

Physics 102Rec
Quiz#2
Chapter 18

Name: Key Id: _____ Sect: 02

Two sounds have sound intensity levels of 50 dB and 70 dB. If the first sound level is heard 50 m from the source, what is the distance from the source to hear the second sound?

$$\beta_1 = 50 \text{ dB} \Rightarrow I_1 = I_0 10^{\frac{\beta_1}{10}} = 10^{-12} \times 10^5 = 10^{-7} \text{ W/m}^2$$

$$\beta_2 = 70 \text{ dB} \Rightarrow I_2 = 10^{-12} \times 10^7 = 10^{-5} \text{ W/m}^2$$

$$I_1 = \frac{P}{4\pi r_1^2} \quad I_2 = \frac{P}{4\pi r_2^2}$$

$$\Rightarrow \frac{I_2}{I_1} = \left(\frac{r_1}{r_2}\right)^2 \Rightarrow r_2 = r_1 \sqrt{\frac{I_1}{I_2}} = 50 \sqrt{\frac{10^{-7}}{10^{-5}}}$$

$$r_2 = 50 \times 0.1 = \underline{\underline{5 \text{ m}}}$$