ALBERTA PHYSICS 20 · UNIT D · 25 QUESTIONS

Oscillatory Motion & Mechanical Waves — Practice Test

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

1 **In simple harmonic motion, the restoring force acting on an oscillating object is always directed**

- A away from the equilibrium position
- B toward the equilibrium position
- C in the direction of the object velocity
- D perpendicular to the direction of motion

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2 **A pendulum swings back and forth with a period of 0.50 s. The frequency of the pendulum is**

- A 0.50 Hz
- B 5.0 Hz
- C 2.0 Hz
- D 0.20 Hz

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3 **The period of a simple pendulum depends on**

- A the length of the pendulum and the gravitational field strength
- B the mass of the bob and the length of the pendulum
- C the mass of the bob and the amplitude of the swing
- D the amplitude of the swing and the length of the pendulum

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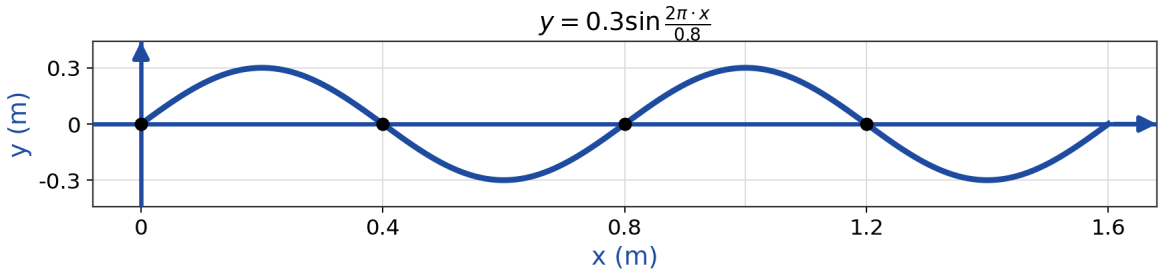
4 **The graph shows a wave travelling along a rope. The wave has a frequency of 5.0 Hz. The speed of the wave, to the nearest tenth, is _____ m/s.**



ANSWER _____

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5 **In a transverse wave, the particles of the medium vibrate**

A parallel to the direction of wave travel

B in large circles around the equilibrium position

C not at all once the wave has passed

D perpendicular to the direction of wave travel

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6 A 0.20 kg mass attached to a spring oscillates on a frictionless horizontal surface. The spring constant is 50 N/m. Using $T = 2\pi\sqrt{\frac{m}{k}}$, the period of oscillation is

- **A** 0.40 s
- **B** 0.63 s
- **C** 1.6 s
- **D** 2.5 s

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7 A simple pendulum has a length of 0.25 m. Using $T = 2\pi\sqrt{\frac{L}{g}}$ with $g = 9.81\ \frac{m}{s^2}$, its period, to the nearest tenth, is _____ s.

ANSWER _____

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8 **When a force of 12 N is applied to a spring, the spring stretches by 0.30 m. The spring constant is**

- **A** 3.6 N/m
- **B** 0.025 N/m
- **C** 40 N/m
- **D** 360 N/m

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9 **An air column that is closed at one end can support standing waves with frequencies that are**

- **A** all whole-number multiples of the fundamental frequency
- **B** only odd multiples of the fundamental frequency
- **C** only even multiples of the fundamental frequency
- **D** only the fundamental frequency itself

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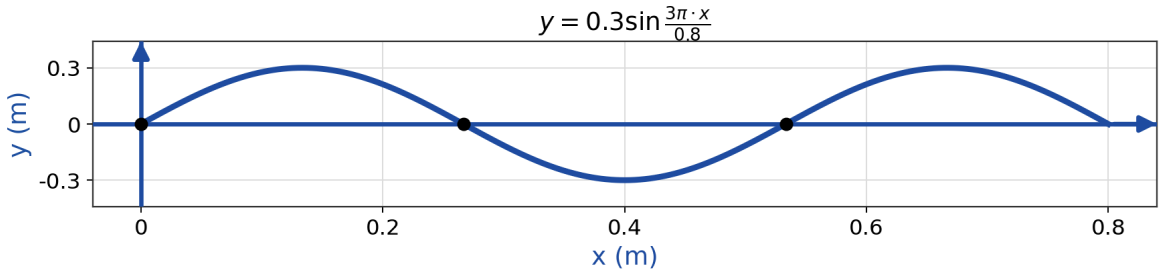
10 **The graph shows a standing wave pattern on a stretched string. Waves travel along the string at 320 m/s. The frequency of the pattern shown, in hertz, is _____**



ANSWER

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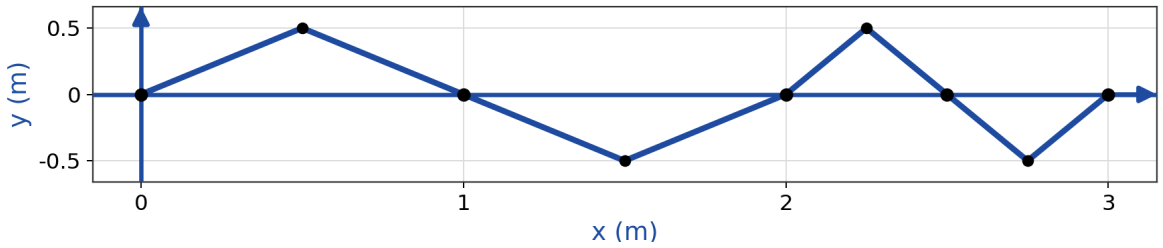
11 **The graph shows a wave travelling from a light rope into a heavier rope, in which waves travel more slowly. As the wave enters the heavier rope,**



A its frequency increases and its wavelength increases

B its frequency decreases and its speed stays the same

C its frequency stays the same and its wavelength increases

D its frequency stays the same and its wavelength decreases

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12 **A pulse travelling along a rope reaches the end of the rope, which is firmly tied to a wall. The reflected pulse is**

- **A** inverted compared with the incoming pulse
- **B** upright, with a larger amplitude than the incoming pulse
- **C** completely absorbed by the wall
- **D** upright, with the same amplitude as the incoming pulse

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13 **A vehicle approaches a stationary observer at 20 m/s while sounding a horn with a frequency of 500 Hz. The speed of sound in air is 343 m/s. The frequency heard by the observer, to the nearest hertz, is ____ Hz.**

ANSWER _____

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14 **A tube open at both ends has a length of 0.85 m. The speed of sound in the air inside the tube is 343 m/s. The fundamental frequency of the tube is approximately**

A 101 Hz

B 202 Hz

C 303 Hz

D 404 Hz

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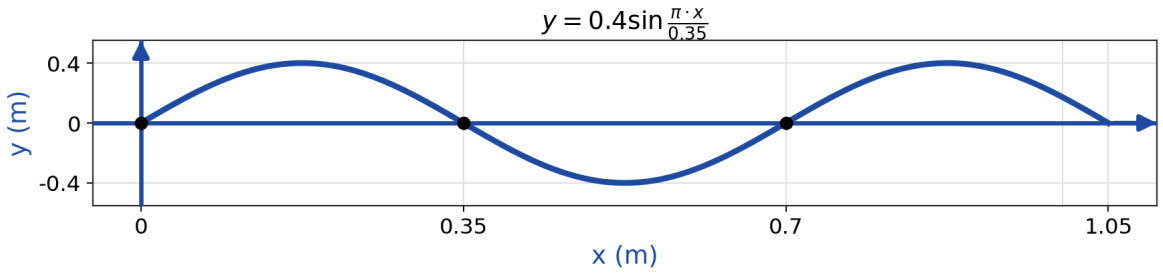
15 **The graph shows a standing wave pattern on a string. The wavelength of the waves that produced the pattern is**



A 0.18 m

B 0.35 m

C 0.70 m

D 1.40 m

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16 **A 0.50 kg mass attached to a spring with a spring constant of 80 N/m oscillates on a frictionless surface. Using $f = \frac{1}{2}\pi\sqrt{\frac{k}{m}}$, the frequency of oscillation, to the nearest tenth, is ____ Hz.**

ANSWER _____

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17 **A pendulum clock that keeps correct time on Earth is taken to the Moon, where the gravitational field is weaker. Compared with its period on Earth, the period of the pendulum on the Moon**

A decreases

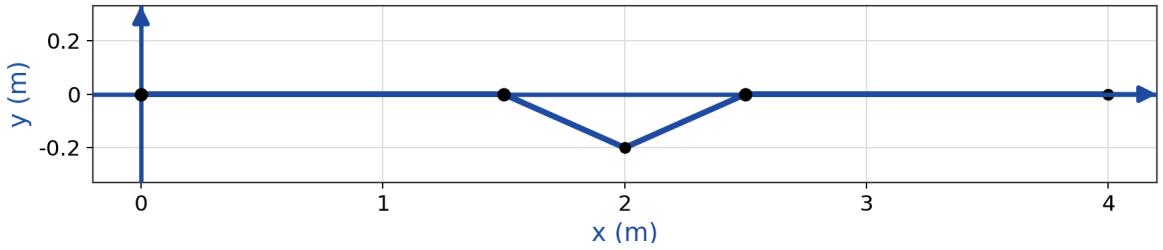
B remains the same

C becomes zero

D increases

Understand It with Pulse | Flag a mistake

18 **Two pulses travelling toward each other on a rope meet and completely overlap. The graph shows the rope at the instant of complete overlap. The displacement of the rope at the centre of the overlap is**



A -0.20 m

B +0.80 m

C -0.80 m

D +0.20 m

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19 **An air column closed at one end has a length of 0.25 m. The speed of sound in the air is 343 m/s. The fundamental frequency of the column is _____ Hz.**

ANSWER _____

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20 **Resonance occurs when a vibrating system is driven by a periodic external force whose frequency**

- **A** is much greater than the natural frequency of the system
- **B** equals the natural frequency of the system
- **C** is much less than the natural frequency of the system
- **D** changes randomly from one cycle to the next

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21 **The speed of a wave in a stretched string is 240 m/s when the tension in the string is 36 N. If the tension is increased to 144 N in the same string, the new wave speed is**

- **A** 240 m/s
- **B** 340 m/s
- **C** 480 m/s
- **D** 960 m/s

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22 **A pendulum is to be built with a period of exactly 2.0 s on Earth. Using $T = 2\pi\sqrt{\frac{L}{g}}$ with $g = 9.81\ \frac{m}{s^2}$, the required length, to the nearest hundredth, is _____ m.**

ANSWER

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23 **In a longitudinal wave, such as a sound wave, the wavelength is the distance between**

A. a compression and the next rarefaction

B. two consecutive compressions

C. the source of the wave and the observer

D. two particles that are not moving

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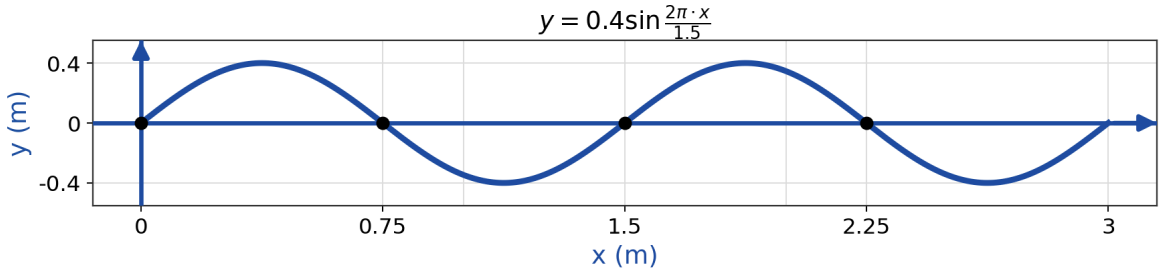
24 **A wave travels a distance of 12 m in 3.0 s. The graph shows the wave. The frequency of the wave is**



A 0.38 Hz

B 2.0 Hz

C 6.0 Hz

D 2.7 Hz

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25 **A guitar string has a fundamental frequency of 110 Hz. The frequency of the fifth harmonic of the string is**

A 550 Hz

B 440 Hz

C 330 Hz

D 110 Hz

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ANSWER KEY

1. B
2. C
3. A
4. 4
5. D
6. A
7. 1
8. C
9. B
10. 600
11. D
12. A
13. 531
14. B
15. C
16. 2
17. D
18. A
19. 343
20. B
21. C
22. 0.99
23. B
24. D
25. A

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