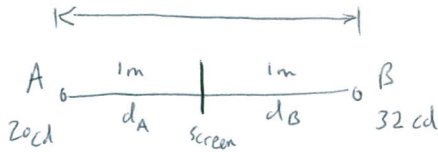


1.



$$E = \frac{I}{r^2}$$

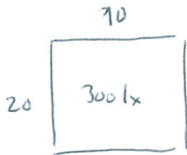
$$E_A = \frac{20}{1^2} = \underline{20 \text{ lx}} \quad 10$$

$$E_B = \frac{32}{1^2} = \underline{32 \text{ lx}} \quad 10$$

$$\left. \begin{aligned} \frac{20}{d_A^2} &= \frac{32}{d_B^2} \quad \text{--- (i)} \\ d_A + d_B &= 2 \quad \text{--- (ii)} \end{aligned} \right\}$$

$$d_A = \underline{0.883 \text{ m}} \quad 10$$

2.



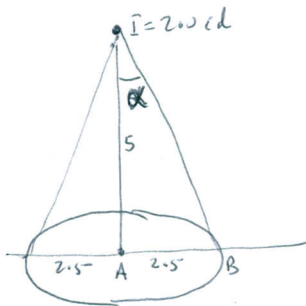
$$Q_{\text{Lighting}} = EA = 300 \times (10 \times 20) = 60000 \text{ lm}$$

$$\phi_{\text{total}} = \frac{60000}{0.8 \times 0.48} = \frac{187500}{156250} \text{ lm}$$

$$\phi_{\text{lamp}} = \frac{\phi_T}{8}$$

$$I = \frac{\phi_{\text{lamp}}}{4\pi} = \frac{156250}{8 \times 4\pi} = \underline{1554.25 \text{ cd}} \quad 20$$

3.



$$(a) \quad E_A = \frac{I}{r^2} = \frac{200}{5^2} = \underline{8 \text{ lx}} \quad 10$$

$$\cos \theta = \frac{5}{\sqrt{5^2 + 2.5^2}} = 0.894$$

$$E_B = E_A \cos^3 \theta = \cancel{8 \text{ lx}}^3 \times 0.894^3 = \underline{5.72 \text{ lx}} \quad 10$$

$$(b) \quad d\phi = I d\omega, \quad \omega = 4\pi$$

$$\phi = I\omega = 200 \times 4\pi = 2513 \text{ lm}$$

$$\phi_{\text{used}} = 0.6 \times 2513 = 1508 \text{ lm}$$

$$E = \frac{\phi_{\text{used}}}{A} = \frac{1508}{\pi \cdot 5^2/4} = \underline{77 \text{ lx}} \quad 30$$