Physics Class Notes

Click here to watch the video

Magnification (m)

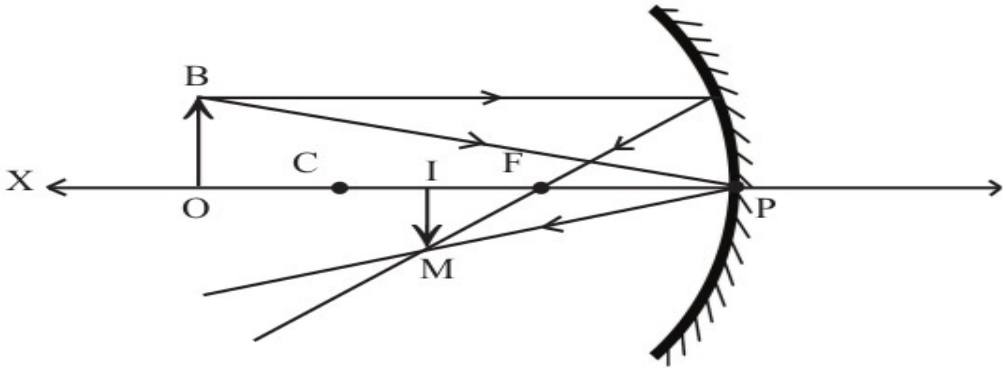
Magnification is the ratio of the height of the image to the height of the object.

Magnification = height of image / height of object.

That is, $m = h_i / h_o = - v / u$

Since magnification is a ratio, it has no unit.

Proof of $m = h_i / h_o = - v / u$



The figure shows the image formation of an object OB placed beyond the centre of curvature (C) of a concave mirror.

In the figure Δ OBP and Δ IMP are similar triangles.

We know that, the ratio of corresponding sides of similar triangles are equal.

Hence IM / OB = PI / PO

According to New Cartesian Sign Convention, $IM = - h_i$, $OB = h_o$, $PI = -v$, and $PO = -u$

On substituting the values in the above equation,

$-h_i / h_o = - v / - u$

or $h_i / h_o = - v / u$

Therefore $m = h_i / h_o = - v / u$

Problems

1. **When an object of height 6 cm is placed in front of a concave mirror at a distance of 10 cm away from it, an image is obtained 16 cm away, on the same side. Find out height of the image and magnification.**

Ans: $u = -10$ cm

$v = - 16$ cm

$h_0 = 6$ cm

magnification, $m = - v / u = -(-16) / (-10)$

$= 16/(-10)$

$= -1.6$

magnification, $m = h_i / h_o$

$-1.6 = h_i / 6$

$h_i = -1.6 \times 6$

$= - 9.6$ cm

2. **An object is placed 8 cm away in front of a concave mirror of focal length 5 cm. Find out position of image and magnification.**

Ans: $u = - 8$ cm

$f = - 5$ cm

Suraj S HST(Physical Science) MTDMHSS Thondernad

v= fu/ (u-f)
= (-5 x – 8) / (-8 - (- 5))
= 40/ - 3
= - 13.33 cm
magnification, m = - v / u
= -(-13.33)/ (-8)
= - 1.66