

Inquiry

Standards

An experiment involves a comparison. For an experiment to be valid and fair, all of the things that can possibly change the outcome of the experiment should be kept the same, if possible.

Scientific explanations emphasize evidence, have logically consistent arguments, and use known scientific principles, models, and theories. Scientists report the results of their investigations honestly, even when those results show their predictions were wrong or when they cannot explain the results.

Scientists communicate the results of their investigations verbally and in writing. They review and ask questions about the results of other scientists' work.

Assessment Questions

1. Why should an investigation have as many controlled variables as possible?
2. Why should an investigation have only one manipulated or changed variable?
3. How do scientists use each other's research to design new investigations?
4. If an investigation shows that a scientist's ideas are wrong, or gets results that are unexpected, why should the results still be communicated?

Systems

Standards

Systems contain subsystems. A system can do things that none of its subsystems can do by themselves.

Assessment Questions

1. Think of a system you use in your daily life. Draw a diagram of the system. Label its function, subsystems, input, and output.

Examples: Bike, Oven, Computer, House

2. Choose a subsystem from the diagram you drew in question 1. Explain how the subsystem's function is different than the function of the whole system.

Application Part 1

Standards

Technology involves changing the natural world to meet human needs or wants.

People in different cultures all around the world use different materials or technologies to solve the same problems.

Science and technology have greatly improved food quality and quantity, transportation, health, sanitation, and communication. People of all ages, interests, and abilities engage in a variety of scientific and technological work.

Assessment Questions

1. Give two examples of a way in which humans have changed the natural world to meet their needs.
2. Give an example of how humans meet their need for shelter in different ways depending on where they live.
3. Give an example of how humans meet their need for entertainment in different ways depending on where they live.
- 4a. What is one way in which food has changed over time as technology has improved?
- 4b. What is one way in which transportation has changed over time as technology has improved?
- 4c. What is one way in which health has changed over time as technology has improved?
- 4d. What is one way in which sanitation has changed over time as technology has improved?
5. Give evidence for the claim that communication has improved over time and explain your reasoning.

Application Part 2

Standards

Problems of moderate complexity can be solved using the technological design process. This process begins by defining and researching the problem to be solved.

Scientists and engineers often work in teams with other individuals to generate different ideas for solving a problem. Possible solutions should be tested to see if they solve the problem. Building a model or prototype is one way to test a possible solution.

Solutions to problems must be communicated, if the problem is to be solved.

Assessment Questions

1. What are the important parts of the engineering design process?
2. Give an example of how you used the engineering design process in class or outside of school. Explain how you used part.
3. Why is communication an important part of the engineering design process?
4. Does the engineering design process repeat? Why?
5. If an engineer is designing a new car and he claims that it would be better if it had 5 wheels, why would it be important for him to provide evidence and reasoning for his claim?
6. What are the reasons an engineer might build a model, or prototype, of their design, instead of building the real design?

Structures and Functions of Organisms

Standards

Plants and animals can be sorted according to their structures and behaviors.

Certain structures and behaviors enable plants and animals to respond to changes in their environment. Plants and animals have structures and behaviors that respond to internal needs.

Nutrition is essential to health. Various kinds of foods are necessary to build and maintain body structures. Individuals have responsibility for their own health and food choices.

Assessment Questions

1. Draw a plant and label its body structures. For each body structure, write its function.
2. Think of an animal that you know about. Write at least 3 behaviors that it has and explain what their function is.
3. If the wolf population in a forest increased, how might the deer in the forest have to change their behavior?
4. Hibernation is when an animal puts its body to sleep for a long period, usually several months, to save energy in winter. If there was a very long winter, how might bears have to change their behavior to get ready for winter and hibernation?
5. How does your body respond to the need to keep its internal temperature from getting too hot or too cold?
6. During a drought, how might a plant respond to the internal need to have enough water?
7. What are some ways that humans can make sure that their nutrition meets their body's internal needs?

Ecosystems

Standards

Plants make their own food using energy from the sun. Animals get food energy by eating plants and/or other animals that eat plants. Plants make it possible for animals to use the energy of sunlight.

Plants and animals are related in food webs with producers (plants that make their own food), consumers (animals that eat producers and/or other animals), and decomposers (primarily bacteria and fungi) that break down wastes and dead organisms, and return nutrients to the soil.

An ecosystem includes all of the populations of living organisms and nonliving physical factors in a given area. Living organisms depend on one another and the nonliving physical factors in their ecosystem to help them survive.

Ecosystems can change slowly or rapidly. Big changes over a short period of time can have a major impact on the ecosystem and the populations of plants and animals living there. All plants and animals change the ecosystem where they live. If this change reduces another organism's access to resources, that organism may move to another location or die.

People affect ecosystems both positively and negatively.

Assessment Questions

1. Write or draw a diagram that explains how energy is transferred from the sun to plants and animals.
2. Draw a food web for an ecosystem with at least 3 producers, 3 consumers, and 2 decomposers.
3. Give an example of a physical factor in an ecosystem and explain how it effects the organisms living there.
4. Make up an example of an organism living in an ecosystem that has changed so that it is harder for the organism to get the resources it needs. This could be a change in hiding places, food supply, water supply, or habitat size. Explain how that organism might adapt to the change.
5. If the organism does not adapt to the change, what will happen?

Grade 4-5 Science Unit Assessments

6. Is it usually harder for an organism to adapt to a fast change or a slow change in an ecosystem?

7. Humans usually make ecosystems change much faster than they would without humans. How could this have a negative impact on the survival of many organisms?

8. What are some ways in which humans can have a positive impact on an ecosystem?

Fossils

Standards

Different kinds of events caused the formation of different kinds of fossils.

By studying the kinds of plant and animal fossils in a layer of rock, it is possible to infer what the environment was like at the time and where the layer formed.

Assessment Questions

1. What are the 4 kinds of fossils and how is each formed?
2. Which types of fossils are the most and least common?
3. How can you estimate a fossil's age AND learn about its environment by studying the layer of sediment it is found in?
4. Why are there many limitations to using fossils to learn about the past?

Heredity and Natural Selection

Standards

Plants and animals inherit many characteristics from their parents. Some inherited characteristics allow organisms to better survive and reproduce in a given ecosystem. Some characteristics and behaviors result from an individual plant's or animal's interactions with the environment and are not passed from one generation to the next by heredity.

In any ecosystem, some populations of organisms thrive and grow, some decline, and others do not survive at all.

Assessment Questions

1. What is the difference between hereditary (heritable) and acquired characteristics?
2. When their environment changes, why do some organisms from a species survive, while other organisms from that same species don't survive?
3. Do most species survive major changes to their environment? Why or why not?

Formation of Earth Materials

Standards

Earth materials include solid rocks and soil, water, and gases of the atmosphere. Materials have different physical and chemical properties which make them useful in different ways. Earth materials provide many of the resources that humans use.

Weathering is the breaking down of rock into pebbles and sand caused by physical processes such as heating, cooling, and pressure, and chemical processes such as acid rain.

Soils are formed by weathering and erosion, decay of plant matter, transport by rain through streams and rivers, and deposition of sediments in valleys, riverbeds, and lakes.

Soils are often found in layers, with each layer having a different chemical composition and different physical properties.

Erosion plays an important role in the formation of soil, but too much erosion can wash away fertile soil from ecosystems and farms.

Assessment Questions

1. What materials is the Earth mostly made of?
2. What are some earth materials that humans commonly use? Choose one and explain how its properties allow it to help humans meet their needs.
3. Give an example of a material whose properties make it easy to modify and explain how humans have used it to meet their needs.
4. Explain at least 4 ways that rocks can be weathered.
5. Why is soil found in layers?
6. Why is some erosion good, but too much harmful, to ecosystems and farms?

Measurement of Force and Motion

Standards

The weight of an object is a measure of how strongly it is pulled down toward the ground by gravity. A spring scale can measure the pulling force.

The relative speed of two objects can be determined in two ways: (1) If two objects travel for the same amount of time, the object that has traveled the greatest distance is the fastest. (2) If two objects travel the same distance, the object that takes the least time to travel the distance is the fastest.

Assessment Questions

1. How are weight and mass different? How would you measure weight and mass?
2. If you knew 2 objects travelled for an equal amount of time, and you measured the distance each object travelled, how would you know which object had a greater speed? Explain using words or pictures.
3. If you knew 2 objects travelled for an equal distance, and you measured the time it took each object to travel that distance, how would you know which object had a greater speed? Explain using words or pictures.

Matter

Standards

Substances can exist in different physical states—solid, liquid, and gas. Many substances can be changed from one state to another by heating or cooling.

Air is a gas. Air fills a closed container completely. Wind is moving air.

The total amount of matter is conserved (stays the same) when it undergoes a physical change such as when an object is broken into tiny pieces, when a solid is dissolved in a liquid, or when matter changes state (solid, liquid, gas).

Assessment Questions

1. How do heating and cooling change matter's state?
2. What are the differences in the properties of solids, liquids, and gasses? You may answer in pictures and / or words.
3. How are physical changes different from chemical changes? Give an example of each type.
4. What does it mean to say that 'conservation of matter' applies to physical changes?

Energy: Heat, Light, Sound, Electricity

Standards

Energy has many forms, such as heat, light, sound, motion, and electricity.

Energy can be transferred from one place to another.

Assessment Questions

1. What are several common forms of energy? Give examples of how we might observe them in every day life.
2. How do changes in wavelength effect the light we see?
3. How do changes in wavelength effect the sounds we hear?
4. Give evidence for the claim that it is possible to transfer heat energy from one place to another and explain your reasoning.
5. How do humans commonly transfer electrical energy?
6. How can you tell if an electrical circuit is complete?
7. How can you modify an electrical circuit so that the current can be started and stopped?

Earth in Space

Standards

Earth is approximately spherical in shape. Things on or near the Earth are pulled toward Earth's center by the force of gravity.

Earth's daily spin relative to the Sun causes night and day.

The Sun is a star. It is the central and largest body in our Solar System. The Sun appears much brighter and larger in the sky than other stars because it is many thousands of times closer to Earth.

Earth's nearly circular yearly orbit around the Sun causes us to see different constellations at different times of year

Assessment Questions

1. Why does gravity often create objects that are approximately spherical in shape?
2. What causes an object to have a stronger or weaker gravitational pull on other objects?
3. Sam the Student said, "Gravity pulls things down!" Explain to him what it really means to say that gravity pulls things down on Earth. Please use both pictures and words.
4. Provide evidence to prove the claim that day and night are caused by Earth spinning on its axis. You may explain your evidence with pictures and / or words.
5. Mia the Student said, "The Sun is brighter than other stars." Provide reasoning to explain why her claim is incorrect. You may use pictures and / or words.
6. How much closer to the Earth is the Sun than other stars?
7. How large is the Sun compared to the Earth and other planets in our solar system?
8. If you took a picture of the night sky on a clear day in January, and then took a picture of the night sky on a clear day in June in the exact same location, would you see the same stars? Provide reasoning for your claim with pictures and / or words.