



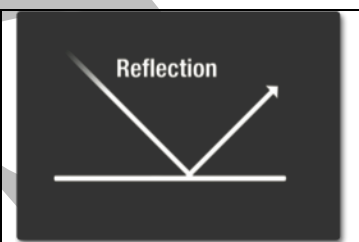
PHYSICS STD 8 ICSE

REFLECTION OF LIGHT AT A PLANE SURFACE



Reflection of light:

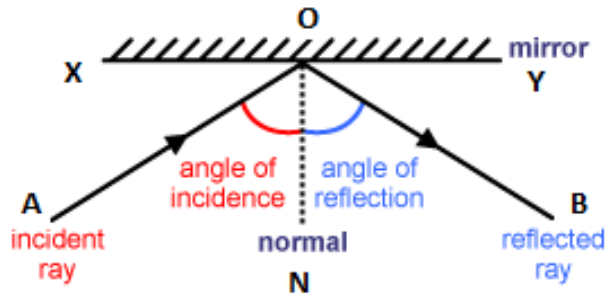
When a beam of light is incident on a surface, a part of it is returned into the same medium. This phenomenon is called reflection of light.



KINDS OF REFLECTION: There are usually two types of reflection:

Regular reflection	Irregular reflection or Diffused reflection
<p>Parallel incident beam</p> <p>Parallel reflected beam</p> <p>Plane Surface</p>	<p>Parallel incident beam</p> <p>Non-parallel reflected beam</p> <p>Irregular (rough) surface</p>
<p>1. Regular reflection occurs when a beam of light falls on a smooth and polished surface.</p> <p>2. If the incident beam is parallel, the reflected beam is also parallel and in a fixed direction.</p> <p>E.g., Reflection of light from a plane mirror.</p>	<p>1. Irregular reflection occurs when a beam of light falls on a rough surface.</p> <p>2. When a parallel beam of light falls on a rough surface, the reflected beam gets scattered in all directions and spreads over a wide area.</p> <p>E.g., Reflection of light from the wall of a room, newspaper, page of a book or any other object.</p> <p>[<u>Note:</u> It is the diffused light obtained by reflection from the uneven surfaces which enables us to see the objects around us.]</p>

REFLECTION OF LIGHT AT A PLANE SURFACE (Terms used)



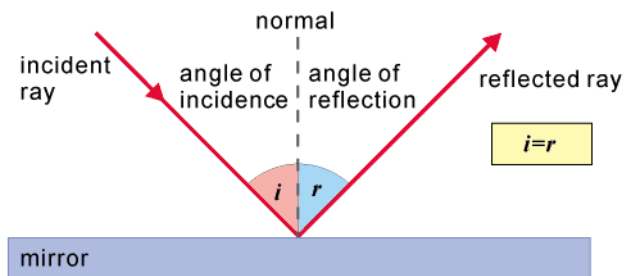
If XY is a reflecting surface, then:

1.Point of incidence(O) :	It is the point on the reflecting surface on which the ray of light falls.
2.Incident ray (AO) :	It is the ray of light that falls on or strikes the reflecting surface.
3.Normal (ON) :	It is an imaginary line drawn perpendicular to the reflecting surface at the point of incidence.
4.Reflected ray (OB) :	It is the ray of light that is sent from the reflecting surface back into the same medium in which the incident ray is travelling.
5.Angle of incidence(i) :	It is the angle formed between the incident ray and the normal.
6.Angle of reflection(r) :	It is the angle formed between the normal and the reflected ray.

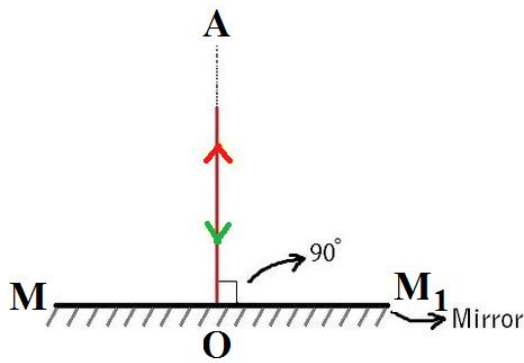
LAWS OF REFLECTION:

The reflection at a surface obeys two laws, which are called the laws of reflection.

- 1.The angle of incidence is equal to the angle of reflection (i.e., $i = r$).
2. The incident ray, the reflected ray and the normal at the point of incidence, all lie in the same plane.



Reflection of a ray of light normally incident on a plane mirror



When a ray of light is incident normally on a surface,
 Angle of incidence, $i = 0^\circ$
 Therefore the angle of reflection, $r = 0^\circ$
 Thus, a ray of light AO incident normally on a surface is reflected along the same path OA.

FORMATION OF IMAGE BY REFLECTION

- To find the position of image of an object formed by a mirror after reflection, we need to consider at least two rays of light incident on the mirror from a point of object.
- Each incident ray gets reflected obeying the laws of reflection.
- The point where the two reflected rays actually meet or they appear to meet (when produced backwards), gives the position of image of that point of object

TYPES OF IMAGE:

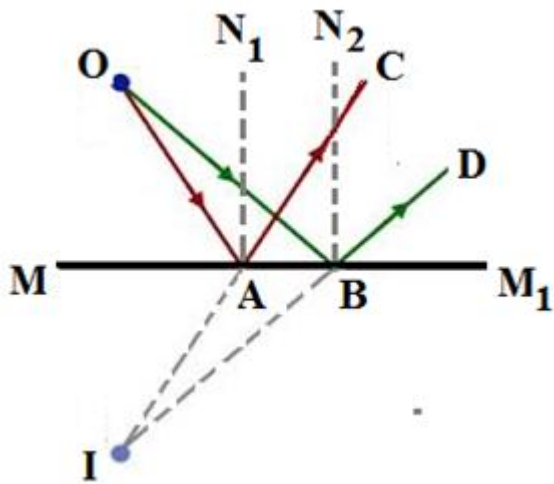
The image can be of two types – (i) Real image

(ii) Virtual image

DIFFERENCE BETWEEN A REAL AND VIRTUAL IMAGE

REAL IMAGE	VIRTUAL IMAGE
1. A real image is formed when two or more rays after reflection actually meet at a point.	1. A virtual image is formed when two or more rays after reflection do not actually meet but appear to meet at a point.
2. A real image can be obtained on a screen.	2. A virtual image cannot be obtained on a screen.
3. A real image is always inverted with respect to the object.	3. A virtual image is always erect with respect to the object.

IMAGE OF A POINT OBJECT FORMED BY A PLANE MIRROR



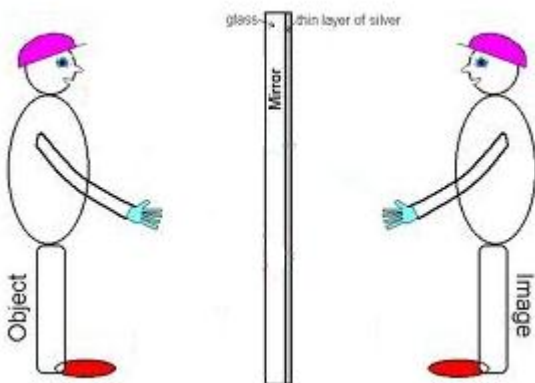
MM_1 = A plane mirror

O = A point object

I = Image of the point object

- To show the formation of image by a plane mirror, we need at least two rays starting from the point object O.
- Let OA and OB be two rays incident on the plane mirror from the point object O.
- AN₁ and BN₂ are the normals at the points A and B.
- The rays OA and OB get reflected from mirror in directions AC and BD respectively obeying laws of reflection.
- When seen from a position between C and D, rays AC and BD appear to come from some point I behind the mirror.
- The point I is the image of the object O.

CHARACTERISTICS OF IMAGE FORMED IN A PLANE MIRROR:



1. The image formed is always **erect**.
2. The image formed is always **virtual**.
3. The image is the **same size** as the object.

4. The image is **laterally inverted**. (The interchange of the left and right sides in the image of an object in a plane mirror is called the **lateral inversion**.)

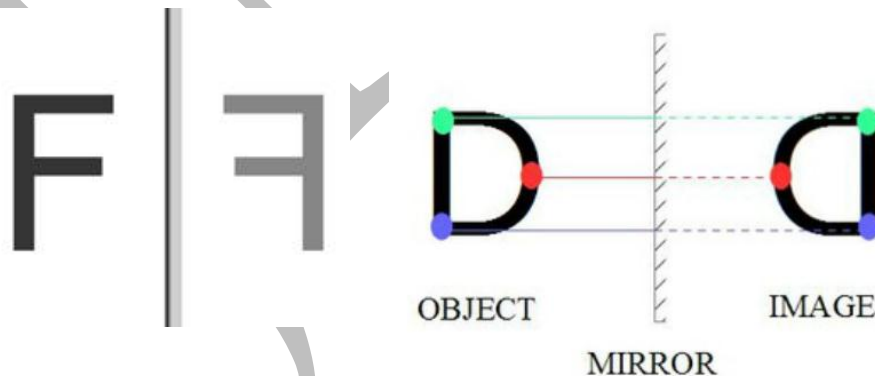
(i) While looking in a mirror, your right hand is perceived as the left hand of your image.



(ii) The letters on the front of an ambulance are written laterally inverted as shown in the picture, so that the driver of the vehicle moving ahead of the ambulance reads these words laterally inverted as AMBULANCE, in his rear view mirror and gives side to pass the ambulance first.

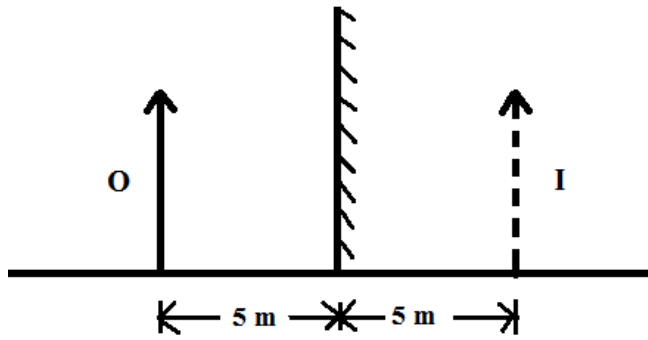


(iii) The lateral inversion of letters D and F



(iv) The lateral inversion of letters such as A, H, I, M, O, T, U, V, W, X and Y is not noticeable since their image remains unchanged (because each of these letters has a symmetry about a vertical line passing through the midpoint of letter.)

5. The image is at the same distance behind the mirror as the object is in front of it.



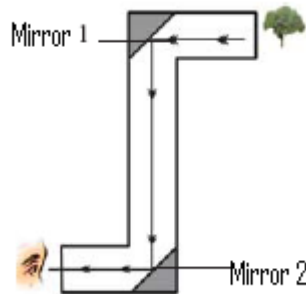
Note: If the object is shifted by a distance 'd' towards mirror, the image will also shift by the same distance 'd' towards the mirror.

USES OF PLANE MIRROR:

1. Plane mirrors are used as looking glass



2. Plane mirrors are also used in constructing periscope which is used in submarines.



3. Plane mirrors are used in solar cookers



4. Plane mirrors are used to make kaleidoscope, a toy which produces beautiful patterns from coloured paper, pieces of glass or small coloured beads.

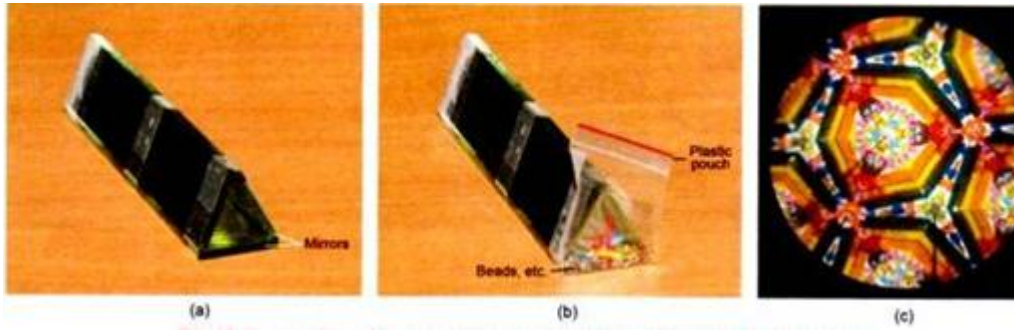


Fig.(a) and (b) shows making a kaleidoscope.
Fig.(c) shows pattern formed.

5. Plane mirrors are also used to create illusions and effects.

