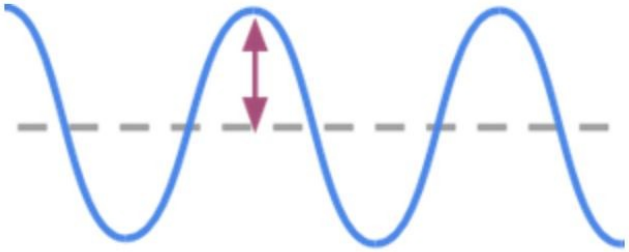
AP Physics 1 – Algebra-Based: Unit 6 Simple Harmonic Motion Practice Test

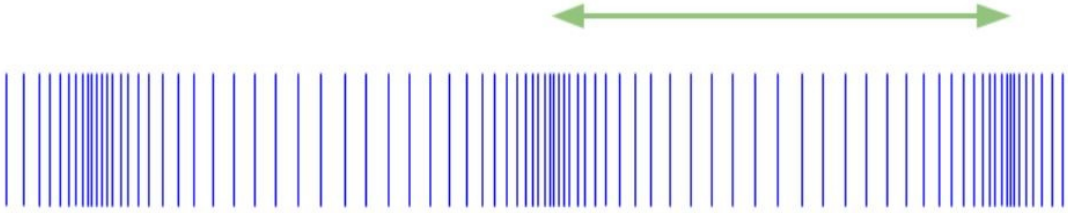
Question 1:



Above is an image of a transverse wave through a medium where the dashed line is the medium's equilibrium position. What does the arrow represent? *(Use a coordinate system where upward is the positive direction for medium displacement.)*

A. Amplitude
B. Expansion
C. Crest
D. Wavelength

Question 2:



Above is a representation of a longitudinal wave traveling in a uniform medium at a particular instant. What does the green arrow represent?

A. Expansion
B. Compression
C. Wavelength
D. Crest

Question 3:

Below is an image of a transverse wave through a medium where the dashed line is the medium's equilibrium position. Which arrow correctly represents the

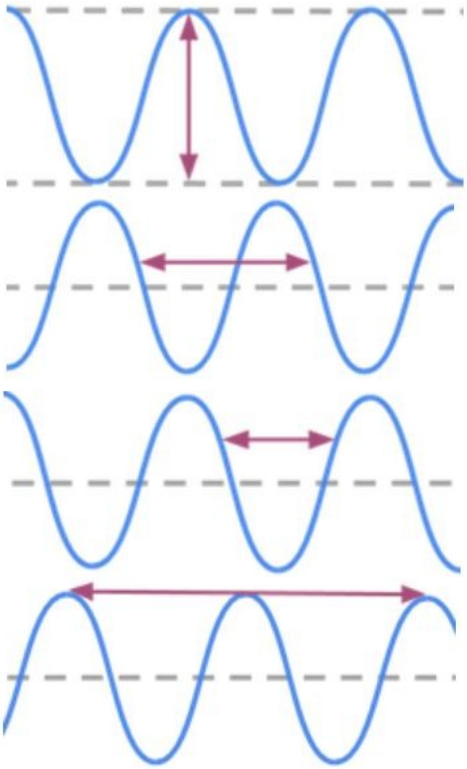
wavelength? ***(Use a coordinate system where upward is the positive direction for medium displacement.)***

A

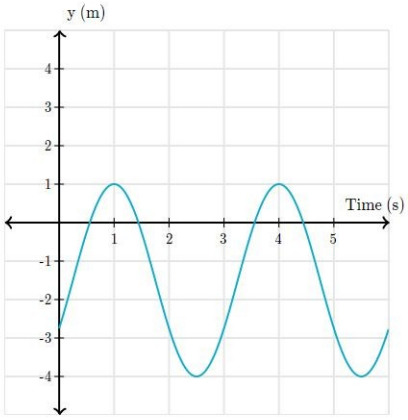
B

C

D



Question 4:

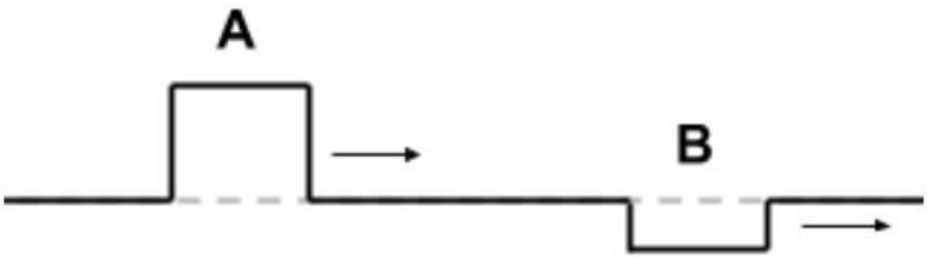


The vertical position of a certain point on a string over time is shown above. If the frequency doubles, what is the new period?

A. $1.5\,s$

B. $2.5\,s$
C. $3\,s$
D. $\frac{1}{3}s$

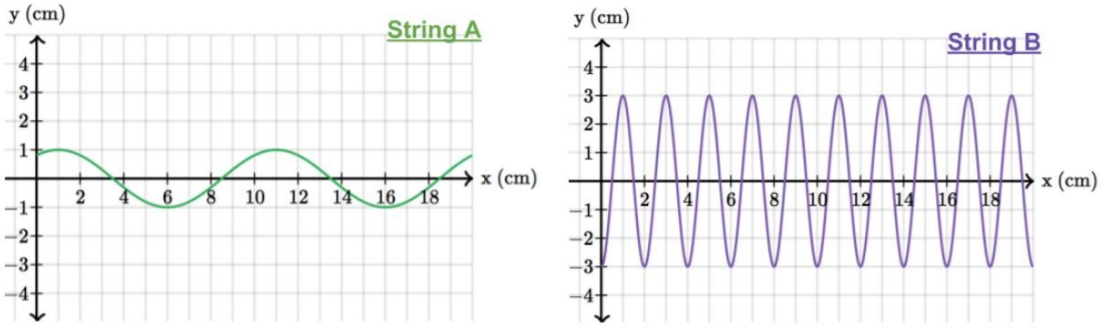
Question 5:



Two waves pulses A and B are created on the same string. The shapes of the waves in the string are shown above. How do the energies of the two wave pulses compare?

A. Wave pulse A has more energy.
B. Wave pulse B has more energy.
C. Both wave pulses have the same energy.

Question 6:

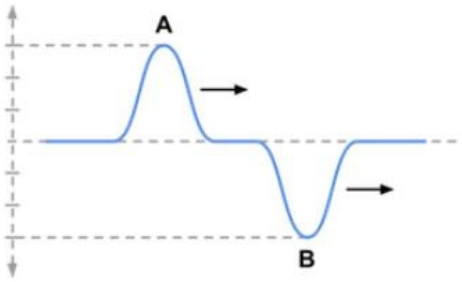


Periodic waves are created on two identical strings (A and B) and their vertical displacement vs. horizontal position graphs are shown above for a snapshot in time. How do the energies of the two waves compare?

A. A wave of string A has more energy.

B. A wave of string B has more energy.
C. Waves on both the strings have equal energy.

Question 7:



Two wave pulses A and B created on the same string travels horizontally to the right. The shapes of the waves in the string are shown above. The vertical axis shows displacement from the mean position. How do the energies of the two wave pulses compare?

A. Wave pulse A has more energy.
B. Wave pulse B has more energy.
C. Both wave pulses have the same energy.

Question 8:

In any system in Simple Harmonic Motion, the restoring force acting on the mass in the system is proportional to

A. the displacement
B. the mass
C. the length of the pendulum
D. the frequency

Question 9:

A simple harmonic oscillator takes $4.8\,s$ **to undergo five complete vibrations. What is the period (** T **) of** $1\,cycle$ **?**

A. 4.8 s
B. 9.8 s
C. 0.96

Question 10:

A pair of trapeze performers at the circus is swinging from ropes attached to a large elevated platform. Suppose that the performers can be treated as a simple pendulum with a length of $16\,m$. Determine the period for one complete back and forth cycle.

- **A.** 2 s
- **B.** 8 s
- **C.** 12 s
- **D.** 10 s

Question 11:

If the length of a simple pendulum is doubled, its period will:

- **A.** halve
- **B.** increase by a factor of $\sqrt{2}$
- **C.** decrease by a factor of $\sqrt{2}$
- **D.** double

Question 12:

A massive spring system can oscillate with simple harmonic motion because a compressed or stretched spring has which kind of energy?

- **A.** kinetic
- **B.** mechanical
- **C.** gravitational potential
- **D.** elastic potential

Question 13:

For a system in simple harmonic motion, which of the following is the number of cycles or vibrations per unit of time?

- **A.** amplitude
- **B.** period
- **C.** frequency
- **D.** revolution

Question 14:

Given equation of Simple Harmonic Motion, $x = 0.34 \cos 3000t$ **where** x **in** mm **and** t **in** $second$ **. The frequency is:**

- **A.** $3000\ Hz$
- **B.** $\frac{3000}{2\pi}\ Hz$
- **C.** $\frac{0.74}{2\pi}\ Hz$
- **D.** $\frac{3000}{\pi}\ Hz$

Question 15:

When is a pendulum in simple harmonic motion?

- **A.** never
- **B.** only at large angles
- **C.** all the time
- **D.** only at small angles

Question 16:

What are the two requirements for a simple harmonic oscillation?

- **A.** The object vibrates about the equilibrium point and the restoring force is proportional to the displacement.
- **B.** The object vibrates about the equilibrium and the restoring force is greater than the displacement.
- **C.** The object moves left to right and the restoring force is proportional to the displacement.
- **D.** The object moves left to right and the restoring force is greater than the displacement.

Question 17:

A force of $30\,N$ **stretches a very light ideal spring** $0.73\,m$ **from equilibrium. What is the force constant (spring constant) of the spring?**

- **A.** $46\frac{N}{m}$
- **B.** $22\frac{N}{m}$
- **C.** $34\frac{N}{m}$

D. $41\,\frac{N}{m}$

Question 18:

What force should be applied to compress a spring by $0.013\,m$ if its spring constant is $k = 1{,}900\,\frac{N}{m}$?

A. $1{,}880\,N$
B. $24.7\,N$
C. $1{,}900\,N$
D. $0.127\,N$

Question 19:

A net force of $430\,N$ acts to stretch an extension spring. How far will the spring stretch if its spring constant is $700\,\frac{N}{m}$?

A. $43.9\,m$
B. $1.63\,m$
C. $0.614\,m$
D. $0.307\,m$

Answer Key:

1. A
2. C
3. B
4. A
5. A
6. B
7. C
8. A
9. C
10. B
11. B
12. D
13. C
14. B
15. D
16. A
17. D
18. B
19. C