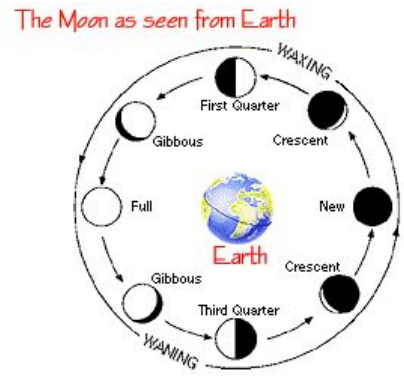
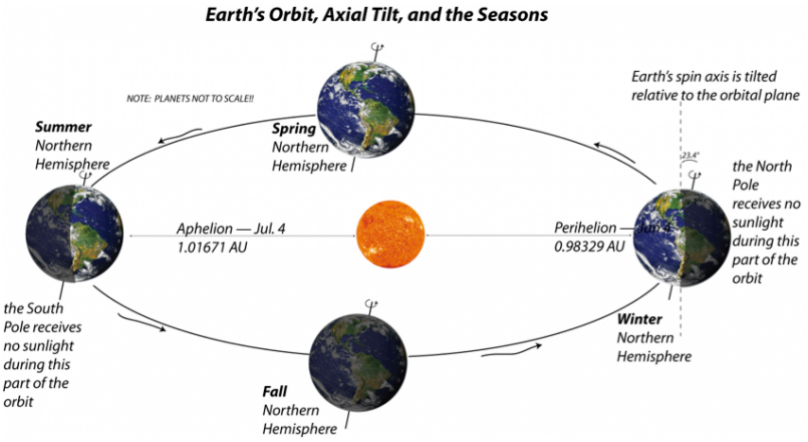
6th Grade Science Study Guide

Moon

The appearance of the lighted portion of the moon changes in a predictable cycle as a result of the relative positions of Earth, the moon, and the sun. Earth turns on an axis that is tilted relative to the plane of Earth's yearly orbit. The tilt causes sunlight to fall more intensely on different parts of the Earth during various parts of the year. The differences in heating of Earth's surface and length of daylight hours produce the seasons.





Seasonal Patterns

Most locations on Earth experience **seasons,** patterns of temperature changes and other weather trends over the course of a year. Near the equator, the temperatures are almost the same year-round. Near the poles, there are very large changes in temperatures from winter to summer. The temperature changes occur because the amount of sunlight at each location changes during the year. The changes in the amount of sunlight are due to the tilt of Earth's axis.

Angles of Sunlight

You have seen that seasons change as sunlight shifts between hemispheres during the year. On the ground, you notice the effects of seasons because the angle of sunlight and the length of daylight change over the year. The effects are greatest at locations far from the equator. You may have noticed that sunshine seems barely warm just before sunset, when the Sun is low in the sky. At noon the sunshine seems much hotter. The angle of light affects the temperature.

When the Sun is high in the sky, sunlight strikes the ground at close to a right angle. The energy of sunlight is concentrated. Shadows are short. You may get a sunburn quickly when the Sun is at a high angle. When the Sun is low in the sky, sunlight strikes the ground at a slant. The light is spread over a greater area, so it is less concentrated and produces long shadows. Slanted light warms the ground less.

Near the equator, the noonday Sun is almost overhead every day, so the ground is warmed strongly year-round. In the middle latitudes, the noon Sun is high in the sky only during part of the year. In winter the noon Sun is low and warms the ground less strongly.

Vocabulary

Earth's axis of rotation: imaginary poles on which Earth spins
Earth's tilt: a 23.5 degree angle
orbit: the path a planet takes during its revolution
reflection: when rays of light or heat are reflected, or bounce off other objects
seasons: patterns of temperature changes over the course of the year
revolution: the action of moving around something in a path that is similar to a circle

Solar System

The solar system consists of planets, moons, and other smaller objects including asteroids and comets that orbit the sun. Planets in the solar system differ in terms of their distance from the sun, number of moons, size, composition, and ability to sustain life. Every object exerts gravitational force on every other object depending on the mass of the objects and the distance between them. The sun's gravitational pull holds Earth and other planets in orbit. Earth's gravitational force holds the moon in orbit. The sun is one of billions of stars in the Milky Way galaxy, that is one of billions of galaxies in the universe. Scientists use a variety of tools to investigate the nature of stars, galaxies, and the universe. Historically, cultures have observed objects in the sky and understood and used them in various ways.

Mercury

It's a tough life living next to the sun but someone's got to do it. Find out why Mercury has more in common with the Moon than our own Earth.

Venus

Similar in size to Earth but just a little hotter, ok make that a lot hotter! Venus is like an oven on a high temperature thanks to its thick clouds which keep the heat in.

Mars

The 'Red Planet' hasn't quite been conquered by humans yet but it's had a few interesting visitors in recent years. Find out more about this and the potential for liquid water on this rocky planet.

Jupiter

It's big, its angry and its home to some of the most extreme conditions in our solar system. Welcome to Jupiter, where storms rage and intense gravity rules.

Saturn

This gas giant is famous for its beautiful rings as well as being the second biggest planet in our solar system. Learn about the ice crystals that make up the rings and much more.

Uranus

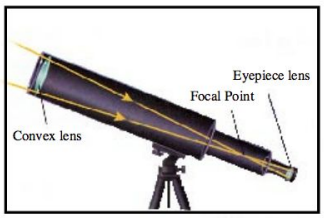
Keen to stand out from the crowd, Uranus rolls like a barrel rather than spinning like Earth. Learn more about this and its long orbit around the sun.

Neptune

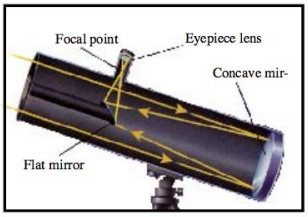
Fierce storms rage on this planet at the edge of our solar system. Read about this and other things that make Neptune such an interesting planet.

Pluto

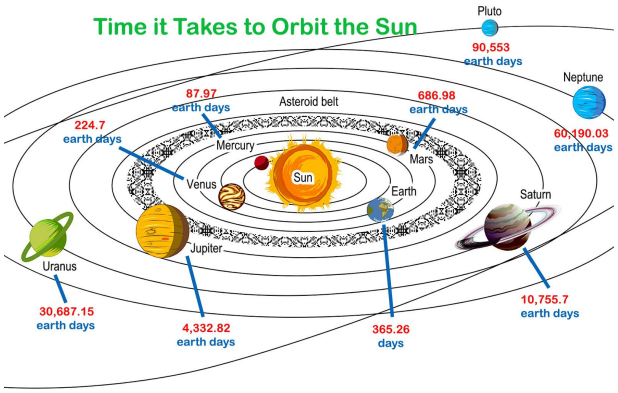
It's tough being the little guy and no one knows this better than Pluto who isn't even considered a planet anymore. Still, there's a lot to learn about an object that orbits so far from the sun.



A Telescope with Lenses



A Telescope with a Lens and Mirrors



Vocabulary

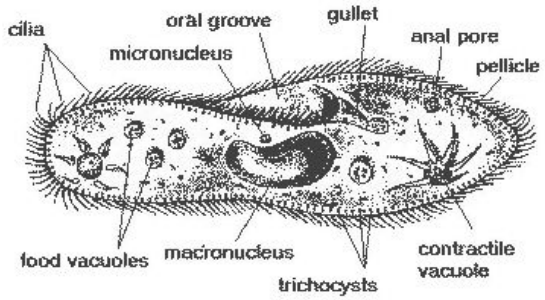
asteroids: irregular pieces of rock that move through space
celestial objects: all of the different objects in space that make up our universe
comets: celestial objects made up of dust, ice, and gases that orbit the sun in a large,elliptical course
distance: a measure of the amount of space between objects
gravitational force: the measurement of the pull of gravity
gravity: the attraction of one mass to another
mass: the amount of matter in something
meteor: one of the small particles of matter in the solar system that is visible when it falls into Earth's atmosphere
planet: a celestial object, larger than asteroids or comets,that revolves around a star without giving off its own light.
satellite: a natural or man made object that revolves around larger objects in space
scale: objects compared to a standard for accurate size perception
solar system: the system made up of the nine unique planets, and many smaller objects that orbit the sun
stars: celestial objects that consist of gases which generate light and heat
sun: the star that is the basis of the solar system and sustains life on Earth as the source of heat and light
telescope: an instrument that magnifies, or makes distant objects appear larger

MIcroorganisms

Microorganisms are those living things that are visible as individual organisms only with the aid of magnification. Microorganisms are components of every ecosystem on Earth. Microorganisms range in complexity from single to multicellular organisms. Most microorganisms do not cause disease and many are beneficial. Microorganisms require food, water, air, ways to dispose of waste, and an environment in which they can live. Investigation of microorganisms is accomplished by observing organisms using direct observation with the aid of magnification, observation of colonies of these organisms and their waste, and observation of microorganisms' effects on an environment and other organisms.

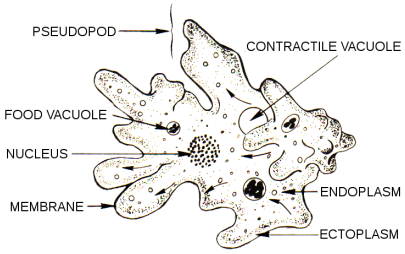
Generally when people think of 'bacteria,' they think of harmful germs. However, not all forms of bacteria are bad! You can enjoy a tasty product of good bacteria by making a batch of yogurt at home.

The human body encounters both good and bad bacteria daily. To microorganisms, the human body represents an attractive environment and source of nutrients. Bacteria that we call "good" helps us digest our food and protects us from bad bacteria that can make us sick or even kill us. Without good bacteria we would die, according to the US Department of Energy. Good bacteria live in our digestive system, on our skin and in our mouth. Bad bacteria may get into our body by contaminated food, wounds or environmental pollution.



If paramecium encounters an obstacle, it reverses the ciliary beat and moves back. It then changes direction slightly and moves forward. It will do this repeatedly until it gets past the obstruction. This reaction also shows that paramecium is sensitive to stimuli (in this case, the stimulus of touch).

An amoeba (pronounced uh-MEE-buh) is any of several tiny, one-celled protozoa in the phylum (or primary division of the animal kingdom) Sarcodina. Amoebas live in freshwater and salt water, in soil, and as parasites in moist body parts of animals. They are composed of cytoplasm (cellular fluid) divided into two parts: a thin, clear, gel-like outer layer that acts as a membrane (ectoplasm); and an inner, more watery grainy mass (endoplasm) containing structures called organelles. Amoebas may have one or more nuclei, depending upon the species.



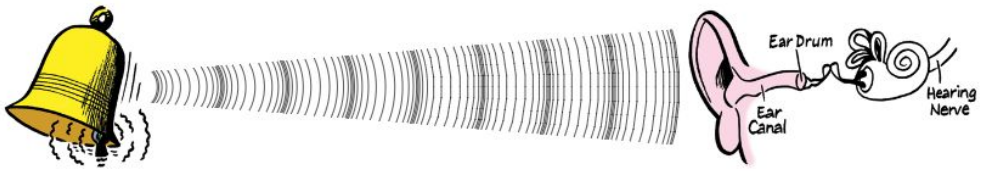
Vocabulary

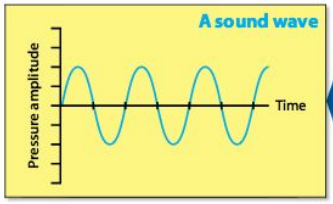
algae: protists that usually live in water and can produce their own food.
bacteria: microscopic, single-celled organisms that exist around you and inside you.
conclusion: The summary of an experiment, based on data related to a hypothesis.
culture: to grow microorganisms in a specially prepared nutrient medium.
decomposer: an organism, often a bacterium or fungus, that feeds on and breaks down dead plant or animal matter.
experiment: a series of steps to find the answer to a question.
fungi: organisms that are neither plant nor animals, but have characteristics of both and absorb food from whatever they are growing on.
hypothesis: an idea made into a statement that can be tested.
investigation: a process designed to answer a question.
microorganism: a living thing that can only be seen with the aid of magnification.
organism: a living thing.
producer: a living thing, like a green plant, that makes its food from simple substances usually using sunlight.
protozoan: microscopic organisms that usually live in water.
single-celled: any organism that has only one cell, the smallest unit of life.
variable: (experimental) a part of an experiment that is changed in order to find out the effects of that change.
control: a part or variable of an experiment that is kept the same to be used for comparison.

Heat, Light, and Sound

Heat, light, and sound are all forms of energy. Heat can be transferred by radiation, conduction and convection. Visible light can be produced, reflected, refracted, and separated into light of various colors. Sound is created by vibration and cannot travel through a vacuum. Pitch is determined by the vibration rate of the sound source.

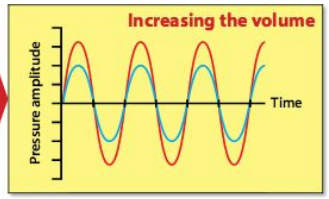
Sounds are caused when an object, the **source** of the sound (e.g. a bell), vibrates. The vibration spreads through the surrounding **medium** (e.g. the air particles). These vibrations, called **sound waves**, are detected by a **receiver** (e.g. the ear). Particles in the medium do not travel the full distance between source and receiver, but oscillate about the rest position as the wave passes by. In a way it is like a mexican wave passing through a football crowd – the supporters do not travel around the stadium but the wave does.

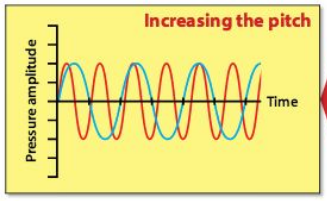




Sound waves travel through different materials – solids, liquids or gases - but not through a vacuum, as there are no particles to oscillate. The sound wave can be plotted, with the x-axis representing time and the y-axis the variation in **pressure** (as the particles are compressed and decompressed by the passing wave).

The difference in pressure **(amplitude)** of two sounds is perceived by our ear as a difference in loudness or **volume.** Loud (high volume) sounds are the result of large pressure oscillations as the wave travels through a medium.





Changes in the **frequency** of the wave are perceived by our ears as a change in **pitch.** The frequency of the sound is the number of pressure oscillations each second. It is measured in Hertz (Hz). 1 Hz = 1 oscillation per second. Increasing the frequency of the sound increases the pitch that we hear.

The general frequency range of hearing for young people is 20 Hz to 20 kHz (=20 000 Hz). The upper frequency limit decreases with age, and so the older a person gets, the less well they can hear high pitch sounds. Animals hear in different frequency ranges to humans: generally, larger animals hear lower frequencies and smaller animals hear higher frequencies.

Acoustics is the science that measures, characterises, quantifies and describes sound.

Vocabulary

angle of incidence: the angle at which light strikes a surface
angle of reflection: the angle at which light bounces off a surface
absorption: taking in or swallowing up energy
conduction: heat transfer through a substance, or from a substance, to another substance, by direct contact of particles
conductor: a substance that allows heat, electricity or sound to travel through it
convection: heat transfer in liquids and gases as molecules circulate in currents
medium: any substance through which a wave is transmitted
pitch: how high or low a musical note sounds
prism: a clear glass or plastic shape that breaks light into the color spectrum
radiation: heat transfer through space in the form of waves
reflection: when rays of light or heat are reflected, or bounce off other objects
refraction: when light goes from one medium to another medium, (from air to water) and is bent
spectrum: the colors red, orange, yellow, green, blue, indigo, and violet, arranged in the order of their wavelengths and seen when white light passes through a prism
vibration: a rapid back and forth movement