

### Answer on Question #41498 – Physics – Mechanics

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  $VU$

- a. 50cm and 24
- b. 60cm and 24
- c. 50cm and 15
- d. 60cm and 15

#### Solution:

$f = 24\text{cm}$  – focal length;

$d_o = 40\text{cm}$  – distance from object to mirror;

$d_i$  – distance from image to mirror;

$m$  – magnification;

The Gaussian mirror equation, also known as the mirror and lens equation, relates the object distance  $d_o$  and image distance  $d_i$  to the focal length  $f$ :

$$\frac{1}{d_o} + \frac{1}{d_i} = \frac{1}{f}$$
$$\frac{1}{d_i} = \frac{1}{f} - \frac{1}{d_o} = \frac{d_o - f}{fd_o}$$
$$d_i = \frac{fd_o}{d_o - f} = \frac{24\text{cm} \cdot 40\text{cm}}{40\text{cm} - 24\text{cm}} = 60\text{cm}$$

Formula for the magnification:

$$m = \frac{h_{\text{image}}}{h_{\text{object}}} = \frac{d_i}{d_o} = \frac{60\text{cm}}{40\text{cm}} = 1.5$$

Hence, correct answer is d.

**Answer:** d. 60cm and 15