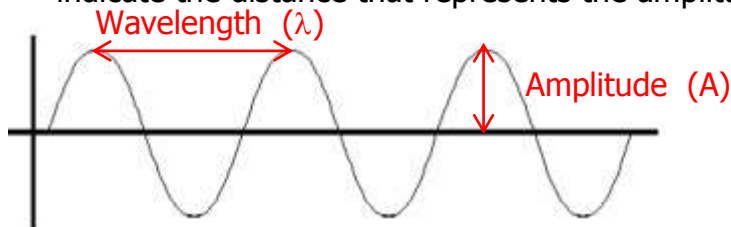


Waves Study Guide Answer Key

1. What is the top of a wave called? **Crest**
2. What is the bottom of a wave called? **Trough**
3. What is frequency? **How many waves go past a point in one second; unit of measurement is hertz (Hz).**
4. If a wave is traveling at 60 cm/second and has a wavelength of 15 cm, what is the frequency?

$$\begin{array}{llll} \text{G} & v = 60 \text{ cm/s} & \lambda = 15 \text{ cm} & \text{E} \quad f = v / \lambda \\ \text{U} & f = ? & & \text{S} \quad f = 4 \text{ Hz} \\ & & & \text{S} \quad f = (60 \text{ cm/s}) / 15 \text{ cm} \end{array}$$

5. What does amplitude measure? **How far the medium moves from rest position (where it is when not moving).**
6. On the diagram below, indicate the distance that represents the wavelength of the wave and indicate the distance that represents the amplitude.



7. How many complete waves are there in the diagram above? Is it transverse or longitudinal?
3, transverse
 8. What is the difference between a transverse wave and a longitudinal wave? **Transverse waves: Waves in which the medium moves at right angles (perpendicular) to the direction of the wave (looks like a jump rope). Longitudinal waves: Waves in which the medium moves back and forth in the same direction as the wave (looks like a slinky).**
 9. Are sound waves transverse waves or longitudinal waves? Why? **Longitudinal waves because they move back and forth in the same direction as the wave.**
 10. Why can't you calculate the frequency of the wave in the diagram? What information is missing? **Missing wave speed or the period. $f = v / \lambda$ or $f = 1/T$**
 11. What is the wavelength of a sound wave with a frequency of 50 Hz? (Speed of sound is 342 m/s)
- $$\begin{array}{llll} \text{G} & v = 342 \text{ m/s} & f = 50 \text{ Hz} & \text{E} \quad \lambda = v / f \\ \text{U} & \lambda = ? & & \text{S} \quad \lambda = 6.84 \text{ m} \\ & & & \text{S} \quad \lambda = (342 \text{ m/s}) / 50 \text{ Hz} \end{array}$$
12. A sound wave in a steel rail has a frequency of 620 Hz and a wavelength of 10.5 m. What is the speed of sound in steel?
- $$\begin{array}{llll} \text{G} & \lambda = 10.5 \text{ m} & f = 620 \text{ Hz} & \text{E} \quad v = f * \lambda \\ \text{U} & v = ? & & \text{S} \quad v = 6510 \text{ m/s} \\ & & & \text{S} \quad v = 10.5 \text{ m} * 620 \text{ Hz} \end{array}$$
13. Determine the frequency of a microwave 6.0 cm in length. (A microwave is an electromagnetic wave. It travels through space at a speed of 3.0×10^8 m/s)
- $$\begin{array}{llll} \text{G} & \lambda = 6 \text{ cm} \rightarrow 0.06 \text{ m} & & \text{E} \quad f = v / \lambda \\ & v = 3.0 \times 10^8 \text{ m/s} & & \text{S} \quad f = 5 \times 10^9 \text{ Hz} \\ \text{U} & f = ? & & \text{S} \quad f = 3 \times 10^8 \text{ m/s} / 0.06 \text{ m} \end{array}$$
14. What is the period of the microwave in problem 13?
- $$\begin{array}{llll} \text{G} & f = 5 \times 10^9 \text{ Hz} & \text{U} & T = ? \\ \text{E} & T = 1 / f & \text{S} & T = 1 / 5 \times 10^9 \text{ Hz} \\ \text{S} & T = 0.000000002 \text{ s} & & \end{array}$$

Waves & Electromagnetic Spectrum Worksheet

Directions: Use the word bank to answer the following questions. **Each word will be used only once.**

Crest	Frequency	Mechanical	Infrared
Trough	Transverse	Radio	Gamma
Wavelength	Longitudinal	Ultraviolet	X-Rays
Visible Light	Amplitude	Electromagnetic	

1. X-Rays waves are used to penetrate solids and are used in doctor's offices and as airports.
2. Wavelength is the distance between one point of a wave to the same point in the next wave.
3. Frequency is the number of waves per unit of time.
4. Longitudinal waves occur when the motion of the medium is parallel to the direction of the wave.
5. Visible Light waves have a color spectrum known as ROYGBIV.
6. Mechanical waves disturb matter.
7. The Crest is the top of a wave.
8. The Trough is the bottom of a wave.
9. Amplitude is the maximum distance that matter is displaced from the resting position.
10. Electromagnetic waves are produced by stars and galaxies.
11. Transverse waves occur when the motion of the medium is at right angles (perpendicular) to the direction of the wave.
12. Infrared waves are often used in heat lamps.
13. Ultraviolet waves are utilized by insects to locate nectar.
14. Radio waves are transverse waves that disturb electromagnetic fields.
15. Gamma waves have the shortest wavelength and the highest frequency.