**Electromagnetic Waves - Review**

1. Define the following terms:
   1. transverse wave
   2. longitudinal wave
   3. wavelength of a wave
   4. frequency of a wave
   5. amplitude of a wave
2. Answer the following:
   1. Explain what is meant by an electromagnetic wave.
   2. State how an electromagnetic wave is produced.
3. In this diagram of part of a transverse wave, the arrow shows the direction in which the energy is being transferred.

A

B

C

D

E

F

G

H

(a) Use the letters A to H to indicate:

(i) a wave crest,

(ii) a wave trough,

(iii) two points which are in phase.

(b) Measure using the diagram:

(i) the wavelength in millimetre.

(ii) the amplitude in millimetre.

B

A

E

1. The figure above shows a 50.0 Hz wave on a string. AB = 3.0 mm and AE = 40.0 cm.

Determine:

* 1. the amplitude,
  2. the wavelength,
  3. the period,
  4. the speed,

of the wave.

Sketch the position of the wave one half a period after this sketch was drawn.

1. The wavelength of a sound wave in a certain material is 18 cm. The frequency of the wave is 2000 Hz. Calculate the speed of the wave.
2. The wavelengths in air comprising the visible spectrum range from about 400 nm (violet) to 700 nm (red). (nm = 10-9 m) Calculate the range of frequencies in the visible spectrum if the speed of light is 3.0 x 108 m/s.
3. An aircraft carrying a LADS laser is depth sounding over the ocean. A laser pulse is directed normally to the ocean. The pulses reflected of the surface of the water and off the ocean bed return to the aircraft in 3.333 s and 3.576 s respectively. Given that the speed of light in seawater is 2.234 x 108m/s, calculate,
   1. the height of the aircraft above the ocean,
   2. the depth of the ocean bed at that point.

Answers:

1. See Below:
   1. Transverse Wave: a wave vibrating at right angles to the direction of its propagation.
   2. Longitudinal Wave: a wave vibrating in the direction of propagation.
   3. Wavelength: the distance between successive points (crest to crest, trough to trough) of a wave, especially points in a sound wave or electromagnetic wave.
   4. Frequency: the number of crests of a wave that move past a given point in a given unit of time.
   5. Amplitude: the vertical distance between a peak or a valley and the equilibrium point.
2. See Below.
   1. EM Waves: waves that are created as a result of vibrations between an electric field and a magnetic field. The waves propagate perpendicular to each other.
   2. Produced by moving charged particles.
3. See blow.
   1. B,D and C/H
   2. Depends on your screen size ☺
4. Determine:
5. the amplitude: 1.5 mm
6. the wavelength: 40 cm
7. the period: 0.020 s
8. the speed: 20.0 m/s
9. 360 m/s
10. 4.3x1014 Hz to 7.5x1014 Hz
11. a. 500 m b. 27 m