

# 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 ( $\lambda$ ), and between frequency and velocity ( $v$ ), bring us to the following **frequency equation**:

$$f = v / \lambda .$$

---

Revision #1

Created 7 July 2022 04:23:15 by Chris Bake

Updated 28 October 2024 02:44:04 by Chris Bake