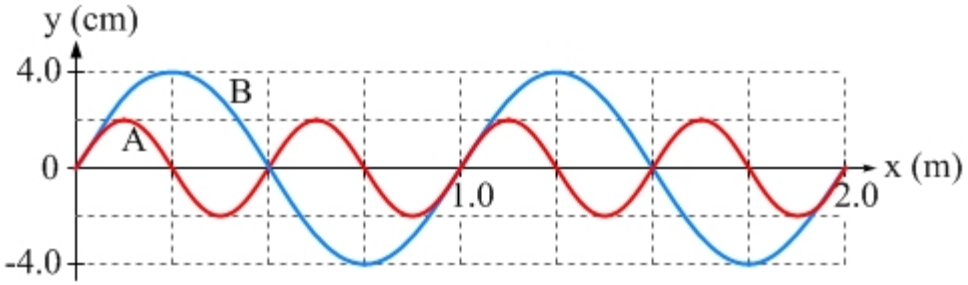
PROBLEM 1 – 10 points

The drawing shows two waves, both traveling to the right at the same speed of 4.0 m/s along identical strings.



(a) [2 points] Determine the wavelength of each wave.

(b) [2 points] Determine the amplitude of each wave.

(c) [2 points] Determine the frequency of each wave.

(d) [2 points] How much time passes before the two strings look exactly the same as the picture above?

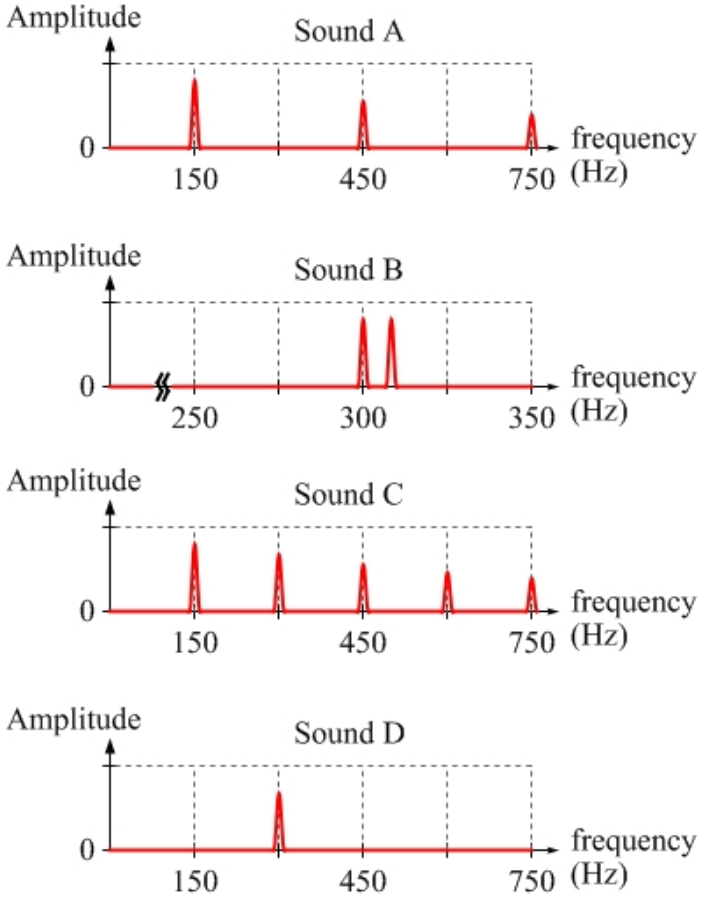
(e) [2 points] For which wave is the maximum transverse speed of a particle on the string larger?

[ ] wave A [ ] wave B [ ] neither, they're equal

Explain:

PROBLEM 2 – 10 points

The graphs show the frequency spectra of four different sounds – match the sound to its description.



[2 points] (a) A sound with a beat frequency of 10 Hz.

[ ] Sound A [ ] Sound B

[ ] Sound C [ ] Sound D

[3 points] (b) A pure tone (single frequency).

[ ] Sound A [ ] Sound B

[ ] Sound C [ ] Sound D

State the value of that single frequency:

_____

[2 points] (c) The sound from a tube that is open at one end, and closed at the other.

[ ] Sound A [ ] Sound B [ ] Sound C [ ] Sound D

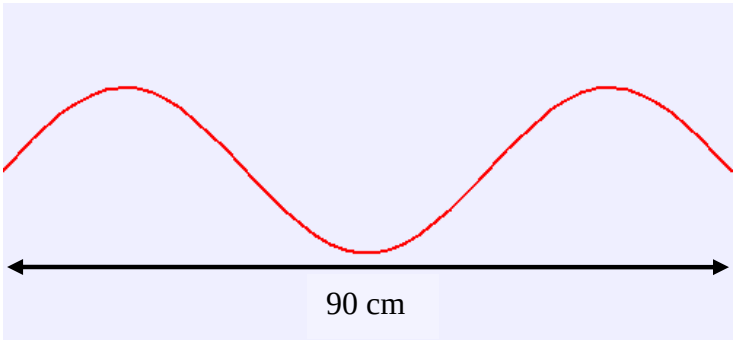
[3 points] (d) The sound coming from strumming a single string on a guitar.

[ ] Sound A [ ] Sound B [ ] Sound C [ ] Sound D

State the value of that string's fundamental frequency: _____

PROBLEM 3 – 10 points

The picture shows a particular standing wave on a guitar string at one particular instant in time. At the anti-nodes, the oscillations have an amplitude of 4.0 mm. The wave speed on the string is 360 m/s, and the string has a length of 90 cm.



[2 points] (a) Determine the wavelength of this wave.

[2 points] (b) Calculate the frequency of this standing wave.

[2 points] (c) This standing wave is formed by a superposition of two identical traveling waves, one moving left and one moving right. The amplitude of each of these traveling waves is

[ ] 1.0 mm [ ] 2.0 mm [ ] 4.0 mm [ ] 8.0 mm

[2 points] (d) Compared to the frequency of the standing wave shown above, the fundamental frequency for this particular string is ….

[ ] larger by a factor of 3 [ ] smaller by a factor of 3

[ ] equal to the frequency of the wave shown

[2 points] (e) If the tension of the string is increased, this string's fundamental frequency …

[ ] increases [ ] decreases [ ] remains the same