

Answer on Question #73641 Physics / Optics

The distance between an object and a screen is 98 cm. A convex lens placed between object and screen so as it get an image on the screen magnified 12 times. Calculate the focal length and power of lens.

Solution:

For a thin lens the focal length f is given by equation

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

where u is the distance from the object to the lens, v is the distance from the lens to the image (screen).

In our case

$$\begin{cases} u + v = 0.98 \text{ m} \\ \frac{v}{u} = 12 \end{cases}$$

We get

$$u = 0.075 \text{ m}, \quad v = 0.905 \text{ m}$$

Thus

$$\begin{aligned} \frac{1}{f} &= \frac{1}{0.075} + \frac{1}{0.905} \\ f &= 0.07 \text{ m} \end{aligned}$$

The power of lens

$$P = \frac{1}{f} = \frac{1}{0.07} = 14.4 \text{ m}^{-1}$$

Answers:

$$f = 0.07 \text{ m}$$

$$P = 14.4 \text{ m}^{-1}$$

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