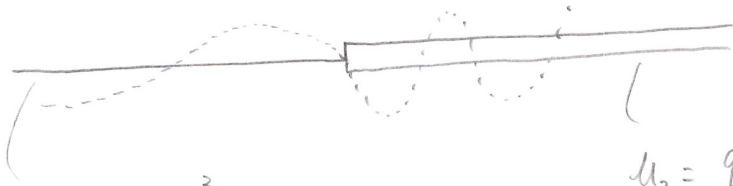


①



$$\mu_1 = 1.57 \times 10^{-3} \frac{\text{kg}}{\text{m}}$$

$$\mu_2 = 9.02 \times 10^{-3} \frac{\text{kg}}{\text{m}}$$

$$f_1 = 60 \text{ Hz}$$

$$|\vec{F}^T| = 10 \text{ N}$$

CONSTRAINTS

$$f_1 = f_2 \equiv f$$

$$|\vec{F}^T| = |\vec{F}^T| \equiv |\vec{F}^T|$$

$$v_1 = \sqrt{\frac{|\vec{F}^T|}{\mu_1}} \quad v_1 = f_1 \lambda_1$$

$$v_2 = \sqrt{\frac{|\vec{F}^T|}{\mu_2}} \quad v_2 = f_2 \lambda_2$$

$$v_1 = \sqrt{\frac{|\vec{F}^T|}{\mu_1}} \quad v_1 = f \lambda_1$$

$$v_2 = \sqrt{\frac{|\vec{F}^T|}{\mu_2}} \quad v_2 = f \lambda_2$$

$$\lambda_1 = \frac{1}{f} \sqrt{\frac{|\vec{F}^T|}{\mu_1}}$$

$$\lambda_2 = \frac{1}{f} \sqrt{\frac{|\vec{F}^T|}{\mu_2}}$$

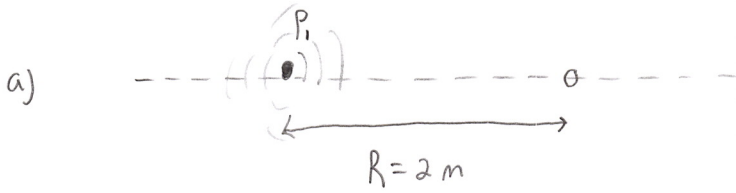
$$\lambda_1 = \frac{1}{60} \sqrt{\frac{10}{1.57 \times 10^{-3}}} \text{ m}$$

$$\lambda_1 \approx 1.33 \text{ m}$$

$$\lambda_2 = \frac{1}{60} \sqrt{\frac{10}{9.02 \times 10^{-3}}} \text{ m}$$

$$\lambda_2 \approx 0.555 \text{ m}$$

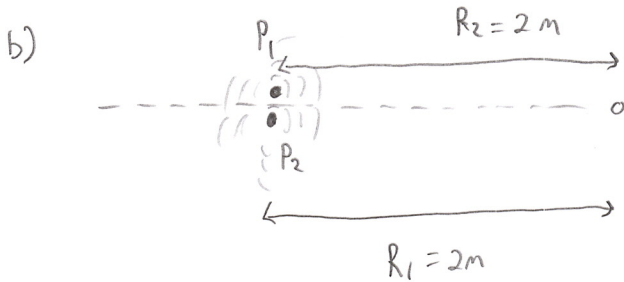
(2)



$$I = \frac{P_5}{A} = \frac{P_1}{4\pi R^2}$$

$$I = \frac{100 \text{ W}}{4\pi(2)^2 \text{ m}^2}$$

$$I \approx 1.99 \frac{\text{W}}{\text{m}^2}$$



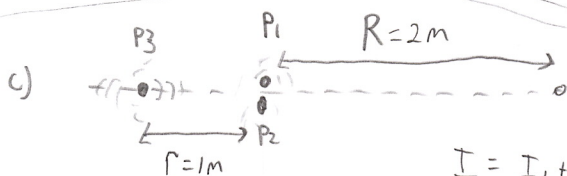
$$I = I_1 + I_2$$

$$I = \frac{P_1}{4\pi R_1^2} + \frac{P_2}{4\pi R_2^2}$$

$$\left. \begin{array}{l} \text{w/ } P_1 = P_2 \\ + \\ R_1 = R_2 \end{array} \right\} I_1 = I_2$$

$$I = (1.99 + 1.99) \frac{\text{W}}{\text{m}^2}$$

$$I = 3.98 \frac{\text{W}}{\text{m}^2}$$



$$I = I_1 + I_2 + I_3 = 5 \frac{\text{W}}{\text{m}^2}$$

$$3.98 \frac{\text{W}}{\text{m}^2} + I_3 = 5 \frac{\text{W}}{\text{m}^2}$$

$$I_3 = 1.02 \frac{\text{W}}{\text{m}^2}$$

$$\frac{P_3}{4\pi(r+R)^2} = 1.02 \frac{\text{W}}{\text{m}^2}$$

$$P_3 \approx 115 \text{ W}$$

(3)

$$\beta = 88 \text{ dB}$$

$$\beta = 10 \log_{10} \left(\frac{I}{I_0} \right)$$

$$\frac{\beta}{10} = \log_{10} \left(\frac{I}{I_0} \right)$$

$$10^{\left(\frac{\beta}{10}\right)} = 10^{\log_{10} \left(\frac{I}{I_0} \right)}$$

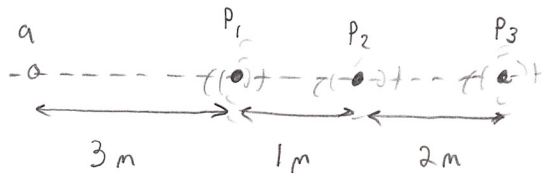
$$10^{\left(\frac{\beta}{10}\right)} = \frac{I}{I_0}$$

$$I = I_0 \cdot 10^{\left(\frac{\beta}{10}\right)}$$

$$I = (1 \times 10^{-12} \frac{\text{W}}{\text{m}^2}) \cdot 10^{\left(\frac{88}{10}\right)}$$

$$I \approx 6.31 \times 10^{-4} \frac{\text{W}}{\text{m}^2}$$

(4)



$$\beta = 10 \log_{10} \left(\frac{\Sigma I}{I_0} \right)$$

$$\Sigma I = I_1 + I_2 + I_3$$

$$\Sigma I = \frac{P_1}{A_1} + \frac{P_2}{A_2} + \frac{P_3}{A_3}$$

$$\Sigma I = \frac{10 \text{ W}}{4\pi(3)^2 \text{ m}^2} + \frac{20 \text{ W}}{4\pi(4)^2 \text{ m}^2} + \frac{30 \text{ W}}{4\pi(6)^2 \text{ m}^2}$$

$$\Sigma I \approx 0.254205811 \text{ W/m}^2$$

$$\beta = 10 \text{ dB} \log_{10} \left(\frac{0.254205811 \text{ W/m}^2}{1 \times 10^{-12}} \right)$$

$$\beta \approx 114 \text{ dB}$$