

Slinky Longitudinal Wave

<https://www.youtube.com/watch?v=7cDAYFTXq3E>

The Wave

<https://www.youtube.com/watch?v=3NxLh-3DdaE>

CTWaves-1. Is "The Wave" at the stadium a transverse wave or a longitudinal wave?

- A) Transverse B) Longitudinal C) neither

Answer: Transverse

CTWaves-2.

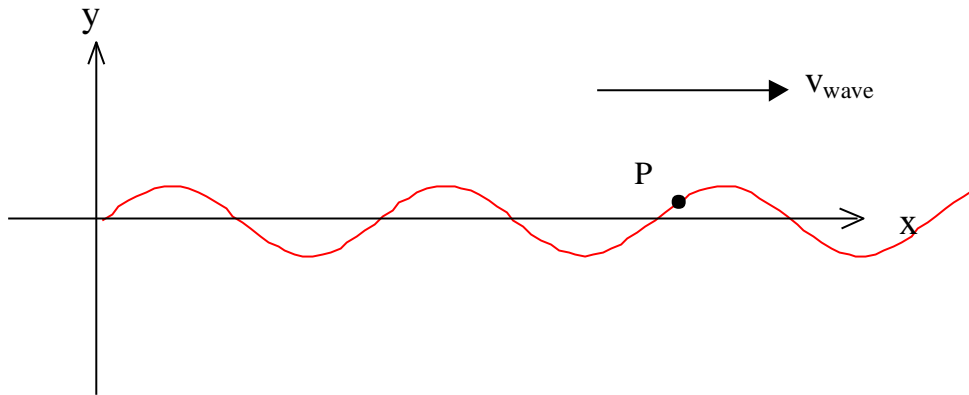
A wave on a stretched drum head is an example of a

- A) Transverse wave B) Longitudinal wave
C) it's not a wave at all

Answer: Transverse

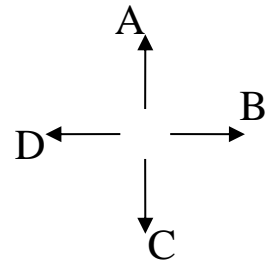
CTWaves-3.

The graph below shows a snapshot of a wave on a string which is traveling to the right. There is a bit of paint on the string at point P.



At the instant shown, the velocity of paint point P has which direction?

E) None of these



Answer: downward

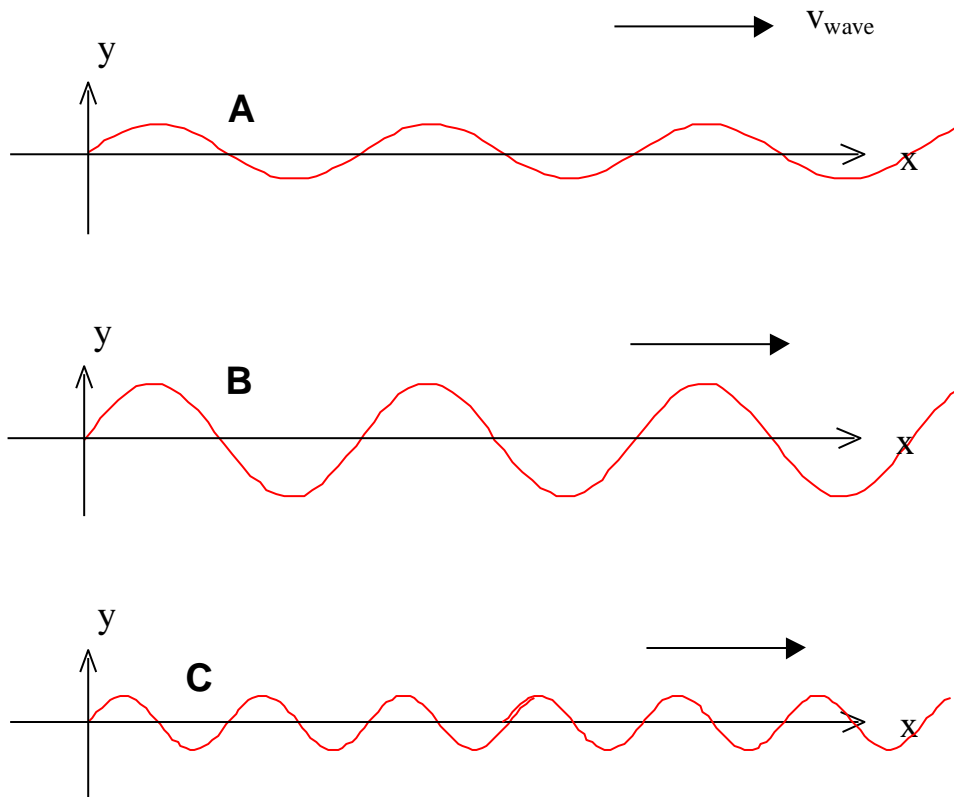
At the instant shown, the acceleration of the particle has which direction? (Same choices)

Answer: downward

CTWaves-4. Three waves are traveling along **identical** strings (same mass per length, same tension, same everything). Wave B has twice the amplitude of the other two. Wave C has $1/2$ the wavelength than A or B.

Which Wave goes slowest? A B C D) All have same v

Answer: All have same v . In general, the speed of a wave depends on the properties of the medium



Which wave has the highest frequency?

A B C D) All 3 have the same frequency

Answer: C

CTWaves-5. Consider the equation $x - vt = \theta$, where v and θ are positive constants. The variable x is position and t is the time. A point x that obeys this equation is a point that

- A) increases (moves to the right) with speed v
- B) decreases (moves to the left) with speed v
- C) is constant x (not moving)
- D) increases (moves to the right) with speed θ
- E) decreases (moves to the left) with speed θ

Answer: increases (moves to the right) with speed v

CTWaves-6. Two traveling waves 1 and 2 are described by the equations.

$$y_1(x, t) = 2 \sin(2x - t)$$

$$y_2(x, t) = 4 \sin(x - 2t)$$

All the numbers are in the appropriate SI (mks) units.

Which wave has the higher speed?

- A) 1
- B) 2
- C) Both have the same speed.

The wavelength λ of wave 1 is most nearly

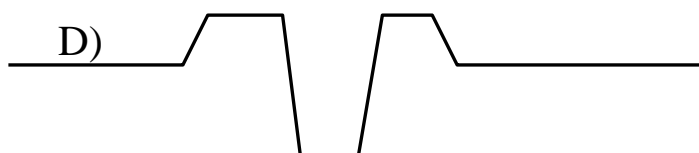
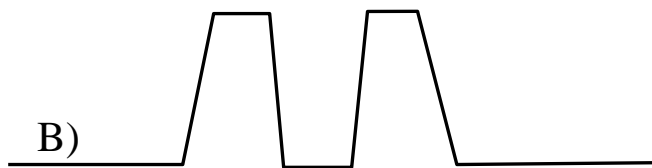
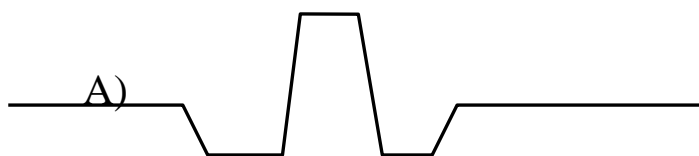
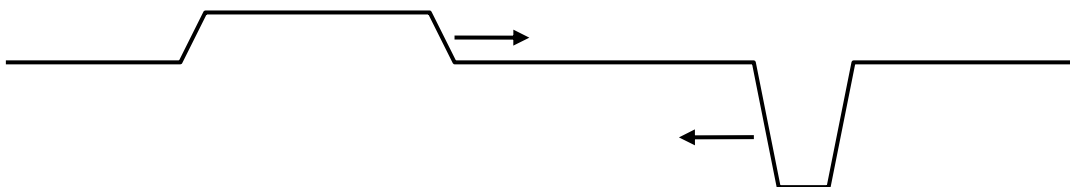
- A) 1m
- B) 2m
- C) 3m
- D) 4m

The period of wave 2 is most nearly

- A) 1s
- B) 2 s
- C) 3 s
- D) 4 s

Answers: Wave 2 has the higher speed. The wavelength of wave 1 is about 3 m (π m, to be exact). The period of wave 2 is about 3 s .

CTWaves-7. Two impulse waves are approaching each other, as shown. Which picture correctly shows the total wave when the two waves are passing through each other?



Answer: D

CTWaves-8. When you turn up the volume on your sound system, ..

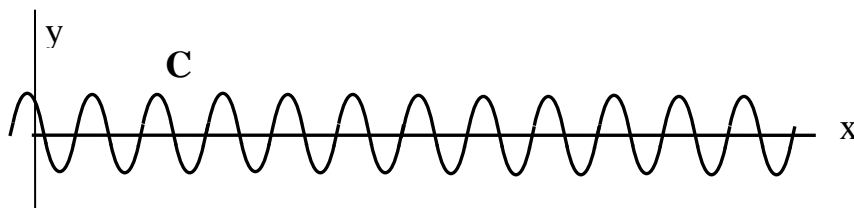
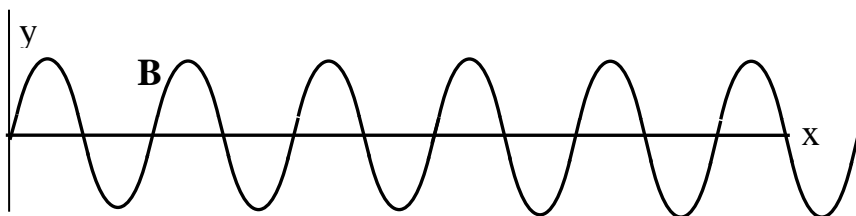
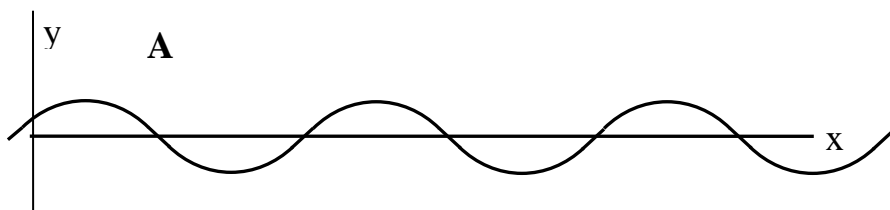
- A) the speaker cone oscillates back and forth more rapidly, completing more cycles per second
- B) the speaker cone oscillates back and forth more slowly, completing fewer cycles per second
- C) the speaker cones oscillates back and forth a farther distance in each cycle
- D) the speaker cones oscillates back and forth a shorter distance in each cycle
- E) None of these

Answer: C

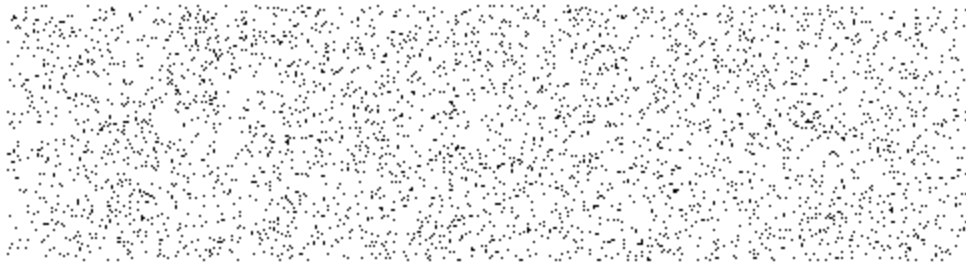
CTWaves-9. Three pressure waves in air (sound waves), all with the mathematical form

$$y(x, t) = A \sin \left[2\pi \left(\frac{x}{\lambda} - \frac{t}{T} \right) \right],$$
 are labeled A, B, and C. Which sound is the loudest

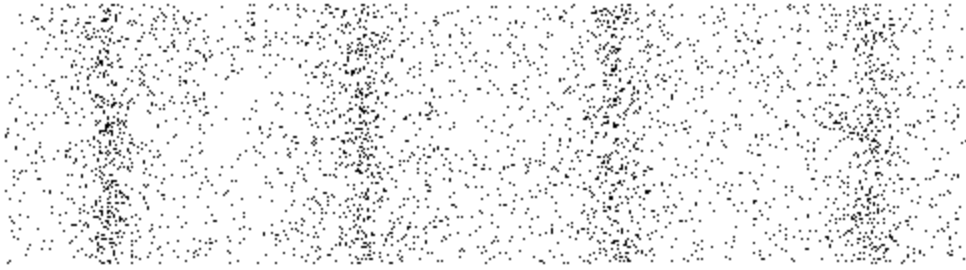
and which is the highest pitch?



Answer: B is loudest (highest amplitude) and C is highest pitch (highest frequency, shortest wavelength).



Undisturbed
air.



Air with sound
wave present.

