

Indiana Science Standards and the Falls

Grade K

Standard 1: The Nature of Science and Technology

Scientific Inquiry

K.1.1 Raise questions about the natural world.

The Scientific Enterprise

K.1.2 Begin to demonstrate that everybody can do science.

Standard 2: Scientific Thinking

Communication

K.2.2 Draw pictures and write words to describe objects and experiences.

Standard 6: Common Themes

Models and Scale

K.6.1 Describe an object by saying how it is similar to or different from another object.

Grade 1

Standard 1: The Nature of Science and Technology

Scientific Inquiry

1.1.1 Observe, describe, draw, and sort objects carefully to learn about them.

1.1.2 Investigate and make observations to seek answers to questions about the world.

Technology and Science

1.1.4 Use tools, such as rulers and magnifiers, to investigate the world and make observations.

Standard 2: Scientific Thinking

Communication Skills

1.2.6 Describe and compare objects in terms of number, shape, texture, size, weight, color, and motion.

Standard 4: The Living Environment

Diversity of Life

- 1.4.2** Observe and describe that there can be differences, such as size or markings, among the individuals within one kind of plant or animal group.

Standard 5: The Mathematical World

Shapes and Symbolic Relationships

- 1.5.3** Observe and describe similar patterns, such as shapes, designs, and events that may show up in nature, like honeycombs, sunflowers, or shells. See similar patterns in the things people make like quilts, baskets, or pottery.

Standard 6: Common Themes

Constancy and Change

- 1.6.2** Observe that and describe how certain things change in some ways and stay the same in others, such as in their color, size, and weight.

Grade 2

Standard 1: The Nature of Science and Technology

The Scientific Enterprise

- 2.1.5** Demonstrate the ability to work with a team but still reach and communicate one's own conclusions about findings.

Standard 3: The Physical Setting

The Earth and the Processes That Shape It

- 2.3.3** Investigate by observing and then describing chunks of rocks and their many sizes and shapes, from boulders to grains of sand and even smaller.

Standard 4: The Living Environment

Interdependence of Life

- 2.4.4** Recognize and explain that living things are found almost everywhere in the world and that there are somewhat different kinds in different places.

Standard 5: The Mathematical World

Reasoning and Uncertainty

- 2.5.6** Explain that sometimes a person can find out a lot (but not everything) about a group of things, such as insects, plants, or rocks, by studying just a few of them.

Standard 6: Common Themes

Constancy and Change

- 2.6.3** Describe that things can change in different ways, such as in size, weight, color, age, and movement. Investigate that some small changes can be detected by taking measurements.

Grade 3

Standard 1: The Nature of Science and Technology

Scientific Inquiry

- 3.1.2** Participate in different types of guided scientific investigations such as observing objects and events and collecting specimens for analysis.

The Scientific Enterprise

- 3.1.5** Demonstrate the ability to work cooperatively while respecting the ideas of others and communicating one's own conclusions about findings.

Standard 3: The Physical Setting

The Earth and the Processes That Shape It

- 3.3.5** Give examples of how change, such as weather patterns, is a continual process occurring on Earth.

Standard 4: The Living Environment

Diversity of Life

- 3.4.1** Demonstrate that a great variety of living things can be sorted into groups in many ways using various features, such as how they look, where they live, and how they act, to decide which things belong to which group.
- 3.4.2** Explain that features used for grouping depend on the purpose of the grouping.

Grade 4

Standard 1: The Nature of Science and Technology

The Scientific Enterprise

- 4.1.3 Explain that clear communication is an essential part of doing science since it enables scientists to inform others about their work, to expose their ideas to evaluation by other scientists, and to allow scientists to stay informed about scientific discoveries around the world.
- 4.1.4 Describe how people all over the world have taken part in scientific investigation for many centuries.

Technology and Science

- 4.1.5 Demonstrate how measuring instruments, such as microscopes, telescopes, and cameras, can be used to gather accurate information for making scientific comparisons of objects and events. Note that measuring instruments, such as rulers, can also be used for designing and constructing things that will work properly.

Standard 2: Scientific Thinking

Computation and Estimation

- 4.2.1 Judge whether measurements and computations of quantities, such as length, area, volume, weight, or time, are reasonable.
- 4.2.2 State the purpose, orally or in writing, of each step in a computation.

Communication Skills

- 4.2.4 Use numerical data to describe and compare objects and events.
- 4.2.5 Write descriptions of investigations, using observations and other evidence as support for explanations.

Standard 3: The Physical Setting

The Earth and the Processes That Shape It

- 4.3.3 Identify salt as the major difference between fresh and ocean waters.
- 4.3.4 Describe some of the effects of oceans on climate.
- 4.3.5 Describe how waves, wind, water, and ice, such as glaciers, shape and reshape the Earth's land surface by eroding of rock and soil in some areas and depositing them in other areas.

- 4.3.6 Recognize and describe that rock is composed of different combinations of minerals.
- 4.3.7 Explain that smaller rocks come from the breakage and weathering of bedrock and larger rocks and that soil is made partly from weathered rock, partly from plant remains, and also contains many living organisms.

Standard 4: The Living Environment

Interdependence of Life and Evolution

- 4.4.3 Observe and describe that organisms interact with one another in various ways.
- 4.4.6 Explain how in all environments, organisms are growing, dying, and decaying, and new organisms are being produced by the old ones.

Standard 6: Common Themes

Constancy and Change

- 4.6.4 Observe and describe that some features of things may stay the same even when other features change.

Grade 5

Standard 1: The Nature of Science and Technology

The Scientific View of the World

- 5.1.1 Recognize and describe that results of similar scientific investigations may turn out differently because of inconsistencies in methods, materials, and observations.

Scientific Inquiry

- 5.1.2 Begin to evaluate the validity of claims based on the amount and quality of the evidence cited.

Standard 2: Scientific Thinking

Communication Skills

- 5.2.7 Read and follow step-by-step instructions when learning new procedures.

Standard 4: The Living Environment

Interdependence of Life and Evolution

- 5.4.4 Explain that in any particular environment, some kinds of plants and animals survive well, some do not survive as well, and some cannot survive at all.
- 5.4.5 Explain how changes in an organism's habitat are sometimes beneficial and sometimes harmful.
- 5.4.6 Recognize and explain that most microorganisms do not cause disease and many are beneficial.
- 5.4.7 Explain that living things, such as plants and animals, differ in their characteristics, and that sometimes these differences can give members of these groups (plants and animals) an advantage in surviving and reproducing.
- 5.4.8 Observe that and describe how fossils can be compared to one another and to living organisms according to their similarities and differences.

Standard 5: The Mathematical World

Reasoning and Uncertainty

- 5.5.7 Explain that predictions can be based on what is known about the past, assuming that conditions are similar.
- 5.5.8 Realize and explain that predictions may be more accurate if they are based on large collections of objects or events.
- 5.5.9 Show how spreading data out on a number line helps to see what the extremes are, where they pile up, and where the gaps are.
- 5.5.10 Explain the danger in using only a portion of the data collected to describe the whole.

Standard 6: Common Themes

Systems

- 5.6.1 Recognize and describe that systems contain objects as well as processes that interact with each other.

Models and Scale

- 5.6.2 Demonstrate how geometric figures, number sequences, graphs, diagrams, sketches, number lines, maps, and stories can be used to represent objects, events, and processes in the real world, although such representation can never be exact in every detail.

Grade 6

Standard 1: The Nature of Science and Technology

The Scientific View of the World

- 6.1.1** Explain that some scientific knowledge, such as the length of the year, is very old and yet is still applicable today. Understand, however, that scientific knowledge is never exempt from review and criticism.

Scientific Inquiry

- 6.1.2** Give examples of different ways scientists investigate natural phenomena and identify processes all scientists use, such as collection of relevant evidence, the use of logical reasoning, and the application of imagination in devising hypotheses* and explanations in order to make sense of the evidence.
- 6.1.3** Recognize and explain that hypotheses are valuable, even if they turn out not to be true, if they lead to fruitful investigations.

The Scientific Enterprise

- 6.1.4** Give examples of employers who hire scientists, such as colleges and universities, businesses and industries, hospitals and many government agencies.
- 6.1.5** Identify places where scientists work including offices, classrooms, laboratories, farms, factories, and natural field settings ranging from space to the ocean floor.

Standard 2: Scientific Thinking

Communication Skills

- 6.2.7** Locate information in reference books, back issues of newspapers and magazines, compact disks, and computer databases.

Standard 4: The Living Environment

Interdependence of Life and Evolution

- 6.4.8** Explain that in all environments, such as freshwater, marine, forest, desert, grassland, mountain, and others, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter. In any environment, the growth and survival of organisms depend on the physical conditions.
- 6.4.9** Recognize and explain that two types of organisms may interact in a competitive or cooperative relationship, such as producer/consumer, predator/prey, or parasite/host.
- 6.4.10** Describe how life on Earth depends on energy from the sun.

Standard 5: The Mathematical World

Reasoning and Uncertainty

- 6.5.5** Explain the strengths and weaknesses of using an analogy to help describe an event, object, etc.
- 6.5.6** Predict the frequency of the occurrence of future events based on data.

Grade 7

Standard 1: The Nature of Science and Technology

The Scientific View of the World

- 7.1.1** Recognize and explain that when similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, which often takes further studies to decide.

Scientific Inquiry

- 7.1.2** Explain that what people expect to observe often affects what they actually do observe and provide an example of a solution to this problem.
- 7.1.3** Explain why it is important in science to keep honest, clear, and accurate records.
- 7.1.4** Describe that different explanations can be given for the same evidence, and it is not always possible to tell which one is correct without further inquiry.

The Scientific Enterprise

- 7.1.5** Identify some important contributions to the advancement of science, mathematics, and technology that have been made by different kinds of people, in different cultures, at different times.

Standard 3: The Physical Setting

The Earth and the Processes That Shape It

- 7.3.3** Describe how climates sometimes have changed abruptly in the past as a result of changes in the Earth's crust, such as volcanic eruptions or impacts of huge rocks from space.
- 7.3.7** Give examples of some changes in the Earth's surface that are abrupt, such as earthquakes and volcanic eruptions, and some changes that happen very slowly, such as uplift and wearing down of mountains, and the action of glaciers.

- 7.3.8** Describe how sediments of sand and smaller particles, sometimes containing the remains of organisms, are gradually buried and are cemented together by dissolved minerals to form solid rock again.
- 7.3.9** Explain that sedimentary rock, when buried deep enough, may be reformed by pressure and heat, perhaps melting and recrystallizing into different kinds of rock. Describe that these reformed rock layers may be forced up again to become land surface and even mountains, and subsequently erode.
- 7.3.10** Explain how the thousands of layers of sedimentary rock can confirm the long history of the changing surface of the Earth and the changing life forms whose remains are found in successive layers, although the youngest layers are not always found on top, because of folding, breaking, and uplift of layers.

Standard 4: The Living Environment

Diversity of Life

- 7.4.1** Explain that similarities among organisms are found in external and internal anatomical features.
- 7.4.2** Describe that all organisms, including the human species, are part of and depend on two main interconnected global food webs, the ocean food web and the land food web.

Standard 5: The Mathematical World

Reasoning and Uncertainty

- 7.5.4** Describe that the larger the sample, the more accurately it represents the whole. Understand, however, that any sample can be poorly chosen and this will make it unrepresentative of the whole.

Grade 8

Standard 1: The Nature of Science and Technology

The Scientific View of the World

- 8.1.1** Recognize that and describe how scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory* leads to looking at old observations in a new way.

Standard 4: The Living Environment

Interdependence of Life and Evolution

- 8.4.8** Describe how environmental conditions affect the survival of individual organisms and how entire species may prosper in spite of the poor survivability or bad fortune of individuals.

Standard 5: The Mathematical World

Reasoning and Uncertainty

- 8.5.6** Explain that a single example can never prove that something is always true, but it could prove that something is not always true.
- 8.5.7** Recognize and describe the danger of making over-generalizations when inventing a general rule based on a few observations.
- 8.5.8** Explain how estimates can be based on data from similar conditions in the past or on the assumption that all the possibilities are known.

Standard 7: Common Themes

Constancy and Change

- 8.7.7** Illustrate how things such as seasons or body temperature occur in cycles.

High School

Earth and Space Science I

Standard 1: Principles of Earth and Space Science

The Earth

- ES.1.10** Recognize and describe that the earth sciences address planet-wide interacting systems, including the oceans, the air, the solid Earth, and life on Earth, as well as interactions with the Solar System.
- ES.1.17** Describe the development and dynamics of climatic changes over time, such as the cycles of glaciation.

Processes That Shape The Earth

- ES.1.24** Understand and discuss continental drift, sea-floor spreading, and plate tectonics. Include evidence that supports the movement of the plates such as magnetic stripes on the ocean floor, fossil evidence on separate continents, and the continuity of geological features.
- ES.1.26** Differentiate among the processes of weathering, erosion, transportation of materials, deposition, and soil formation.

ES.1.28 Discuss geologic evidence, including fossils and radioactive dating, in relation to the Earth's past.

ES.1.29 Recognize and explain that in geologic change, the present arises from the materials of the past in ways that can be explained according to the same physical and chemical laws.

Biology I

Standard 1: Principles of Biology

Developmental and Organismal Biology

B.1.15 Understand and explain that, in biological systems, structure and function must be considered together.

B.1.17 Understand that and describe how the maintenance of a relatively stable internal environment is required for the continuation of life and explain how stability is challenged by changing physical, chemical, and environmental conditions, as well as the presence of disease agents.

Evolution

B.1.32 Explain how natural selection leads to organisms that are well suited for survival in particular environments, and discuss how natural selection provides scientific explanation for the history of life on earth as depicted in the fossil record and in the similarities evident within the diversity of existing organisms.

B.1.34 Explain that evolution builds on what already exists, so the more variety there is, the more there can be in the future. Recognize, however, that evolution does not necessitate long-term progress in some set direction.

Ecology

B.1.37 Explain that the amount of life any environment can support is limited by the available energy, water, oxygen, and minerals, and by the ability of ecosystems to recycle the residue of dead organic materials.

B.1.39 Describe how ecosystems can be reasonably stable over hundreds or thousands of years. Understand that if a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages that eventually result in a system similar to the original one.

B.1.40 Understand and explain that like many complex systems, ecosystems tend to have cyclic fluctuations around a state of rough equilibrium. However, also understand that ecosystems can always change with climate changes or when one or more new species appear as a result of migration or local evolution.

B.1.43 Understand that and describe how organisms are influenced by a particular combination of living and non-living components of the environment.

B.1.45 Recognize that and describe how the physical or chemical environment may influence the rate, extent, and nature of the way organisms develop within ecosystems.

B.1.46 Recognize and describe that a great diversity of species increases the chance that at least

some living things will survive in the face of large changes in the environment.

- B.1.47** Explain, with examples, that ecology studies the varieties and interactions of living things across space while evolution studies the varieties and interactions of living things across time.

Environmental Science, Advanced

Standard 1: Principles of Environmental Science

Environmental Systems

- Env.1.1** Know and describe how ecosystems can be reasonably stable over hundreds or thousands of years.
- Env.1.2** Understand and describe that if a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages that eventually result in a system similar to the original one.
- Env.1.3** Understand and explain that ecosystems have cyclic fluctuations such as seasonal changes or changes in populations as a result of migrations.

Natural Resources

- Env.1.27** Understand and describe the concept of integrated natural resource management and the values of managing natural resources as an ecological unit.