
Life Science (Biology)

The life sciences investigate the diversity, complexity, and interconnectedness of life on earth. Students are naturally drawn to examine living things, and as they progress through the grade levels, they become capable of understanding the theories and models that scientists use to explain observations of nature.

- As Piaget noted, young children tend to describe anything that moves as *alive*. For purposes of working with students in **grades PreK–2**, who do not yet understand the continuity of life (e.g., from seed to seedling to tree to log), *living* can be defined as anything that is alive or has ever been alive (e.g., muskrat, flower, roadkill, log) and *nonliving* can be defined as anything that is not now and has never been alive (e.g., rock, mountain, glass, wristwatch). Over time, students refine their intuitive understanding. They begin to include in their definition of *living* such behaviors as eating, growing, and reproducing. They learn to use their senses to observe and then describe the natural world. Noticing differences and similarities, and grouping organisms based on common features are skills developed in the life science curriculum at this grade span.

Learning standards for PreK–2 fall under the following four subtopics: *Characteristics of Living Things*; *Heredity*; *Evolution and Biodiversity*; and *Living Things and Their Environment*.

- In **grades 3–5**, students expand the range of observations they make of the living world. In particular, students in these grades record details of the life cycles of plants and animals, and explore how organisms are adapted to their habitats. Students move beyond using their senses to gather information. They begin to use measuring devices to gather quantitative data that they record, examine, interpret, and communicate. They are introduced to the power of empirical evidence as they design ways of exploring questions that arise from their observations.

Learning standards for grades 3–5 fall under the following four subtopics: *Characteristics of Plants and Animals*; *Structures and Functions*; *Adaptations of Living Things*; and *Energy and Living Things*.

- In **grades 6–8**, the emphasis changes from observation and description of individual organisms to the development of a more connected view of biological systems. Students in these grades begin to study biology at the microscopic level, without delving into the biochemistry of cells. They learn that organisms are composed of cells and that some organisms are unicellular and other organisms, including human beings, are multicellular, with cells working together. Students in these grades also examine the hierarchical organization of multicellular organisms and the roles and relationships that organisms occupy in an ecosystem. They should develop the understanding that the human body has organs, each of which has a specific function of its own, and that these organs together create systems that interact with each other to maintain life.

At the macroscopic level, students focus on the interactions that occur within ecosystems. They explore the interdependence of living things, specifically the dependence of life on photosynthetic organisms such as plants, which in turn depend upon the sun as their source of energy. Students use mathematics to calculate rates of growth, derive averages and ranges, and represent data graphically to describe and interpret ecological concepts.

Learning standards for grades 6–8 fall under the following eight subtopics: *Classification of Organisms*; *Structure and Function of Cells*; *Systems in Living Things*; *Reproduction and Heredity*; *Evolution and Biodiversity*; *Living Things and Their Environment*; *Energy and Living Things*; and *Changes in Ecosystems Over Time*.