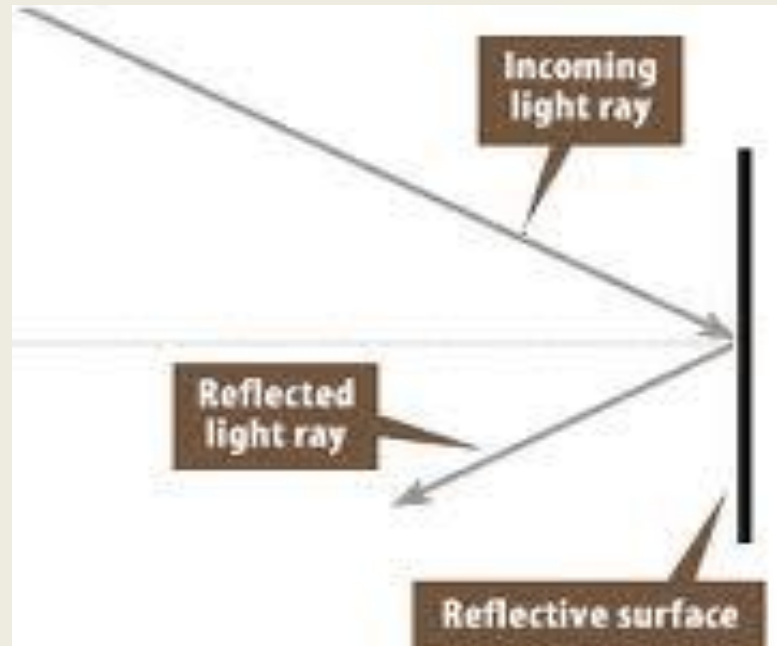


# Reflection of light at Plane surface



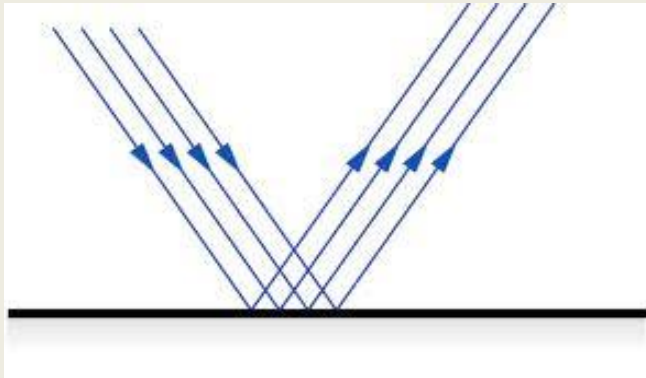
# Reflection of Light



The return of light into the same medium after striking a surface is called reflection

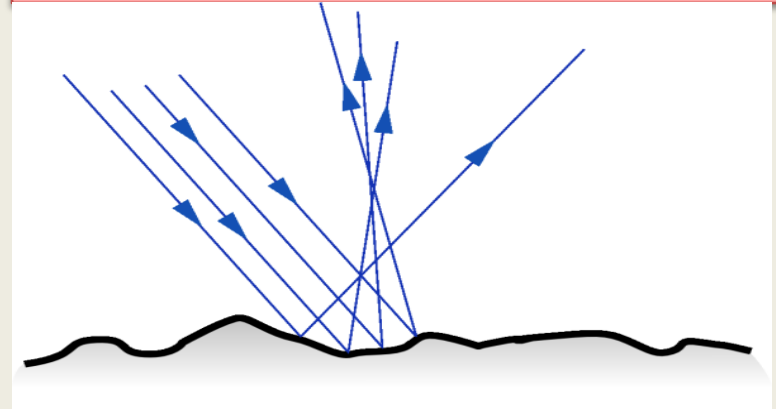
# Kinds of Reflection

## Regular reflection



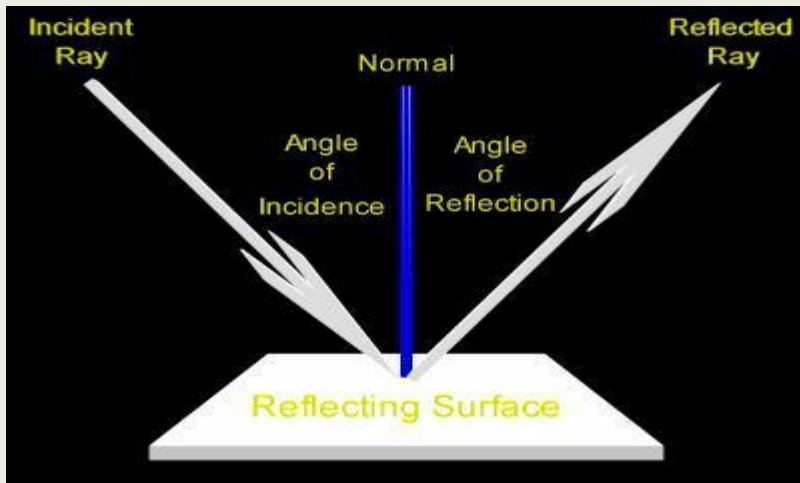
- Regular reflection occurs when a beam of light falls on a smooth and polished surface such as a plane mirror. If a parallel beam of light is incident on a plane mirror, the reflected beam is also parallel and it is in a fixed direction. This is called regular reflection

## Irregular reflection



- Irregular reflection occurs when a beam of light falls on a rough surface such as walls of a room . When light rays strike at different parts of a rough surface, each ray gets reflected from different points of the rough surface. Due to uneven surface, the light rays get reflected in different directions and give rise to irregular reflection

# Terms related with reflection



The light ray striking a reflecting surface is called **incident ray**

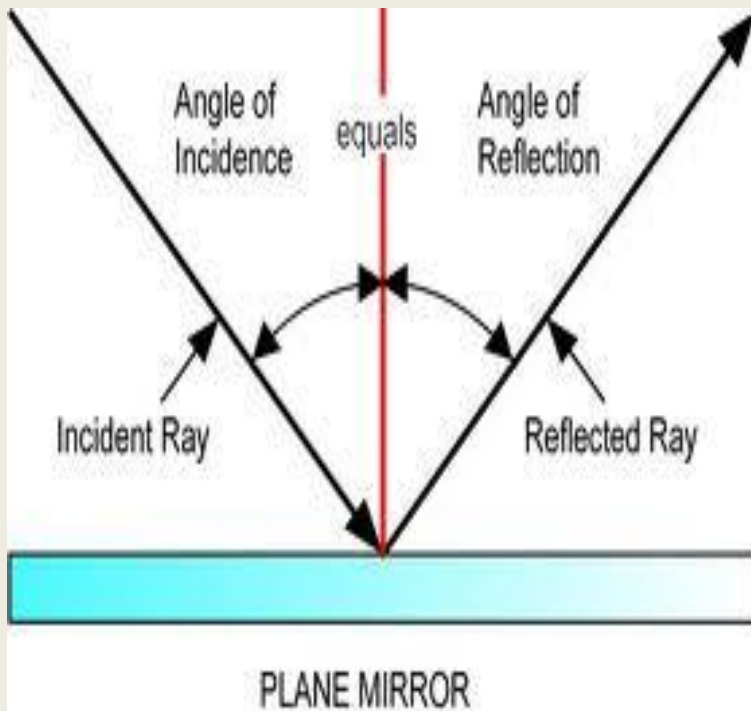
The light ray obtained after reflection from the surface ,in the same medium in which the incident ray is travelling is called the **reflected ray** .

The perpendicular drawn to the surface at the point of incidence ,is called **the normal**

The angle which the incident ray makes with the normal at the point of incidence , is called the **angle of incidence**

The angle which the reflected ray makes with the normal at the point of incidence is called **angle of reflection**.

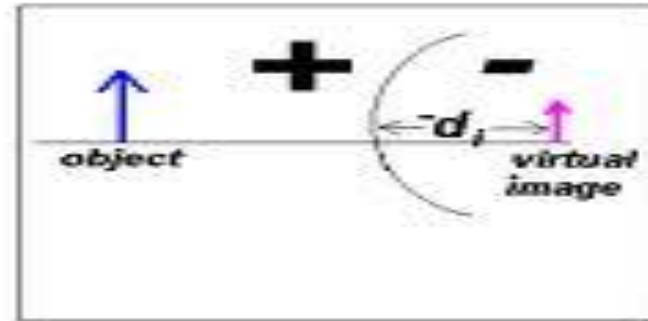
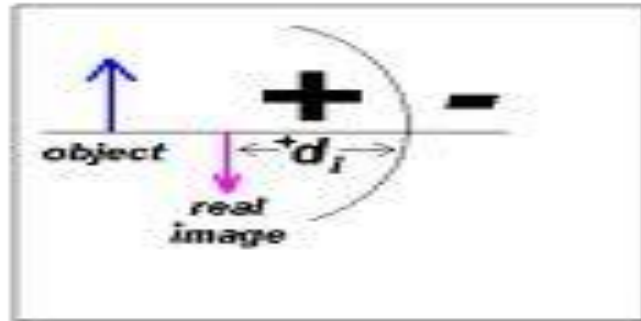
# Laws of reflection



The angle of incidence  $i$  is equal to the angle of reflection  $r$

The incident ray, the reflected ray and the normal at the point of incidence, lie in the same plane.

# Types of images



A real image is formed due to actual intersection of the reflected rays.

A real image can be obtained on a screen.

A real image is inverted with respect to the object.

Example: The image of a distant object formed by a concave mirror

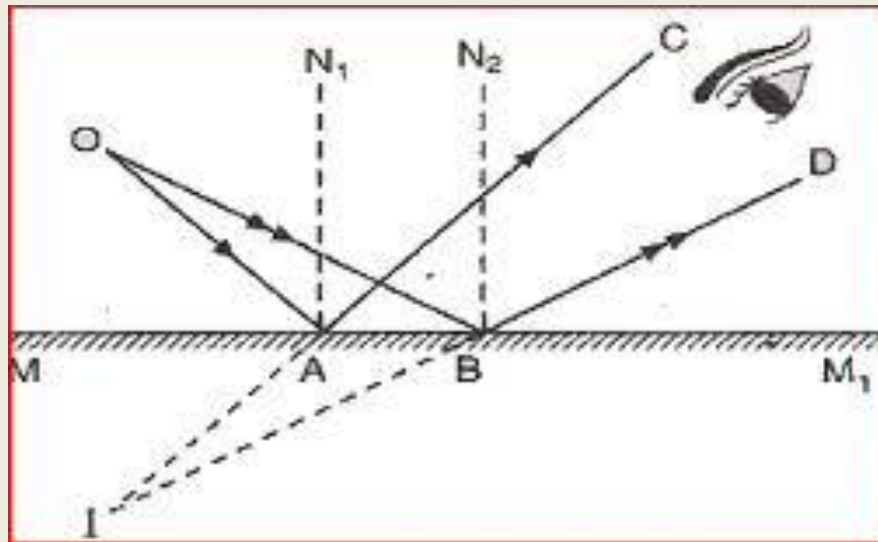
A virtual image is formed when the reflected rays meet if they are produced backwards

A virtual image can not be obtained on a screen.

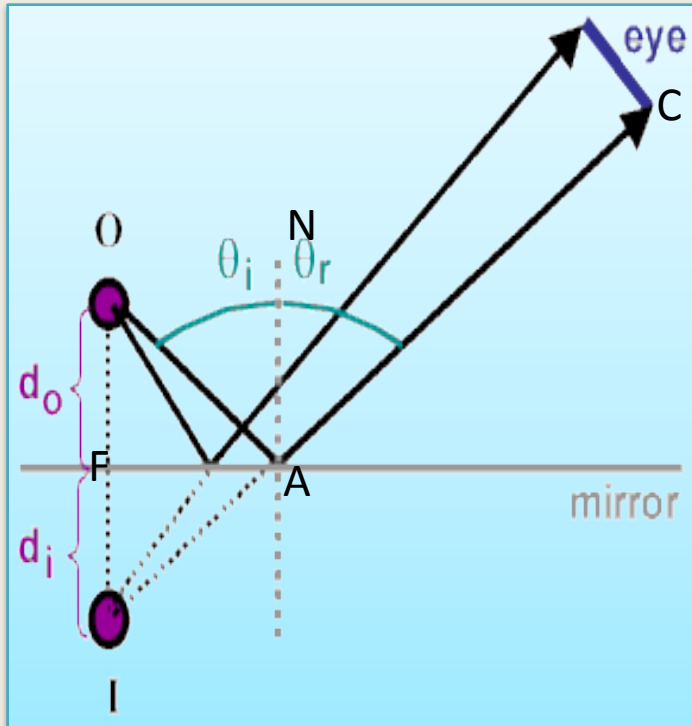
A virtual image is erect with respect to the object

Example : the image formed by a plane mirror or by a convex mirror.

# Image of a point object formed by a Plane Mirror



## Position of image



## Proof:

For the incident ray OA reflected as AC,

$\angle OAN =$  angle of incidence  $i$

$\angle CAN =$  angle of reflection  $r$

By the law of reflection,

Angle of incidence = angle of reflection

or  $\angle OAN = \angle CAN$

$\angle OAN = \angle AOF$  (Alternate angles)

$\angle CAN = \angle AIF$  (Corresponding angles)

Therefore  $\angle AOF = \angle AIF$

$\angle AFO = \angle AFI (= 90^\circ)$

and FA is the common side.

Therefore, the triangles AOF and AIF are congruent.

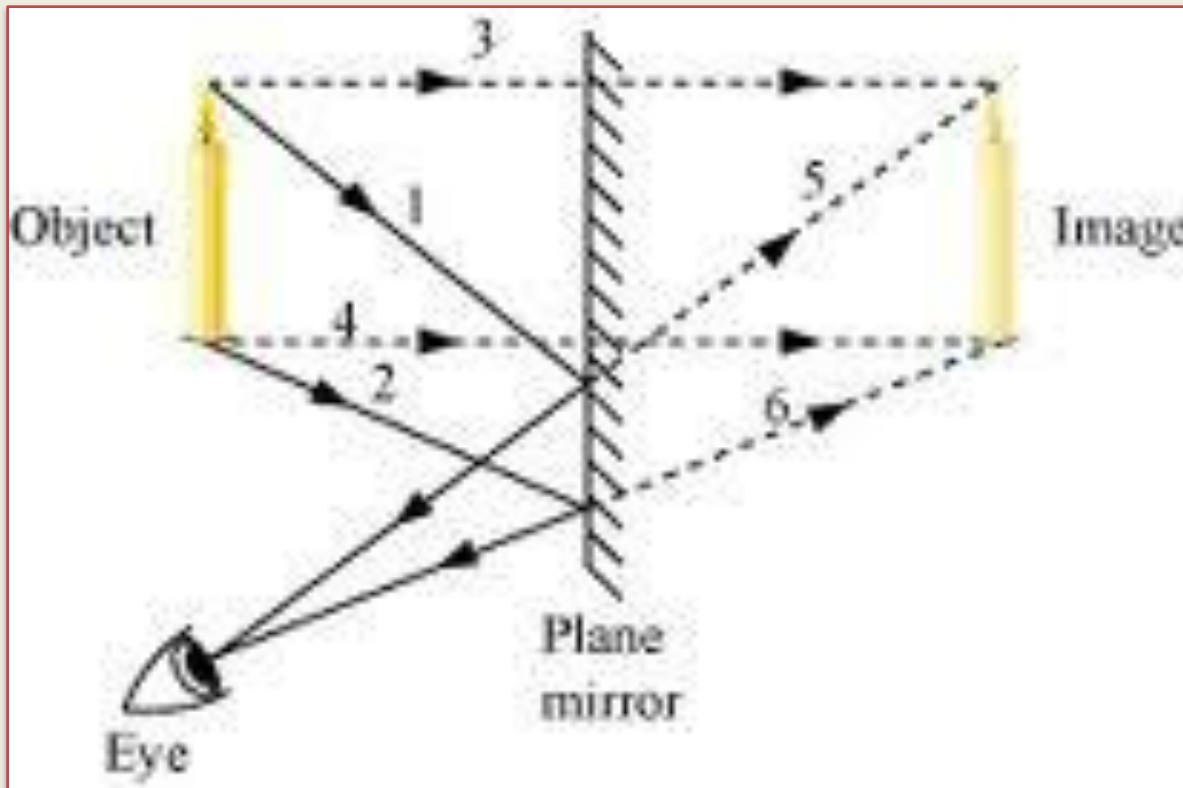
Hence  $OF = IF$

Since OF is the normal drawn from the object O on the mirror, so the normal distance of the object from the mirror is equal to the normal distance of image from the mirror

The image is situated on the normal drawn from the object on mirror and it is as far behind the mirror as the object is in front of it.

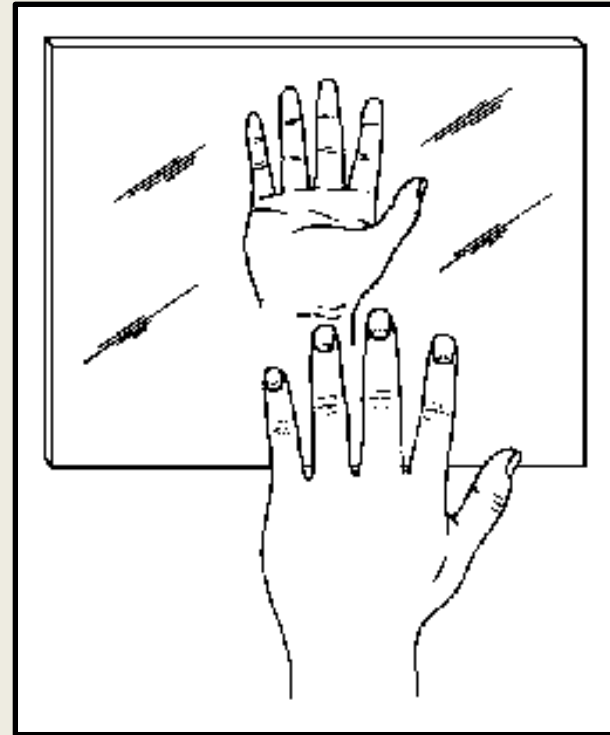
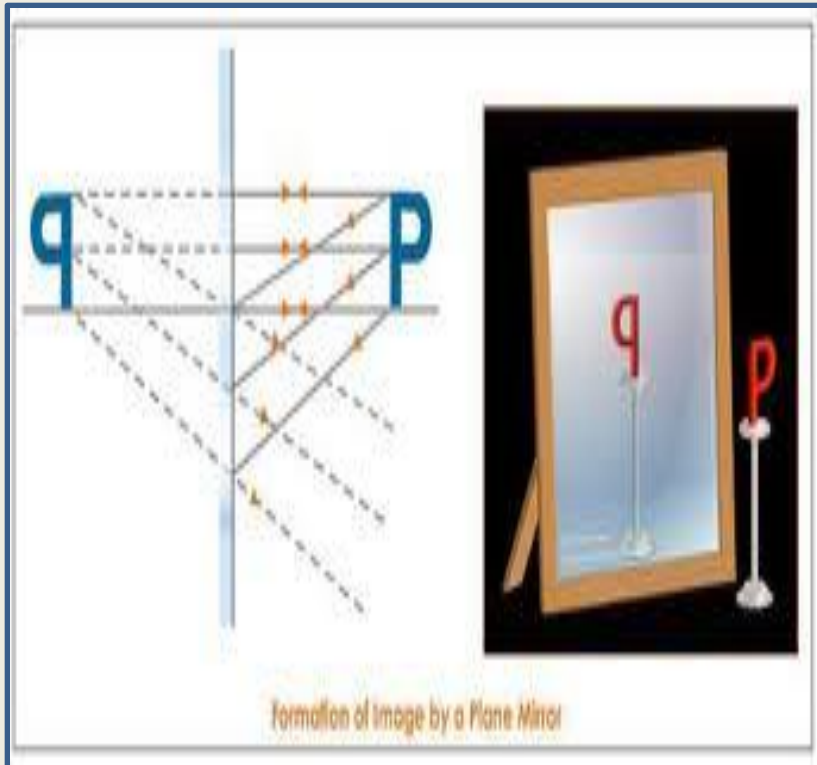


# Image of an extended object formed by a plane mirror



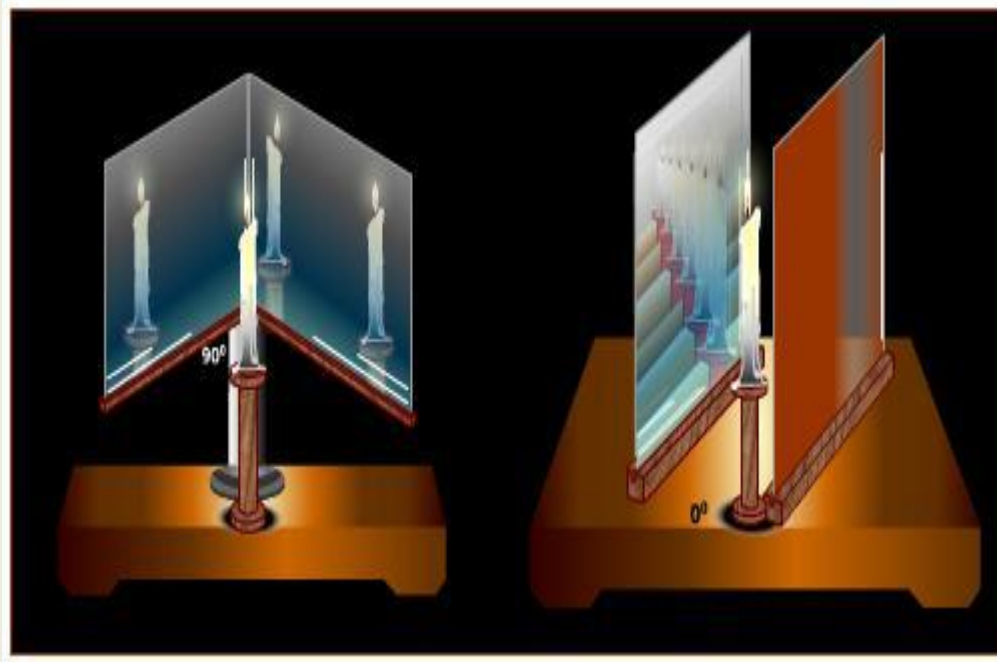
It is erect and of size equal to that of the object. The normal distance of each point of image behind the mirror is the same as the normal distance of the corresponding object point in front of the mirror.

# Lateral Inversion



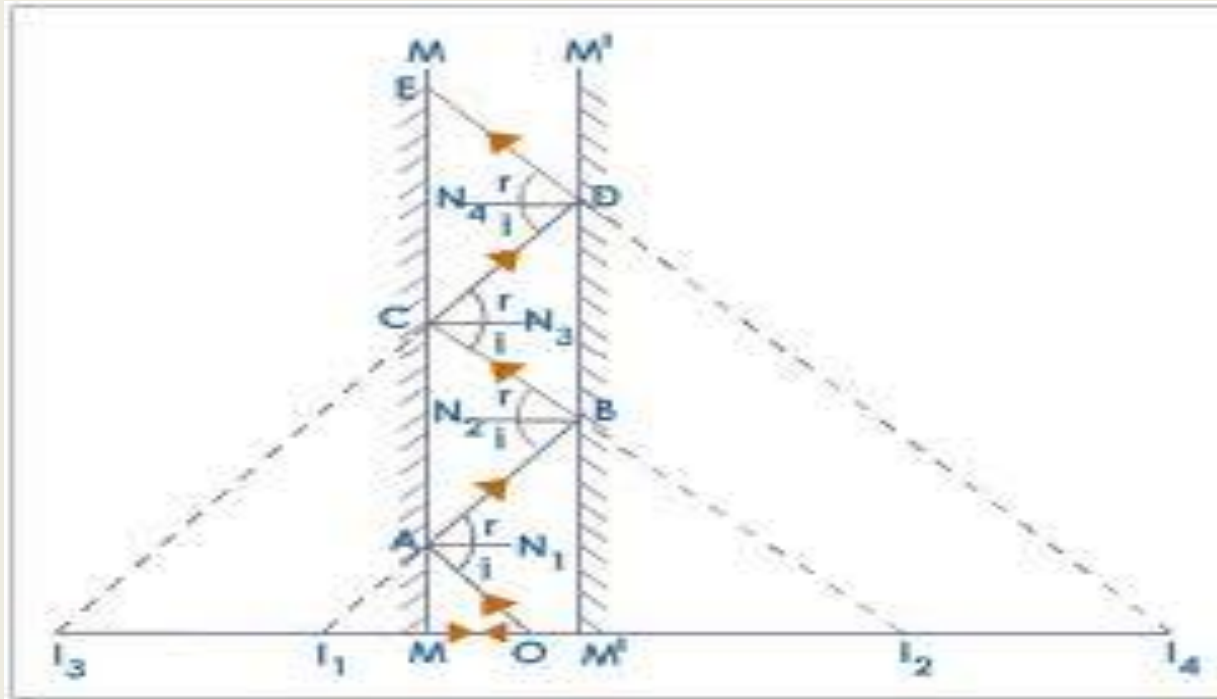
The interchange of the left and right sides in the image of an object in a plane mirror is called the lateral inversion

# Images formed in a pair of mirrors



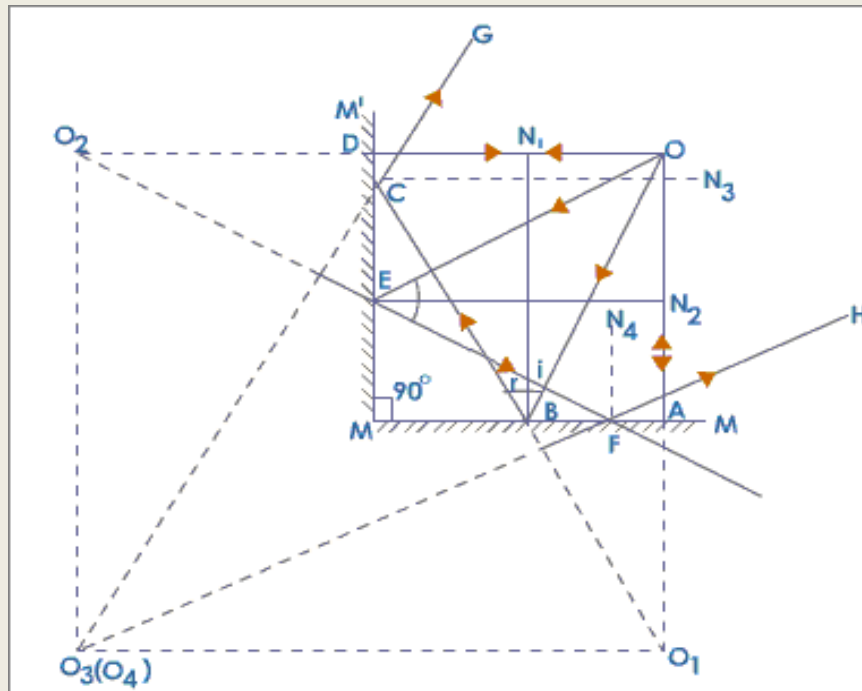
The number of images formed depends on the angle between the two mirrors. If two mirrors make an angle  $\theta$  with each other and the object is placed between the two mirrors, the number of images formed is  $n = 360/\theta$  or  $(360/\theta) - 1$  such that  $n$  is always an odd integer.

# Images formed in a pair of mirrors placed parallel to each other



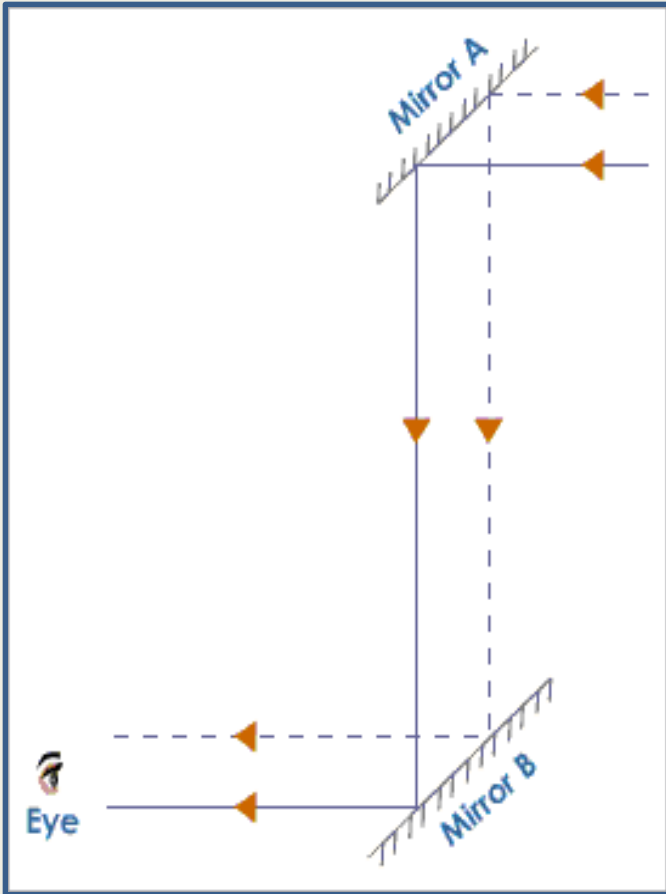
When the mirrors are kept parallel to each other, an infinite number of images are formed for an object kept in between them.

# Images formed in two perpendicular mirrors



If two mirrors are kept perpendicular to each other, three images are formed for an object kept in between them

# Simple Periscope



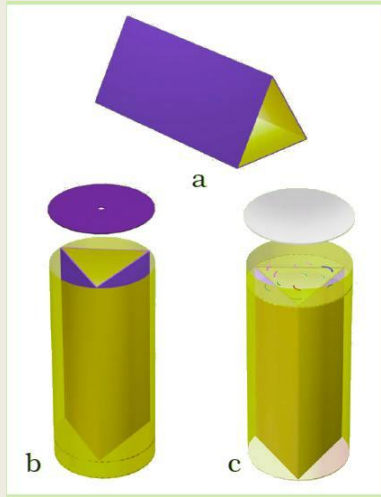
It is an instrument used for looking over the heads of a crowd by raising it above the obstacle or for observing the enemy's trenches without being seen. It is also used in submarines for observing the movement of other ships.

**Principle:** It is based on the principle of reflection at the two parallel plane mirrors facing each other and each kept inclined at an angle of  $45^\circ$  with the vertical.

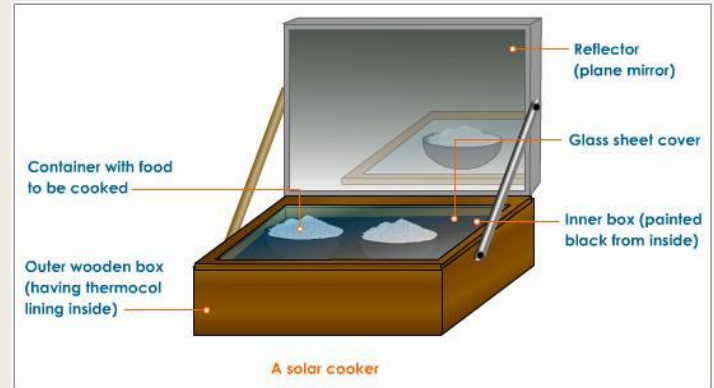
# Uses of Plane Mirror



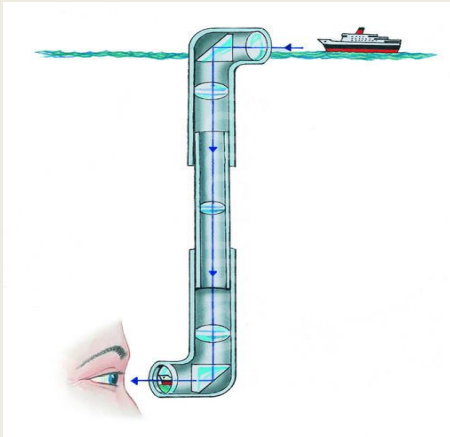
As a looking glass



Kaleidoscope



In the solar heating devices such as solar cooker.



Periscope