Edexcel IGCSE Physics

3 - Waves

Flashcards

Complete this sentence .

Waves transfer _____ and _____ without transferring _____.

Waves transfer energy and information without transferring matter.

Define frequency and give its units.

Define frequency and give its units.

- The number of waves passing through a point per second.
- Hz (hertz)

Define wavelength.

Define wavelength.

The distance between two adjacent peaks on a wave.

Define amplitude.

Define amplitude.

- The maximum displacement of the wave from its equilibrium position.
- The distance between the centre of the wave and a peak

What is meant by the period of the wave?

What is meant by the period of the wave?

The length of time it takes for one full wave to pass through a point .

How can you calculate the wave speed?

How can you calculate the wave speed?

- Wave speed (measured in metres per second) is equal to the product of the wavelength and the frequency of the wave.
- Wave velocity= $f \times \lambda$

State an equation linking frequency and period of a wave

State an equation linking frequency and period of a wave

$$Frequency(Hz) = \frac{1}{Period(s)}$$

$$f = \frac{1}{T}$$

What is a longitudinal wave? Give some examples.

What is a longitudinal wave? Give some examples.

- Vibrations are parallel to the direction of energy transfer(wave)
- Examples include sound waves and earthquakes (seismic waves)

What is a transverse wave? Give some examples.

What is a transverse wave? Give some examples.

- A wave with oscillations that are perpendicular (90 degrees) to the direction of energy transfer.
- Examples include electromagnetic waves

Explain what is meant by “the doppler effect”

Explain what is meant by “the doppler effect”

When a wave source is moving towards the observer, observed frequency increases and observed wavelength decreases; when a wave source is moving away from the observer, observed frequency decreases and observed wavelength decreases since v= f ×λ and speed in constant

At what speed does an electromagnetic wave travel in a vacuum?

At what speed does a electromagnetic wave travel in a vacuum?

3×10^8 m/s

What types of waves are electromagnetic waves?

What types of waves are electromagnetic waves?

Transverse

What do electromagnetic waves transfer?

What do electromagnetic waves transfer?

Energy and Information

What are the four common properties of all electromagnetic waves?

What are the four common properties of all electromagnetic waves?

- They are all transverse waves
- They all transfer energy or information
- They all travel at the speed of light in vacuum
- They all can be reflected, refracted or diffracted

Which part of the electromagnetic spectrum has the longest wavelength?

Which part of the electromagnetic spectrum has the longest wavelength?

Radio waves

Order the electromagnetic spectrum from the highest frequency to the lowest frequency.

Order the electromagnetic spectrum from the highest frequency to the lowest frequency.

Gamma rays, x-rays, ultraviolet, visible light, infrared, microwaves and radio waves

What are the colours of the visible light spectrum?

What is the colours of the visible light spectrum

Red, Orange, Yellow, Green, Blue, Violet.

a. Which colour has the highest frequency?
b. Which colour has the lowest frequency?
c. Which colour has the lowest wavelength?
d. Which colour has the highest wavelength?

a. Which colour has the highest frequency? Violet
b. Which colour has the lowest frequency? Red
c. Which colour has the lowest wavelength? Violet
d. Which colour has the highest wavelength? Red

What are the uses of radio waves?

What are the uses of radio waves?

- For communication through radio
- Used for satellite transmissions

What are microwaves used for?

What are microwaves used for?

- Cooking in microwaves ovens
- Communications
- Satellites

Which part of the electromagnetic spectrum is used in cooking, thermal imaging and television remote controls?

Which part of the electromagnetic spectrum is used in cooking, thermal imaging and television remote controls?

Infrared

Give examples of uses for visible light?

Give examples of uses for visible light?

- Allows us to see (used for vision)
- Photography
- Optical Fibres (endoscope,communication)

What part of the electromagnetic spectrum is used to for security marking and in fluorescent lamps?

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Ultraviolet

What are some uses of x-rays?

What are some uses of x-rays?

- Scanners at airports
- Medical x-ray machines

What are the uses and disadvantages of gamma rays?

What are the uses and disadvantages of gamma rays?

- Used to sterilise food and medical equipment
- Used in cancer diagnosis
- Can cause mutations or damage to body cells. This could lead to death.

What are the disadvantages of microwaves?

What are the disadvantages of microwaves?

They can cause heating of internal tissues in the body

Which part of the electromagnetic spectrum is used in TV remotes and can also cause skin burns?

Which part of the electromagnetic spectrum is used in TV remotes and can also cause skin burns?

Infrared

Does the danger that is associated with electromagnetic waves increase with frequency or with wavelength?

Does the danger that is associated with electromagnetic waves increase with frequency or with wavelength?

With frequency

What are the dangers of excessive exposure to ultraviolet?

What are the dangers of excessive exposure to ultraviolet?

You could damage your eyes and the cells on the surface of your skin. This could lead to skin cancer or eye conditions.

What is the normal (in terms of reflection and refraction)?

What is the normal (in terms of reflection and refraction)?

A vertical imaginary line which is perpendicular to the boundary.

What happens when light is reflected off a boundary?

What happens when light is reflected off a boundary?

It is reflected (bounces) off a smooth flat surface so that the angle of incidence (the angle it comes in at) is the same as the angle of reflection (the angle it leaves at).

What happens when light is refracted while passing through 2 different media?

What happens when light is refracted while passing through 2 different media?

- The light changes speed and direction in the new medium
- If the new medium is more dense, the light will travel slower and bend towards the normal
- If the new medium is less dense, the light will travel faster and bend away from the normal

State an equation linking angle of incidence, angle of refraction and refractive index

State an equation linking angle of incidence, angle of refraction and refractive index

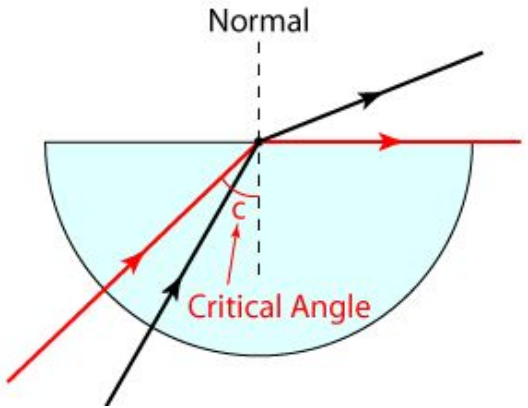
$$n = \frac{sin(i)}{sin(r)}$$

n:refractive index
i: angle of incidence
r: angle of refraction

What is the critical angle?

What is the critical angle?

The angle of incidence which causes the angle of reflection to be 90 degrees so that that the light refracts onto the boundary.



State an equation linking critical angle and refractive index

State an equation linking critical angle and refractive index

$$n = \frac{1}{sin(c)}$$

n: refractive index
c: critical angle

What is total internal reflection?

What is total internal reflection?

When light is trying to pass from a less dense medium to a denser medium, it can be reflected back to the less dense medium if the angle of incidence is larger than the critical angle between two media.

This reflection is called Total Internal Reflection.

State two uses of total internal reflection

State two uses of total internal reflection

- Endoscopes
- Periscopes
- Optical Fibres
- Cat Eye Reflectors
- Shining of Diamonds

If light hits a boundary at 90 degrees to the surface, will the light refract?

If light hits a boundary at 90 degrees to the surface, will the light refract?

No it will not.