

21.23. Model: We assume that the speakers are identical and that they are emitting in phase.

Solve: Since you don't hear anything, the separation between the two speakers corresponds to the condition of destructive interference. With $\Delta\phi_0 = 0$ rad, Equation 21.23 becomes

$$2\pi \frac{d}{\lambda} = 2(m + \frac{1}{2})\pi \text{ rad} \Rightarrow d = (m + \frac{1}{2})\lambda \Rightarrow d = \frac{\lambda}{2}, \frac{3\lambda}{2}, \frac{5\lambda}{2}$$

Since the wavelength is

$$\lambda = \frac{v}{f} = \frac{340 \text{ m/s}}{170 \text{ Hz}} = 2.0 \text{ m}$$

three possible values for d are 1.0 m, 3.0 m, and 5.0 m.