Q1.
For a given medium, the wavelength of a wave is:

A) inversely proportional to the frequency
B) independent of the frequency
C) proportional to the frequency
D) proportional to the amplitude
E) inversely proportional to the amplitude

$$v = f\lambda \rightarrow \lambda = \frac{v}{f} \rightarrow \lambda \propto \frac{1}{f} \; ; \; v = \text{const.}$$

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Q2.
A stretched string has a length of 2.0 m and a mass of 2.5 g. A sinusoidal transverse wave traveling on the string is described by the equation: $y(x,t) = 0.010 \sin(3.0x - 75t)$, where $x$ and $y$ are in meters and $t$ is in seconds. What is the tension in the string?

A) 0.78 N
B) 0.31 N
C) 0.39 N
D) 0.47 N
E) 0.53 N

$$Y(x,t) = 0.01 \sin(3.0x - 75t)$$

$$v = \frac{\omega}{k} = \frac{75}{3} = 25 \text{ m/s} = \sqrt{\frac{T}{\mu}}$$

$$T = (25)^2 * \frac{2.5 * 10^{-3}}{2} = 0.78 \text{ N}.$$

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Q3.
A transverse sinusoidal wave with amplitude of 2.5 cm is traveling on a stretched string. The speed of the wave on the string is 35 cm/s, and the maximum transverse speed of a particle on the sting is 7.5 cm/s. What is the wavelength of the wave?

A) 73 cm
B) 54 cm
C) 66 cm
D) 47 cm
E) 31 cm

$$v_{max} = \omega Y = 7.5 \text{ cm/s} \rightarrow \omega = \frac{7.5}{2.5} = 3 \text{ rad/s}.$$

$$= 2\pi f.$$

$$v_{ph} = f\lambda \rightarrow \lambda = \frac{35}{f} = \frac{35 * 2\pi}{3} = 73 \text{ Cm}.$$

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Q4.
The displacement of a string carrying a traveling sinusoidal wave is given by: $y(x,t) = y_m \sin(kx - \omega t - \phi)$.
At time $t = 0$ the point at $x = 0$ has a displacement of 0 and is moving in the positive y direction.
The phase constant $\phi$ is:

$Y = Y_m \sin(kx - \omega t - \phi)$.

$Y(0,0) = 0 = Y_m \sin(0 - 0 - \phi)$.

$\rightarrow \phi = 0$ Since ~~disp~~motion in +Y.

A) 180°
B) zero
C) 45°
D) 90°
E) 135°

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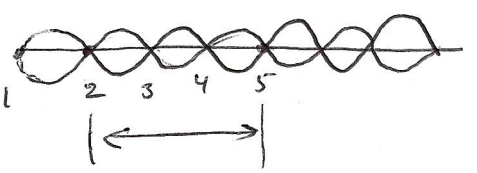
Q5.
Standing waves are produced by the interference of two traveling sinusoidal waves, each of frequency 100 Hz. The distance from the second node to the fifth node is 60 cm. The wavelength of each of the two original waves is:

$60 = 3\frac{\lambda}{2}$.

$\lambda = 30$ Cm.




A) 40 cm
B) 50 cm
C) 30 cm
D) 20 cm
E) 15 cm

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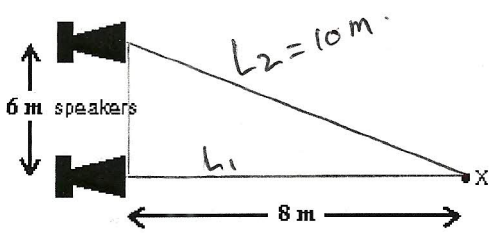
Q6.
Two small identical speakers are connected (in phase) to the same source. The speakers are 6 m apart and are at ear level. An observer stands at X=8 m in front of one speaker as shown in Fig. 1. The sound he hears will be least intense if the wavelength is: (First minema).

Fig#

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$L_2 - L_1 = \frac{\lambda}{2} \rightarrow \lambda = 4$ m.

A) 4 m
B) 9 m
C) 3 m
D) 2 m
E) 5 m