

Answer on Question #41830, Physics, Optics

Find the position and magnification, m , of the image formed by a concave mirror of focal length 24 cm when an object is placed 40 cm from the mirror given that m is

Solution:

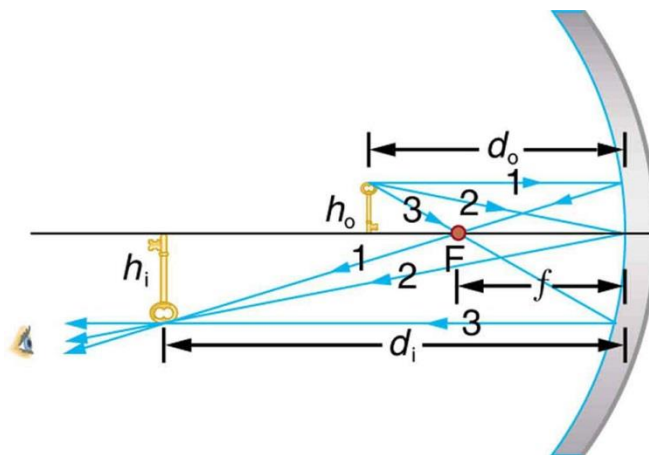
Given:

$$d_o = 40 \text{ cm} = 0.4 \text{ m},$$

$$f = 24 \text{ cm} = 0.24 \text{ m},$$

$$m = ?,$$

$$d_i = ?$$



The equation expresses the quantitative relationship between the object distance (d_o), the image distance (d_i), and the focal length (f). The equation is stated as follows:

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

Thus,

$$\frac{1}{d_i} = \frac{1}{f} - \frac{1}{d_o}$$

$$\frac{1}{d_i} = \frac{1}{0.24} - \frac{1}{0.4} = 1.67$$

$$d_i = \frac{1}{1.67} = 0.6 \text{ m} = 60 \text{ cm}$$

The magnification of the lens is given by:

$$m = -\frac{d_i}{d_o}$$

$$m = -\frac{60}{40} = -1.5$$

A negative sign in the value of the magnification indicates that the image is real.

Answer. $d_i = 60 \text{ cm}$, $m = -1.5$