Science: Sixth Grade

Benchmark	Indicators	Specificity	Materials/Month
Science as Inquiry Standard 1: The student will develop the abilities to do *scientific inquiry*, be able to demonstrate how *scientific inquiry* is applied, and develop understandings about *scientific inquiry*.			
1.1 The student will demonstrate abilities necessary to do the processes of *scientific inquiry*.	The student… 1. ▲ identifies questions that can be answered through scientific investigations. 2. ▲ designs and conducts *scientific investigations* safely using appropriate tools, mathematics, *technology*, and techniques to gather, analyze, and interpret data. 3. ▲ identifies the relationship between evidence and logical conclusions.	The student… 1. explores properties and phenomena of various materials and generates testable questions to investigate. 2. a. designs and conducts an investigation on a question. b. given an investigative question, determines what to measure and how to measure (quantitative, qualitative). c. displays data collected from performing an investigation using tables, graphs, diagrams, and other graphic organizers.	August-October
1.2 The student will apply different kinds of investigations to different kinds of questions.	1. develops questions and adapts (frames) the inquiry process to guide the appropriate type of investigation.	1. a. adapts an existing lab or activity to write a different question, identify another variable, and/or modify the procedure to guide a new investigation.	August-October
1.3 The student will analyze how science advances through the interaction of new ideas, scientific investigations, skepticism, and examinations of evidence of varied explanations.	1. after completing an investigation, generates alternative methods of investigation and/or further questions for inquiry. 2.▲ evaluates the work of others to determine evidence which scientifically supports or contradicts the results, identifying faulty reasoning or conclusions that go beyond evidence and/or are not supported by data.	1. asks “What would happen if…?” questions to generate new ideas for investigation. 2. a. examines and analyzes a scientific breakthrough (such as a Hubble discovery) using multiple scientific sources. b. explains how a reasonable conclusion is supported. c. analyzes evidence and data which supports or contradicts various theories (e.g. theory of continental drift, spontaneous generation, etc.).	August-October

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Physical Science Standard 2: The student will apply process skills to develop an understanding of physical science including: properties, changes of properties of matter, motion and forces, and transfer of energy.			
2.1 The student will observe, compare, and classify properties of matter.	The student… 1. ▲ compares and classifies the states of matter; solids, liquids, gases, and plasma. 2. compares and contrasts the classes of matter; elements, compounds, and mixtures. 3. identifies and communicates properties of matter including, but not limited to, boiling point, solubility, and density.	The student… 1. makes a diagram/model showing the various states of water. 2. a. separates sand, iron filings, and salt using a magnet and water. b. observes properties of kitchen powders (baking soda, salt, sugar, flour). c. given a chemical formula, uses a periodic table to identify the number and type of elements in a compound. 3. observes substances that dissolve (sugar) and substances that do not dissolve (sand).	October-November
2.2 The student will observe, measure, infer, and classify changes in properties of matter.	The student… 1. ▲ understands the relationship of atoms to elements and elements to compounds. 2. ▲ measures and graphs the effects of temperature on matter.	The student… 1. draws a diagram to show how different compounds are composed of elements in various combinations. 2. changes water from solid to liquid to gas using heat. Measures and graphs temperature changes. Observes changes in volume occupied.	October-November

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Physical Science Standard 2: The student will apply process skills to develop an understanding of physical science including: properties, changes of properties of matter, motion and forces, and transfer of energy.			
2.3 The student will investigate motion and forces.	The student… 1. identifies the forces that act on an object (e.g. gravity and friction). 2. ▲ describes, measures, and represents data on a graph showing the motion of an object (position, direction of motion, speed). 3. ▲ recognizes and describes examples of Newton's Laws of Motion. 4. ▲investigates and explains how simple machines multiply force at the expense of distance.	The student… 1. a. explores the variables of surfaces that would allow a car to overcome the forces of gravity and friction to climb an inclined plane. 2. a. follows the path of several objects down a ramp to look at properties that reduce friction. b. traces the force, direction, and speed of a baseball, from leaving the pitcher's hand and returning it back to the pitcher through one of many possible paths. 3. a. places a penny on a rolling toy vehicle, stops the vehicle abruptly, and observes the motion of the penny. Relates to personal experience – stopping rapidly in a car. 4 a. investigates the load (force) that can be moved as the number of pulleys in a system is increased. b. investigates how bicycle gears work.	April-May Levels and Pulleys (FOSS)
2.4 The student will understand and demonstrate the transfer of energy.	The student… 1. understands the difference between potential and kinetic energy. 2. ▲ understands that when work is done, energy transforms from one form to another, including mechanical, heat, light, sound, electrical, chemical, and nuclear energy, yet is conserved. 3. ▲ observes and communicates how light (electromagnetic) energy interacts with matter: transmitted, reflected, refracted, and absorbed. 4. ▲ understands that heat energy can be transferred from hot to cold by radiation, convection, and conduction	The student… 1. compares kinetic energy (speed) with potential energy (height). 2. sequences the transmission of energy through various situations. 3. classifies objects as to how they interact with light: transmits; absorbs; refracts; reflects. 4. Observes convection. Measures and graphs temperature over time.	April-May

Science: Sixth Grade

Benchmark	Indicators	Specificity	Materials/Month
Life Science Standard 3: The student will apply process skills to explore and understand structure and function in living systems, reproduction and heredity, regulation and behavior, populations and ecosystems, and diversity and adaptations of organisms.			
3.1 The student will model structures of organisms and relate functions to the structures.	The student… 1. ▲ will understand the Cell Theory; that all organisms are composed of one or more cells, cells are the basic unit of life, and that cells come from other cells. 2. ▲ relates the structure of cells, organs, tissues, organ systems, and whole organisms to their functions. 3. compares organisms composed of single cells with organisms that are multi-cellular. 4. concludes that breakdowns in structure or function may be caused by disease, damage, heredity, or aging.	The student... 1. compares plant and animal cells, major parts and functions of cells. 2. creates and compares single and multi-cell organisms. 3. a. Identifies human body systems and functions. b. relates an organisms structure to how it works. c. compares and contrasts plant and animal cells.	January/February
3.2 The student will understand the role of reproduction and heredity for all living things.	The student… 1. understands how hereditary information of each cell is passed from one generation to the next. 2. infers that the characteristics of an organism result from heredity and interactions with the environment.	The student... 1. knows the terms metosis, meosis, phenotype, and genotype.	January-February

Science: Sixth Grade

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Life Science Standard 3: The student will apply process skills to explore and understand structure and function in living systems, reproduction and heredity, regulation and behavior, populations and ecosystems, and diversity and adaptations of organisms.			
3.3 The student will describe homeostasis, the regulation and balance of internal conditions in response to a changing external environment.	The student... 1. ▲ understands that internal and/or environmental conditions affect an organism's behavior and/or response in order to maintain and regulate stable internal conditions to survive in a continually changing environment. 2. recognizes that the survival of all organisms requires the ingestion of materials, the intake and release of energy, growth, release of wastes, and responses to environmental change.	The student... 1 a. selects a variable to alter in the environment (e.g., temperature, light, moisture, gravity) and observes the effects on an organism. b. observes the response of the body when competing in a running event. (In order to maintain body temperature, various systems begin cooling through such processes as sweating and cooling the blood at the surface of the skin). c. investigates the effects of various stimuli and how they adapt their growth: phototropism, geotropism, and thermotropism are examples.	January-February
3.4 The student will identify and relate interactions of populations of organisms within an ecosystem.	The student… 1. ▲ recognizes that all populations living together (biotic resources) and the physical factors (abiotic resources) with which they interact, compose an ecosystem. 2. ▲ traces the energy flow from the sun (source of radiant energy) to producers (via photosynthesis – chemical energy) to consumers and decomposers in food webs.	The student… 1 a. identifies the interactions between the populations and physical conditions needed for survival. b. examines the living and nonliving parts of a community. 2 a. Identifies various food webs and observes that organisms in a system are classified by their function. b. role-plays the interactions and energy flow of organisms in a food web e.g. Passes a ball of string among a circle of students who represent parts of a food web. c. investigates the importance of photosynthesis to all life.	January-February

Science: Sixth Grade

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Life Science Standard 3: The student will apply process skills to explore and understand structure and function in living systems, reproduction and heredity, regulation and behavior, populations and ecosystems, and diversity and adaptations of organisms.			
3.5 The student will observe the diversity of living things and relate their adaptations to their survival or extinction.	The student… 1. concludes that species of animals, plants, and microorganisms may look dissimilar on the outside but have similarities in internal structures, developmental characteristics, chemical processes, and genomes. 2. ▲ understands that adaptations of organisms (changes in structure, function, or behavior that accumulate over successive generations) contribute to biological diversity. 3. ▲ associates extinction of a species with environmental changes and insufficient adaptive characteristics.	The student… 1. a. observes numerous objects and creates a classification system based on observations of similarities and differences. b. uses a field guide and/or dichotomous key to identify an organism 2.compares characteristics of birds with how they behave in their environments.	January-February
Earth & Space Science Standard 4: The student will apply process skills to explore and develop an understanding of the structure of the earth system, earth's history, and earth in the solar system.			
4.1 The student will understand that the structure of the earth system is continuously changing due to earth's physical and chemical processes.	The student… 1. ▲ identifies properties of the solid earth, the oceans and fresh water, and the atmosphere. 2. ▲ models earth's cycles, constructive and destructive processes, and weather systems	The student… 1 a. classifies rocks, minerals, and soil by their properties. b. investigates water's major role in changing the solid surface of earth, such as the effect of oceans on climates and water as an erosion force. c. maps major climate zones and relates to ocean currents. d. compares heating and cooling over land and water. e. compares the densities of salt and fresh water. 2 a. creates rock cycle and water cycle dioramas. b. illustrates global ocean and wind currents. c. observes the effects of mechanical and chemical weathering on various rock types.	March-April

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Benchmark	Indicators	Specificity	Materials/Month
Earth & Space Science Standard 4: The student will apply process skills to explore and develop an understanding of the structure of the earth system, earth's history, and earth in the solar system.			
4.2 The student will understand past and present earth processes and their similarities	The student… 1.▲ understands that earth processes observed today (including movement of lithospheric plates and changes in atmospheric conditions) are similar to those that occurred in the past; earth history is also influenced by occasional catastrophes, such as the impact of a comet or asteroid.	The student… 1. a. shows how erosion and deposition have changed Earth's surface over time. b. investigates how the Grand Canyon was formed and continues to change.	March-April Landforms (FOSS)
4.3 The student will identify and classify stars, planets, and other solar system components.	The student… 1. ▲ compares and contrasts the characteristics of stars, planets, moons, comets, and asteroids. 2. models spatial relationships of the earth/ moon/planets/sun system to scale. 3. identifies past and present methods used to explore space.	The student… 1. a. identifies the sun as a star and compares its characteristics to those of other stars. b. classifies bright stars visible from earth by color, temperature, age, apparent brightness, and distance from earth. c. creates a graphic organizer to visualize comparisons of planets. d. identifies and classifies characteristics of asteroids and comets. 2. researches ancient observations and explanations of the heavens and compares with today's knowledge and methods such as, how we learn about phenomena/objects we can't observe directly. Ex. Spectral analysis to determine the chemistry of stars.	November-December

Science: Sixth Grade

Benchmark	Indicators	Specificity	Materials/Month
Earth & Space Science Standard 4: The student will apply process skills to explore and develop an understanding of the structure of the earth system, earth's history, and earth in the solar system.			
4.4 The student will model motions and identify forces that explain earth phenomena.	The student… 1. ▲ demonstrates and models object/space/time relationships that explain phenomena such as the day, the month, the year, seasons, phases of the moon, eclipses and tides. 2. describes how the angle of incidence of solar energy striking earth's surface affects the amount of heat energy absorbed at earth's surface.	The student... 1. a. uses an earth/moon/ sun model to demonstrate a day, a month, a year, and the seasons. b. models the relative positions of the sun, earth, and moon to create eclipses, phases of the moon, and tides.	November-December
Personal and Environmental Perspectives Standard: 6 The student will apply process skills to explore and develop an understanding of issues of personal health, population, resources and environment, and natural hazards.			
6.1 The student will understand scientific knowledge relative to personal health.	The student… 1. ▲ identifies individual nutrition, exercise, and a rest needs based on science and uses a scientific approach to thinking critically about personal health, lifestyle choices, risks and benefits.	The student… 1. a. designs, implements, and self-evaluates a personal nutrition and exercise program. b. compares and contrasts immediate benefits of eating junk food (high caloric, low nutritional foods) to long term benefits of: i. lifetime of healthy eating. ii. evaluates the risks and benefits of foods, medicines, and personal products. iii. evaluates and compares the nutritional and toxic properties of various natural and synthetic foods.	Taught in 6th grade health class.
6.2 The student will understand the impact of human activity on resources and environment.	The student… 1. ▲ investigates the effects of human activities on the environment and analyzes decisions based on the knowledge of benefits and risks.	The student… 1. a. investigates the effects of traffic volume on environmental quality (e.g. water and air quality, plant health). b. evaluates the benefits of burning fossil fuels to meet energy needs against the risks of increased air pollution, etc.	April

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Personal and Environmental Perspectives Standard: 6 The student will apply process skills to explore and develop an understanding of issues of personal health, population, resources and environment, and natural hazards.			
6.3 The student will understand that natural hazards are dynamic examples of earth processes which cause us to evaluate risks.	The student… 1. recognizes patterns of natural processes and/or human activities that may cause and/or contribute to natural hazards.	The student… 1. sees how channeling a stream may promote flooding downstream.	March-April Landforms FOSS kit
History and Nature of Science Standard 7: The student will examine and develop an understanding of science as a historical human endeavor.			
7.2 The student will research contributions to science throughout history.	The student… 1. ▲ recognizes that new knowledge leads to new questions and new discoveries, replicates historical experiments to understand the principles of science, and relates contributions of men and women to the fields of science.	The student… 1. a. discusses discoveries that replaced previously held knowledge, such as the setup of the solar system or Pluto's status as a planet.	November-December