Review Session

Thursday, January 24, 2019 5:21 PM

★★★★

multiple choice question

A traveling harmonic wave on a string is described by $y(x,t)=(1.5\times10^{-3}\ m)\ \sin[(25\ m^{-1})x+(21\ s^{-1})t]$.
What is the velocity of the wave?

A.

0.84 m/s in the positive x-direction

B.

0.84 m/s in the negative x-direction

C.

1.2 m/s in the positive x-direction

D.

1.2 m/s in the negative x-direction

E.

0.038 m/s in the positive x-direction

$*D_y = A\sin(kx-\omega t+\phi_i)$, $c=\frac{\omega}{k}$ Remember the equation!

Method I. $y(x,y) = 1.5\times10^{-3}\sin(25x+21t)$ B

$kc=\omega \Rightarrow c=\frac{\omega}{k}=-\frac{21}{25}=-0.84$

Method II. $f(x-ct)$ +x direction

$f(x+ct)$ −x direction

- Significant Figures: Matters during Lab.

★★★

multiple choice question

Suppose you pluck the thinnest guitar string producing a note, and at the same time, your friend also produces another note by plucking the thickest guitar string which is under the same tension as the thinnest string. Which note travels faster in the air?

A.

Your note

B.

Your friend's note

C.

They travel at the same speed.

D.

Not enough information is given.

$c=\sqrt{\frac{T}{\mu}}$

μ is the same for air!! careful! C

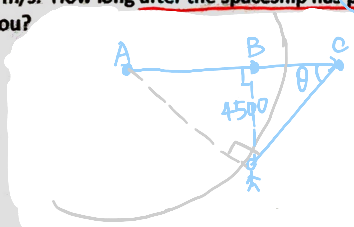
Probs

Thursday, January 31, 2019 9:57 AM

Midterm 2016w17

4. You are on the ground and observing a jet traveling in air at a constant height of 4500 m with a speed of 650 m/s. How long after the spaceship has passed directly overhead will the shock wave reach you?

A 4.3 s
B 6.9 s
C 11.2 s
D 13.2 s
E 21.3 s



$BC = \frac{4500\,m}{\tan\theta} = 7332\,m$

$t = \frac{BC}{v} = \frac{7332\,m}{650\,m/s} = 11.2$

$\sin\theta = \frac{a}{v_s}$

$\theta = 31.54°$

Midterm 2abw17

6. You are on a train travelling north at 80.0 m/s relative to the ground. The air is still relative to the ground when you hear the whistle of a train travelling south. You know that train whistles are emitted with a frequency of 262 Hz, but the whistle appears to have a frequency of 350 Hz. What is the speed of the other train?

A 8.3
B 26 m/s
C 146 m/s
D 221 m/s
E 540 m/s

think of Doppler when some objects moves toward each other.

$f_o = \frac{C+v_o}{C-v_s} f_s$

$C - v_s = (C+v_o)\frac{f_s}{f_o}$

$C - v_s = (340+80)\cdot\frac{262}{350}$

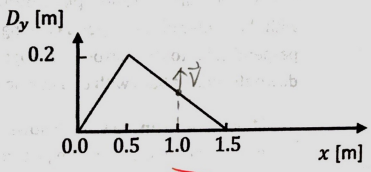
$v_s = 26\,m/s$

Midterm 2abw17

III Lecture free response (26 points total)

Show enough work to get partial credit.

You attach one end of a slinky firmly to a tree and hold the other end 2 m away. At $t = 0.0$ s you start moving the end that you are holding. At $t = 0.5$ s you stop moving the end and the figure shows the wavefunction at that time.



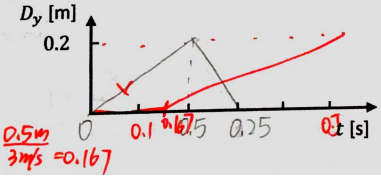
A. (6 points) At $t = 0.5$ s what is the speed, v, of the string element located at $x = 1.0$ m? Draw an arrow on the wavefunction diagram indicating direction.

$v = \frac{\Delta D_y}{0.5s} = 0.4\,m/s$

$v = \frac{0.2\,m}{\frac{2}{3}\times 0.5s} = 0.6\,m/s$

$\frac{1.5-0.5}{1.5} = \frac{2}{3}$ right part $= \frac{2}{3}\cdot 0.5s$

B. (6 points) On the axes to right draw the displacement curve at $x = 0.5$ m. Be sure to indicate at least two times on the horizontal axis.



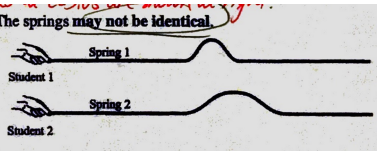
$C = \frac{1.5\,m}{0.5s} = 3\,m/s$

$\therefore$ intersection with $t = \frac{0.5m}{3m/s} = 0.167$

Midterm 1B Winter

B. Springs 1 and 2 are extended side by side. The springs may not be identical.

Students 1 and 2 *begin* to generate pulses in their respective springs at exactly the same time. The shapes of the two springs are shown a short time later, before any reflections have occurred. At this instant, the trailing edges are the same distance from the students' hands.



i. [5 pts] Is v_1, the wave speed of the pulse on spring 1, *greater than*, *less than*, or *equal to* v_2, the wave speed of the pulse on spring 2? If there is not enough information to answer, state so explicitly. Explain your reasoning in either case.

4

$v_1 < v_2$. Because in pulse 2, it's more stretched out, which means it's speed is higher, linear density of spring 2 higher

ii. [4 pts] Could Δt_1, the total time it took to create pulse 1, be equal to Δt_2, the total time it took to create pulse 2? If there is not enough information to answer, state so explicitly. Explain your reasoning.

No. $\because v_1 < v_2$. $\therefore$ every part of pulse 1 moves faster than that of part 2. it could. The height of two pulses are (seemed) same, which must be produced by the same motion of hand, so the time can be the same.

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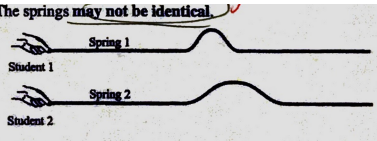

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$V_1 < V_2$. Because in pulse 2, it's more stretched out, which means it's speed is higher, linear density of spring 2 higher

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No. $\because V_1 < V_2$.
$\therefore$ every part of pulse 1 moves faster than that of part 2. it could. The height of two pulses are (seemed) same, which it be produced by the same motion of hand, so the time can be the same.
$\therefore$ Pulse 1 leaves the hand earlier than wave 2 does. produces different pulse.

Midterm 1 18 Win

21) (5 pts) The figure shows linear density in a sound wave. At which point(s) is the displacement zero?

A. Point A
B. Point B
C. Point C
D. Points A and C
E. Points B and D