Reference material:

Chapter 10.4 (pg 248) of JMH Physics

Chapter 8 of MHR

⇨   A wave is a transfer of energy, in a form of a disturbance usually through a material substance, or medium.

- ⇨   Electromagnetic Waves
- ⇨   Sound waves
- ⇨   Water waves
- ⇨   Pressure waves
- ⇨   Gravity waves
- ⇨   Matter waves   *Demos to visualize new terms.

⇨When objects repeat a pattern of motion (e.g. a pendulum), we say that object is vibrating or oscillating. (wiimote demo)

⇨The oscillation is repeated over and over with the same time interval each time.

⇨One complete oscillation is called a cycle.

⇨The number of cycles per second is called the frequency, f. The frequency is measured in Hertz (Hz).

⇨ The period, T, usually measured in seconds, is the time required for one cycle. The frequency and period are reciprocals of each other.

Close Read Pg 338 - 339 of MHR. Pay attention to and note the many terms introduced.

rest position
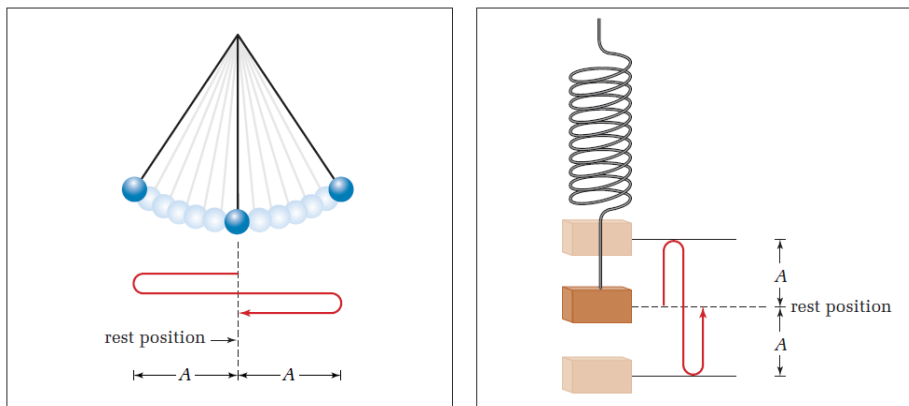
rest position

Figure 8.2 (A) When a simple pendulum completes one full cycle of its motion, it is in its original position.

(B) One full cycle of the motion of the mass on a spring brings the mass back to the rest position.

PERIOD AND FREQUENCY

The period is the quotient of the time interval and the number of cycles.

$$T = \frac{\Delta t}{N}$$

The frequency is the quotient of the number of cycles and the time interval.

$$f = \frac{N}{\Delta t}$$

The frequency is the reciprocal, or inverse, of the period.

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

Quantity	Symbol	SI unit
period	T	s (seconds)
frequency	f	Hz (hertz)
time interval	Δt	s (seconds)
number of cycles	N	none (pure number)

Note: $1 \text{ Hz} = \frac{1}{s} = 1 \text{ s}^{-1}$

Example. A pendulum completes 30 cycles in 15 seconds. Calculate its frequency and period.

Read MHR pg 344 - top of 345.

Follow Up Questions:

1. What is a medium when talking about waves?
2. Summarize the properties of mechanical waves.
3. What determines the speed of a mechanical wave? Provide an explanation for your answer.
4. What affect does friction have within a mechanical wave?

Transverse Waves
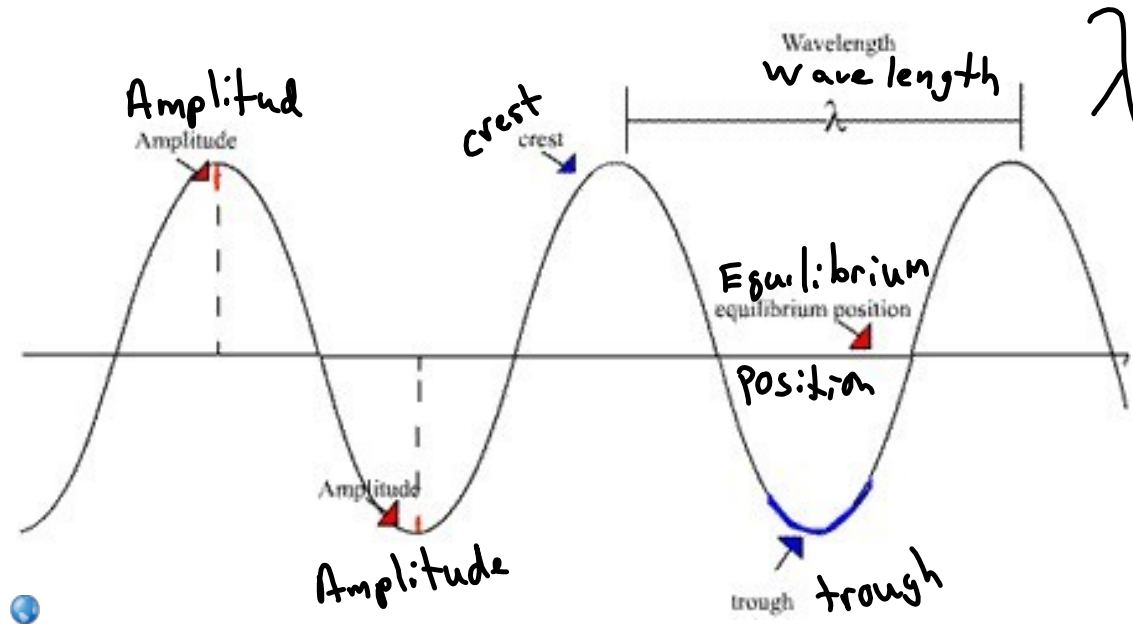
⇨ The particles in the medium vibrate at right angles to the direction in which the wave travels.

⇨ The high section is called the crest, and the low section is called the trough.

⇨ The height of the crest or depth of the trough, from the equilibrium position is called the <u>amplitude</u>.

⇨ For periodic waves, the distance between successive crests and troughs is equal and is called the <u>wavelength</u>. The symbol for the wavelength is the Greek letter lambda, λ

⇨ The period of a transverse wave is the time it takes for one wavelength (one cycle) to pass a fixed point.

⇨ The frequency is the number of wavelengths that passed a fixed point in one second.

⇨ Examples include water waves and making vibrations on a rope.

Longitudinal Wave

→ Wave velocity

Vibration

→
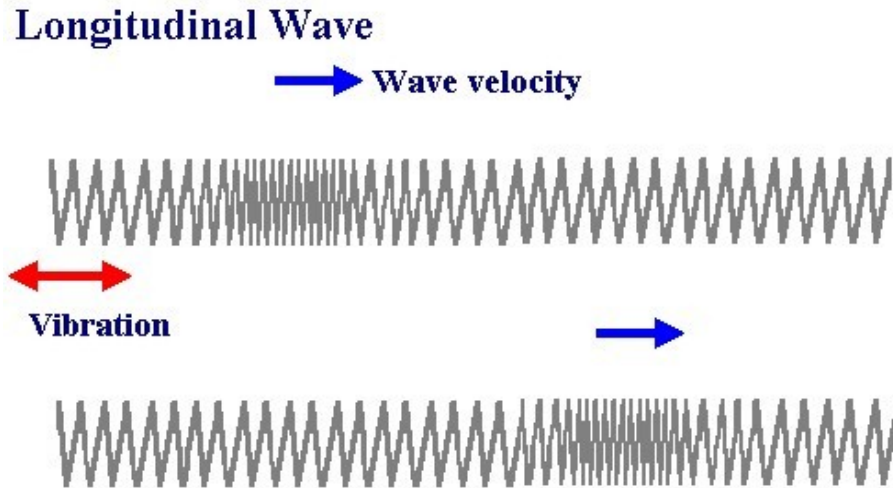
Longitudinal Waves

➪ The vibrations of the particles are parallel to the direction of motion.

➪ There are a compressions and rarefactions created in longitudinal waves.

➪ One wavelength is the distance between the midpoints of successive compressions or rarefactions.

➪ The amplitude is the maximum displacement of the particles from their rest position. Amplitude is a measure of the wave's energy.

➪ Sound waves, pressure waves are examples.