Frequency definition and the frequency formula

> Source: https://www.omnicalculator.com/physics/frequency

Have a look at the following model of a wave; it will help you understand the terms used in the frequency definition below it.

Picture of a wave with terminology Source: Encyclopedia Britannica

Frequency is the number of completed wave cycles per second. In other words, frequency tells us how many wave crests pass a given point in a second.

This frequency definition leads us to the simplest **frequency formula**:

`f = 1 / T`.

`f` denotes frequency and `T` stands for the time it takes to complete one wave cycle measured in seconds.

The SI **frequency unit is Hertz (Hz)**, which equals 1/s (one cycle per second). Other frequency units include millihertz (mHz), kilohertz (kHz), megahertz (MHz), gigahertz (GHz), and terahertz (THz).

Frequency equation from the wavelength

Have a look at another picture which will allow us to see that frequency is connected to wavelength. Wavelength is the distance between two adjacent crests (or troughs). In other words - it is the length of one wave cycle. **The longer the wavelength, the lower the frequency**:

Picture of a low frequency and high frequency waves Source: Encyclopedia Britannica)

Another fact we need - how fast the waves travel at (wave velocity) determines how many of them will pass a given point per second. This means **the higher the wave velocity, the higher the frequency**.

These two relationships between frequency and wavelength (λ), and between frequency and velocity (v), bring us to the following **frequency equation**:

`f = v / λ`.

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