

GRADE SEVEN SCIENCE COMPETENCIES

Earth Sciences

Identify and describe the processes of the water cycle and explain their effects on climate patterns.

Identify and describe the impact certain factors have on the Earth's climate, including changes in the ocean's temperature, changes in the composition of the atmosphere, and geological shifts due to events such as volcanic eruptions and glacial movements.

Describe how water flows into and through a watershed, falling on the land, collecting in rivers and lakes, soil, and porous layers of rock, until much of it flows back into the ocean.

Identify the physical and chemical properties that make water an essential component of the Earth's system.

Explain the processes that cause cycling of water into and out of the atmosphere and their connections to our planet's weather patterns.

Explain how gravitational force affects objects in the Solar system (e.g., moons, tides, orbits, satellites.)

Identify the potential impact of converting forested land to uses such as farms, homes, factories, or tourist attractions.

Describe the layers of the Earth, including the core, mantle, lithosphere, hydrosphere, and atmosphere.

Explain the roles of differential heating or convection in ocean currents, winds, weather, and weather patterns, atmosphere, or climate.

Recognize the relationships between the tides and the phases of the moon, and use tide charts and NOAA information to describe them.

Explain the temporal or positional relationships between or among the Earth, Sun and Moon (e.g., night/day, seasons, year, and tide.)

Describe the Sun as the principle energy source for phenomena on the Earth's surface.

Explain how to test natural materials to measure and compare their properties.

Explain how technologies can reduce the environmental impact of natural disasters.

Understand that some scientific jobs/careers involve the application of Earth Space science content knowledge and experience in specific ways that meet the goals of the job.

Physical Science

Differentiate between durable goods, which are designed to operate for a long period of time, and non-durable goods, which are only intended to operate for a short period of time.

Science Processing Skills

Use appropriate tools to accurately collect and record both qualitative and quantitative data gathered through observations (e.g., temperature probes, electronic balances, spring scales, microscopes, stop watches.)

Ask questions about relationships between and among observable variables.

Identify the manipulated, responding and controlled variables in an experiment.

Design a controlled experiment, identifying and controlling the major variables.

Identify flaws or omissions in the design of simple experiments.

Use appropriate laboratory techniques to carry out student- or teacher- developed procedures or experiments.

Follow the teacher's instructions in performing experiments, following all appropriate safety rules and procedures.

Use appropriate tools to gather data as part of an investigation (e.g., ruler, meter stick, thermometer, spring scale, graduated cylinder, calipers, balance, probes, and microscopes.)

Identify sources of error in experiments.

Draw appropriate conclusions regarding the scientific question under investigation, based on the data collected.

Determine if the results of an experiment support or refute support of the scientific idea tested.

Evaluate whether the information and data collected allows an evaluation of the scientific idea under investigations.

Determine what additional information would be helpful in answering the scientific questions.

Describe the structure and function of various organ systems (i.e., digestion, respiration, circulation, nervous, protection and support) and how these systems contribute to homeostasis of the organism.

Compare the structure and function of organ systems in one organism to the structure and function in another organism.

Make sketches, graphs, and diagrams to explain ideas and to demonstrate the interconnections between systems.

Life Science

Recognize that similarities among organisms are found in anatomical features and patterns of development, and explain how these can be used to infer the degree of relatedness among organisms.

Describe or compare how different organisms have mechanisms that work in a coordinated way to obtain energy, grow, move, respond, provide defense, enable reproduction, or maintain internal balance (e.g., cells, tissues, organs, and systems.)

Explain why it is beneficial for an organism to be able to regulate its internal environment while living in a constantly changing external environment.

Explain relationships between or among the structure and function of the cells, tissues, organs, and organ systems in an organism.

Explain that a species of sexually reproducing organisms is comprised of all the organisms that can mate to produce fertile offspring.

Recognize that in any given environment the growth and survival of organisms depend on the physical conditions that exist, and explain that in all environment, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter.

Categorize organisms into kingdoms that are currently recognized according to shared characteristics.

Using data provided, select evidence that supports the concept that genetic information is passed on from both parents to offspring.

Recognize that hereditary information is contained in genes, which are located in the chromosomes of each cell, and explain that inherited traits can be determined by either one or many genes, and that a single gene can influence more than one trait, such as eye and hair color.

Recognize that humans are able to control some characteristics of plants and animals through selective breeding and explain how this results in small differences between the parents and offspring, which can accumulate in successive generations so that decedents are very different from their ancestors.

Identify and describe the factors that influence the number and kinds of organisms an ecosystem can support, including the resources that are available, the differences in temperature, composition of the soil, any disease, the threat of predators, and completion from other organisms.

Recognize that unlike human beings, behavior in insects and many other species is determined almost entirely by biological inheritance.

Explain that organism's behavioral response is a reaction to internal or and environmental stimuli, and that these responses may be determined by heredity or from past experience.

Explain how all behavior is affected by both inheritance and experience.

Recognize that disease in organisms can be caused by intrinsic failures of the system or infection from other organisms.

Use data and observations to support the concept that environmental or biological factors affect human body systems (biotic and abiotic.)

Recognize that an organism can be described in terms of a combination of traits, and differentiate between inherited traits and those that result from interactions with the environment.

Using data provided, select evidence that supports the concept that genetic information is passed on from both parents to offspring.

Give examples of how increased understanding of biology has led to improvements in biotechnology, such as scientific methods for increasing the yield or the pest resistance of important food crops.

Describe ways biotechnology helps humans, including improved health and medicine.

Understand that some scientific jobs/careers involve the application of life science content knowledge and experience in specific ways that meet the goals of the job.

Describe the major changes that occur over time in human development from single cell through embryonic development to new born (i.e., group of cells during the first trimester, organs form during the second, organs mature during the third.)

Explain how technology has influenced the course of history, and provide examples such as those that relate to agriculture, sanitation and medicine.

Describe how the fossil record provides geologic evidence verifying the existence of now extinct life forms, and explains how this evidence provides documented proof of their appearance, diversification and extinction.

Explain the concept of extinction and describe its importance in biological evolution.

Cite examples supporting the concept that certain traits of organisms may provide a survival advantage in a specific environment and therefore, an increased likelihood to produce offspring.

Compare patterns of human development with those of other vertebrates.

Explain how fossils found in sedimentary rock can be used to support the theories of Earth's evolution over geologic time, and describe how the folding, breaking, and uplifting of the layers affect the evidence.

Identify the functions of the human body's systems, including digestion, respiration, reproduction, circulation, excretion, movement, control and coordination and protection from disease, and describe how they interact with one another.

Explain how food provides energy and materials for growth and repair of body parts.

Describe the function of white blood cells and explain how they support the body's defense system.

Explain the necessity of and purpose for the proper disposal of medical products.

Explain that most microorganisms do not cause disease and that many are beneficial to the environment.

Recognize and describe the hierarchical organization of living systems, including cells, tissues, organs, organ systems, whole organisms, and ecosystems.

Explain that multicellular organisms have specialized cells, tissues, organs and organ systems that perform certain necessary functions, including digestion, respiration, reproduction, circulation, excretion, movement control and coordination and protection from disease.

Recognize that the human cells found in tissues and organs are similar to those of other animals, but somewhat different from cells found in plants.

Define a population and describe the factors that can affect it.

Using data and observations about the biodiversity of an ecosystem, make predictions or draw conclusion about how the diversity contributes to the stability of the ecosystem.

Explain how changes in environmental conditions can affect the survival of individual organisms and the entire species.

Explain that all environments, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter, and that in any particular environment the growth and survival of organisms depend on the physical conditions.

Using data and observations, predict outcomes when abiotic/biotic factors are changed in an ecosystem.

Given a scenario, trace the flow of energy through an ecosystem, beginning with the sun, through organisms in the food web, and into the environment (includes photosynthesis and respiration.)

Identify autotrophs as producers who may use photosynthesis, and describe this as the basis of the food web.

Know that all organisms, including humans, are part of, and depend on, two main interconnected global food webs; one which includes microscopic ocean plants, and the other which includes land plants.

Describe how matter is recycled within ecosystems and explain that the total amount of matter remains the same, though its form and location change.

Identify carbon, hydrogen oxygen, nitrogen and phosphorus as common elements of living matter.

Given an ecosystem, trace how matter cycles among and between organisms and the physical environment (includes water, oxygen, food web, decomposition and recycling, but not carbon cycle nor nitrogen cycle.)

Recognize that in any given environment the growth and survival of organisms depend on the physical with one another for resources, including food, space, water, air, and shelter.

Provide examples of ways technology is used to protect the environment, such as using bacteria to clean water.

Explain how insects and various other organisms depend on dead plant and animal matter for food, and describe how this process contributes to the system.

Provide examples of how all organisms, including humans, impact their environment, and explain how some changes can be detrimental to other organisms.