

PINHOLE CAMERA QUESTIONS

1. If an object is h_o 7.0 cm tall, and it is d_o 15.0 cm in front of a pinhole camera whose d_i = 6.0 cm, calculate the height of the image.

$$\frac{h_i}{h_o} = \frac{d_i}{d_o} \quad \frac{h_i}{7.0\text{cm}} = \frac{6.0\text{cm}}{15.0\text{cm}} \quad \boxed{h_i = 2.8\text{cm}}$$

2. A candle is h_o 4.3 cm tall. If a pinhole camera is d_i 15.0 cm in length, where would the candle be found if its image is h_i 6.7 cm high. $d_o = ?$

$$\frac{h_i}{h_o} = \frac{d_i}{d_o} \quad \frac{6.7\text{cm}}{4.3\text{cm}} = \frac{15.0\text{cm}}{d_o} \quad \boxed{d_o = 9.6\text{cm}}$$

3. Calculate the size of the image of a tree that is h_o 8.0 cm high and d_o 80 m from a pinhole camera that is d_i 20 cm long. $\rightarrow 80\text{m} \times \frac{100\text{cm}}{1\text{m}} = 8000\text{cm}$

$$\frac{h_i}{h_o} = \frac{d_i}{d_o} \quad \frac{h_i}{80\text{cm}} = \frac{20\text{cm}}{8000\text{cm}} \quad \boxed{h_i = 0.02\text{cm}}$$

4. Calculate the distance from the pinhole to an object that is h_o 3.5 m high, and whose image is h_i 10 cm high in a pinhole camera d_i 20 cm long. $\rightarrow 3.5\text{m} \times \frac{100\text{cm}}{1\text{m}} = 350\text{cm}$

$$\frac{h_i}{h_o} = \frac{d_i}{d_o} \quad \frac{10\text{cm}}{350\text{cm}} = \frac{20\text{cm}}{d_o} \quad 0.02857 = \frac{20\text{cm}}{d_o} \quad \boxed{d_o = 700\text{cm}}$$

2. Use a ray diagram to show how the light forms the image in the pinhole camera.

