

Waves

Printable revision sheet — Galaxscia

LEVEL 1

What is a wave?

A wave is **a disturbance that travels** through a medium or through space. It carries energy but not matter.

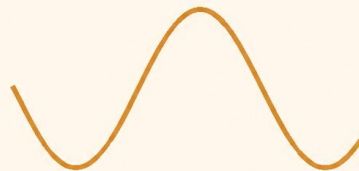
Two main types of waves

Mechanical wave



needs a material medium

Electromagnetic wave



can travel in a vacuum

The two main types of wave

Mechanical waves: they need a material medium (air, water, a rope...) in order to travel.

Examples: sound, ripples on the surface of water, earthquakes.

Electromagnetic waves: they can travel even through a vacuum.

Examples: light, radio waves, microwaves.

Example : When you throw a pebble into water, the ripples that form move away from the impact. It is the disturbance that travels, not the water itself.

Key points — revision questions

What is a wave?

What is the difference between a mechanical wave and an electromagnetic wave?

Give two examples of mechanical waves and two examples of electromagnetic waves.

LEVEL 2

Periodicity of a wave

A wave is therefore a disturbance of a medium that causes oscillations (vibrations) in that same medium. When this disturbance repeats itself in the same way, the wave is **periodic**. It can then easily be described.

Quantities that describe a wave

Several quantities are used to describe a wave:

Period (T): the time taken by one complete oscillation.

Wavelength (λ): the distance between two points that vibrate in the same way (e.g. two wave crests).

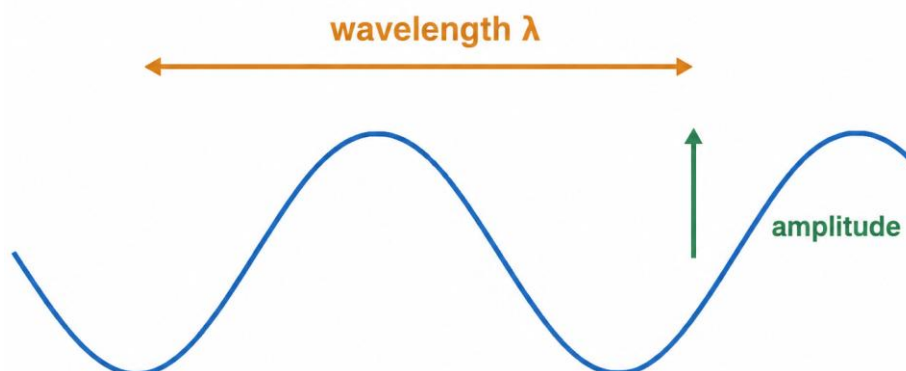
Frequency (f): the number of oscillations per second.

Relation: $f = 1/T$

Wave speed (v, or c in the case of light): the speed at which the wave travels.

Relation: $v = \lambda \times f$

Describing a periodic wave



$$f = 1/T \quad v = \lambda \times f$$

Example : A sound wave of frequency 440 Hz (the note A in music) travels through air at about 340 m/s (this is its wave speed). Its wavelength is: $\lambda = v/f = 340/440 \approx 0.77 \text{ m}$

Key points — revision questions

Define wavelength, period and frequency.

What is the relation between frequency and period?

Which formula links speed, wavelength and frequency?