

Standard/Advanced

Question 1 (1 point)

The electromagnetic waves with the highest frequencies are called

- A. radio waves.
- B. gamma rays.
- C. X-rays.
- D. visible light.

Question 2 (1 point)

After a wave passes through a medium, how does the position of that medium compare to its original position?

- A. The medium's position is about the same as its original position.
- B. The medium's position continues to change from its original position.
- C. The medium's position moves in the direction of the wave.
- D. The medium's position moves perpendicular to its original position.

Question 3 (1 point)

What happens when parallel rays of light hit a smooth surface?

- A. diffuse reflection
- B. diffraction
- C. refraction
- D. regular reflection

Question 4 (1 point)

_____ is the number of waves that occur in 1 second.

- A. Interference
- B. Frequency
- C. Amplitude
- D. Wavelength

Question 5 (1 point)

Electromagnetic energy is classified by the length and frequency of its wave. Which form of electromagnetic energy has the shortest wavelength?

- A. radio waves
- B. gamma rays
- C. infrared waves
- D. ultraviolet waves

Question 6 (1 point)

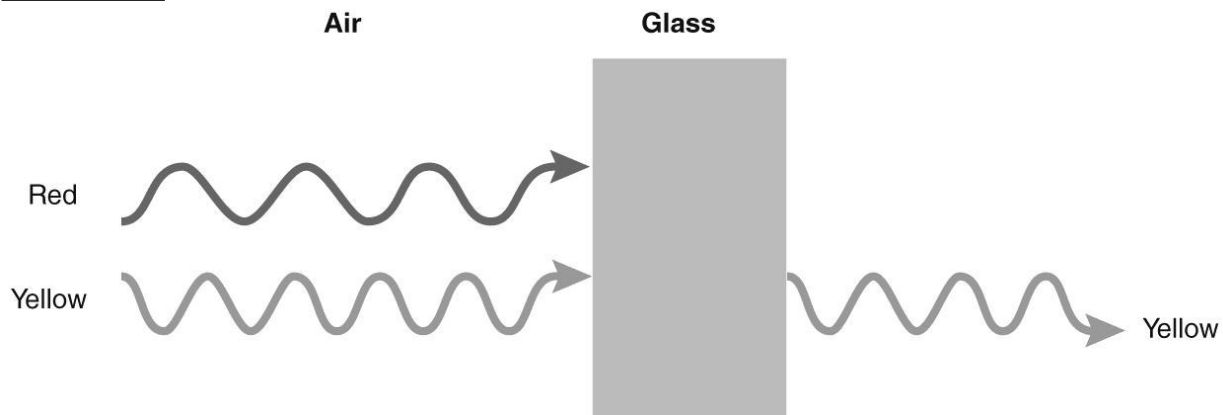
The range of electromagnetic waves placed in a certain order is called the

- A. electromagnetic spectrum.
- B. electromagnetic wavelength.
- C. electromagnetic frequency.
- D. electromagnetic field.

Question 7 (1 point)

Red light waves and yellow light waves travel through air and strike the surface of glass. Only the yellow light waves travel through the glass as shown in the figure below.

Extra Content:



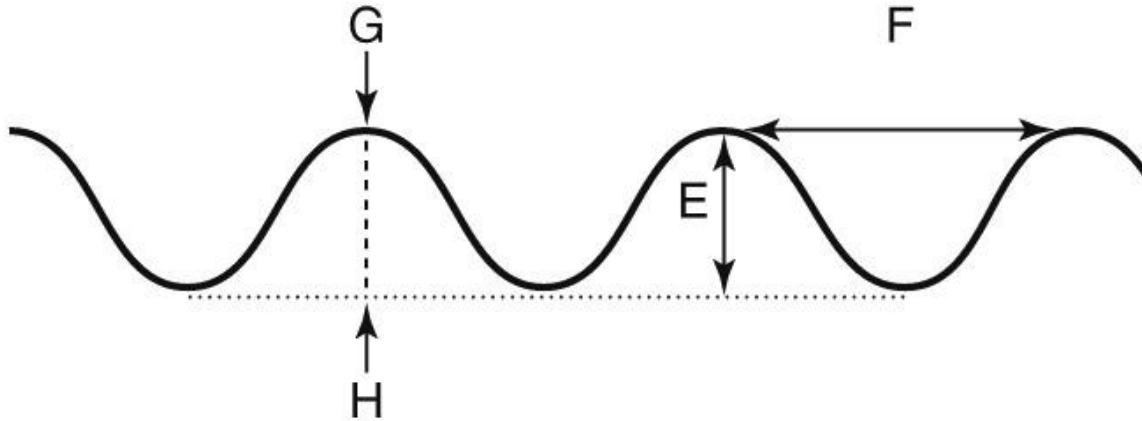
Which of these phrases **best** describes the glass?

- A. reflective for red light
- B. opaque for yellow light
- C. translucent for red light
- D. transparent for yellow light

Question 8 (1 point)

Waves can be measured in many different ways.

Extra Content:



What property of a wave is measured by F?

- A. period
- B. frequency
- C. amplitude
- D. wavelength

Question 9 (1 point)

What is the term for the distance from the highest part of one wave to the highest part of the next wave?

- A. period
- B. frequency
- C. amplitude
- D. wavelength

Question 10 (1 point)

Which of the following is the law of reflection?

- A. The angle of incidence is equal to the angle of reflection.
- B. The angle of incidence is equal to the normal.
- C. The angle of reflection is equal to the normal.
- D. The normal is perpendicular to the reflecting surface.

Question 11 (1 point)

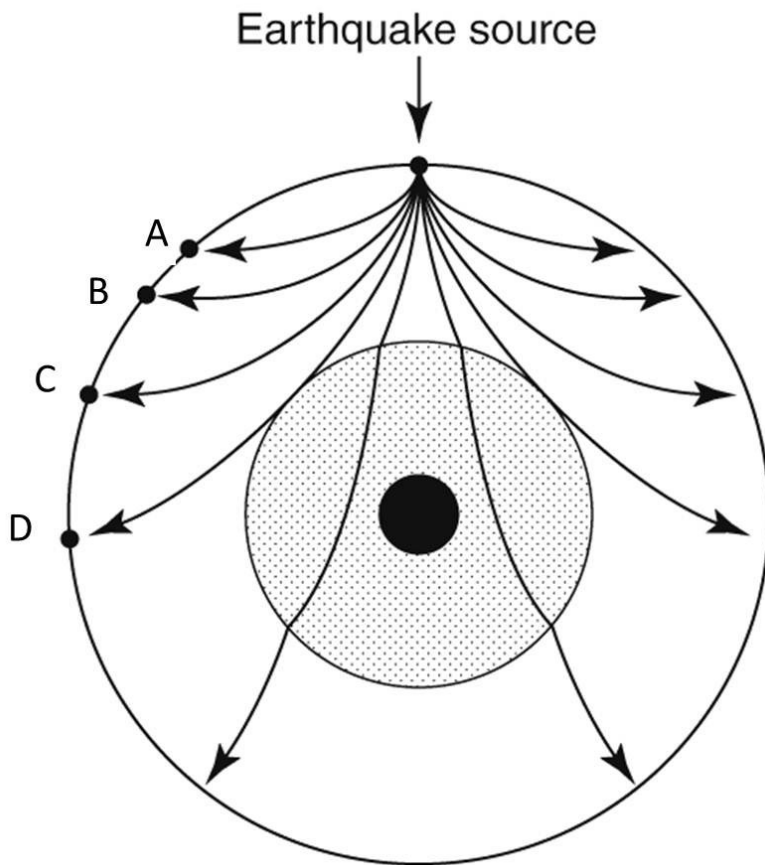
Our eyes detect light that lies only within a small region of the electromagnetic spectrum. This region is called visible light. Which of these statements describes the visible spectrum of light as seen by the human eye?

- A. The lowest frequency appears red, and the highest frequency appears violet.
- B. The lowest frequency appears green, and the highest frequency appears red.
- C. The lowest frequency appears blue, and the highest frequency appears orange.
- D. The lowest frequency appears yellow, and the highest frequency appears green.

Question 12 (1 point)

An earthquake sends out mechanical waves in all directions from its source. In answering the following question, assume the waves all have the same energy when they leave the source of the earthquake.

Extra Content:



- A. Point A
- B. Point B
- C. Point C
- D. Point D

Question 13 (1 point)

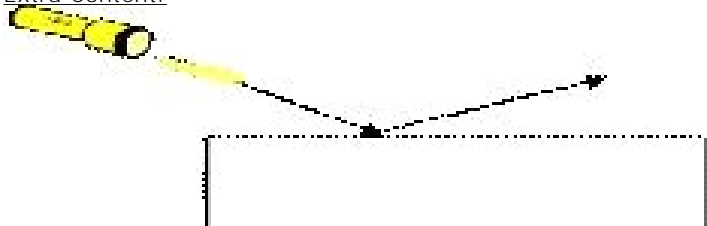
The medium through which a mechanical wave passes can be a solid, a liquid, or a gas. Properties of a wave might change when it moves from one medium to another. What happens to the speed of a wave when it moves from a gas to a solid?

- A. It speeds up.
- B. It slows down.
- C. It remains the same.
- D. It speeds up and then slows down.

Question 14 (1 point)

Calvin shines a light onto a surface. The diagram below is a drawing of what he observed.

Extra Content:



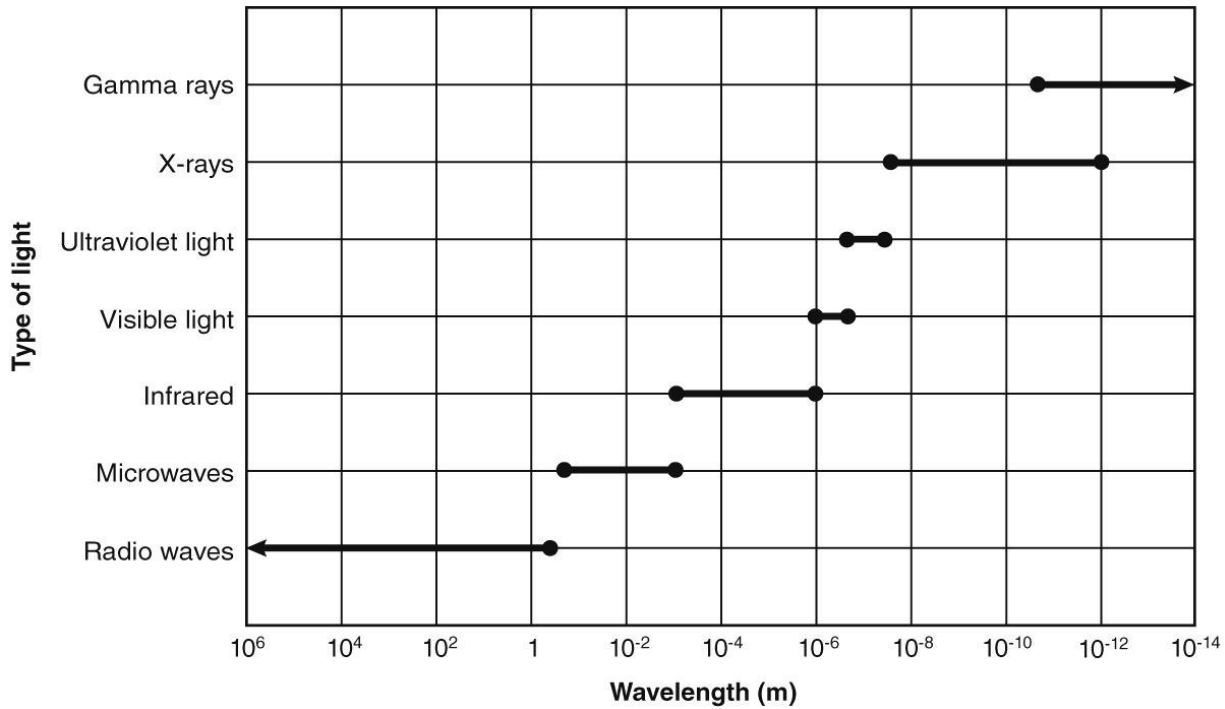
Which of the following best describes what happened to the light when it hit the surface?

- A. Transmission
- B. Absorption
- C. Reflection
- D. Refraction

Question 15 (1 point)

Which of the waves listed below has the highest frequency?

Extra Content:



- A. radio waves
- B. x-ray waves
- C. infrared waves
- D. ultraviolet waves

Question 16 (1 point)

Sunlight shines through a clear window. What happens to most of the light that strikes the window?

- A. It is reflected.
- B. It is absorbed.
- C. It is scattered.
- D. It is transmitted.

Question 17 (1 point)

Why can't you see your reflection in a brick wall?

- A. Reflection of light from a rough surface is regular reflection.
- B. No light is reflected from a brick wall.
- C. Light rays are reflected in many directions from the uneven surface.
- D. Light rays are reflected in only one direction from the rough surface.

Question 18 (1 point)

There are two types of waves: mechanical and electromagnetic. Microwaves, infrared waves, and radio waves are examples of electromagnetic waves. Which statement is **true** about the speed of an electromagnetic wave?

- A. It is not affected by changes in media.
- B. It is slower in a vacuum than in a medium.
- C. In a vacuum, its speed equals half the speed of light.
- D. It slows down when it goes from a vacuum to a medium.

Question 19 (1 point)

Heather puts a straw into a glass of water. She notices that the straw appears to be broken when she looks through the glass and the water from the side. Which term **best** explains why the straw looks like it is broken?

Extra Content:



- A. absorption
- B. refraction
- C. scattering
- D. transmission

Question 20 (1 point)

An earthquake sends out mechanical waves in all directions from its source. As these mechanical waves travel through different parts of Earth, through which part of Earth do they travel most quickly?

- A. rock
- B. rivers
- C. oceans
- D. pockets of air

Question 21 (1 point)

Which statement **best** explains why a banana is yellow?

- A. It emits yellow light.
- B. It reflects yellow light and absorbs other colors.
- C. It absorbs yellow light and reflects other colors.
- D. It transmits yellow light and absorbs other colors.

Question 22 (1 point)

In a vacuum, all electromagnetic waves have the same

- A. wavelength.
- B. frequency.
- C. speed.
- D. amplitude.

Question 23 (1 point)

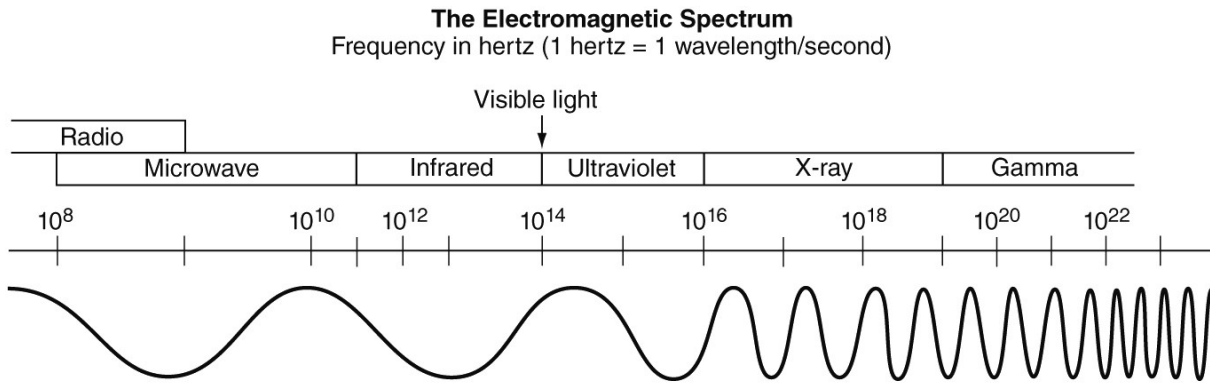
What causes light waves to refract?

- A. The speed of light is reduced to zero.
- B. The speed of light remains constant.
- C. The light is repelled by some materials.
- D. The speed of light changes from one medium to the next.

Question 24 (1 point)

Radiant energy is the source of electromagnetic waves, which include X-ray, infrared, and ultraviolet waves among others. The diagram below shows the electromagnetic spectrum.

Extra Content:



Which of these statements **best** describes the speed of these waves in a vacuum?

- A. X-rays travel slower than infrared.
- B. Infrared travels slower than X-rays.
- C. Infrared travels faster than ultraviolet.
- D. Infrared travels at the same speed as X-rays.

Question 25 (1 point)

When you listen to the radio, watch TV, or cook food in a microwave, you are using a device that makes use of man-made electromagnetic waves. Which statement about electromagnetic waves is **false**?

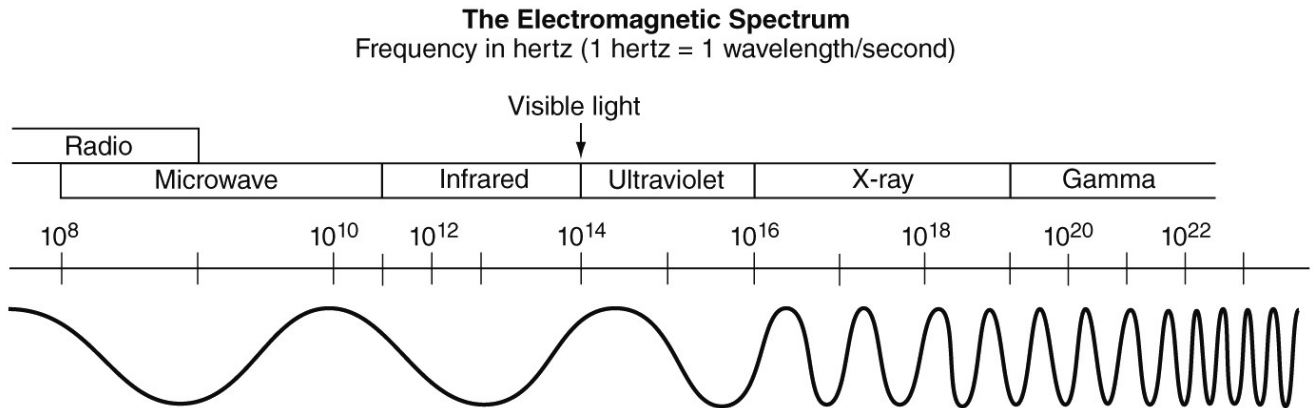
- A. Electromagnetic waves travel at the speed of light.
- B. Electromagnetic waves need a medium to travel through.
- C. Different frequencies of light are interpreted by our eyes as different colors.
- D. The transfer of energy as electromagnetic waves is called electromagnetic radiation.

Question 26 (1 point)

The diagram below represents the electromagnetic spectrum.

What is the relationship between frequency and wavelength for electromagnetic waves?

Extra Content:



- A. Frequency equals wavelength.
- B. As frequency increases, wavelength increases.
- C. As frequency increases, wavelength decreases.
- D. The relationship depends on the speed of the wave.

Question 27 (1 point)

Reflection occurs when a wave _____ .

- A. compresses air particles as it travels
- B. bends and changes speeds as it travels
- C. causes ripples in a pool of water
- D. strikes an object and bounces off of it

Question 28 (1 point)

What type of waves do not require matter to carry energy?

- A. mechanical
- B. electromagnetic
- C. transverse
- D. compressional

Question 29 (1 point)

What do radio waves transfer between a cell phone and a cell phone tower?

- A. sound
- B. energy
- C. the medium
- D. air particles

Question 30 (1 point)

A coconut drops into water and makes a large splash. What type of wave is created in the water?

- A. spring
- B. invisible
- C. mechanical
- D. electromagnetic

Question 31 (1 point)

A jellyfish is floating in the ocean, far from shore where breakers occur. What will happen to the jellyfish when a wave passes through the water?

- A. It will be carried away with the wave.
- B. It will not move, but the water around it will move.
- C. It will be moved up to the surface of the water.
- D. It will move up and down, but it will return to about the same place.

Question 32 (1 point)

Which of the following media will refract light the most?

- A. a diamond
- B. air
- C. water
- D. ice

Question 33 (1 point)

Objects that allow only some light to pass through them are considered _____.

- A. opaque
- B. solid
- C. transparent
- D. translucent

Question 34 (1 point)

The bending of light rays as they enter a new medium is called

- A. diffuse reflection.
- B. regular reflection.
- C. refraction.
- D. diffraction.

Question 35 (1 point)

How does the sun transfer energy to Earth?

- A. by making Earth spin
- B. by mechanical waves
- C. by electromagnetic waves
- D. by the Earth revolving around the sun

Question 36 (1 point)

The visible spectrum of light from the longest to shortest wavelength is:

- A. violet, indigo, blue, green, yellow, orange, red
- B. infrared, ultraviolet, gamma, X-rays, microwaves
- C. red, orange, yellow, green, blue, indigo, violet
- D. radio, microwave, infrared, visible, ultraviolet, X-ray, gamma

Question 37 (1 point)

What occurs when parallel rays of light hit a rough or bumpy surface?

- A. regular reflection
- B. diffuse reflection
- C. refraction
- D. diffraction

Question 38 (1 point)

Through which of these media do sound waves travel most slowly?

- A. iron
- B. wood
- C. water
- D. air

Question 39 (1 point)

In which of these situations would light slow down?

- A. from glass to air
- B. from ice to water
- C. from plastic to air
- D. from a vacuum to air

Question 40 (1 point)

Electromagnetic radiation is energy that travels in waves. Two types of electromagnetic waves are infrared waves and ultraviolet waves. Which of these statements describes a property that is shared by infrared waves and ultraviolet waves?

- A. Both waves have the same energy.
- B. Both waves have the same frequency.
- C. Both waves have the same wavelength.
- D. Both waves travel at the same speed in a vacuum.

Question 41 (1 point)

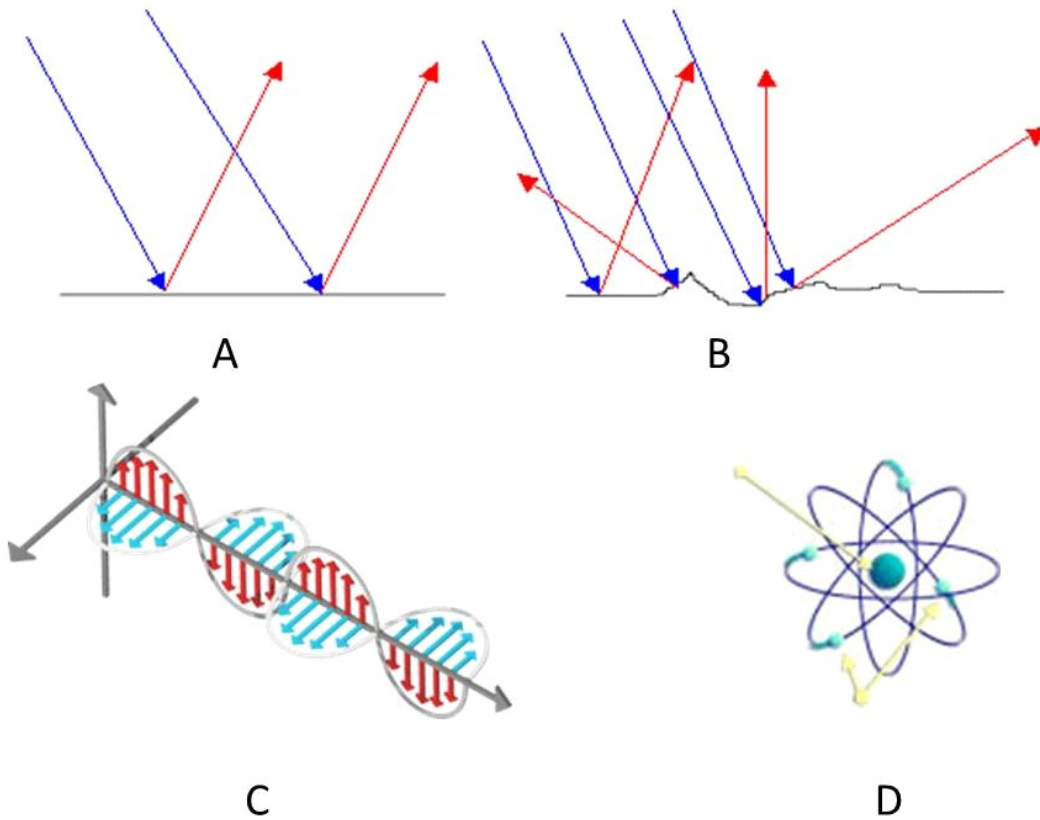
Which of the following enables your body to make vitamin D?

- A. ultraviolet radiation
- B. infrared waves
- C. gamma rays
- D. visible light

Question 42 (1 point)

Which of the following models best represents a diffuse reflection?

Extra Content:



- A. A
- B. B
- C. C
- D. D

Question 43 (1 point)

Which electromagnetic waves have the longest wavelengths and lowest frequencies?

- A. infrared waves
- B. radio waves
- C. ultraviolet rays
- D. gamma rays

Question 44 (1 point)

A wave transfers _____.

- A. gas
- B. energy
- C. matter
- D. liquid

Question 45 (1 point)

In which of the following will light travel fastest?

- A. air
- B. water
- C. vacuum
- D. glass

Question 46 (1 point)

Which of the following devices does NOT utilize radio waves or microwaves?

- A. cellular telephone
- B. radar
- C. satellite
- D. television remote control

Question 47 (1 point)

Which of the following types of waves can travel through space?

- A. electromagnetic
- B. mechanical
- C. transverse
- D. compressional

Question 48 (1 point)

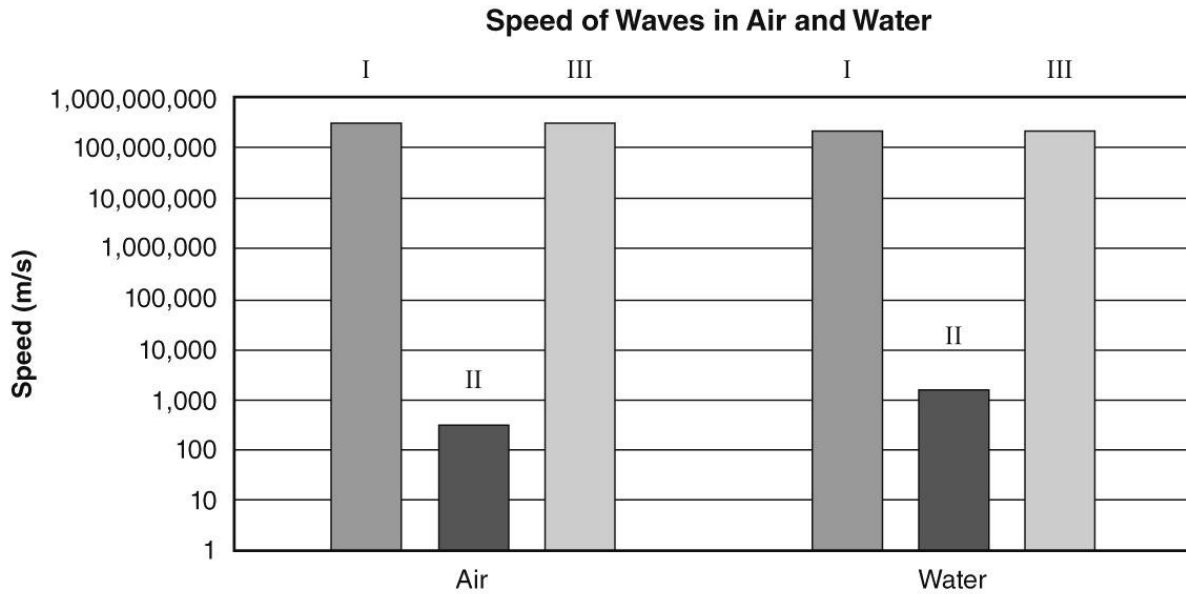
What happens when light passes from air into water?

- A. The light speeds up.
- B. The light continues at the same speed.
- C. The light slows down.
- D. The light forms a mirage.

Question 49 (1 point)

The graph below shows the speeds of three waves in air and water.

Extra Content:



Which wave(s) are electromagnetic waves?

- A. II only
- B. I, II, and III
- C. I and II only
- D. I and III only

Question 50 (1 point)

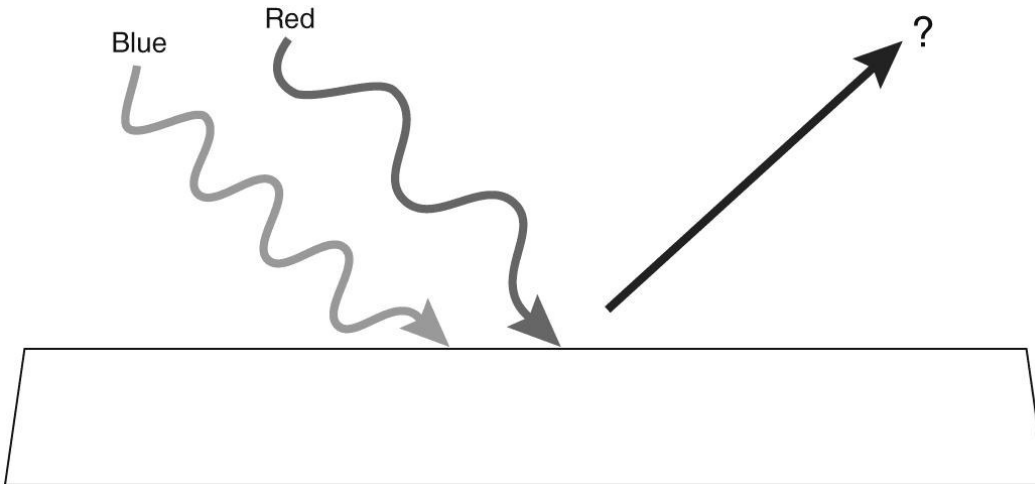
An electromagnetic wave from the sun travels through space

- A. at half the speed of light.
- B. at the speed of sound.
- C. at twice the speed of sound.
- D. at the speed of light.

Question 51 (1 point)

Kana shines a light onto paper as shown in the figure below. The light contains both blue and red wavelengths of light.

Extra Content:



If the paper is blue, what color (or colors) of light bounces off the paper?

- A. only red
- B. only blue
- C. both red and blue
- D. neither red nor blue

Question 52 (1 point)

Electromagnetic radiation is energy that travels in waves. Two types of electromagnetic waves are microwaves and gamma rays. Gamma rays have a shorter wavelength than microwaves. Which of these statements is **true**?

- A. Gamma rays travel faster than microwaves.
- B. Gamma rays have more energy than microwaves do.
- C. Gamma rays have a lower frequency than microwaves do.
- D. Gamma rays, but not microwaves, can travel through a vacuum.

Question 53 (1 point)

An image of a distant object caused by refraction of light is called a

- A. prism.
- B. mirage.
- C. rainbow.
- D. refracted medium.

Question 54 (1 point)

Waves that use matter to transfer energy are called _____ waves.

- A. electromagnetic
- B. medium
- C. mass
- D. mechanical

Question 55 (1 point)

Which statement is true regarding mechanical and electromagnetic waves?

- A. A mechanical wave requires a medium, but an electromagnetic wave does not.
- B. Neither type of wave requires a medium.
- C. Both types of waves require a medium.
- D. The speed of an electromagnetic wave can be affected by a medium, but the speed of a mechanical wave cannot.

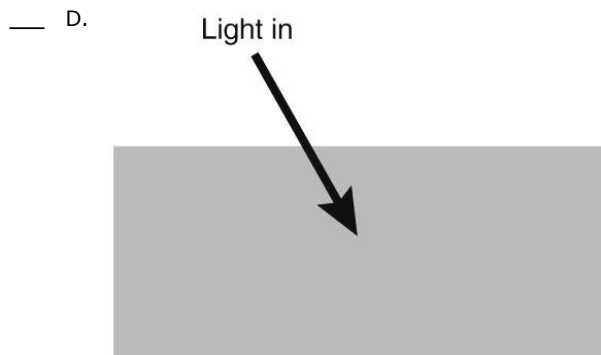
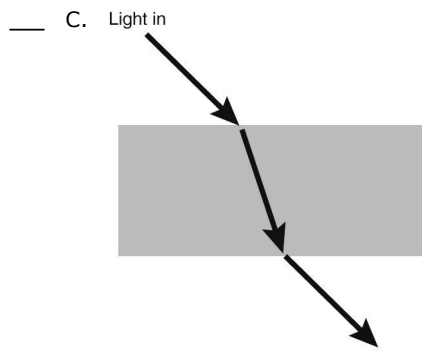
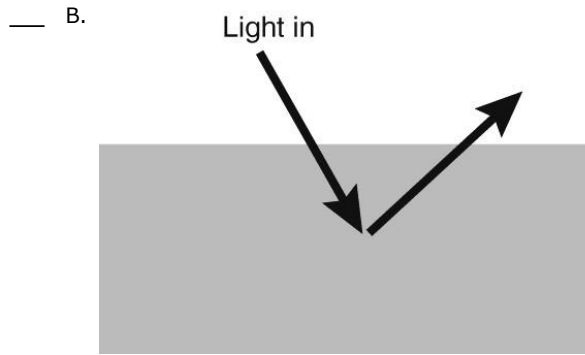
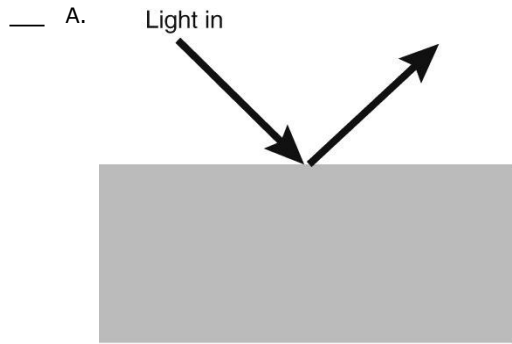
Question 56 (1 point)

The imaginary line perpendicular to the surface of a medium where a wave strikes it is called the _____.

- A. incidence
- B. normal
- C. average
- D. interference

Question 57 (1 point)

Calvin shines a thin beam of light onto a material, and the light refracts. Which diagram **best** shows what happens to the light?



Question 58 (1 point)

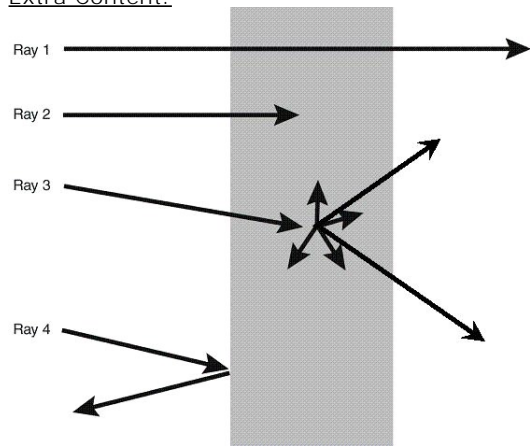
Sunlight is composed of energy that is visible to humans and energy that is not visible to humans. Which statement describes how the visible energy from the Sun is different from the nonvisible energy?

- A. It has different amplitudes.
- B. It travels a different distance.
- C. It travels at a different speed.
- D. It has different wavelengths.

Question 59 (1 point)

The model below shows four light rays approaching a material. Which light ray **best** shows absorption?

Extra Content:



- A. Ray 1
- B. Ray 2
- C. Ray 3
- D. Ray 4

Question 60 (1 point)

The speed of light is _____.

- A. slower in water than in air
- B. fastest in water
- C. faster in water than in air
- D. the same speed in water and air

Question 61 (1 point)

What happens to the energy of a wave as it moves away from its source through a medium?

- A. It increases.
- B. It decreases due to absorption by the medium.
- C. It stays the same.
- D. It increases and then decreases.

Question 62 (1 point)

The energy generated by the sun travels to Earth as electromagnetic waves of varying lengths. Which statement describes an electromagnetic wave with a long wavelength?

- A. It has a high frequency and low energy.
- B. It has a high frequency and high energy.
- C. It has a low frequency and can travel through a vacuum.
- D. It has a low frequency and needs a medium to travel through.

Question 63 (1 point)

A dolphin makes a sound underwater that is too high-pitched for humans to hear. What type of wave is this?

- A. water
- B. visible light
- C. mechanical
- D. electromagnetic

Question 64 (1 point)

An overhead light shines onto a sheet of white paper. Which term **best** describes what happens to the light?

- A. absorbed
- B. reflected
- C. refracted
- D. transmitted

Question 65 (1 point)

Why can you see most objects?

- A. light refracts through them
- B. light reflects off them
- C. they emit light
- D. they absorb light

Question 66 (1 point)

Brianna reported a measurement in units of hertz. What property of a wave was she measuring?

- A. period
- B. wavelength
- C. amplitude
- D. frequency

Question 67 (1 point)

As frequency increases, wavelength _____.

- A. becomes faster
- B. increases
- C. decreases
- D. remains constant

Question 68 (1 point)

The Global Positioning System is a system of satellites, ground monitoring stations, and receivers that uses electromagnetic waves to _____.

- A. broadcast television signals
- B. provide two-way radio service for police cars, fire trucks, and ambulances
- C. provide mobile telephone service
- D. provide information about the receiver's exact location at or above Earth's surface

Question 69 (1 point)

The _____ of an electromagnetic light wave determines the color of the light.

- A. amplitude
- B. pitch
- C. compression speed
- D. frequency

Question 70 (1 point)

Habib looks around his classroom at different objects. Which object reflects almost all of the light that strikes it?

- A. white poster board
- B. clear window glass
- C. bright overhead light
- D. black construction paper

Question 71 (1 point)

Which waves have some electrical properties and some magnetic properties?

- A. longitudinal waves
- B. transverse waves
- C. mechanical waves
- D. electromagnetic waves

Question 72 (1 point)

A store uses green-colored glass in its windows. What is the **main** reason the glass appears green?

- A. It emits green light.
- B. It absorbs green light.
- C. It reflects green light.
- D. It transmits green light.

Question 73 (1 point)

Electromagnetic waves can transfer energy without a(n)

- A. medium.
- B. electric field.
- C. magnetic field.
- D. change in either a magnetic or an electric field.

Question 74 (1 point)

Electromagnetic energy travels through space in waves. The electromagnetic spectrum includes all electromagnetic waves, arranged according to frequency and wavelength. Which of these is an example of an electromagnetic wave?

- A. radio wave
- B. sound wave
- C. ocean wave
- D. gravitational pull

Question 75 (1 point)

Visible light has a higher frequency than

- A. X-rays.
- B. ultraviolet rays.
- C. infrared rays.
- D. gamma rays.

Question 76 (1 point)

A blue car looks blue because _____.

- A. blue light is absorbed while others are reflected,
- B. the blue car emits blue light
- C. blue light is reflected while others are absorbed
- D. the blue car is opaque

Question 77 (1 point)

Latif wakes up one morning after the sun has risen and sees that it is foggy outside. Which term **best** describes the fog he sees?

- A. opaque
- B. reflective
- C. translucent
- D. transparent

Question 78 (1 point)

The matter through which a mechanical wave travels is called a _____.

- A. wave relay
- B. medium
- C. mass
- D. mechanical

Question 79 (1 point)

Which statement **best** explains why a leaf appears green?

- A. It absorbs green light.
- B. It reflects green light.
- C. It refracts green light.
- D. It transmits green light.

Question 80 (1 point)

When a light ray travels from a more dense material such as glass to a less dense material such as air, the light ray refracts:

- A. in the same direction as the incident ray
- B. away from the normal line
- C. towards the normal line
- D. in a random direction

Question 81 (1 point)

Electromagnetic energy travels in waves. When we describe electromagnetic waves, we often talk about the wave's length and frequency. Which of these statements accurately describes the relationship between the wavelength and frequency of an electromagnetic wave?

- A. If wavelength increases, frequency increases.
- B. If frequency decreases, wavelength increases.
- C. If frequency remains constant, wavelength increases.
- D. If wavelength remains constant, frequency increases.