Earth/Space Science

ESS1 The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.

S:ESS1:11: 3.2	**FOSSILS AND GEOLOGIC TIME: Relate how geologic time is determined using various dating methods (e.g., radioactive decay, rock sequences, fossil records).**
Level 1 Entering	Draw and label the geologic time scale, using a word bank; indicate the oldest and youngest/newest sections of the time scale.
Level 2 Beginning	Match specific information (words/phrases provided in a word bank) with the appropriate dating method, from a list of dating methods.
Level 3 Developing	Complete cloze activities using dating method terminology, using a word bank.
Level 4 Expanding	Compare and contrast dating methods, with a partner, to determine the most appropriate method for a given piece of rock; explain the reasoning behind the choice of method, orally or in a paragraph.
Level 5 Bridging	Summarize in writing the advantages and disadvantages of various geologic dating methods.

S:ESS1:11: 4.1	**OBSERVATION OF THE EARTH FROM SPACE: Provided with geologic data (including movement of plates) on a given locale, predict the likelihood for an earth event (e.g., volcanoes, mountain ranges, islands, earthquakes, tides, tsunamis).**
Level 1 Entering	Identify and label Earth events on a simplified map of the world, using a word bank.
Level 2 Beginning	Label the various tectonic Earth movements and types of boundaries on a graphic; then match the movements/boundaries with corresponding words or phrases from a word bank.
Level 3 Developing	Describe differences between the types of boundaries using simple sentences, a bulleted list, or a Venn diagram.
Level 4 Expanding	Complete a cause and effect table showing folds and faults by filling in possible causes; explain the chart using oral sentences or in written paragraph(s).
Level 5 Bridging	Identify and describe the type of plate boundary in a particular locale, given a description of landforms and Earth events in that locale.

S:ESS1:11: 5.4	**PROCESSES AND RATES OF CHANGE: Provide supporting geologic/geographic evidence that supports the validity of the theory of plate tectonics.**
Level 1 Entering	Make a “Pangaea puzzle” to demonstrate continental drift, using a picture; then label or color code the original continents, using words from a word bank
Level 2 Beginning	Draw pictures of Mesosaurus and ferns (fossil record evidence) where they have been discovered on an outline map of the continents; use the same map and draw pictures of rocks (geological evidence) where they have been discovered.
Level 3 Developing	Make a “Pangaea puzzle” to demonstrate continental drift, as in Level 1, using a picture; then label or color code the original continents, without using a word bank.
Level 4 Expanding	Explain (orally or in a paragraph) the development of the Hawaiian Island chain (hot spots, plate movement, names of plates), using a student- generated diagram or graphic representation.
Level 5	Analyze and discuss the components of the Ring of Fire (hot spots, ocean

Bridging	trenches, transverse plate boundaries), in an essay.

S:ESS1:11: 5.5	**PROCESSES AND RATES OF CHANGE: Trace the development of the theory of plate tectonics.**
Level 1 Entering	Make "Pangaea puzzle" to demonstrate continental drift, using a picture.
Level 2 Beginning	Sequence and label pictorial representations of Pangaea/ continental drift, Mid-Ocean Ridge, and sea-floor spreading; trace or draw the Mid-Ocean Ridge on a map.
Level 3 Developing	Complete a cloze exercise about the development of the theory of plate tectonics, using a word bank containing technical terms.
Level 4 Expanding	Complete a table of information about Pangaea/continental drift, Mid-Ocean Ridge, and sea-floor spreading; use the table to describe (orally or in writing) Pangaea, Mid-Ocean Ridge, and sea-floor spreading.
Level 5 Bridging	Summarize the development of the theory of plate tectonics (e.g., make a brochure, make a book for children, etc.).

S:ESS1:11: 5.6	**PROCESSES AND RATES OF CHANGE: Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading**).
Level 1 Entering	Label a graphic of sea-floor spreading with arrows to show the direction of heat movement in a density current.
Level 2 Beginning	Label a diagram of the tectonic plates that relates plate movement to density currents in the mantle, using a word bank.
Level 3 Developing	Use a Venn diagram to compare and contrast the three major rock types, in a small group; explain where and how they are formed.
Level 4 Expanding	Create a diagram showing types of plate boundaries, with a partner; explain the associated magma movement; place pictures of rocks with the appropriate boundary (sedimentary, metamorphic, and igneous).
Level 5 Bridging	Create a labeled, cross-sectional diagram of the Earth's interior and magma movement; explain the diagram either orally or in a paragraph.

ESS2 The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.

S:ESS2:11 :2.3	**ENERGY: Explain how internal and external sources of heat (energy) fuel geologic processes (e. g., rock cycle, plate tectonics, sea floor spreading).**
Level 1 Entering	Label a graphic of sea-floor spreading with arrows to show the direction of heat movement in a density current.
Level 2 Beginning	Label a diagram of the tectonic plates that relates plate movement to density currents in the mantle, using a word bank.
Level 3 Developing	Use a Venn diagram to compare and contrast the three major rock types, in a small group; explain where and how they are formed.
Level 4 Expanding	Create a diagram showing types of plate boundaries, with a partner; explain the associated magma movement; place pictures of rocks with the appropriate boundary (sedimentary, metamorphic, and igneous).
Level 5 Bridging	Create a labeled, cross-sectional diagram of the Earth's interior and magma movement; explain the diagram either orally or in a paragraph.

ESS3 The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.

S:ESS3:11: 2.3	**STARS AND GALAXIES: Explain the relationships between or among the energy produced from nuclear reactions, the origin of elements, and the life cycles of stars.**
Level 1 Entering	Sequence pictures of a star from its creation to its death.
Level 2 Beginning	Label pictures of the life cycle of a star appropriately, using a word bank; match elements found with the appropriate stage in the cycle.
Level 3 Developing	Complete a cloze activity of a description of how the elements originate from nuclear reactions, using a word bank.
Level 4 Expanding	Use a timeline to explain, orally or in writing, how elements form from nuclear reactions during the life cycle of a star.
Level 5 Bridging	Summarize the development of a star from its creation to its death (brochure, make a book, timeline).

S:ESS3:11: 3.3	**UNIVERSE: Provide scientific evidence that supports or refutes the "Big Bang" theory of how the universe was formed.**
Level 1 Entering	Demonstrate understanding of expansion by drawing points on a diagram of an un-inflated balloon and an inflated balloon, and/or drawing measured marks on a rubber band and then stretching the rubber band.
Level 2 Beginning	Create a timeline of the creation of the universe from the Big Bang to today, using data supplied by the teacher; draw pictures to go with timeline.
Level 3 Developing	Match, with a partner, important dates of scientific evidence with short descriptions of the evidence (e.g., 1929: Hubble observed galaxies as they appeared to be moving away from the earth); then create a time line of important scientific evidence.
Level 4 Expanding	Discuss the scientific evidence to date about the Big Bang theory, in a small group; then write a paragraph summarizing the discussion.
Level 5 Bridging	Use scientific evidence to write an essay supporting or refuting the Big Bang theory.

S:ESS3:11: 3.4	**UNIVERSE: Based on the nature of electromagnetic waves, explain the movement and location of objects in the universe or their composition (e.g., red shift, blue shift, line spectra).**
Level 1 Entering	Identify, with a partner, the types of waves on a labeled Electromagnetic Spectrum Diagram (e.g., radio, gamma, ROYGBIV); then place pictures showing various kinds of waves (e.g., rainbow, x-ray of a bone, radio, microwave oven) in the appropriate places on the diagram
Level 2 Beginning	Identify, in a small group, whether a star has red shifted or blue shifted, using a normal line spectrum of an element and then the spectrum of a moving star; indicate if the star is moving toward Earth or away from Earth.
Level 3 Developing	Match the elements being produced by a star, using the bright line spectra of the star and the spectra of common elements.
Level 4 Expanding	Complete a cloze activity that explains the use of the spectrometer to determine movement and composition of a star.
Level 5 Bridging	Explain the use of the spectrometer to determine movement and composition of a star.

S:ESS3:11: 3.5	**UNIVERSE: Explain how scientific theories about the structure of the universe have been advanced through the use of sophisticated technology (e.g., space probes and visual, radio and x-ray telescopes).**
Level 1 Entering	Label instruments of technology (probes, telescopes, satellites) with their names and uses, using a word bank.
Level 2	Match instruments of technology with the names of the scientists and the dates of

Beginning	the discovery; then match each instrument of technology with its use.
Level 3 Developing	Make a timeline of scientists, their instruments, and their discoveries, in a small group.
Level 4 Expanding	Compare and contrast (in a Venn diagram, table, or paragraph) the data gained from rudimentary technology (Galileo) and the data gained from modern technology (Hubble telescope).
Level 5 Bridging	Summarize the information gained from each successive piece of technology.

Life Science

LS1 All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).

S:LS1:11: 2.8	**LIVING THINGS AND ORGANIZATION: Use data and observation to make connections between, to explain, or to justify how specific cell organelles produce/regulate what the cell needs or what a unicellular or multi-cellular organism needs for survival (e.g., protein synthesis, DNA transport, nerve cells).**
Level 1 Entering	Draw and label cell structures, using a word bank; then match pictures of cell structures to their function, using a list of functions.
Level 2 Beginning	Sort organelles by the survival need(s) they meet (protein synthesis, DNA transport, nerve cells), with a partner.
Level 3 Developing	Compare and contrast, with a partner organelles and their functions, using a Venn diagram; describe connections between organelles.
Level 4 Expanding	Summarize, orally or in a paragraph, how prokaryotic cells differ from eukaryotic cells.
Level 5 Bridging	Determine the type of cell (prokaryotic, eukaryotic, muscle, or blood cell) based on the organelles present and/or the kinds of cell processes shown to be taking place.

S:LS1:11: 3.4	**REPRODUCTION: Explain or justify with evidence how the alteration of the DNA sequence may produce new gene combinations that make little difference, enhance capabilities, or can be harmful to the organism (e.g., selective breeding, genetic engineering, mutations).**
Level 1 Entering	Use a diagram or text to demonstrate the concept that one small change in the pattern of DNA affects the outcome of the whole (e.g., change one letter and *The cat ate the rat* becomes *The cat ate the hat),* with visuals and teacher assistance*.*
Level 2 Beginning	Sort a list of real-world examples of effects of alteration of the DNA sequence (e.g., albinism, sickle cell anemia, BT corn, red flowers increase pollination) into a three-column chart (enhance capabilities, make little difference, harmful), with a partner.
Level 3 Developing	Compare and contrast, in a small group and using a Venn diagram or a bulleted list, natural and human-influenced changes in DNA sequences (e.g., wild animals were domesticated through selective breeding; Darwin's finches; ligers).
Level 4 Expanding	Discuss in a small group the relative advantages and disadvantages of genetic engineering and/or selective breeding; then write a summary of the discussion.
Level 5 Bridging	Compare and contrast the effects of the alteration of a DNA sequence. and predict the outcomes of a change (e.g., sickle cell mutation can protect against malaria).

LS2 Energy flows and matter recycles through an ecosystem.

S:LS2:11:	**ENVIRONMENT: Using data from a specific ecosystem, explain relationships**

1.5	**or make predictions about how environmental disturbance (human impact or natural events) affects the flow of energy or cycling of matter in an ecosystem.**
Level 1 Entering	Draw a picture to predict the effect of an environmental disturbance on the flow of energy in a particular ecosystem, with teacher assistance (e.g., given a diagram of the flow of energy in a forest ecosystem, and a second diagram showing the introduction of wolves to the ecosystem, student will draw a third diagram to show how the wolf affects the flow of energy in the ecosystem).
Level 2 Beginning	Sequence pictures of an ecosystem before and after an environmental disturbance, with a partner; then use a word bank of simple phrases/sentences to complete a cloze activity about the changes in the flow of energy and matter.
Level 3 Developing	Watch a video segment and retell, orally or in writing, the effects of an environmental disturbance on an ecosystem.
Level 4 Expanding	Discuss in a small group the impact of an environmental disturbance (e.g., a flood) on a given ecosystem, given information about the disturbance; then write a summary of the discussion.
Level 5 Bridging	Predict in writing the social or economic impact of a chosen environment disturbance on the human and/or wild population of a chosen ecosystem.

S:LS2:11: 1.6	**ENVIRONMENT: Explain or evaluate potential bias in how evidence is interpreted in reports concerning a particular environmental factor that impacts the biology of humans.**
Level 1 Entering	Take a poll, using pictures of real things and events that have environmental impact (e.g., forest fires, thunder storms, wolves, hunting deer), and asking classmates if they are “good” or “bad”; identify the pictures that receive both responses.
Level 2 Beginning	Listen to simple, visually-supported sentences about how a particular environmental factor impacts the biology of humans, and identify them as fact and opinion.
Level 3 Developing	Find a news story (paper, internet, TV) about an environmental issue and discuss it, with teacher assistance, in a small group; identify parts of the story that elicited differing points of view during the discussion.
Level 4 Expanding	Discuss different perspectives concerning an environmental problem (e.g., global warming); then write a summary of the discussion.
Level 5 Bridging	Discuss your position, in extended written discourse, regarding the impact of a particular environmental factor (e.g., global warming).

S:LS2:11: 3.2	**RECYCLING OF MATERIAL: Trace the cycling of matter (e.g., carbon cycle) and the flow of energy in a living system from its source through its transformation in cellular, biochemical processes (e.g., photosynthesis, cellular respiration, fermentation).**
Level 1 Entering	Add arrows to a diagram of a cycle (e.g., carbon cycle, water cycle) to show the flow of energy.
Level 2 Beginning	Label the parts of a cycle, using an incomplete diagram and a word bank.
Level 3 Developing	Discuss in a small group a diagram of a cycle; then write a summary of the discussion.
Level 4 Expanding	Make a poster, with a partner, showing the impact on a cycle if a key component is removed; present and explain the poster to the class.
Level 5 Bridging	Explain and diagram a cycle of energy through its changes in living systems (e.g., trace the energy in a bag of peanuts from the where it originates with the sun, to where it is used in the muscles of a tennis player).

LS3 Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).

S:LS3:11: 2.5	**EVIDENCE OF EVOLUTION: Explain how evidence from technological advances supports or refutes the genetic relationships among groups of organisms (e.g., DNA analysis, protein analysis).**
Level 1 Entering	Sort pictures of skeletons based upon similarity in form and taxonomy, with teacher assistance.
(Level 2 Beginning	Describe features that groups of related organisms have in common (e.g., birds, frogs, and reptiles lay eggs, mammals and birds are warm blooded, etc.), with visual support.
Level 3 Developing	Identify the protein codes in a series of DNA sequences, with a partner.
Level 4 Expanding	Identify the protein codes in a series of DNA sequences, in a small group, and match the organisms that would be most similar; justify the response.
Level 5 Bridging	Compare and contrast, orally or in writing, amino acid sequence differences in key proteins of very different animals (e.g., cytochrome C, hemoglobin), to link number and kinds of differences with evolutionary connections.

S:LS3:11: 2.6	**EVIDENCE OF EVOLUTION: Given information about living or extinct organisms, cite evidence to explain the frequency of inherited characteristics of organisms in a population; or explain the evolution of varied structures (with defined functions) that affected the organisms' survival in a specific environment (e.g., giraffe, wind pollination of flowers).**
Level 1 Entering	Identify key adaptations, on pictures of organisms, that allow for their survival (giraffe's neck reaches food, polar bear fur is camouflage, flowers for hummingbird pollination are red, penguin "wings" fly in water).
Level 2 Beginning	Sequence a series of pictures that portray natural selection in a population (e.g., a population of rabbits tending to be darker in fur color over time due to predator pressure).
Level 3 Developing	Sequence a series of pictures that portray natural selection in a population, and then explain, orally or in writing, the adaptations that have changed from picture to picture.
Level 4 Expanding	Compare and contrast, in a small group, and using a Venn diagram, the different key adaptations between plants and animals; then write a summary of the diagram.
Level 5 Bridging	Create a brochure or children's book using the concept of natural selection to explain how a given organism came to be (e.g., polar bears > brown bears); the story should link environmental pressures to at least three key adaptations (e.g., white fur, fat accumulation, wide paws, etc.).

S:LS3:11: 3.9	**EVIDENCE OF EVOLUTION: Given a scenario, provide evidence that demonstrates how sexual reproduction results in a great variety of possible gene combinations and contributes to natural selection (e.g., Darwin's finches, isolation of a species, Tay Sach's disease).**
Level 1 Entering	Explore how the shape of a bird's beak affects its ability to eat different foods by placing beads into various vessels (beaker, graduated cylinder, newspaper) and picking them up using various tools (fingers, spoon, tweezers); match tool shape to beak shape.
Level 2 Beginning	Match pictures of bird beaks with their food types; then list reasons why particular beak shapes are most appropriate for gathering particular foods, with a partner.
Level 3 Developing	Read a modified passage about the Galapagos tortoises and their distinctive shell shapes; explain why shell shape depends on the climate of the particular island

	they live on, in a small group.
Level 4 Expanding	Compare the products of asexual reproduction (binary fission, budding, cloning) with sexual reproduction, in a small group; state reasons why sexual reproduction favors survival of the species as a whole and why asexual reproduction leaves organisms vulnerable to extinction.
Level 5 Bridging	Discuss, orally or in writing, the potential implications on human variation of artificial selection versus natural selection.

LS4 Humans are similar to other species in many ways, and yet are unique among Earth's life forms.

S:LS4:11: 2.6	**DISEASE: Use evidence to make and support conclusions about the ways that humans or other organisms are affected by environmental factors or heredity (e.g., pathogens, diseases, medical advances, pollution, mutations).**
Level 1 Entering	Grow common everyday bacteria on agar with and without the presence of a chemical (antibiotic, bleach, alcohol); record the effects through drawings or a simple chart.
Level 2 Beginning	Label the population and life expectancy for humans in different countries, with a partner, using a simplified map of the world and data supplied by the teacher.
Level 3 Developing	Compare data supplied by the teacher on the incidence of lung disease among different populations (e.g., residents of Mexico City and residents of rural Iowa; coal miners and foresters; smokers and non-smokers), in a small group; then list possible causes of lung disease.
Level 4 Expanding	Discuss in a small group evidence that antibiotic-resistant bacteria are largely the result of human behavior; then summarize the discussion in writing.
Level 5 Bridging	Draw conclusions about the connectedness of sickle cell anemia and malaria, based on data showing the prevalence of each worldwide; justify the conclusion in writing.

S:LS4:11: 3.3	**HUMAN IDENTITY: Explain how the immune system, endocrine system, or nervous system works and draw conclusions about how systems interact to maintain homeostasis in the human body.**
Level 1 Entering	Match a list of the different body systems with their functions in the body.
Level 2 Beginning	Match organs on a diagram of a human body system with their names on a list; then match each name with a brief description of the organ's function.
Level 3 Developing	Complete cloze activities about human body systems, using a word bank, with a partner; give examples, either orally or in writing, of homeostasis.
Level 4 Expanding	Label key parts from two body systems (endocrine, nervous, or immune), in a small group; write a description of the main functions of each system in humans.
Level 5 Bridging	Compare and contrast the main activities of two body systems (e.g., endocrine vs. nervous systems), and describe how they work together to accomplish their individual functions (e.g., brain stimulates adrenal glands to produce adrenaline to raise body activities to accomplish a fight or flight response in emergency situations).

Physical Science

PS1 All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).

S:PS1:11: 1.5	**COMPOSITION: Scientific thought about atoms has changed over time. Using information (narratives or models of atoms) provided, cite evidence that changed our understanding of the atom and the development of atomic theory.**
Level 1 Entering	Label models of the atom with their parts and theorists, with a partner, using a word bank.
Level 2 Beginning	Sort different atomic models, with a partner and with visual support; then match the name of the theorist and the date of the discovery with the atomic model, using a word/date bank.
Level 3 Developing	Make a timeline of atomic models, theorists, and their discovery, in a small group, using data supplied by the teacher.
Level 4 Expanding	Compare and contrast specific influential atomic discoveries and theories, using a graphic organizer (e.g., Venn diagram, table, paragraph).
Level 5 Bridging	Discuss and then summarize in writing the information gained from each successive model of the atom (e.g., components of an atom, quarks, neutrinos, etc.).

S:PS1:11: 1.6	**COMPOSITION: Model and explain the structure of an atom or explain how an atom's electron configuration, particularly the outermost electron(s), determines how that atom can interact with other atoms.**
Level 1 Entering	Match the parts of the atom on a diagram with a list of their names.
Level 2 Beginning	Label an atom and parts of the atom on a diagram, using a word bank.
Level 3 Developing	List and describe properties of parts of the atom, with a partner and graphic support.
Level 4 Expanding	Create a model of an atom with all of its sub-atomic particles, including valence electrons, in a small group.
Level 5 Bridging	Discuss, orally or in written form, the importance of valence electrons in ionic and covalent bonding.

S:PS1:11: 2.6	**PROPERTIES: Use physical and chemical properties as determined through an investigation to identify a substance.**
Level 1 Entering	Label physical and chemical changes and properties (e.g., solid, liquid, gas; rusting, burning, baking) on visuals, using a word bank.
Level 2 Beginning	Sort visuals showing physical and chemical properties/changes by whether they are physical or chemical.
Level 3 Developing	Complete a chart or table with various substances and their physical or chemical properties, with a partner, using a word bank.
Level 4 Expanding	Describe in a small group and summarize individually, in writing, physical and chemical properties observed in laboratory experiments.
Level 5 Bridging	Use specific physical and chemical properties collected in the lab to identify a substance.

S:PS1:11: 2.7	**PROPERTIES: Explain how properties of elements and the location of elements on the periodic table are related.**
Level 1 Entering	Locate names and symbols of elements on the periodic table; use the key on the table to identify physical properties of the elements (e.g., boiling point and density).
Level 2 Beginning	Make an informational poster about an element, with a partner.
Level 3 Developing	Provide missing information about an element by using a periodic table to complete a gap-fill activity (e.g., the student is given an element and needs to find missing information about it, from a data sheet provided by the teacher).

Level 4 Expanding	Sort elements first by group and period, and then by property, using a periodic table.
Level 5 Bridging	Complete a cloze activity on a periodic table (the table has missing information that the student needs to fill in).

PS2 Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.

S:PS2:11: 1.5	**CHANGE: Explain relationships between and among electric charges, magnetic fields, electromagnetic forces, and atomic particles.**
Level 1 Entering	Point to N and S on a magnet and demonstrate how opposite poles of the magnet attract each other and like poles repel; then make a labeled drawing of these forces, using a word bank.
Level 2 Beginning	Label diagrams of protons, electrons, and neutrons within an atom, using a word bank; then identify the charges, with a partner.
Level 3 Developing	Complete a cloze activity about the connection between electricity (moving charged particles) and magnetism in forming the electromagnetic force, using a word bank.
Level 4 Expanding	Discuss orally in a small group and then write a paragraph about the connection between electricity (moving charged particles) and magnetism in forming the electromagnetic force.
Level 5 Bridging	Follow multi-step directions to make an electromagnet; draw a conclusion as to why the nail becomes a magnet when a current-carrying wire is wrapped around it.

S:PS2:11: 2.5	**CONSERVATION: Demonstrate how transformations of energy produce some energy in the form of heat and therefore the efficiency of the system is reduced (chemical, biological, and physical systems).**
Level 1 Entering	Use a graphic to sort, label or match types of energy in use (e.g., thermal, light, chemical, electrical, kinetic, mechanical).
Level 2 Beginning	List types of energy, using a word bank; then give examples of each type, with a partner.
Level 3 Developing	Sequence and explain energy transfer in a system, using a graphic (e.g., source of electrical energy > electricity > electric wires > socket > lamp > light and heat).
Level 4 Expanding	Describe and explain transformations of energy (e.g., human food pyramid for meat eaters vs. vegetarians; incandescent vs. compact fluorescent light bulb), either orally or in a paragraph, using a graphic.
Level 5 Bridging	Compare and contrast the efficiency of transformations of energy (chemical, biological, and physical systems).

S:PS2:11: 3.10	**ENERGY: Using information provided about chemical changes, draw conclusions about the energy flow in a given chemical reaction (e.g., exothermic reactions, endothermic reactions).**
Level 1 Entering	Identify chemical reactions (e.g., hand warmer packs, chemical cold pack, glow sticks, fireworks) as either exothermic or endothermic by use of the senses.
Level 2 Beginning	Sort pictures of chemical reactions, or real reactions, as either exothermic or endothermic, with a partner.
Level 3 Developing	Complete an energy diagram of exothermic or endothermic reactions, using a word bank.
Level 4 Expanding	Discuss in a small group and then write a paragraph about the energy transformations shown in a diagram of a particular reaction.
Level 5 Bridging	Analyze information to draw conclusions about energy changes in a reaction, using real world situations and examples.

PS3 The motion of an object is affected by force.

S:PS3:11: 1.8	**FORCES: Given information (e.g., graphs, data, diagrams), use the relationships between or among force, mass, velocity, momentum, and acceleration to predict and explain the motion of objects.**
Level 1 Entering	Demonstrate how force and mass influence the speed of an object, given objects of different mass and a spring scale.
Level 2 Beginning	Identify, orally or in writing, whether the object speed shown in different distance-time (*d-t*) graphs is more (increasing), less (decreasing), or the same (constant).
Level 3 Developing	Explain, orally or in writing, the relationship between acceleration and change in velocity shown on a graph, data, or diagram, using a word bank.
Level 4 Expanding	Complete a set of word problems, using the formulas for force, mass, velocity, momentum, and acceleration.
Level 5 Bridging	Create *d-t* and *v-t* graphs, using given data; relate the slopes of these graphs to the appropriate formulas.

S:PS3:11: 2.3	**MOTION: Apply the concepts of inertia, motion, and momentum to predict and explain situations involving forces and motion, including stationary objects and collisions.**
Level 1 Entering	Use real objects (e.g., soccer, wiffle, bowling balls) to physically demonstrate (e.g., kicking, rolling, throwing, etc.) the concepts of mass and inertia, and their relationship to motion and momentum.
Level 2 Beginning	Complete gap-fill phrases about the real objects listed above to explain concepts of inertia, motion, and momentum, using a word bank.
Level 3 Developing	Write the formula for momentum; then practice solving the equation for each of the three possible unknowns (momentum, mass, and velocity).
Level 4 Expanding	Discuss in a small group, and them summarize in a written paragraph, how a series of sequential photos of a head-on collision with a crash dummy, air bag, etc. illustrates inertia and momentum.
Level 5 Bridging	Predict how train cars will respond as two of them collide, given their initial velocity, mass, and the knowledge that momentum is conserved in a closed system.

S:PS3:11: 2.4	**MOTION: Explain the effects on wavelength and frequency as electromagnetic waves interact with matter (e.g., light diffraction, blue sky).**
Level 1 Entering	Differentiate among the types of electromagnetic (EM) wavelengths (low, medium, or high frequency) by placing pictures (e.g., rainbow, x-ray of a bone, radio, microwave oven) on a labeled EM diagram.
Level 2 Beginning	Label an electromagnetic (EM) diagram (radio, gamma, etc.), using a word bank.
Level 3 Developing	Complete a cloze activity about the reflection, transmission, and absorption of visible light waves (e.g., things that are blue absorb all colors and reflect blue light energy), and the dissection of light through a prism, using a word bank.
Level 4 Expanding	Summarize orally in a small group, and then in a written paragraph, the reflection, transmission, and absorption of visible light waves, and the dissection of light through a prism.
Level 5 Bridging	Analyze and discuss real-world situations where EM energy interacts with matter (e.g., X-rays with genetic material [mutations], visible light [white vs. black vs. transparent objects]).