1 - Waves

A **wave** is...

Ex.

Medium:

Crest:

Trough:

Amplitude (A):

Wavelength (λ):

There are 3 types of mechanical waves:
(1) Transverse

(2) Longitudinal

(3) Surface

Period (T):

Frequency (f):

Frequency and period are reciprocals, that is:

Ex: Playing middle C on a piano produces a sound with a frequency of 256 Hz. What is the period of the sound wave?

Remember that speed is:

If we look a single wave then:

(1)

(2)

This gives us the **Universal Wave Equation**:

Where:

$v =$

$λ =$

$f =$

Ex: An air horn sounds at a frequency of 220 Hz. If the speed of sound in air is 330 m/s what is the wavelength of the sound wave?

Ex: The distance between successive crests in a series of water waves is 4.0 m, and the crests travel 8.6 m in 5.0 s. Calculate the frequency of a block of wood bobbing up and down on these water waves.

1. A wave has a frequency of 5.0×10^{-1} Hz and a speed of 3.3×10^{-1} m/s. What is the wavelength of this wave?

6. Sitting on the dock of the bay, you notice that the waves rolling under the dock measure about 1.5 m from crest to crest and appear to be traveling at about 3.0 m/s. Determine the frequency and period of these waves.

2. A wave moves through a 4.60 m slinky in 2.00 s. What is the velocity of the wave?

7. A certain radio station broadcasts radio waves that have a wavelength of 298 cm. if radio waves travel at 3.00×10^8 m/s, what is its broadcast frequency?

3. A water wave has a wavelength of 5.0 m and a speed of 2.50 m/s. What is the period of the wave?

8. Flipper (the dolphin) is out in the open ocean hunting tuna avec sonar. He emits a pulse at 22 KHz and 0.42 s later hears it echo bouncing back from a fat tuna (dolphins can get a general idea of size from these echoes). If these dolphin sound waves have a 2.0 cm wavelength, how far away is the tuna?

4. If 9.5 waves break on a beach in 1.0 minute, what is the frequency of the waves?

5. Tommy Morello is playing his guitar on a sunny day when he notices that the A string is vibrating at 220 Hz and that the wavelength of the waves on the string is 2.20 m. Determine the speed of these waves as they travel up and down the string.

9. A hiker shouts toward a vertical cliff 685 m away. The echo is heard 4.00 s later.
a. What is the speed of sound of the hiker's voice in air?

b. The wavelength of the sound is 0.750 m. What is the frequency?

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1) 0.66 m 2) 2.30 m/s 3) 2.0 s 4) 0.16 Hz 5) 484 s 6) 2.0 Hz, 0.50 s 7) 1.01×10^8 Hz or 101 MHz 8) 92 m 9) a. 343 m/s b. 457 Hz