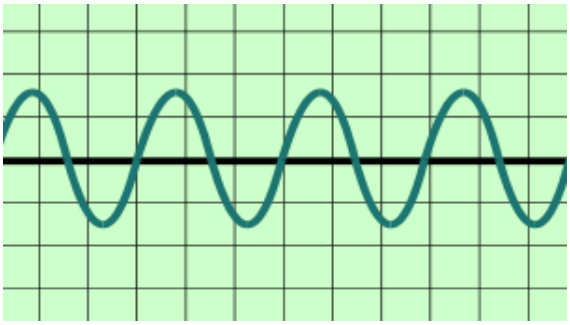
Question

What do waves transfer?

(They do this without transferring what?)

Question

Draw and label this wave: -



Question

What do all electromagnetic waves have in common?

Question

Name the electromagnetic spectrum from shortest to longest wavelength

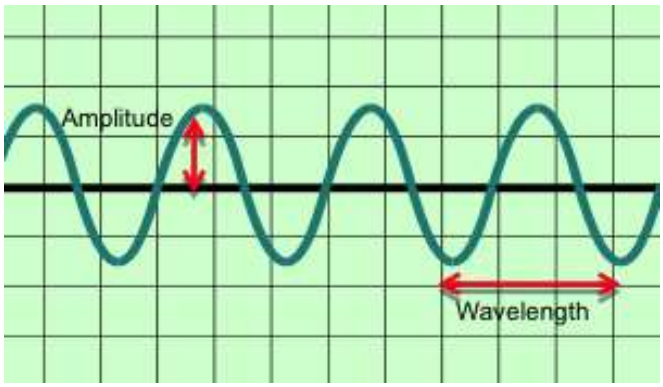
Question

What is a longitudinal wave and what does it look like?

Question

What can happen when radiation is absorbed by a substance?

Answer



Frequency – number of waves produced each second (Hz)

Answer

Transfer energy without transferring matter

Answer

Gamma (shortest)
X-rays
Ultra-violet
Visible light
Infra red
Microwaves
Radio waves (longest)

Answer

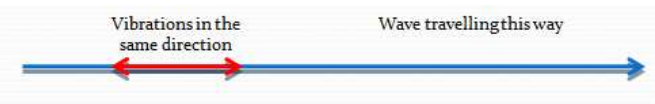
They all travel at the same speed through a vacuum – the speed of light (300'000'000m/s)

Answer

Radiation may make things hotter, or set up an alternating current with the same frequency as the radiation itself

Answer

Vibrations in the same direction as the wave (e.g. sound)



Question

What are the effects of these types of electromagnetic radiation on living cells: -

a) Radio waves & visible light
b) Microwaves & infrared
c) X-rays, UV and gamma rays

Question

How can the harmful effects of X-rays be reduced?

Question

How can the harmful effects of UV radiation be reduced?

Question

How are these electromagnetic waves used: -

a) Radio waves
b) Microwaves

Question

How are these electromagnetic waves used: -

a) Infrared
b) Visible light

Question

How are these electromagnetic waves used: -

a) Ultra-violet
b) X-rays

Answer

Reducing exposure & using lead aprons

Answer

Radio waves & visible light have very little effect on cells
Microwaves and infrared can cause heating of cells
X-rays, UV and gamma rays can cause ionization of cells and lead to mutations, cancers and death

Answer

Radio waves: communications

Microwaves: heating food & sending information (e.g. mobile phones)

Answer

Reduce exposure to the Sun (using a broad spectrum sun screen)

Answer

UV: security tags and sun-beds

X-rays: imaging the body (broken bones)

Answer

Infrared: communications (phone & via optical fibres), remote controls and electric heaters

Visible light: used to send information via optical fibres

Question

How are gamma rays used?

Question

Which 4 forms of electromagnetic radiation can be used for communications?

Question

Why are microwaves used to communicate with satellites?

Question

What is a transverse wave and what does it look like?

Question

What are rarefactions and compressions?

Question

What is the formula for calculating the speed of a wave (triangle will also help)

Answer

Communications via: radio waves, microwaves, infrared waves (optical fibres) and visible light (optical fibres)

Answer

Sterilising surgical equipment by killing bacteria & radiotherapy for cancer patients

Answer

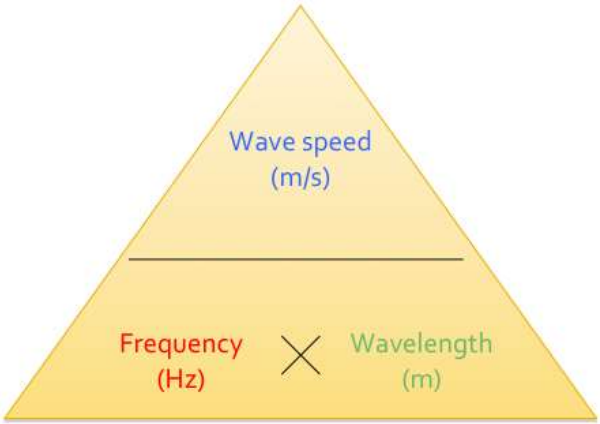
Vibrations which are sideways (e.g. light)

Answer

Microwaves are able to pass through the Earth's atmosphere to reach the distant satellites

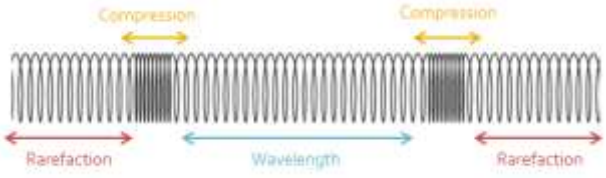
Answer

Speed (m/s) = Frequency (Hz) x Wavelength (m)



Answer

Regions where the wave is pulled apart (rarefactions) and pushed together (compressions)



Question

What properties effect waves?

Question

How can light be reflected?

Question

What is refraction?

Question

Draw out an angle of incidence and an angle of reflection

Question

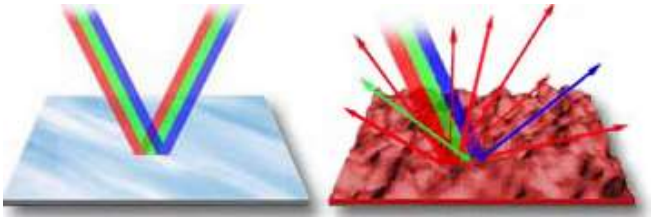
How can the refractive index be worked out?

Question

What is constructive interference?

Answer

Light can reflect off an even surface (clear) or from an uneven surface (diffuse)

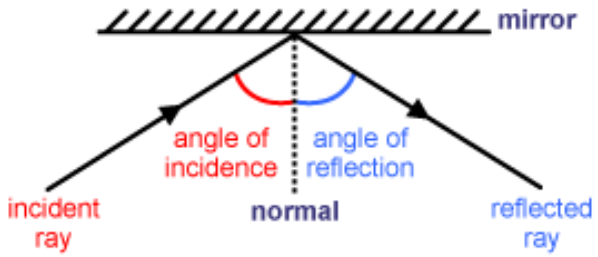


Answer

Waves can be reflected, refracted and diffracted

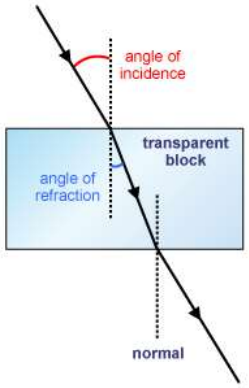
Answer

Angle of incidence = angle of reflection



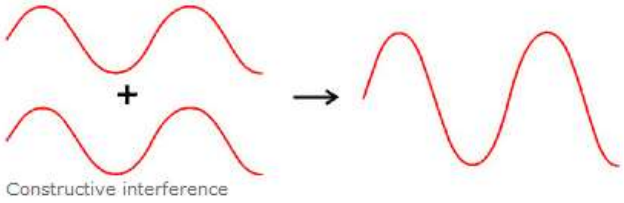
Answer

Refraction occurs as light can bend at the boundary between materials of different densities



Answer

Where two waves arrive in step reinforcing one another (increasing the amplitude)



Answer

Refractive index = sin i ÷ sin r

Question

What happens if the size of a gap is made similar to the wavelength of a wave?

Question

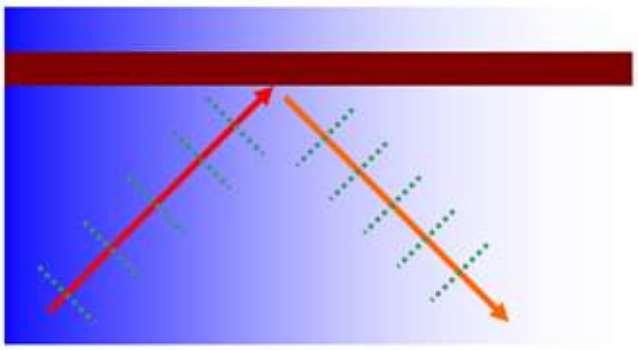
What is destructive interference?

Question

What happens to diffraction if the wavelength is increased?

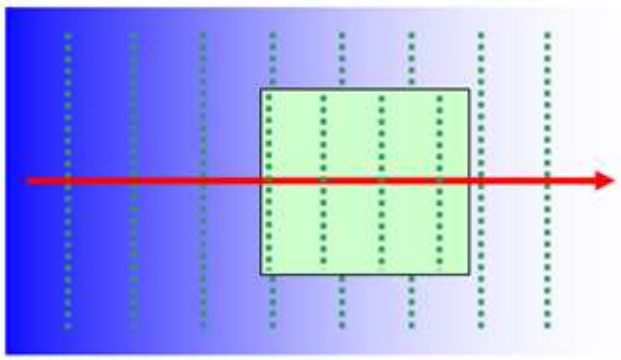
Question

What does this picture show?



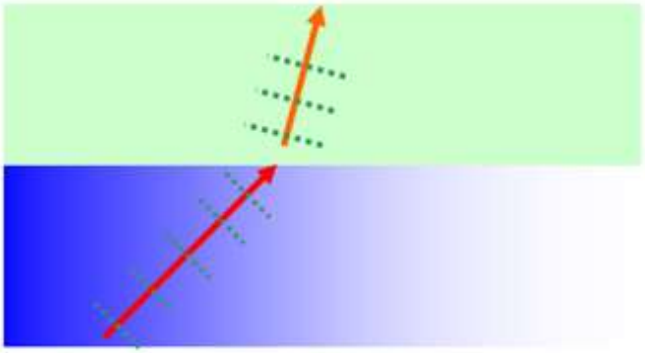
Question

What does this picture show?



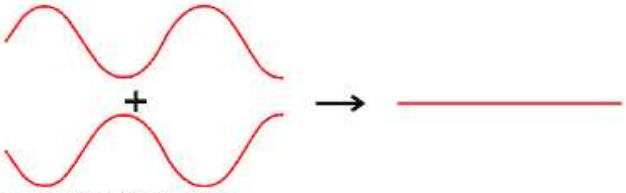
Question

What does this picture show?



Answer

Where two waves arrive out of step cancelling one another out



Destructive interference

Answer

Diffraction increases

Answer

Reflection

Answer

Diffraction increases

Answer

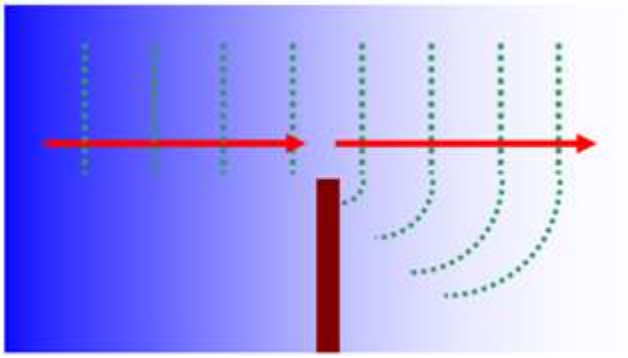
Refraction

Answer

Refraction

Question

What does this picture show?



Question

What does the red-shift provide evidence for?

Question

How do optic fibres work, and what are they used for?

Question

How do people who work with radiation monitor their exposure?

Question

What is red-shift?

Question

What is cosmic microwave background radiation?

Answer

The big bang – galaxies are moving away from us, providing evidence that the universe is still expanding after the explosion of the big bang

Answer

Diffraction

Answer

Photo film badges, half covered with paper and half covered with foil – the film turns black if radiation hits it (top half = beta, all = gamma)

Answer

Optic fibres carry information (light / infra red) via total internal reflection (used for networking / endoscopes)

Answer

The relatively uniform background radiation is the remains of energy created just after the Big Bang

Answer

When light rays moving away from us appear red, as the wavelength becomes stretched

Question

What is amplitude?

Question

What is pitch?

Question

What properties does an image in a plane mirror have?

Question

Draw an image as shown in a plane mirror

Question

What type of EM radiation can we detect?

Question

What colour of light is refracted the most and why?

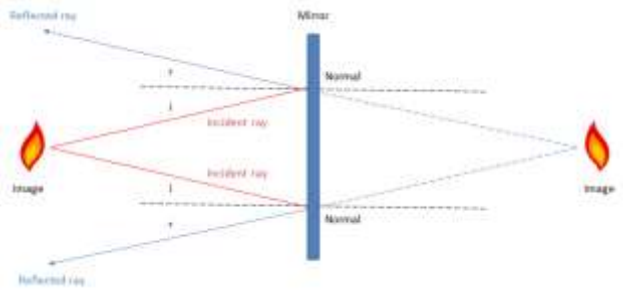
Answer

Pitch is how high or low a sound is, dependent upon the frequency of the waves

Answer

A measure of how loud a sound is (how much energy is carried)

Answer



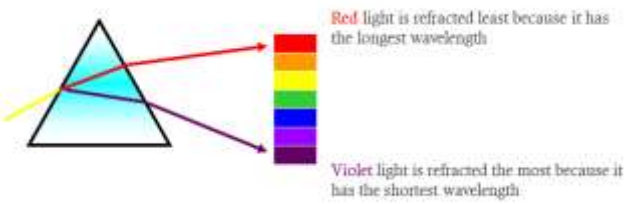
Plane mirror image

Answer

Image is the same size, it is as far behind the mirror as the object is in front, and it is formed from diverging rays meaning it is virtual

Answer

Violet (it has the shortest wavelength)



Answer

Visible light