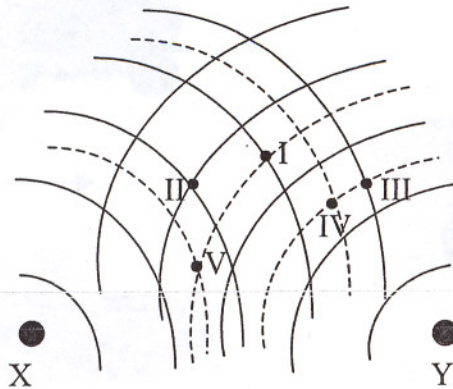
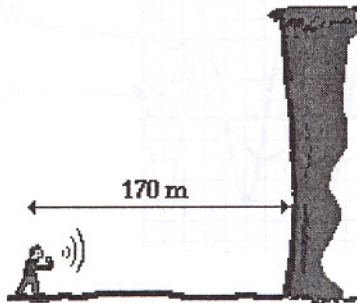


Sound Waves

1. In the diagram below, the curved solid lines represent crests and the curved dotted lines represent troughs of waves emanating from point sources X and Y.

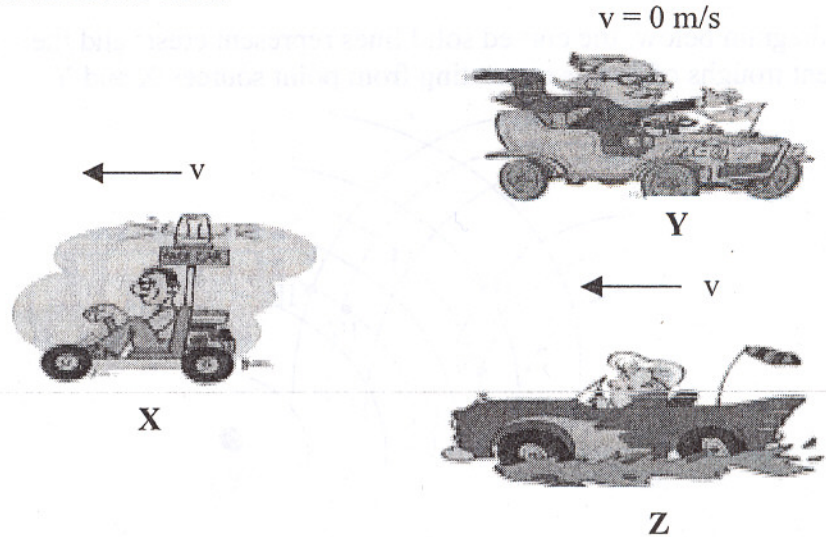


- Points which are on nodal lines at the moment represented by the diagram are _____.
2. What is the wavelength of sound produced by a bat if the frequency of the sound is 90 kHz on a night when the air temperature is 22°C?
 3. One end of a tube is closed. The shortest length that will produce resonance for a particular sound is 30 cm. Resonance occurs again for this sound when the length of the tube is increased to _____.
 4. While hiking, a physics student was anxious to find out the air temperature. With stopwatch in hand he clapped and recorded that the echo took 1.01 s to return from a rock face 170 m away. Using this information determine the temperature of the air.



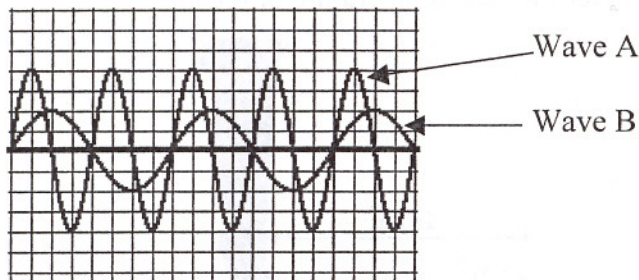
5. The CORRECT statement regarding the speed of sound is:
 - A) As the temperature falls, the speed of sound decreases.
 - B) The speed of sound in a vacuum is 331 m/s.
 - C) The speed of sound is greater in gases than in liquids.
 - D) The speed of sound is greater in liquids than in solids.

6. Three cars X, Y, and Z are shown below. Cars X and Z are moving to the left with the same velocity and car Y is parked at the curb.



If the driver of car X blows his horn, the pitch of the sound heard by a person in car Y will be

- A) lower than the pitch of the sound heard by a person in car X.
 - B) higher than the pitch of the sound heard by a person in car X.
 - C) higher than the pitch of the sound heard by a person in car Z.
 - D) the same as the pitch of the sound heard by a person in car Z.
7. A difference of 10 dB means that a sound is _____.
8. The diagram below shows two sound waves, A and B. Which statement is TRUE regarding the two waves?



Which of the following statements is TRUE?

- A) Wave A has a higher pitch and a louder sound than Wave B.
- B) Wave B has a higher frequency and transmits more energy than Wave A.
- C) Wave A has a higher frequency and transmits less energy than Wave B.
- D) Wave B has a lower pitch and a louder sound than Wave A.

1. ~~I, III~~

2. $v = f\lambda$ $v = 331 + .6(22) = 344.2 \text{ m/s}$

$$344.2 = 90 \times 10^3 \lambda$$

$$\lambda = \underline{3.8 \times 10^{-3} \text{ m}}$$

3. $f_1 = \frac{v}{4L}$ $f_3 = \frac{3v}{4L}$

$$L_1 = \frac{1}{4} \lambda$$

$$L_3 = \frac{3}{4} \lambda$$

$$30 \text{ cm} = \frac{1}{4} \lambda$$

$$L_3 = \frac{3}{4} (120) = \underline{90 \text{ cm}}$$

4. $d = 170 \text{ m}$

$$t = 1.01 \text{ s} / 2 = 0.505 \text{ s}$$

$$v = ?$$

$$v = \frac{d}{t} = \frac{170 \text{ m}}{.505} = 337 \text{ m/s}$$

$$v = 331 + .6T$$

$$337 = 331 + .6T$$

$$\underline{T = 10^\circ \text{ C}}$$

5. A

6. A

7. twice as loud (if 10 dB more)
half as loud (if 10 dB less)

8. A