LIGHT QUEST

Light is the fastest thing in the Universe. It travels 186,000 ____ per second.

A. feet
B. miles
C. kilometers

ANSWER: B. Light travels 186,000 miles per second.

LIGHT QUEST

Different colors are actually different wavelengths of visible light. The longest wavelength we can see is:

A. red light
B. violet light
C. white light

ANSWER: A. The longest wavelength we can see is red light. The shortest wavelength we can see is or violet light.

LIGHT QUEST

White light is:

A. the combination of all the colors of visible light
B. the absence of any colors of visible light
C. its own unique "color" or wavelength

ANSWER: A. White light is the combination of all the colors of visible light. In the 17th century, Sir Isaac Newton proved this fact by experimenting with prisms.

LIGHT QUEST

The colors of the rainbow appear when sunlight travels through:

A. a cloud
B. a raindrop
C. the ozone layer

ANSWER: B. The colors of the rainbow are the result of sunlight passing through groups of raindrops. The white light is refracted in the raindrop and dispersed into different colors as the light leaves the drop.

LIGHT QUEST

A diamond ring sparkles with many colors because:

A. it is reflecting the colors around it
B. it is cut in a way that light is refracted into different colors
C. there are colors hidden beneath the stone

ANSWER: B. A diamond ring sparkles with many colors because it is cut in a way so that light is refracted into different colors. The cut of the diamond also enhances how these colors are reflected outward.

LIGHT QUEST

Visible light is a special kind of energy called electromagnetic radiation. We can't see other forms of electromagnetic radiation, like microwaves and X-rays, because:

A. our eyes cannot detect their wavelengths
B. they move too fast
C. they hide behind trees

ANSWER: A. We can't see other forms of electromagnetic radiation, like microwaves and X-rays, because our eyes cannot detect their wavelengths. (Microwaves are too long and X-rays are too short.)

LIGHT QUEST

Visible light is part of the electromagnetic spectrum. On one end of the spectrum are radio waves, which can be several miles long. On the other end of the spectrum are gamma rays, which are about the size of:

A. an apple
B. an ant
C. an atom

ANSWER: C. Gamma rays are tiny, about the size of an atom. These rays carry a lot of energy and can be dangerous to living things.

LIGHT QUEST

A straw in a glass of water can appear bent or broken. This is an example of:

A. reflection
B. refraction
C. magic

ANSWER: B. A straw in a glass of water appears bent because of refraction. Light bends, or refracts, when it passes through some materials, like air, glass, or water. Refraction occurs because light actually slows down as it passes through materials.

LIGHT QUEST

A flat mirror reflects an identical, though reversed, image of an object because the light rays bounce off the mirror at the same angle as the incoming rays. However, a convex (or bulging) mirror will reflect a distorted image because the reflected light rays are spread out. This makes the reflected image appear:

A. larger
B. smaller
C. upside-down

ANSWER: B. A convex mirror reflects a small, upright image of an object.

LIGHT QUEST

Light acts as:

A. a wave
B. a particle
C. both a wave and a particle

ANSWER: C. Light acts as both a wave and a particle.

LIGHT QUEST

Light is energy made of small particles called:

A. photons
B. electrons
C. light bulbs

ANSWER: A. Light is energy made of small particles called photons.

LIGHT QUEST

The photoelectric effect shows:

A. how light behaves as particles
B. how light behaves as waves
C. that light makes things hotter

ANSWER: A. The photoelectric effect shows how light behaves as particles.

LIGHT QUEST

In the center of every atom is a tiny, dense nucleus containing:

A. electrons and neutrons
B. protons and electrons
C. protons and neutrons

ANSWER: C. In the center of every atom is a tiny, dense nucleus containing protons and neutrons. The electrons orbit in orbitals around the nucleus. A hydrogen atom, however, has only one proton and no neutrons.

LIGHT QUEST

Electrons are negatively charged subatomic particles. In an atom, they can:

A. orbit the nucleus in different layers or orbitals
B. jump from one orbital to another
C. both of the above

ANSWER: C. Electrons orbit the nucleus and can jump from one orbital to another.

LIGHT QUEST

The particles that orbit in orbitals around the nucleus are called:

A. electrons
B. photons
C. orbitons

ANSWER: A. The particles that surround the orbitals around the nucleus are called electrons, which are negatively charged bundles of energy.

LIGHT QUEST

A photon of light is emitted when an electron jumps from:

A. an inner orbital to an outer orbital
B. an outer orbital to an inner orbital
C. any orbital to the atom's nucleus

ANSWER: B. A photon of light is emitted when an electron jumps from an outer orbital to an inner orbital.

LIGHT QUEST

During a 1919 solar eclipse, an experiment showed that stars around the Sun appeared to shift in position. This observation made Einstein an overnight celebrity, proving his theory that:

A. $E=mc^2$
B. stars move during an eclipse
C. space can be bent by the force of gravity

ANSWER: C. The solar eclipse experiment proved Einstein's theory that space can be bent by the force of gravity: the rays of light from distant stars followed the bent curvature of space as they passed near our Sun. This idea was part of Einstein's General Theory of Relativity.

LIGHT QUEST

The inventor who introduced the first light bulb in the United States was:

A. Alexander Graham Bell
B. Thomas Edison
C. Thomas Jefferson

ANSWER: B. Thomas Edison introduced the first light bulb in the United States in 1879. At practically the same time, a British scientist named Joseph Swan was also developing an early version of the light bulb.

LIGHT QUEST

Sir Isaac Newton performed many experiments with sunlight and prisms. In one experiment, he concluded that:

A. sunlight is a mixture of many colors
B. nothing is faster than sunlight
C. sunlight is warm

ANSWER: A. In one of his many experiments, Sir Isaac Newton concluded that sunlight is a mixture of many colors. First he used a prism to disperse sunlight into many colors, then he used a prism to combine these colors back into white light.

LIGHT QUEST

Fact or Fiction? We can see all forms of light.

ANSWER: FICTION
We can only see visible light of the spectrum. There are many other forms of light, or electromagnetic radiation, which are invisible to our eyes.

LIGHT QUEST

Fact or Fiction? All colors of the spectrum can be broken down into blue, green, and red.

ANSWER: FACT
Blue, green, and red are the primary colors, which means that all other colors are a mix of two or three of these colors. For example, yellow is produced by mixing red and green together.

LIGHT QUEST

Fact or Fiction? If the nucleus of a gold atom were the size of a peanut on second base of Yankee Stadium, then the electron orbitals would encompass the whole stadium.

ANSWER: FICTION
The space between the nucleus and the electron orbitals is incredibly vast. In fact, if the nucleus of a gold atom were the size of a peanut on second base of Yankee Stadium, then the electron orbitals would extend 200 meters in every direction, reaching as high as a 50-story building.

LIGHT QUEST

Fact or Fiction? The photoelectric effect is the phenomenon that when photons of light are shined on a metal surface, protons are emitted from the metal's atoms.

ANSWER: FICTION
The photoelectric effect is the phenomenon that when photons of light are shined on a metal surface, electrons are emitted from the metal's atoms.

LIGHT QUEST

Fact or Fiction? Light has no weight.

ANSWER: FACT
Light has no weight and no mass.

LIGHT QUEST

Fact or Fiction? The first person to measure the speed of light was an astronomer, not a physicist.

ANSWER: FACT
The first scientist who tried to measure the speed of light was the Danish astronomer Ole Roemer. He noticed that Io, one of the moons of Jupiter, appeared at different times, depending on how far it was from Earth. He concluded that when Io was farther away, it was taking more time for its light to reach Earth, making it seem to appear later. Using what he knew about Earth's changing distances from Jupiter, he tried to calculate the speed of light.