
 | * Know different fields of scientific studies and what a scientist from that field may do to study an ecosystem ex: geologist, or entomologists.
* Know definitions for different factors that at scientists study in an ecosystem and be able to give an example of:

Abiotic factor (nonliving)Biotic factor(living) |  |
| **Objective 3:** Analyze human influence on the capacity of an environment to sustain living things. |
| 1. Describe specific examples of how humans have changed the capacity of an environment to support specific life forms (e.g., people create wetlands and nesting boxes that increase the number and range of wood ducks, acid rain damages amphibian eggs and reduces population of frogs, clear cutting forests affects squirrel populations, suburban sprawl reduces mule deer winter range thus decreasing numbers of deer).
 | * Organisms, including humans, have multiple ways (both positive and negative) to influence the ability of other organisms to live in a specific environment.
* Humans affect the environment in multiple ways.

**Urban Sprawl**Carrying capacity- total amount the environment can supportchanges seasonally |  |
| 1. Distinguish between inference and evidence in a newspaper or magazine article relating to the effect of humans on the environment.
 | * Know the difference between inference and evidence (observations and evidence are measureable).
* Be able to evaluate a source and determine whether they use inference or evidence.
* inference is based on person's prior knowledge
* evidence is measureable observations
 |   |
| 1. Infer the potential effects of humans on a specific food web.
 | * Understand how removing one species from a food web would affect the other species in the web.
 |  |
| 1. Evaluate and present arguments for and against allowing a specific species of plant or animal to become extinct, and relate the argument to the of flow energy in an ecosystem.
 | * See c.
 |  |
| **STANDARD III:** **Students will understand the processes of rock and fossil formation.** |
| **Objective 1:** Compare rocks and minerals and describe how they are related. |
| 1. Recognize that most rocks are composed of minerals.
 | * Rocks are made of minerals.
* Rocks can be identified by looking at clues to their formation such as texture, color, presence of banding and mineral content.
 |  |
| 1. Observe and describe the minerals found in rocks (e.g., shape, color, luster, texture, hardness).
 | * Minerals can be identified by their properties such as: streak test, hardness, cleavage pattern, luster, and crystal shape.
* Use a Mohs hardness scale to identify a mineral
* Density of a rock/mineral = Mass/Volume
 |  |
| 1. Categorize rock samples as igneous, sedimentary, metamorphic
 | * Rocks are classified as igneous, metamorphic or sedimentary. Igneous rocks can be identified by the texture of the crystals (either large and randomly oriented or very small and glassy) Sedimentary rocks can be identified by their layers of grains of recycled rock. Metamorphic rocks can be identified by the rearranged bands of rock crystals.
 | Identify environments in which different rocks are formed and explain how. For example: Coal= swamp, limestone= ocean, granite = composite volcano, basalt= shield volcano, conglomerate= riverbed, Gneiss =mountain building events |
| **Objective 2:** Describe the nature of the changes that rocks undergo over long periods of time. |
| 1. Diagram and explain the rock cycle.
 | * Earth’s surface is changed by heat flowing from Earth's hot interior toward the cooler surface due to convection currents.
* Earth's surface is changed by process created by the sun's energy such as: winds, erosion, physical and chemical weathering
* The rock cycle describes how Earth processes such as: weathering, erosion, melting and recrystallization continually form and change rocks

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| 1. Describe the role of energy in the processes that change rock materials over time.
 | * Sun creates wind
* Gravity produces deposition
* chemical process produce chemical erosion/depositions
 |  |
| 1. Use a model to demonstrate how erosion changes the surface of Earth.
 | * Use pictures to help identify what process formed rock formations such as: caves, sand dunes, glacier cirques, river gorges etc.
 |  |
| 1. Relate gravity to changes in Earth’s surface.
 | * Describe how gravity effects deposition of weathered materials
* Gravity pulls all substances downward.
* ie: slumps, land slides
 |  |
| 1. Identify the role of weathering of rocks in soil formation.
 | * Soil forms as weathered materials form layers on Earth's surface.
* understand organic material and pore spaces
 |  |
| 1. Describe and model the processes of fossil formation.
 | * Fossils are formed from the remains of living organisms. They cannot be found in igneous or metamorphic rocks.
 |  |
| **Objective 3:** Describe how rock and fossil evidence is used to infer Earth’s history. |
| 1. Describe how the deposition of rock materials produces layering of sedimentary rocks over time.
 | * Rock layers are deposited with the oldest on the bottom except when faulting or folding has altered the order.
* Law of Superposition
 |  |
| 1. Identify the assumptions scientists make to determine relative ages of rock layers.
 | * Processes that change the Earth's surface operated in the past much as they do today and this is called Uniformitarianism.
* know how to apply the Law of Superposition in various rock layers
* Understand what Index fossils do for relative dating
 |  |
| 1. Explain why some sedimentary rock layers may not always appear with youngest rock on top and older rocks below (i.e., folding, faulting).
 | * Understand how various unconformities effect the age of rock layers such as: magma inclusions and cross-cutting from faulting and rivers and, also, folding.
* Be able to interpret a stratigraphy (rock layer diagram)
* http://t1.gstatic.com/images?q=tbn:ANd9GcS8WsrZYLqfj0f86vBBJIN-o97wfsiSpAdVYPGAotSzHEr2HWTRpA:novellaqalive.mhhe.com/sites/dl/free/0078664233/184123/124_soilp_ca_210c.jpg
 |  |
| 1. Research how fossils show evidence of the changing surface of the Earth.
 | * Evidence of past surface and climatic changes are indicated in the rock and fossil records.
* Understand Uniformitarianism as it applies to fossil formation
 |  |
| 1. Propose why more recently deposited rock layers are more likely to contain fossils resembling existing species than older rock layers.
 | * Law of Superposition of sedimentary rock layers
* Students should be able to interpret a cross section and interpret which rock layers are older.
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| **Objective 4:** Compare rapid and gradual changes to Earth’s surface. |
| 1. Describe how energy from the Earth's interior causes changes to Earth’s surface (i.e., earthquakes, volcanoes).
 | * Understand Mountain-building processes along plate boundaries
* Heat from the interior rises due to convection currents in the mantle.
* http://t0.gstatic.com/images?q=tbn:ANd9GcQqV2WbslrnopV9VM1idFkA3FdzBuKK41fMXWU5doeYhix3KVwp:earthchangesmedia.com/news/wp-content/uploads/2013/05/core51.jpg
 | Expand on Earthquakes and Volcanoes: * Identify the different types of faulting: shearing, compression, and tension
* Explain the different methods of measuring energy from an earthquake: Richter scales, Mercalli scales, moment magnitude etc...
* Identify different types of waves: S waves, P waves.
* Explain the difference between the formation of different volcanoes due to composition or location: shield, composite, cinder cone, super etc...
 |
| 1. Describe how earthquakes and volcanoes transfer energy from Earth's interior to the surface (e.g., seismic waves transfer mechanical energy, flowing magma transfers heat and mechanical energy).
 | * understand how the Earth's interior heat is recycled through the plate boundaries i.e.: Ring of Fire
* Show how the magma from a volcano is heated
 |  |
| 1. Model the process of energy buildup and release in earthquakes.
 | * Describe how the amount of energy build-up will create the different type of volcanoes and magmas
* Talk about the differences between Mt. St. Helens and Mauna Loa
 |  |
| 1. Investigate and report possible reasons why the best engineering or ecological practices are not always followed in making decisions about building roads, dams, and other structures.
 | * What human interests override ecological and practical engineering needs. Such as : Why do people build on fault lines,

Why do cities grow near active volcanoes, etc.  | Investigate the Wasatch Fault.  |
| 1. Model how small changes over time add up to major changes to Earth’s surface.
 | * Know terms such desertification, urban sprawl, and landfills.
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| **STANDARD IV:****Students will understand the relationships among energy, force, and motion.** |
| **Objective 1:** Investigate the transfer of energy through various materials. |
| 1. Relate the energy of a wave to wavelength.
 | Shorter wavelengths transfer more energy Waves transfer energy away from the source in all directionsStudents will be able to diagram the parts of a transverse wave (wavelength, amplitude, frequency)energy=ability to do work or cause change | For sound relate frequency and wavelength to pitch and for amplitude to loudness. For light relate frequency and wavelength to energy or the type of the light wave (light spectrum) and amplitude to brightness |
| 1. Compare the transfer of energy (i.e., sound, light, earthquake waves, heat) through various mediums.
 | * Mechanical waves require a medium to travel through
* light waves ARE NOT mechanical
* waves travel at different speeds through various mediums
 |  |
| 1. Describe the spread of energy away from an energy-producing source.
 | Waves last until all of the energy has been transferredThe energy dissipates as the wave moves away from its source |  |
| 1. Compare the transfer of heat by conduction, convection, and radiation and provide examples of each.
 | thermal energy (heat) can be transferred by conduction, radiation and convection* conduction requires direct contact(solid)
* convection transfers through liquids or gas
* radiation travels through waves
 |  |
| 1. Demonstrate how white light can be separated into the visible color spectrum.
 | * White light separates into colors (ROYGBIV) based on different wavelengths
* prisms will separate white light based on wavelength
 |  |
| **Objective 2:** Examine the force exerted on objects by gravity. |
| 1. Distinguish between mass and weight.
 | * Mass is the amount of matter in an object (will not change with changes in gravity)
* Weight is the force of gravity acting on an object ( will change with changes in gravity)
 | Introduce the formula for weight. Calculate weight (as opposed to mass.)  |
| 1. Cite examples of how Earth’s gravitational force on an object depends upon the mass of the object.
 |  Objects with greater mass exert more gravity small objects (ex gases) can escape earth's gravity | Be able to explain how Earth’s gravitational force on an object depends upon the mass and distance of the object by using the Universal Law of Gravitation |
| 1. Describe how Earth’s gravitational force on an object depends upon the distance of the object from Earth.
 | The closer an object is to earth , the greater the gravitational force exerted on that object  |  |
| 1. Design and build structures to support a load.
 | structures need to be able to withstand the force of gravityTacoma Sounds bridge collapse |  |
| 1. Engineer (design and build) a machine that uses gravity to accomplish a task.
 | see above |  |
| **Objective 3:** Investigate the application of forces that act on objects, and the resulting motion. |
| 1. Calculate the mechanical advantage created by a lever.
 | * ideal mechanical advantage= length of input arm
* length of output arm
* machines make work easier but the amount of work stays constant
* work=apply force to object and moves direction of force
* force= mass x acceleration
 | Calculate work and use the correct units. |
| 1. Engineer a device that uses levers or inclined planes to create a mechanical advantage.
 | * ideal MA of inclined plane =length of inclined plane
* height of inclined plane
* friction decreases mechanical advantage of machines
 | Calculate mechanical advantage for lever, inclined plane, wheel and axle, and pulley.  |
| 1. Engineer a device that uses friction to control the motion of an object.
 | * friction force that resists motion of 2 surfaces that are touching
* results in objects stopping
* moves opposite direction of objects motion
 | Identify Newton's three law of motion. Calculate speed, acceleration, force. Explain and use the correct units for each.  |
| 1. Design and build a complex machine capable of doing a specified task.
 | * design models to test structures
* gravity is used in the design of some machines - ie dams
 |  |
| 1. Investigate the principles used to engineer changes in forces and motion.
 | * machines have been designed to overcome the force of gravity
* i.e. catapults launch
* motion results from unbalanced forces
 |  |
| **Objective 4:** Analyze various forms of energy and how living organisms sense and respond to energy. |
| 1. Analyze the cyclic nature of potential and kinetic energy (e.g., a bouncing ball, a pendulum).
 | * Energy cycles from potential (stored energy) to kinetic energy (motion) in moving objects.
 | Calculate kinetic energy and gravitational potential energy.  |
| 1. Trace the conversion of energy from one form of energy to another (e.g., light to chemical to mechanical).
 | * Energy conversions can be traced from one form of energy to another.
* Students can describe transfer of energy through an example situation.
 |  |
| 1. Cite examples of how organisms sense various types of energy.
 | * Sound and light waves allow organisms to "hear" and "see" the world around them.
 |  |
| 1. Investigate and report the response of various organisms to changes in energy (e.g., plant response to light, human response to motion, sound, light, insects’ response to changes in light intensity).
 | * Plant responses to light. (Phototropism)
* Human Responses to

Motion (Newton's laws, Inertia)Sound (Decibel Levels, Hearing)Light (Vision) |  |
| 1. Investigate and describe how engineers have developed devices to help us sense various types of energy (e.g., seismographs, eyeglasses, telescopes, hearing aids).
 | * Sound (Hearing) Microphones, Hearing Aids, Sonar…
* Light (Vision) Glasses, Telescopes…
 |  |