

Alabama Dept of Ed's Disciplinary Core Ideas & Life Science Standards

Ecosystems: Interactions, Energy, and Dynamics

K-3. Distinguish between living and nonliving things and verify what living things need to survive (e.g., animals needing food, water, and air; plants needing nutrients, water, sunlight, and air).

K-4. Gather evidence to support how plants and animals provide for their needs by altering their environment (e.g., tree roots breaking a sidewalk to provide space, red fox burrowing to create a den to raise young, humans growing gardens for food and building roads for transportation).

K-5. Construct a model of a natural habitat (e.g., terrarium, ant farm, diorama) conducive to meeting the needs of plants and animals native to Alabama.

K-6. Identify and plan possible solutions (e.g., reducing, reusing, recycling) to lessen the human impact on the local environment.*

2-5. Plan and carry out an investigation, using one variable at a time (e.g., water, light, soil, air), to determine the growth needs of plants.

2-6. Design and construct models to simulate how animals disperse seeds or pollinate plants (e.g., animals brushing fur against seed pods and seeds falling off in other areas, birds and bees extracting nectar from flowers and transferring pollen from one plant to another).*

2-7. Obtain information from literature and other media to illustrate that there are many different kinds of living things and that they exist in different places on land and in water (e.g., woodland, tundra, desert, rainforest, ocean, river).

5-8. Defend the position that plants obtain materials needed for growth primarily from air and water.

5-9. Construct an illustration to explain how plants use light energy to convert carbon dioxide and water into a storable fuel, carbohydrates, and a waste product, oxygen, during the process of photosynthesis.

5-10. Construct and interpret models (e.g., diagrams, flow charts) to explain that energy in animals' food is used for body repair, growth, motion, and maintenance of body warmth and was once energy from the sun.

5-11. Create a model to illustrate the transfer of matter among producers; consumers, including scavengers and decomposers; and the environment.

7-5. Examine the cycling of matter between abiotic and biotic parts of ecosystems to explain the flow of energy and the conservation of matter. a. Obtain, evaluate, and communicate information about how food is broken down through chemical reactions to create new molecules that support growth and/or release energy as it moves through an organism. b. Generate a scientific explanation based on evidence for the role of photosynthesis and cellular respiration in the cycling of matter and flow of energy into and out of organisms.

7-6. Analyze and interpret data to provide evidence regarding how resource availability impacts individual organisms as well as populations of organisms within an ecosystem.

7-7. Use empirical evidence from patterns and data to demonstrate how changes to physical or biological components of an ecosystem (e.g., deforestation, succession, drought, fire, disease, human activities, invasive species) can lead to shifts in populations.

7-8. Construct an explanation to predict patterns of interactions in different ecosystems in terms of the relationships between and among organisms (e.g., competition, predation, mutualism, commensalism, parasitism).

7-9. Engage in argument to defend the effectiveness of a design solution that maintains biodiversity and ecosystem services (e.g., using scientific, economic, and social considerations regarding purifying water, recycling nutrients, preventing soil erosion).

7-10. Use evidence and scientific reasoning to explain how characteristic animal behaviors (e.g., building nests to protect young from cold, herding to protect young from predators, attracting mates for breeding by producing special sounds and displaying colorful plumage, transferring pollen or seeds to create conditions for seed germination and growth) and specialized plant structures (e.g., flower brightness, nectar, and odor attracting birds that transfer pollen; hard outer shells on seeds providing protection prior to germination) affect the probability of successful reproduction of both animals and plants.

7-11. Analyze and interpret data to predict how environmental conditions (e.g., weather, availability of nutrients, location) and genetic factors (e.g., selective breeding of cattle or crops) influence the growth of organisms (e.g., drought decreasing plant growth, adequate supply of nutrients for maintaining normal plant growth, identical plant seeds growing at different rates in different weather conditions, fish growing larger in large ponds than in small ponds).

Earth's Systems & Earth's Place in the Universe

K-7. Observe and describe the effects of sunlight on Earth's surface (e.g., heat from the sun causing evaporation of water or increased temperature of soil, rocks, sand, and water).

K-9. Observe, record, and share findings of local weather patterns over a period of time (e.g., increase in daily temperature from morning to afternoon, typical rain and storm patterns from season to season).

1-8. Observe, describe, and predict patterns of the sun, moon, and stars as they appear in the sky (e.g., sun and moon appearing to rise in one part of the sky, move across the sky, and set; stars other than our sun being visible at night, but not during the day).

1-9. Observe seasonal patterns of sunrise and sunset to describe the relationship between the number of hours of daylight and the time of year (e.g., more hours of daylight during summer as compared to winter).

3-13. Display data graphically and in tables to describe typical weather conditions expected during a particular season (e.g., average temperature, precipitation, wind direction).

4-13. Plan and carry out investigations to examine properties of soils and soil types (e.g., color, texture, capacity to retain water, ability to support growth of plants).

4-15. Analyze and interpret data (e.g., angle of slope in downhill movement of water, volume of water flow, cycles of freezing and thawing of water, cycles of heating and cooling of water, speed of wind, relative rate of soil deposition, amount of vegetation) to determine effects of weathering and rate of erosion by water, ice, wind, and vegetation using one single form of weathering or erosion at a time.

5-14. Use a model to represent how any two systems, specifically the atmosphere, biosphere, geosphere, and/or hydrosphere, interact and support life (e.g., influence of the ocean on ecosystems, landform shape, and climate; influence of the atmosphere on landforms and ecosystems through weather and climate; influence of mountain ranges on winds and clouds in the atmosphere).

6-7. Use models to construct explanations of the various biogeochemical cycles of Earth (e.g., water, carbon, nitrogen) and the flow of energy that drives these processes.

6-12. Integrate qualitative scientific and technical information (e.g., weather maps; diagrams; other visualizations, including radar and computer simulations) to support the claim that motions and complex interactions of air masses result in changes in weather conditions. Use various instruments (e.g., thermometers, barometers, anemometers, wet bulbs) to monitor local weather and examine weather patterns to predict various weather events, especially the impact of severe weather (e.g., fronts, hurricanes, tornados, blizzards, ice storms, droughts).

From Molecules to Organisms: Structures and Processes

1-5. Design a solution to a human problem by using materials to imitate how plants and/or animals use their external parts to help them survive, grow, and meet their needs (e.g., outerwear imitating animal furs for insulation, gear mimicking tree bark or shells for protection).*

1-6. Obtain information to provide evidence that parents and their offspring engage in patterns of behavior that help the offspring survive (e.g., crying of offspring indicating need for feeding, quacking or barking by parents indicating protection of young)

3-5. Obtain and combine information to describe that organisms are classified as living things, rather than nonliving things, based on their ability to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.

3-6. Create representations to explain the unique and diverse life cycles of organisms other than humans (e.g., flowering plants, frogs, butterflies), including commonalities such as birth, growth, reproduction, and death.

4-9. Examine evidence to support an argument that the internal and external structures of plants (e.g., thorns, leaves, stems, roots, colored petals, xylem, phloem) and animals (e.g., heart, stomach, lung, brain, skin) function to support survival, growth, behavior, and reproduction.

4-11. Investigate different ways animals receive information through the senses, process that information, and respond to it in different ways (e.g., skunks lifting tails and spraying an odor when threatened, dogs moving ears when reacting to sound, snakes coiling or striking when sensing vibrations).

Heredity: Inheritance & Variation of Traits

1-7. Make observations to identify the similarities and differences of offspring to their parents and to other members of the same species (e.g., flowers from the same kind of plant being the same shape, but differing in size; dog being same breed as parent, but differing in fur color or pattern)

3-7. Examine data to provide evidence that plants and animals, excluding humans, have traits inherited from parents and that variations of these traits exist in groups of similar organisms (e.g., flower colors in pea plants, fur color and pattern in animal offspring).

3-8. Engage in argument from evidence to justify that traits can be influenced by the environment (e.g., stunted growth in normally tall plants due to insufficient water, change in an arctic fox's fur color due to light and/or temperature, stunted growth of a normally large animal due to malnourishment).

7-14. Gather and synthesize information regarding the impact of technologies (e.g., hand pollination, selective breeding, genetic engineering, genetic modification, gene therapy) on the inheritance and/or appearance of desired traits in organisms. (like native plants)

Unity and Diversity:

3-10. Investigate how variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing (e.g., plants having larger thorns being less likely to be eaten by predators, animals having better camouflage coloration being more likely to survive and bear offspring).

3-11. Construct an argument from evidence to explain the likelihood of an organism's ability to survive when compared to the resources in a certain habitat (e.g., freshwater organisms survive well, less well, or not at all in saltwater; desert organisms survive well, less well, or not at all in woodlands). a. Construct explanations that forming groups helps some organisms survive. b. Create models that illustrate how organisms and their habitats make up a system in which the parts depend on each other. c. Categorize resources in various habitats as basic materials (e.g., sunlight, air, freshwater, soil), produced materials (e.g., food, fuel, shelter), or as nonmaterial (e.g., safety, instinct, nature-learned behaviors).

3-12. Evaluate engineered solutions to a problem created by environmental changes and any resulting impacts on the types and density of plant and animal populations living in the environment (e.g., replanting of sea oats in coastal areas due to destruction by hurricanes, creating property development restrictions in vacation areas to reduce displacement and loss of native animal populations).*

7-17. Obtain and evaluate pictorial data to compare patterns in the embryological development across multiple species to identify relationships not evident in the adult anatomy.

7-18. Construct an explanation from evidence that natural selection acting over generations may lead to the predominance of certain traits that support successful survival and reproduction of a population and to the suppression of other traits.