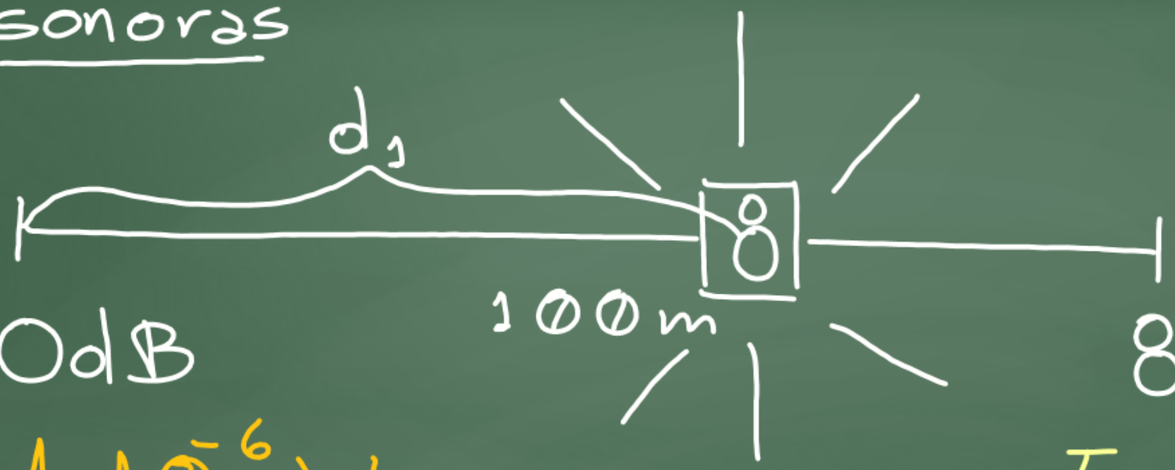
Ondas sonoras

6)



$I_1 = 1 \times 10^{-6} \frac{W}{m^2}$

$I_2 = 1 \times 10^{-4} \frac{W}{m^2}$

$$60\,dB = 10 \log\left(\frac{I_1}{I_0}\right) \Rightarrow 6 = \log\left(\frac{I_1}{I_0}\right)$$

$$10^6 = \frac{I_1}{I_0} \Rightarrow I_1 = 1 \times 10^{-6} \frac{W}{m^2}$$

$$I_2 = I_0 \times 10^{8}$$

$$\Rightarrow I_2 = 1 \times 10^{-9}\ W/m^2$$

$$I_1 = \frac{P}{A_1} \qquad I_2 = \frac{P}{A_2}$$

$$I_1 A_1 = I_2 A_2$$

$$\frac{I_2}{I_1} = \frac{A_1}{A_2} = \frac{\cancel{4\pi}\, d_1^2}{\cancel{4\pi}\,(\underbrace{100 - d_1}_{d_2})^2}$$

$$\Rightarrow d_1^2 = \frac{I_2}{I_1}(100 - d_1)^2 = 100(100 - d_1)^2$$

$$99 d_1^2 - 20.000\, d_1 + 1 \cdot 10^6 = 0$$

$$\Rightarrow \boxed{\begin{aligned} d_1 &= 90{,}9\ \text{m} \\ d_2 &= 9{,}1\ \text{m} \end{aligned}}$$