Wave Properties Questions for GCSE Physics (ANSWERS)

1. Define the term "amplitude."

The maximum displacement of a point on a wave from it starting (or equilibrium) position.

2. A wave has a frequency of 10 Hz. What is its period?

T = 1 / f = *1 / 10* = ***0.1 seconds***

3. What is meant by the frequency of a wave?

The number of waves to pass a point in a second (or the number of complete oscillations per second).

4. What is a transverse wave? Give one example.

In a transverse wave the oscillations are perpendicular to the direction of wave travel.

Light is an example of a transverse wave

5. What is a longitudinal wave? Give one example.

In a longitudinal wave the oscillations are parallel (or along) the direction of wave travel.

Sound is an example of a longitudinal wave.

6. If the period of a wave is 0.2 seconds, calculate its frequency.

f = 1 / T *= 1 / 0.2* *= **5 Hz***

7. A wave has a wavelength of 5 meters and a frequency of 2 Hz. What is its speed?

$v = f \lambda$

$= 2 \times 5$

= 10 m/s

8. Explain the difference between frequency and period.

Frequency is the number of oscillations (or waves) per second. It is measured in hertz (Hz).

Period is the time for one complete oscillation (or wave). It is measured in seconds (s).

9. If the amplitude of a wave increases, what happens to the energy of the wave?

The energy of the wave increases if the amplitude increases.

10. If a wave travels at 340 m/s and has a frequency of 170 Hz, what is its wavelength?

$v = f \lambda$

$340 = 170 \times \lambda$

$340 / 170 = \lambda$

= **2 metres**

11. A wave travels with a speed of 300 m/s and a wavelength of 0.5 meters. Calculate its frequency.

$v = f \lambda$

$300 = f \times 0.5$

$300 / 0.5 = f$ $= \mathbf{600\ Hz}$

12. A sound wave has a frequency of 500 Hz and a wavelength of 0.68 meters. Calculate its speed.

$v = f \lambda$

$= 500 \times 0.68$

$= \mathbf{340\ m/s}$

13. A water wave has a wavelength of 3 meters and a speed of 1.5 m/s. Calculate its frequency.

$v = f \lambda$

$1.5 = f \times 3$

$1.5 / 3 = f$ $= \mathbf{0.5\ Hz}$

14. The period of a wave is 0.05 seconds. What is the frequency?

$f = 1 / T$

$= 1 / 0.05$

$=$ **20 Hz**

15. A wave has a frequency of 5 Hz and travels at 15 m/s. Calculate the wavelength.

$v = f \lambda$

$15 = 5 \times \lambda$

$15 / 5 = \lambda$

$= \mathbf{3\ metres}$

16. A wave traveling in water has a wavelength of 4 meters and a period of 0.2 seconds. Calculate its speed.

$f = 1 / T \quad = 1 / 0.2 \quad = 5\ Hz$

$v = f \lambda \quad = 5 \times 4$

$= \mathbf{20\ m/s}$

17. A light wave in a vacuum has a speed of 3×10^8 m/s and a frequency of 6×10^{14} Hz. Calculate its wavelength.

$v = f \lambda$

$3 \times 10^8 = 6 \times 10^{14} \times \lambda$

$3 \times 10^8 / 6 \times 10^{14} = \lambda \quad = \mathbf{5 \times 10^{-7}\ m}$

18. A sound wave travels at 330 m/s in air. If the wavelength is 0.75 m, what is the frequency?

$v = f \lambda$

$330 = f \times 0.75$

$330 / 0.75 = f \quad = \mathbf{440\ Hz}$

19. A radio wave travels at 3×10^8 m/s with a wavelength of 100 meters. Determine the period of this wave.

$v = f \lambda \quad 3 \times 10^8 = f \times 100$

$3 \times 10^8 / 100 = f \quad = 3 \times 10^6\ Hz$

$T = 1 / f \quad = 1 / 3 \times 10^6 \quad = \mathbf{3.33 \times 10^{-7}\ seconds}$

20. An ultrasound wave in soft tissue travels at 1540 m/s. If its wavelength is 3.0 millimeters, calculate the period of the wave.

$v = f \lambda \quad 1540 = f \times 0.003$

$1540 / 0.003 = f \quad = 5.13 \times 10^5\ Hz$

$T = 1 / f$

$= 1 / 5.13 \times 10^5 \quad = \mathbf{1.95 \times 10^{-6}\ seconds}$