

Q- A 3.0-cm-tall domino is located 100 cm from a concave spherical mirror of $R = 30$ cm. Locate the position of the image and find the magnification.

The mirror formula is

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

In a concave mirror the focus is on the same side as that of object and hence the focal length f is negative. Moreover, the focal length is half of the radius of curvature hence here $f = -15$ cm and object distance $u = -100$ cm. Substituting in the formula we get

$$\frac{1}{-15} = \frac{1}{-100} + \frac{1}{v}$$

Or
$$\frac{1}{v} = \frac{1}{-15} + \frac{1}{100} = \frac{-17}{300}$$

Gives $v = -17.647$ cm

Negative sign shows that the image is on the same side as that of the object.

The magnification is given by

$$m = -v/u = -(-17.647)/(-100) = -0.1765$$

Negative sign is showing that the image is inverted.

Thus, the length of the image is given by

$$m = I/O = 0.1765$$

Or
$$I = 3 \times 0.1765 = 0.5294 \text{ cm.}$$

Hence an inverted image of height 0.53 cm is formed at a distance of 17.65 cm from the mirror on the same side of the object.
