

# Basic Concepts on Waves

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## Objective

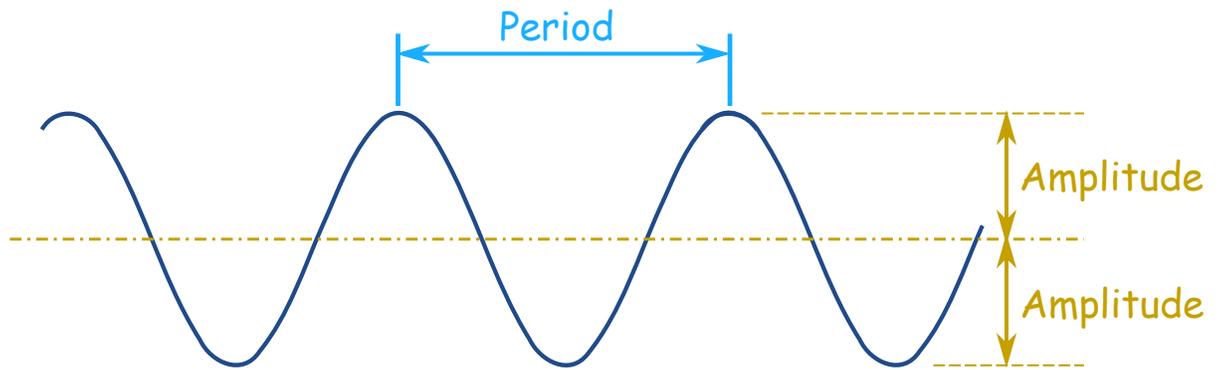
- talk about some basic concepts on Waves

## 1. Wave

A signal is a more general and abstract concept, which is almost anything carrying information. A signal has no physical manifestation.

A wave is a physical phenomenon, which can be used to transmit signals. A wave can be modelled and measured.

- Period ( $T$ ): refers to the time taken to complete one oscillation, i.e. cycle from one peak to the next (or from any point to the next matching point),
- Amplitude ( $A$ ): the height from the center line to the peak (or to the trough).
- Frequency ( $f$ ): the number of oscillations per unit time



## 2. Frequency and Period

The relationship between frequency and period is:

$$f = \frac{1}{T}$$

$$T = \frac{1}{f}$$

- The SI unit for frequency is *the cycle per second*, which is defined to be a *hertz* (Hz):

$$1 \text{ Hz} = \frac{\text{cycle}}{\text{sec}} = \frac{1}{\text{s}}$$

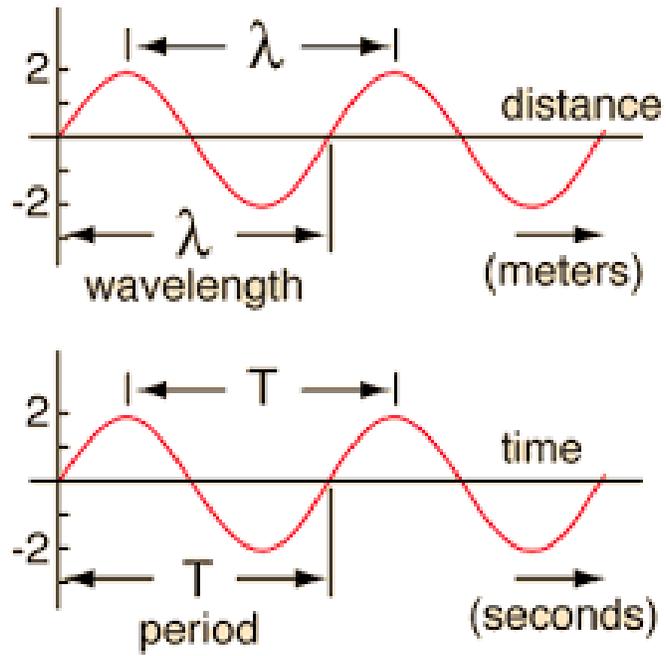
## 3. Wavelength

Besides, there is also another important concept called **wavelength**

It is the distance over which a wave repeats, which can be defined as the distance between two successive crests or troughs of a wave.

$$\lambda = \frac{\text{velocity}}{\text{frequency}} = \frac{V}{f}$$

The higher the frequency, the shorter the wavelength, and the lower the frequency, the longer the wavelength.



## 4. Waveforms

Waveform describes the shape or form of a wave signal. There are four basic types of waveforms:

- Sine wave
- Square wave
- Triangle wave
- Sawtooth wave

