Tutorial 6

Work collaboratively in groups of four!

1. Suppose a mandolin plays an A=440Hz, what is the wavelength of this sound wave?

$\lambda = \frac{344\ m/s}{440\ Hz}$

A) less than 1m
B) between 1m and 5m
C) between 5m and 10m
D) all of the above

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2. A piano string is tuned to a frequency of 688 Hz. What is the wavelength of a wave that propagates along this piano string?

$\lambda = \frac{0.344}{688}$

A) 2.0 m
B) 1.0 m
C) 0.5 m
D) Insufficient information to determine

3. What type of sound would travel faster through air?
A) a high-pitched sound
B) a low-pitched sound
C) a loud sound
D) a quiet sound
E) they all travel at the same speed

4. Knowing the water level goes up and down as a water wave passes by, how would you categorize a water wave?
A) a transverse wave
B) a longitudinal wave
C) a string wave
D) a spring wave

5. A sound wave is an example of a
A) conservative wave
B) transverse wave
C) longitudinal wave
D) string wave

6. Let's examine the musical range in terms of wavelength. On the piano keyboard there is a C_2=65Hz, a C_4=262Hz and a C_7=2093Hz. These frequencies are approximate. Roughly, what wavelength sound waves do these notes correspond to?

$= \frac{344}{\ }$

A) less than 1m
B) 0.2m, 0.8m, 9m
C) between 5m and 10m
D) 5m, 1m, 0.2m

7. Describe what destructive interference is. Give a physical example.

When 2 sound waves cancel out. If one side of a jump rope is thrown up and 1 down, they cancel out

8. Describe what constructive interference is. Give a physical example different from the one you gave in Problem 7.

When 2 waves interfer, they combine. Think of 2 bubbles combining

9. Suppose you are sitting on a pier with your friend Sarah, holding a meter stick in the water and a sinusoidal water wave goes by. You measure 32 cm at the wave peak and 14 cm at the wave minimum. What is the amplitude of the wave?

$A = 32 - 14 = 18$ cm

Are these water waves longitudinal or transverse waves? Explain your answer.

transverse because they move up and down

10. Continuing with the situation in Problem 9, suppose you measure the time between peaks to be 0.8 seconds with your handy stopwatch. Your friend Sarah, who happens to be a mechanical engineer says, "Those waves are traveling at 1 m/s!" Assuming Sarah is correct, what is the wavelength of the wave.

$\lambda = \frac{1}{1.25} = 0.8$ m

$f = \frac{1}{0.8} = 1.25$