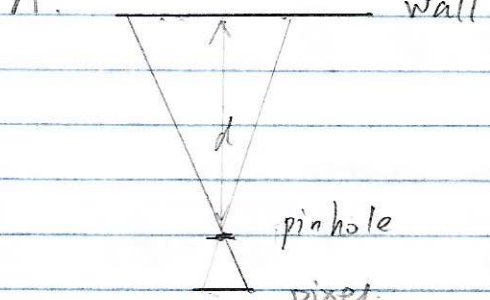
P2/ Apixel represents the area of pixel

1. $d = 1000$ mm.

$A_{pixel} = 1 \times 1$ mm$^2$

A.

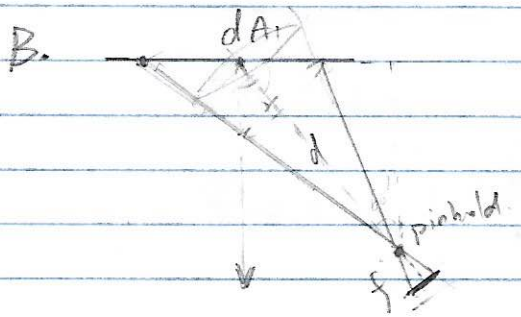



$$\frac{A}{A_{pixel}} = \frac{d^2}{f^2}$$

$$A = \frac{d^2}{f^2} A_{pixel}$$

$$= \frac{(1000)^2}{(50)^2} \times 1 \times 1 = 400 \text{ mm}^2$$

B.

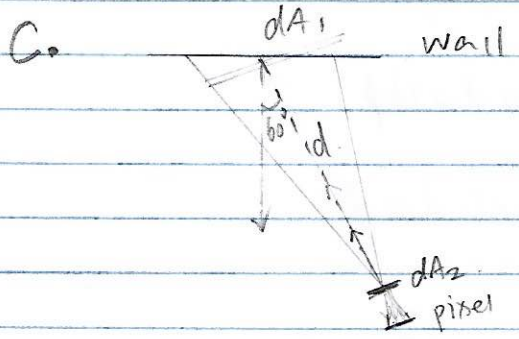



$\theta_1 = 60°$

$$\frac{dA_1 \cos\theta_1}{A_{pixel}} = \frac{d^2}{f^2}$$

$$dA_1 = \frac{d^2 A_{pixel}}{f^2 \cos\theta_1} = 800 \text{ mm}^2$$

C.




$$L = \frac{P}{(dA\cos\theta)d\omega}$$

$$d\omega = \frac{dA\cos\theta}{r^2} \qquad \theta_1 = 60° \quad \theta_2 = 0°, \; r = d$$

$$P_{A2} = L \, dA_1 \cos A_1 \, d\omega_{1\to 2}$$

$$= \frac{L}{r^2} dA_1 dA_2 \cos\theta_1 \cos\theta_2$$

$$= \frac{L}{d^2} dA_1 dA_2 \cos\theta_1$$

$$= L \, dA_2 \, \frac{800 \times \cos 60°}{(1000)^2}$$

$$= \frac{L \, dA_2}{2500}$$