

Science Homework Helper

Earth Science

Astronomy

S4E1. Students will compare and contrast the physical attributes of stars, star patterns, and planets.

- Recognize the physical attributes of stars in the night sky such as number, size, color and patterns.
- Compare the similarities and differences of planets to the stars in appearance, position, and number in the night sky.
- Explain why the pattern of stars in a constellation stays the same, but a planet can be seen in different locations at different times.
- Identify how technology is used to observe distant objects in the sky.

S4E2. Students will model the position and motion of the earth in the solar system and will explain the role of relative position and motion in determining sequence of the phases of the moon.

- Explain the day/night cycle of the earth using a model.
- Explain the sequence of the phases of the moon.
- Demonstrate the revolution of the earth around the sun and the earth's tilt to explain the seasonal changes.
- Demonstrate the relative size and order from the sun of the planets in the solar system.

star: a huge hot sphere of gases that give off energy.

constellation: a pattern or picture outlined by stars.

solar system: the system that contains the Sun and the objects that orbit around it.

planet: a satellite of the Sun.

inner planets: Mercury, Venus, Earth, and Mars

outer planets: Jupiter, Saturn, Uranus, and Neptune

asteroid belt: thousands of asteroids that separate the inner and outer planets.

asteroid: chunks of rock or metal that orbit the sun.

comet: chunks of ice or other metals that move in long narrow orbits.

meteor: a fragment of rock, ice, or metal that has broken off colliding comets or asteroids (also known as 'shooting star').

meteorite: a meteor that hits the Earth.

orbit: the path a revolving object moves along.

rotate: to spin around

revolve: to move around an object.

axis: a real or imaginary line that a spinning object turns around.

Order of the Planets from the Sun									
Sun (a star, not a planet)	Mercury	Venus	Earth	Mars	Asteroid Belt	Jupiter	Saturn	Uranus	Neptune

moon phases: as the Moon travels around the Earth, we see various amounts of its lighted half. It appears to change shape; these different shapes are the phases.

new moon: the Moon is between the Sun and the Earth. You cannot see the lighted half.

waxing crescent moon: The lighted side of the Moon begins to show. The Moon is waxing which means the part you can see appears to grow larger.

first quarter moon: the Moon is a quarter the way around the Earth. This is sometimes called the half moon.

waxing gibbous moon: A gibbous Moon is almost full.

full moon: the Moon is now half way around the Earth. You can see its entire lighted side.

waning gibbous moon: the moon is waning which means the part you see is getting smaller.

last quarter moon: The Moon is three-quarters away around the Earth.

waning crescent moon: The lighted side has almost disappeared. Soon the new moon will begin the cycle again.

NOTES:

Water Cycle and Weather

S4E3. Students will differentiate between the states of water and how they relate to the water cycle and weather.

- Demonstrate how water changes states from solid (ice) to liquid (water) to gas (water vapor/steam) and changes from gas to liquid to solid.
- Identify the temperatures at which water becomes a solid and at which water becomes a gas.
- Investigate how clouds are formed.
- Explain the water cycle (evaporation, condensation, and precipitation).
- Investigate different forms of precipitation and sky conditions. (rain, snow, sleet, hail, clouds, and fog).

S4E4. Students will analyze weather charts/maps and collect weather data to predict weather events and infer patterns and seasonal changes.

- Identify weather instruments and explain how each is used in gathering weather data and making forecasts (thermometer, rain gauge, barometer, wind vane, anemometer).
- Using a weather map, identify the fronts, temperature, and precipitation and use the information to interpret the weather conditions.
- Use observations and records of weather conditions to predict weather patterns throughout the year.
- Differentiate between weather and climate.

Water boils (becomes a gas) at 100°C and 212°F.

Water freezes (becomes a solid) at 0°C and 32°F.

Water exists in three states: liquid (water), gas (water vapor), and solid (ice).

The **water cycle** is the movement of water through *evaporation*, *condensation*, and *precipitation*. As water moves through the water cycle it changes states as it **absorbs** energy or **releases** energy.

Liquid water **evaporates** as heat is absorbed, becoming water vapor.

Solid water (ice) **melts** as heat is absorbed, becoming liquid water.

Liquid water **freezes** as heat is released, becoming ice.

Water vapor **condenses** as heat is released, becoming liquid water.

evaporation: the process in which water changes from a liquid to a gas.

condensation: the process in which water changes from water vapor to liquid water.

precipitation: water in the atmosphere falling to the Earth's surface. The forms of precipitation are rain, snow, hail, and sleet.

cloud: A cloud is a large collection of very tiny droplets of water or ice crystals and is formed when water condenses in the atmosphere onto tiny pieces of dust that are floating in the air and forms a tiny droplet around each dust particle.

cumulus clouds: white, puffy clouds frequently with flat bottoms made of water particles; cumulus clouds are often called "fair-weather clouds". The base of each cloud is flat and the top of each cloud has rounded towers. When the top of the cumulus clouds resemble the head of a cauliflower, it is called towering cumulus. These clouds grow upward and they can develop into giant cumulonimbus clouds, which are thunderstorm clouds.

cirrus clouds: thin, wispy, feathery clouds made of ice particles; they are blown in high winds into long streamers. Cirrus clouds are usually white and predict fair to pleasant weather. By watching the movement of cirrus clouds you can tell from which direction weather is approaching. When you see cirrus clouds, it usually indicates that a change in the weather will occur within 24 hours.

stratus clouds: gray clouds that blanket the sky in flat layers that often cover the entire sky. They resemble fog that doesn't reach the ground. Light mist or drizzle sometimes falls out of these clouds. Nimbostratus clouds form a dark gray, wet looking cloudy layer with continuously falling rain or snow. They often produce precipitation that is usually light to moderate.

thermometer: measures the air temperature.

barometer: measures air pressure. It tells you whether or not the pressure is rising or falling. A rising barometer means sunny and dry conditions, while a falling barometer means stormy and wet conditions.

rain gauge: measures the amount of rain that has fallen over a specific time period.

wind vane: an instrument that determines the direction from which the wind is blowing.

anemometer: measures wind speed. The cups catch the wind, turning a dial attached to the instrument. The dial shows the wind speed.

hygrometer: measures the water vapor content of air or the humidity.

weather map: indicate atmospheric conditions above a large portion of the Earth's surface. Meteorologists use weather maps to forecast the weather.

weather satellites: are used to photograph and track large-scale air movements. Then meteorologists compile and analyze the data with the help of computers.

YOUR EYES are one of the best ways to help detect the weather. Always keep an eye at the sky and you'll usually be on top of weather conditions.

high pressure system: a whirling mass of cool, dry air that generally brings fair weather and light winds. When viewed from above, winds spiral out of a high-pressure center in a clockwise rotation in the Northern Hemisphere. These bring sunny skies. A high pressure system is represented as a big, blue H.

low pressure system: a whirling mass of warm, moist air that generally brings stormy weather with strong winds. When viewed from above, winds spiral into a low-pressure center in a counterclockwise rotation in the Northern Hemisphere. A low pressure system is represented as a big, red L.

front is a boundary between two different air masses, resulting in stormy weather. A front usually is a line of separation between warm and cold air masses.

cold front: a boundary between two air masses, one cold and the other warm, moving so that the colder air replaces the warmer air. A cold front is represented as a blue line with the teeth pointing toward the direction of movement.

warm front: a boundary between two air masses, one cool and the other warm, moving so that the warmer air replaces the cooler air. A warm front is represented as a red line with half circles pointing toward the direction of movement.

stationary front: a boundary between two air masses that more or less doesn't move, but some stationary fronts can wobble back and forth for several hundred miles a day. A stationary front is represented as an alternating warm and cold front symbols.

weather: It describes the condition of the air at a particular time and place. Weather also tells how the air moves (wind) and describes anything it might be carrying such as rain, snow or clouds. Thunder, lightning, rainbows, haze and other special events are all part of weather.

climate: Climate is the average weather usually taken over a 30-year time period for a particular region and time period. Climate is not the same as weather, but rather, it is the average pattern of weather for a particular region.

NOTES:

Physical Science

Light

S4P1. Students will investigate the nature of light using tools such as mirrors, lenses, and prisms.

- Identify materials that are transparent, opaque, and translucent.
- Investigate the reflection of light using a mirror and a light source.
- Identify the physical attributes of a convex lens, a concave lens, and a prism and where each is used.

light: a form of energy

transparent: transmitting light; able to see through clearly.

example: windows

translucent: almost transparent; allowing light to pass through diffusely.

example: lamp shades

opaque: does not transmit light; opaque objects make shadows.

example: desks, you

reflection: when light strikes a surface and bounces off.

refraction: the bending of light as it passes from one material into another.

lenses: tools for refracting light.

convex lens: bulges in the middle and brings light together.

examples: magnifying glass

concave lens: curves inward and spreads light rays apart.

examples: contacts

prism: an object that separates white light into the colors that make it up.

spectrum: a range of light waves with different wavelengths and energies.

wavelength: the distance from the top of one wavelength to the top of the next.

Sound

S4P2. Students will demonstrate how sound is produced by vibrating objects and how sound can be varied by changing the rate of vibration.

- Investigate how sound is produced.
- Recognize the conditions that cause pitch to vary.

vibration: back and forth motion.

sound wave: an area of crowded particles followed by widely space particles.

frequency: the number of times a sound source vibrates in one second.

pitch: the highness or lowness of sound, determined by frequency.

amplitude: the energy in a sound wave, determines volume.

Sound is mechanical energy because it is produced by motion (vibrations).

Force, Motion, and Simple Machines

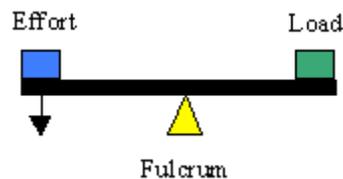
S4P3. Students will demonstrate the relationship between the application of a force and the resulting change in position and motion on an object.

- Identify simple machines and explain their uses (lever, pulley, wedge, inclined plane, screw, wheel and axle).
- Using different size objects, observe how force affects speed and motion.
- Explain what happens to the speed or direction of an object when a greater force than the initial one is applied.
- Demonstrate the effect of gravitational force on the motion of an object.

lever: a straight rod or board that pivots on a point known as a fulcrum. The fulcrum can be moved depending on the weight of the object to be lifted or the force you wish to exert. Pushing down on one end of a lever results in the upward motion of the opposite end of the fulcrum. **Examples:** door on hinges, seesaw, hammer, bottle opener

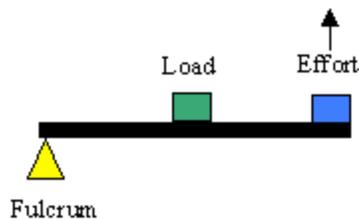
first class lever: The **fulcrum** lies between the **effort** and the **load**.

examples: crowbar, hand trucks, seesaw, scissors, hammer (when removing nails),



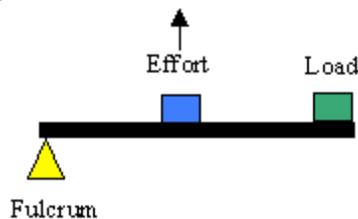
second class lever: The **fulcrum** is at one end, the **effort** at the other end and the **load** lies between the effort and the fulcrum.

examples: wheelbarrow, nutcracker



third class lever: The **fulcrum** is at one end, the **load** at the other end and the **effort** lies between the load and the fulcrum.

examples: tweezers, fishing rod, broom



pulley: a wheel that usually has a groove around the outside edge. This groove is for a rope or belt to move around the pulley. Pulling down on the rope can lift an object attached to the rope. Work is made easier because pulling down on the rope is made easier due to gravity.

examples: flag pole, crane, window blinds

inclined plane: a sloping surface, such as a ramp. An inclined plane can be used to alter the effort and distance involved in doing work, such as lifting loads. The trade-off is that an object must be moved a longer distance than if it was lifted straight up, but less force is needed.

examples: staircase, ramp, bottom of a bath tub

wedge: two inclined planes joined back to back. Wedges are used to split things.

examples: axe, zipper, knife

screw: an inclined plane wrapped around a shaft or cylinder. This inclined plane allows the screw to move itself or to move an object or material surrounding it when rotated.

examples: bolt, spiral staircase

wheel and axle: a wheel and a bar (axle) that passes through the center of the wheel and is fastened to the wheel so that they turn together. When the axle is turned, the wheel moves a greater distance than the axle, but less force is needed to move it. The axle moves a shorter distance, but it takes greater force to move it.

examples: door knob, wagon, toy car

gear: two toothed wheels fit together either directly or through a chain or belt so one wheel will turn the other. Some gears may have a screw or a toothed shaft in place of one of the wheels. A gear may also be a combination of toothed wheels that produces a certain speed (such as a bicycle's top gear which makes the bike go fast, and the low gear for slow speed.)

examples: clock, automobile, drill

machine: a tool that makes a job easier by saving time or energy.

simple machine: a machine with few parts.

compound machine: a machine made up of two or more simple machines.

load: the object being lifted or moved by a simple machine.

force: a push or pull; forces cause change in speed or direction.

effort force: how much force you use to move something.

speed: the distance an object moves in a certain amount of time.

acceleration: any change in speed or direction of a moving object.

gravity: the force that pulls two objects together.

friction: the force that slows motions and acts between the surface of two objects that touch.

energy: the ability to do work.

work: moving an object a certain distance.

NOTES:

Life Science

Ecosystems

S4L1. Students will describe the roles of organisms and the flow of energy within an ecosystem.

- a. Identify the roles of producers, consumers, and decomposers in a community.
- b. Demonstrate the flow of energy through a food web/food chain beginning with sunlight and including producers, consumers, and decomposers.
- c. Predict how changes in the environment would affect a community (ecosystem) of organisms.
- d. Predict effects on a population if some of the plants or animals in the community are scarce or if there are too many.

S4L2. Students will identify factors that affect the survival or extinction of organisms such as adaptation, variation of behaviors (hibernation), and external features (camouflage and protection).

- a. Identify external features of organisms that allow them to survive or reproduce better than organisms that do not have these features (for example: camouflage, use of hibernation, protection, etc.).
- b. Identify factors that may have led to the extinction of some organisms.

ecosystem: the living and nonliving things.

community: the living part of the ecosystem.

population: one type of organism.

habitat: an organism's home.

producer: capture light energy from the sun and transform it into food; plants.

consumer: organisms that must get food from other organisms.

omnivores: consumers that eat both consumers (animals) and producers (plants).

carnivores: consumers that eat other consumers (animals).

herbivores: consumers that eat producers (plants).

decomposers: organisms that break down dead matter and wastes.

food chain: a series of steps in which organism get the food they need to survive; it shows how energy is passed from the sun, to producer, consumers, and decomposers.

food web: shows how food chains in an ecosystem overlap.

overpopulation: the problem of having too many of at least one kind of living thing in an ecosystem.

pollution: harmful substances are up in the air, land or water.

camouflage: blending with surrounding because of color.

adaptation: a trait that helps the organism survive.

mimicry: when one organism imitates the traits of another.

protective resemblance: when an animal's body resembles its environment.

inherited behavior: a behavior that is not learned

instinct: a complicated inherited behavior

migration: animals moving to a new location to find food, water, shelter, better climate, etc.

hibernation: a state of inactivity in animals, characterized by lower body temperature, slower breathing, and lower metabolic rate. Hibernation conserves energy during the winter when food is short.

NOTES: