



**STUDY PLUS**  
A BRIGHTER FUTURE

## **Year 9 Physics 7**

**Topics: Waves**

**Name :** .....

**Year :** .....

- **Waves**

Waves are a way to transfer energy from one place to another place without transporting matter.

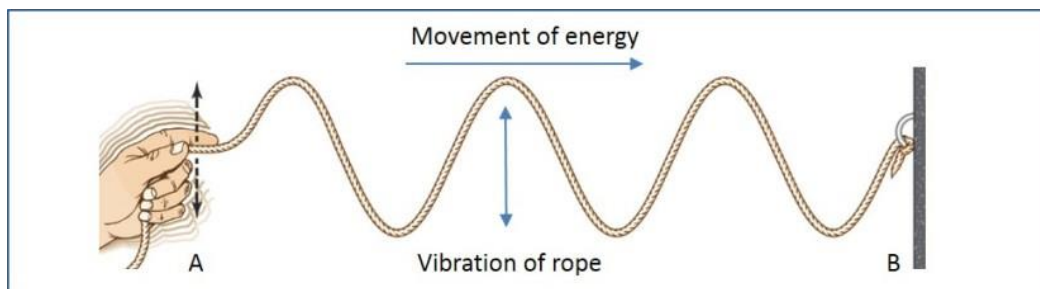
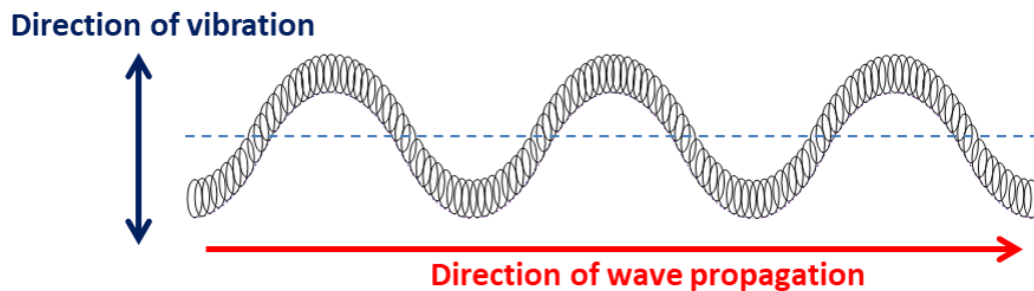
There are two types of waves:

- Transverse waves
- Longitudinal waves

- **Transmission**

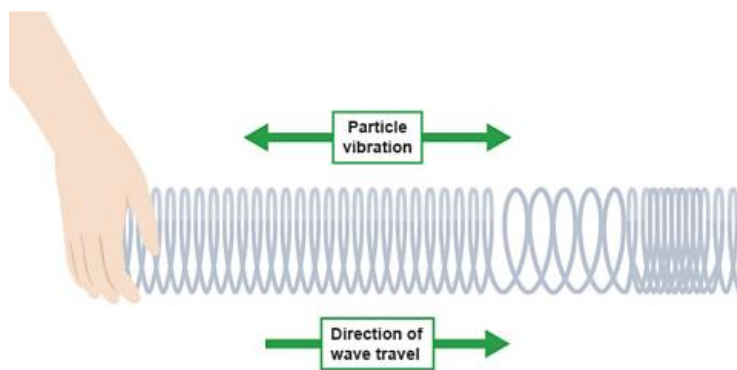
Where waves travel through a medium rather than be absorbed or reflected.

- **Transverse wave**

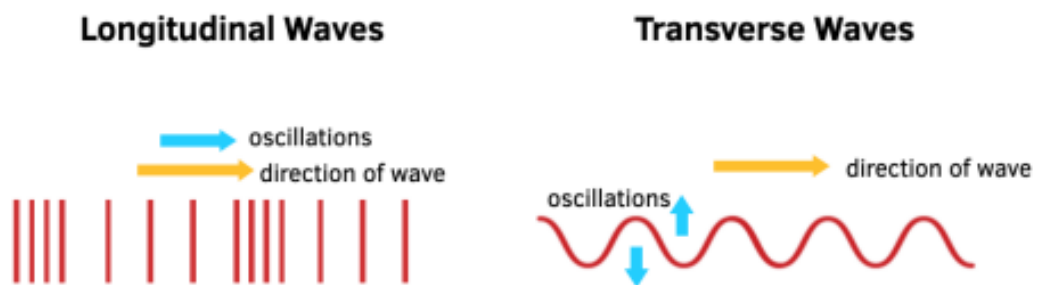


Where the direction of vibration is **perpendicular** to that of the wave.

- **Longitudinal waves**



A wave that moves in the same direction as the direction in which the particles are vibrating.



**Fig 1. Transverse and Longitudinal Waves.**

## Examples of Longitudinal waves



Sound Waves



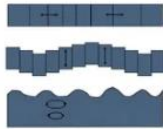
Seismic P Waves



Tsunami wave



Spring vibration



Waves in Solids

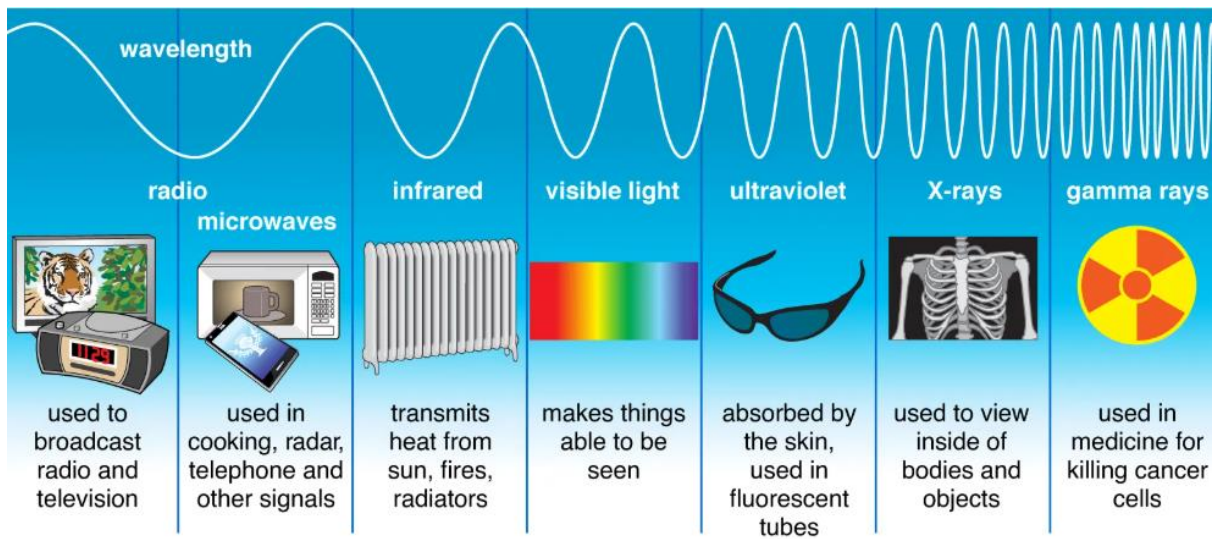


Ultrasound waves

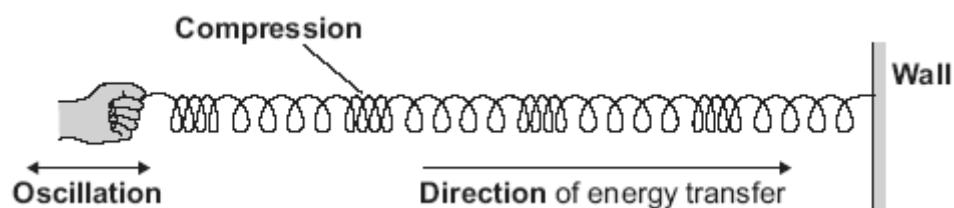


Pressure waves in Gases

## Examples of Transverse waves



1. The diagram shows a longitudinal wave being produced in a stretched spring.



- (i) Use the bold words from the diagram to complete the following sentence. Put only **one** word in each space.

A longitudinal wave is one in which the ..... causing  
the wave is parallel to the ..... of energy transfer.

[2 marks]

- (ii) Name the type of energy that is transferred by longitudinal waves in the diagram above.

.....

[1 mark]

- **Speed of a wave**

Wave speed tells us how fast the wave is moving. Therefore, it also tells us how fast energy is being transferred through a substance.

It is expressed as  $V = f \lambda$ , where  $v$  is the wave speed,  $\lambda$  is the wavelength, and  $f$  is the frequency.

A diagram showing the equation  $v = f\lambda$  inside a rectangular box. Three arrows point from labels to the variables in the equation: a green arrow points from 'speed or velocity (ms<sup>-1</sup>)' to 'v'; a blue arrow points from 'frequency (Hz)' to 'f'; and a red arrow points from 'wavelength (m)' to 'λ'.

1. A wave of frequency 8 Hz has a wave speed of 24 m/s. What is its wavelength?

.....

.....

[2 marks]

2. Find the velocity of a wave in a ripple tank if its frequency is 12 Hz and its wavelength 3 cm.

.....

.....

[2 marks]

3. The speed of a wave is 1.5 m/s, and its wavelength is 0.25m. What is its frequency?

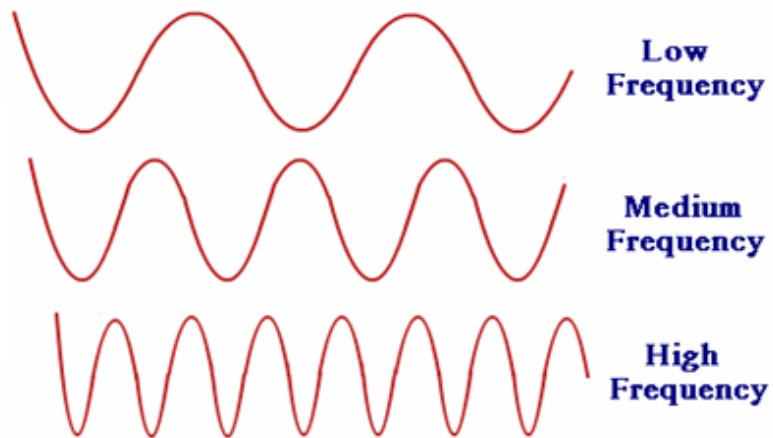
.....

.....

[2 marks]

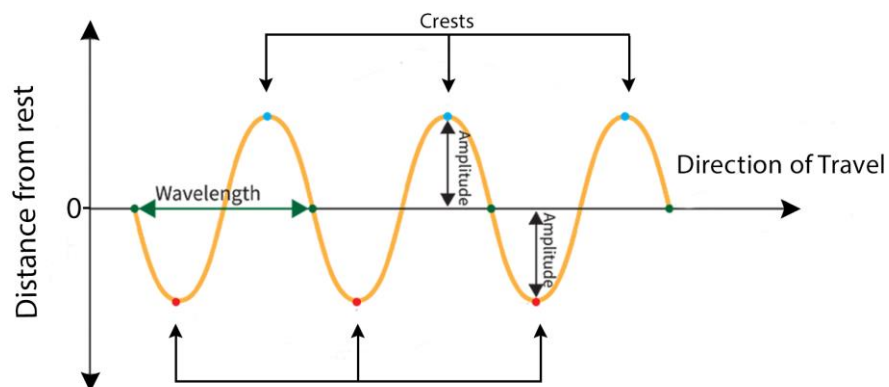
- **Frequency -  $f$**

The number of waves that pass a point in a given amount of time. Frequency is measured in hertz (Hz).



- **Wavelength -  $\lambda$**

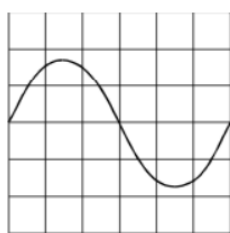
The distance between two corresponding points on adjacent waves. Wavelength is measured in meters. The symbol for wavelength is the Greek letter lambda,  $\lambda$ .



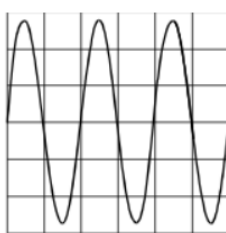
- **Amplitude**

The amplitude of a wave is the distance from the wave's centre line to the top of a crest or the bottom of a trough.

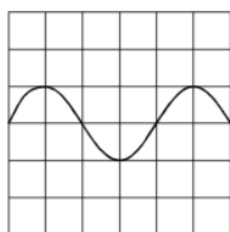
2. (a) The diagram shows four oscilloscope wave traces. The controls of the oscilloscope were the same for each wave trace.



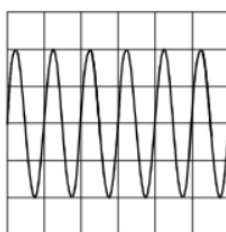
A



B



C



D

Which one of the waves traces, A, B, C or D, has:

(i) the largest amplitude, ..... [1 mark]

(ii) the lowest amplitude? ..... [1 mark]





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