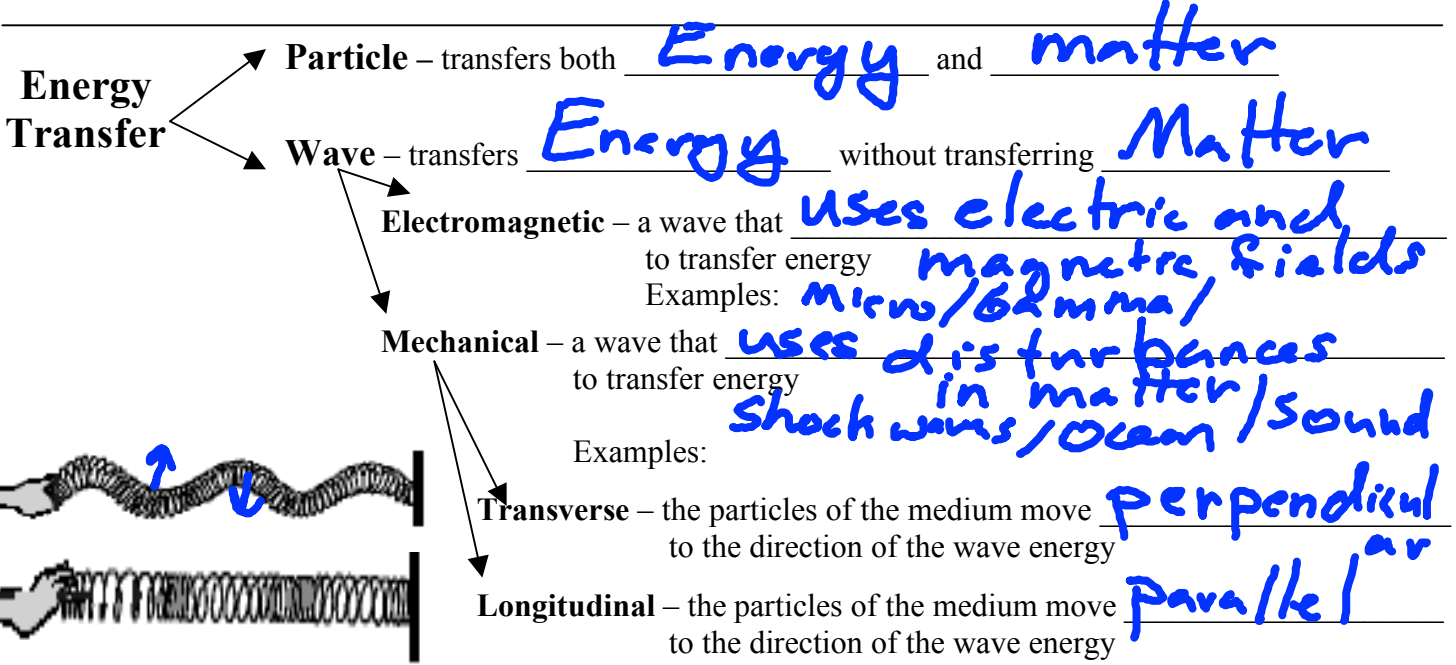# Waves

1. **Medium** — the material through which the wave (energy) is traveling
2. **Wave Pulse** — a single oscillation or disturbance of the medium
3. **Wave** — a series of pulses or oscillations that move through a medium

Energy Transfer

Particle – transfers both **Energy** and **matter**

Wave – transfers **Energy** without transferring **Matter**

Electromagnetic – a wave that **uses electric and magnetic fields** to transfer energy
Examples: **Micro/Gamma/**

Mechanical – a wave that **uses disturbances in matter** to transfer energy
Examples: **Shockwaves/Ocean/Sound**

Transverse – the particles of the medium move **perpendicular** to the direction of the wave energy

Longitudinal – the particles of the medium move **Parallel** to the direction of the wave energy

4. Other types of mechanical waves

   Elliptical wave (surface wave):

   Torsional wave: **twisting**

   Crest | Wave motion ⟶
   Trough
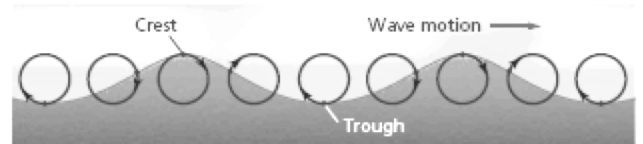
Wave Characteristics

Cycle:

5. On the axes at right, sketch two cycles of a transverse wave.

   Vertical position

   "snapshot" of the whole wave

   Crest — λ — **crest**

   Amplitude

   Trough

   Distance
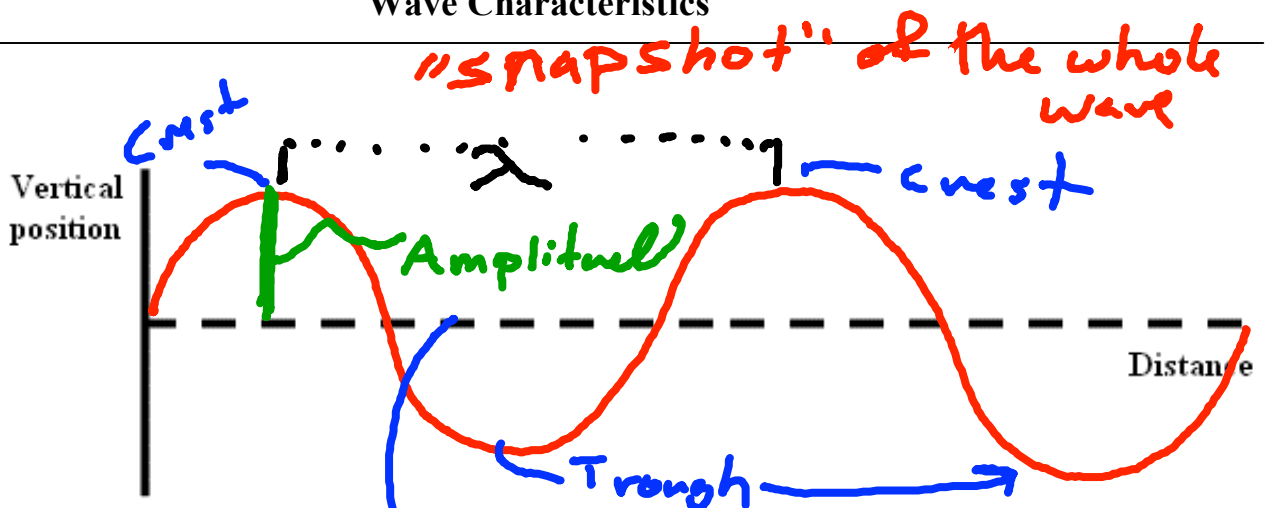
6. Label the following parts of the wave you drew: **equilibrium position, crest, trough, amplitude, wavelength**

   Equilibrium

7. Identify each of the following terms:

a) __Amplitude__ maximum displacement from the equilibrium position

b) __Wavelength__ shortest distance along the wave between two points that are in phase

c) __Period__ time taken for one cycle

d) __Frequency__ number of cycles per second

Symbol	Units
A	distance
λ	distance
T	s
f ν	Hz $= \frac{1}{s}$

λ "magi" Lambda nus

8. What is the relationship between period and frequency?

Period **Relationship** **Examples:**
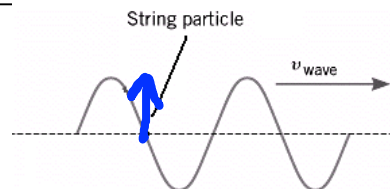
T $T = \frac{1}{f}$

Frequency

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

9. Name each part of the longitudinal wave shown at right. Indicate the amplitude and wavelength of the wave.
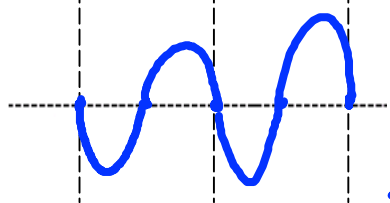
Compression   Rarefaction

http://surendranath.tripod.com/Applets.html
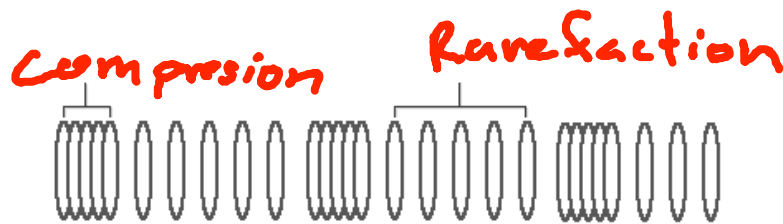
Wave Motion vs. Particle Motion

a) In which direction is the string particle moving at this instant?

String particle
v_{wave}

b) Sketch the wave and particle after ¼ of a period from the time shown in a).
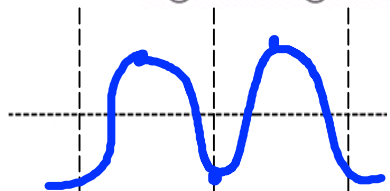
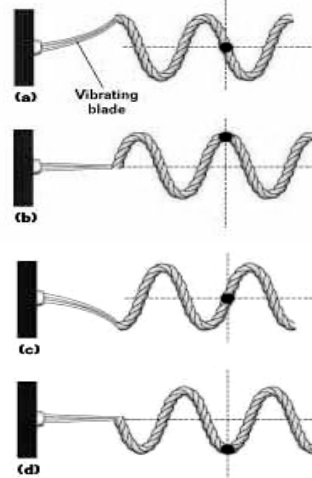c) Sketch the wave and particle after ½ of a period from the time shown in a).

d) How far will the wave energy travel in one period? The distance of a wavelength $\lambda = \lambda$

e) How long does it take one complete cycle to pass a given point? a period T

Compare the motion of the wave with the motion of a single particle of the medium.

(a) Vibrating blade
(b)
(c)
(d)

Wave (energy) motion right

Particle motion up + down

2