

Waves Test Review

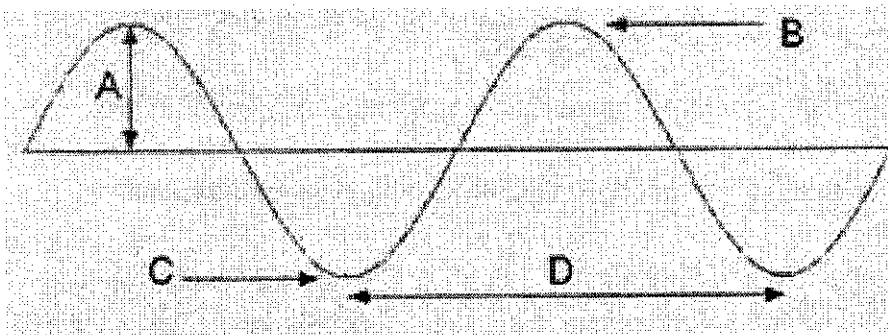
Name: Key

True/False

Indicate whether the statement is true or false and if it is false, change the statement to make it true.

- T 1. The period and frequency of a wave are inversely proportional.
- F 2. The unit for ~~period~~ ^{frequency} is Hertz, or cycles per second.
- F 3. A point on a wave completes one cycle every 3 seconds. The frequency of this wave is ~~1/3 seconds~~ ^{Hz}.
- T 4. Hooke's Law states that the force exerted by a spring is directly proportional to the amount it is stretched.
- F 5. The moving parts of a standing waves are called the ~~nodes~~ ^{antinodes}.
- F 6. Because of the Doppler Effect, an observer will hear a sound moving away from him as being ~~higher~~ ^{lower} in pitch.
- T 7. The period of a simple harmonic pendulum is the time it takes for one complete cycle of the pendulum to be completed.
- F 8. If the wave's wavelength is kept constant, the ~~amplitude~~ ^{frequency} increases as the speed of the wave increases.
- F 9. In a transverse wave, the vibrational displacement occurs in the same direction as the motion of the wave. ^{longitudinal}
- T 10. A wave is a rhythmic disturbance that carries energy through a medium.

Label this wave:



- A: Amplitude
- B: Crest
- C: Trough
- D: Wavelength

This is a transverse wave.

11. Name some characteristics of a sound wave.

- created by vibration
- does not have constant speed. - changes w/ temperature
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12. What is an example of periodic motion?

- a grandfather clock
- a swing

13. In the waveform of a longitudinal wave, which direction does the wave travel? Perpendicular or parallel?

Parallel

14. How many nodes does a 207th harmonic standing wave have?

208 nodes

15. A periodic wave has a wavelength of 0.50 m and a speed of 20 m/s. What is the wave frequency?

Formula: $\frac{v}{\lambda} = \frac{\lambda f}{\lambda}$	Plug in numbers: $f = \frac{v}{\lambda} \quad f = \frac{20 \text{ m/s}}{.5 \text{ m}}$	Answer: 40 Hz
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16. The length of a guitar string is 1.25m and is vibrating in the 4th harmonic. What is the wavelength of the wave?

Formula: $L = \frac{n}{2} \lambda$	Plug in numbers: $1.25 \text{ m} = \frac{4}{2} \lambda$	Answer: $\lambda = .625 \text{ m}$
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17. What is the spring constant for a spring that stretches by .27 m when a load of 200 N is suspended from it?

Formula: $F = -kx$	Plug in numbers: $200 \text{ N} = -k(.27 \text{ m})$	Answer: $k = -740.74 \text{ N/m}$
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18. A pendulum clock is taken to the moon where the gravity is 1.6 m/s^2 . How long must the pendulum be in order for the clock to continue keeping accurate time (1 second in a cycle)?

Formula: $T = 2\pi\sqrt{\frac{L}{g}}$	Plug in numbers: $1 \text{ s} = 2\pi\sqrt{\frac{L}{1.6 \text{ m/s}^2}}$ $.159 = \sqrt{\frac{L}{1.6}}$	Answer: $.04 \text{ m}$
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19. If the period of a certain wave (wavelength = 4.5 m) is 2 seconds, what is the speed of the wave?

Formula: $f = \frac{1}{T}$ $v = f\lambda$	Plug in numbers: $f = \frac{1}{2 \text{ s}} = f = .5 \text{ Hz}$ $v = (.5 \text{ Hz})(4.5 \text{ m})$	Answer: 2.25 m/s
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20. Tapping the surface of a pan of water generates 17.5 cycles per second. If the wavelength of each wave is 0.45 m, what is the velocity of the wave?

Formula: $v = f\lambda$	Plug in numbers: 17.5 Hz $v = (17.5 \text{ Hz})(.45 \text{ m})$	Answer: 7.875 m/s
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21. A bell with a frequency of 880 Hz is moving toward an observer at 3.5 m/s. If the speed of sound is 343 m/s, what frequency would be heard by the observer?

Formula: $f = f_0 \left(\frac{v + v_o}{v - v_s} \right)$	Plug in numbers: $f = 880 \text{ Hz} \left(\frac{343 \text{ m/s} + 0 \text{ m/s}}{343 \text{ m/s} - 3.5 \text{ m/s}} \right)$	Answer: 889.07 Hz
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22. An amusement park ride swings back and forth once every 40 seconds. What is the ride's frequency?

Formula: $f = \frac{1}{T}$	Plug in numbers: $f = \frac{1}{40 \text{ s}} =$	Answer: 0.025 Hz
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23. What is the period of a wave with a velocity of 3.4 m/s and a wavelength of .6 m?

Formula: $f = \frac{v}{\lambda}$ $T = \frac{1}{f}$	Plug in numbers: $f = \frac{3.4 \text{ m/s}}{.6 \text{ m}} = 5.67 \text{ Hz}$ $T = \frac{1}{5.67 \text{ Hz}} = 0.176$	Answer: 0.176 s
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