

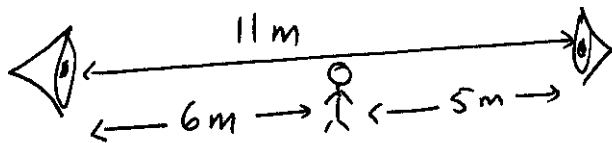
Name : Solution

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Sec. # :

Two speakers are driven by a common oscillator and face each other at a distance of 11 m. A man is standing at 6.0 m from one of the speakers along the line joining the two speakers. What is the lowest frequency of the oscillator, within the audible range (20.0 Hz to 20.0 kHz), so that the man hears a maximum sound? (Speed of sound = 343 m/s).

$$\Delta L = 6 - 5 = 1 \text{ m}$$



Maximum sound \Rightarrow constructive interference

$$\Rightarrow \Delta L = m \lambda \quad ; \quad m = 0, 1, 2, 3, \dots$$

$$\lambda = \frac{\Delta L}{m} = \frac{1}{m}$$

$$f_m = \frac{v}{\lambda} = \frac{343}{\frac{1}{m}} = 343 m \quad ; \quad m = 0, 1, 2, \dots$$

The lowest frequency within the audible range is when $m=1$

$$\Rightarrow \boxed{f = 343 \text{ Hz}}$$