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Science Grade 5



The Physical Setting

STANDARD 4: Physical Setting -- Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Key Idea 3: Matter is made up of particles whose properties determine the observable characteristics of matter and its reactivity. *Objects in the universe are composed of matter. Matter is anything that takes up space and has mass. Matter is classified as a substance or a mixture of substances. Knowledge of the structure of matter is essential to students' understanding of the living and physical environments. Matter is composed of elements which are made of small particles called atoms. All living and nonliving material is composed of these elements or combinations of these elements.*

PERFORMANCE INDICATOR 3.1 Observe and describe properties of materials, such as density, conductivity, and solubility.

Major Understandings:

- 3.1a Substances have characteristic properties. Some of these properties include color, odor, phase at room temperature, density, solubility, heat and electrical conductivity, hardness, and boiling and freezing points.
- 3.1b Solubility can be affected by the nature of the solute and solvent, temperature and pressure. The rate of solution can be affected by the size of the particles =, stirring, temperature, and the amount of solute already dissolved.
- 3.1c The motion of particles helps to explain the phases (states) of matter as well as changes from one phase to another. The phase in which matter exists depends on the attractive forces among its particles.
- 3.1d Gases have neither a determined shape not a definite volume. Gases assume the shape and volume of a closed container.
- 3.1e A liquid has definite volume, but takes the shape of a container.
- 3.1f A solid has definite shape and volume. Particles resist a change in position
- 3.1g Characteristic properties can be used to identify different materials, and separate a mixture of substances into its components. For example, iron can be removed from a mixture by means of a magnet. An insoluble substance can be separated from soluble substances y such process as filtration, setting, and evaporation.
- 3.1h Density can be described as the amount of matter that is in a given amount of space. If two objects have equal volume, but one has more mass, the one with more mass is denser.
- 3.1i Buoyancy is determined by comparative densities.

PERFORMANCE INDICATOR 3.2 Distinguish between chemical and physical changes.

Major Understandings:

- 3.2a During physical change a substance keeps its chemical composition and properties. Examples of physical changes include freezing, melting, condensation, boiling, evaporation, tearing and crushing.
- 3.2b Mixtures are physical combination of materials and can be separated by physical mean.

The Living Environment

STANDARD 4: Living Environment -- Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

Key Idea 5: Organisms maintain a dynamic equilibrium that sustains life. *All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment. Organisms respond to internal or environmental stimuli.*

PERFORMANCE INDICATOR 5.1: Compare the way a variety of living specimens carry out basic life functions and maintain dynamic equilibrium.

Major Understanding:

- 5.1a Animals and plants have a great variety of body plans and internal structures that contribute to their ability to maintain a balanced condition.
- 5.1b An organism's overall body plan and its environment determine the way that the organism carries out the life processes
- 5.1.C All organisms require energy to survive. The amount of energy needed and the method for obtaining this energy varies among cells. Some cells use oxygen to release the energy stored in food.
- 5.1.D The methods for obtaining nutrients vary among organisms. Producers, such as green plants, use light energy to produce their food. Consumers, such as animals, take in energy rich foods.
- 5.1.E Herbivores obtain energy from plants. Carnivores obtain energy from animals. Omnivores obtain energy from plants and animals. Decomposers, such as bacteria and fungi, obtain energy by consuming waste and/or dead organisms.

PERFORMANCE INDICATOR 5.2: Describe the importance of major nutrients, vitamins, and minerals in maintaining health and promoting growth, and explain the need for a constant input of energy for living organisms.

Major Understandings:

- 5.2d Energy in foods is measured in Calories. The total caloric value of each type of food varies. The number of Calories a person requires varies from person to person.
- 5.2f Contraction of infectious disease, and personal behaviors such as use of toxic substances and some dietary habits, may interfere with one's dynamic equilibrium. During pregnancy these conditions may also affect the development of the child. Some effects of these conditions are immediate; others may not appear for many years.

Key Idea 6: Plants and animals depend on each other and their physical environment. *An environmentally aware citizen should have an understanding of the natural world. All organisms interact with one another and are dependent upon their physical environment. Energy and matter flow from one organism to another. Matter is recycled in ecosystems. Energy enters ecosystems as sunlight, and is eventually lost from the community to the environment, mostly as heat.*

PERFORMANCE INDICATOR 6.1: Describe the flow of energy and matter through food chains and webs.

Major Understandings:

- 6.1a Energy flows through ecosystems in one direction, usually from the Sun, through producers, to consumers, and then to decomposers. This process may be visualized with food chains or energy pyramids
- 6.1.b Food webs identify feeding relationships among producers, consumers, and decomposers in an ecosystem.
- 6.1c Matter is transferred from one organism to another and between organisms and their physical environment. Water, nitrogen, carbon dioxide, and oxygen are examples of substances cycled between the living and nonliving environment.

PERFORMANCE INDICATOR 6.2 Provide evidence that green plants make food and explain the significance of this process to other organisms.

Major Understandings:

- 6.2a Photosynthesis is carried on by green plants and other organisms containing chlorophyll. In this process, the sun's energy is converted into and stored as chemical energy in the form of a sugar. The quantity of sugar molecules increases in green plants during photosynthesis in the presence of sunlight.
- 6.2b The major source of atmospheric oxygen is photosynthesis. Carbon dioxide is removed from the atmosphere and oxygen is released during photosynthesis.
- 6.2c Green plants are the producers of food which is used directly or indirectly by consumers.

Key Idea 7: Human decisions and activities have had a profound impact on the physical and living environment.

PERFORMANCE INDICATOR 7.1: Describe how living things, including humans, depend upon the living and nonliving environment for their survival.

Major Understandings:

- 7.1a A population consists of all individuals of a species that are found together at a given place and time. Populations living in one place form a community. The community and the physical factors with which it interacts compose an ecosystem.
- 7.1b Given adequate resources and no disease or predators, populations (including humans) increase. Lack of resources, habitat destruction, and other factors such as predation and climate limit the growth of certain populations in the ecosystem.
- 7.1c In all environments, organisms interact with one another in many ways. Relationships among organisms may be competitive, harmful, or beneficial. Some species have adapted to be dependent upon each other with the result that neither could survive without the other.
- 7.1d Some microorganisms are essential to the survival of other living things.
- 7.1e The environment may contain dangerous levels of substances (pollutants) that are harmful to organisms. Therefore, the good health of environments and individuals requires the monitoring of soil, air, and water, and taking steps to keep them safe.

PERFORMANCE INDICATOR 7.2 Describe the effects of environmental changes on humans and other populations.

Major Understandings:

- 7.2a In ecosystems, balance is the result of interactions between community members and their environment.
- 7.2b The environment may be altered through the activities of organisms. Alterations are sometimes abrupt. Some species may replace others over time, resulting in long term gradual changes (ecological succession).
- 7.2c Overpopulation by any species impacts the environment due to the increased use of resources. Human activities can bring about environmental degradation through resource acquisition, urban growth, land-use decisions, waste disposal, etc.
- 7.2d Since the Industrial Revolution, human activities have resulted in major pollution of air, water, and soil. Pollution has cumulative ecological effects such as acid rain, global warming, or ozone depletion. The survival of living things on our planet depends on the conservation and protection of Earth's resources.

INQUIRY AND PROCESS SKILLS BASED ON ALL STANDARDS

Reasoning and Inquiry Skills

Classifying – arranging or distributing objects, event, or information representing objects or events in classes according to some method or system

Comparing and contrasting – identifying similarities and differences between or among objects, events, data, systems, etc.

Generalizing – drawing general conclusions from particulars

Inferring – drawing a conclusion based on prior experiences

Making decisions – identifying alternatives and choosing a course of action from among the alternatives after basing the judgment for the selection on justifiable reasons

Predicting – making a forecast of future events or conditions expected to exist

Communicating and Representation Skills

Oral Observations – playing a variety of roles in group discussions and asking questions to seek elaboration and clarification of ideas

Written Observations – presenting information in ways appropriate to a given task

Graphic Representations – using a range of equipment and software to integrate several forms of information in order to create good-quality audio, video, graphic, or text-based presentations

Collaboration and Connections Skills

Working Effectively – contributing to the work of a brainstorming group, laboratory partnership, cooperative learning group, or project team; planning procedures; identifying and managing responsibilities of team members; and staying on task, whether working alone or as part of a group

Presenting Results – using a variety of media to present the solution and to communicate the results

Self-regulation Skills

Investment in Learning – actively participates in lessons, engages in the learning process, identifies and uses necessary resources, develops a positive work ethic with consistent quality of work, uses time wisely, and demonstrates age-appropriate independence

Responsibility – comes with appropriate materials, respects rights of others to learn, completes work promptly, and utilizes an organizational system

PROCESS SKILLS BASED ON STANDARD 4

- General Skills:
- follow safety procedures in the classroom and laboratory
- safely and accurately use the following measurement tools:
 - metric ruler
 - balance
 - stopwatch
 - graduated cylinder
 - thermometer
- use appropriate units for measured or calculated values
- recognize and analyze patterns and trends
- sequence events
- identify cause-and-effect relationships
- use indicators and interpret results

PHYSICAL SETTING SKILLS

- given the latitude and longitude of a location, indicate its position on a map and determine the latitude and longitude of a given location on a map
- using identification tests and a flow chart, identify mineral samples
- use a diagram of the rock cycle to determine geological processes that led to the formation of a specific rock type 4. plot the location of recent earthquake and volcanic activity on a map and identify patterns of distribution
- use a magnetic compass to find cardinal directions
- measure the angular elevation of an object, using appropriate instruments
- generate and interpret field maps including topographic and weather maps
- predict the characteristics of an air mass based on the origin of the air mass
- measure weather variables such as wind speed and direction, relative humidity, barometric pressure, etc.
- determine the density of liquids, and regular- and irregular-shaped solids
- determine the volume of a regular- and an irregular-shaped solid, using water displacement

LIVING ENVIRONMENT SKILLS

- manipulate a compound microscope to view microscopic objects
- determine the size of a microscopic object, using a compound microscope
- prepare a wet mount slide
- use appropriate staining techniques
- design and use a Punnett square or a pedigree chart to predict the probability of certain traits
- classify living things according to a student-generated scheme and an established scheme
- interpret and/or illustrate the energy flow in a food chain, energy pyramid, or food web
- identify pulse points and pulse rates
- identify structure and function relationships in organisms