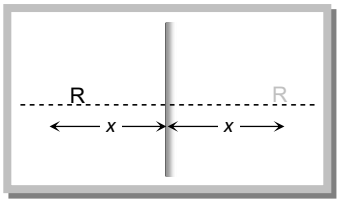
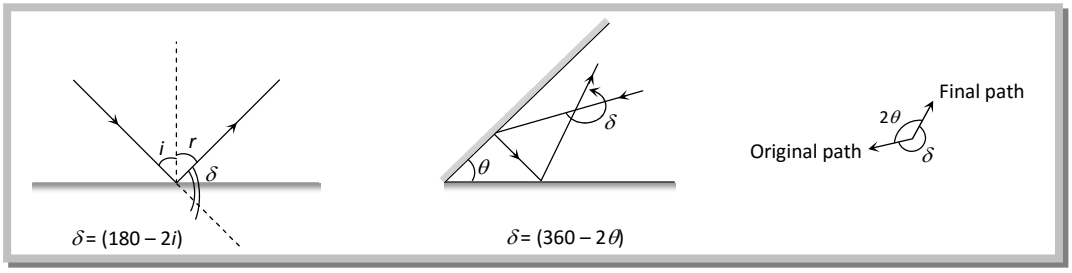
## Plane Mirror.

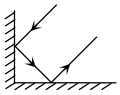
The image formed by a plane mirror is virtual, erect, laterally inverted, equal in size that of the object and at a distance equal to the distance of the object in front of the mirror.



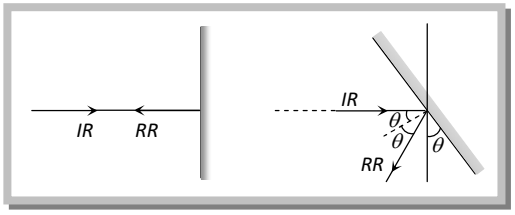

(1) Deviation: Deviation produced by a plane mirror and by two inclined plane mirrors.




Note: If two plane mirrors are inclined to each other at 90o, the emergent ray is anti-parallel to incident ray, if it suffers one reflection from each. Whatever be the angle to incidence.



(2) Rotation: If a plane mirror is rotated in the plane of incidence through angle$\theta$, by keeping the incident ray fixed, the reflected ray turned through an angle $2\theta$.



(3) Images by two inclined plane mirrors: When two plane mirrors are inclined to each other at an angle$\theta$, then number of images (n) formed of an object which is kept between them.

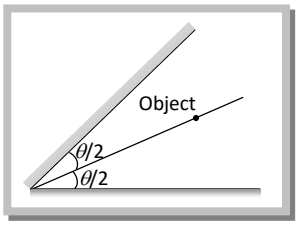
(i) $n = \left(\frac{360}{\theta} - 1\right)$; If $\frac{360}{\theta} =$ even integer

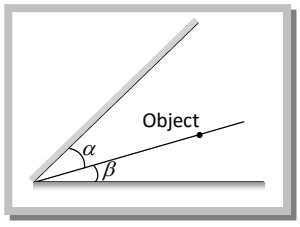
(ii) If $\frac{360}{\theta} =$ odd integer then there are two possibilities

(a) Object is placed symmetrically (b) Object is placed asymmetrically

$$n = \left(\frac{360}{\theta} - 1\right)$$

$$n = \frac{360}{\theta}$$




Note: If θ = 0o i.e. mirrors are parallel to each other so $n = \infty$ i.e. infinite images will be formed.

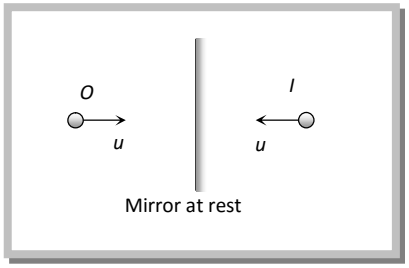
If θ = 90o, $n = \frac{360}{90} - 1 = 3$

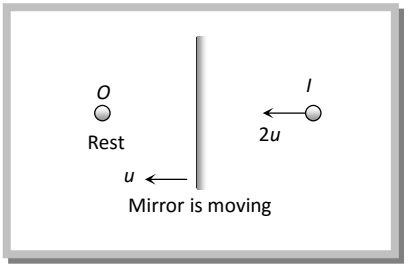
If θ = 72o, $n = \frac{360}{72} - 1 = 4$ (If nothing is said object is supposed to be symmetrically placed).

(4) Other important information's

(i) When the object moves with speed u towards (or away) from the plane mirror then image also moves toward (or away) with speed u. But relative speed of image w.r.t. object is 2u.

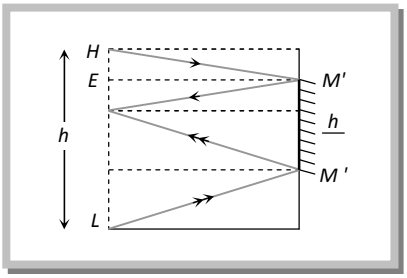
(ii) When mirror moves towards the stationary object with speed u, the image will move with speed 2u.

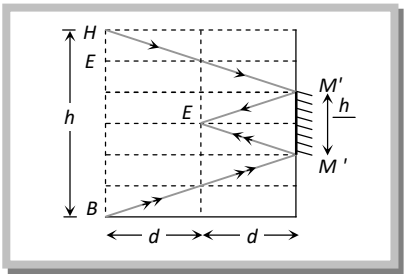


(iii) A man of height h requires a mirror of length at least equal to h/2, to see his own complete image.

(iv) To see complete wall behind himself a person requires a plane mirror of at least one third the height of wall. It should be noted that person is standing in the middle of the room.

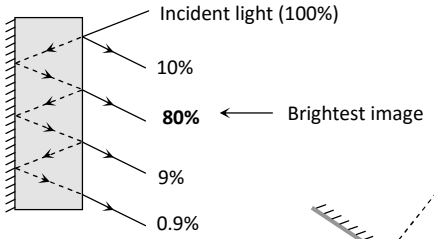


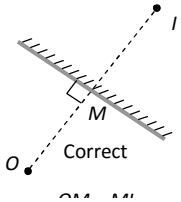



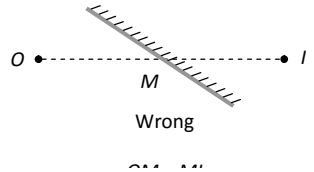

Concepts

The reflection from a denser medium causes an additional phase change of $\pi$ or path change of $\lambda/2$ while reflection from rarer medium doesn't cause any phase change.

We observe number of images in a thick plane mirror, out of them only second is brightest.




To find the location of an object from an inclined plane mirror, you have to see the perpendicular distance of the object from the mirror.