

# Y9 Waves

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## Wave Properties and Behaviour

Waves transfer energy and information without transferring matter.

Waves can be transverse or longitudinal. You should be able to describe the difference, and give examples of each.

Waves are described by their amplitude, wavelength, frequency and period. You should be able to label and measure the amplitude and wavelength on a diagram, and you should be able to do calculations to find the frequency and period, including the use of the formula **period = 1 / frequency**.

All waves obey the relationship **wave speed = frequency x wavelength**.

You should be able to describe methods for measuring the speed of sound in air and the speed of ripples on water.

When a wave encounters a boundary between materials there can be reflection, refraction and absorption.

Refraction is caused by a change in the speed of the wave from one medium to another.

You should be able to construct ray diagrams and wavefront diagrams for reflection and refraction.

## The Electromagnetic Spectrum

Electromagnetic waves form a continuous spectrum and all types of electromagnetic wave travel at the same velocity through a vacuum (space) or air.

The waves that form the electromagnetic spectrum are grouped in terms of their wavelength and their frequency. Going from long to short wavelength (or from low to high frequency) the groups are: radio, microwave, infrared, visible light (red to violet), ultraviolet, x-rays and gamma rays.

Electromagnetic waves have many practical applications. For example:

- radio waves – television and radio (including Bluetooth)
- microwaves – satellite communications, cooking food
- infrared – electrical heaters, cooking food, infrared cameras
- visible light – fibre optic communications
- ultraviolet – energy efficient lamps, sun tanning
- x-rays – medical imaging and treatments.

You should be able to give brief explanations why each type of electromagnetic wave is suitable for the practical application.

You should be able to describe the dangers of different parts of the electromagnetic spectrum. UV, x-rays and gamma rays are ionising, and can cause the mutation of genes and cancer.

Radiation dose (in sieverts) is a measure of the risk of harm resulting from an exposure of the body to the radiation. 1000 millisieverts (mSv) = 1 sievert (Sv)

You will not be required to recall the unit of radiation dose. You should be able to draw conclusions from given data about the risks and consequences of exposure to radiation.