Answer on Question #52056 | Mechanics

An important news announcement is transmitted by radio waves to people who are 100 km away, sitting next to their radios, and by sound waves to people sitting across the newsroom, 3.0 m from the newscaster. Who receives the news first? Explain. Take the speed of sound in air to be 343 m/s.

Solution

The speed of radio wave is c = 3*10^8 m/s. The speed of sound v = 343 m/s. For transmission by radio waves we obtain:

$$t_r = \frac{l_r}{c} = \frac{10^5}{3*10^8}s \approx 3.34*10^{-4}s$$

And for transmission by sound waves we obtain:

$$t_s = \frac{l_s}{v} = \frac{3}{343}s \approx 8.7*10^{-3}s$$

Answer: $t_s > t_r$. It means that news transmitted by radio waves receives first.