Lesson 16

LIGHT

Properties of Light:

Rectilinear Propagation of Light: It is the property of light to travel in a straight line in any direction.

Reflection of Light: It is the bouncing back of light after striking the surface of an object. Shiny smooth surfaces reflect almost all the light.

Reflection of Light

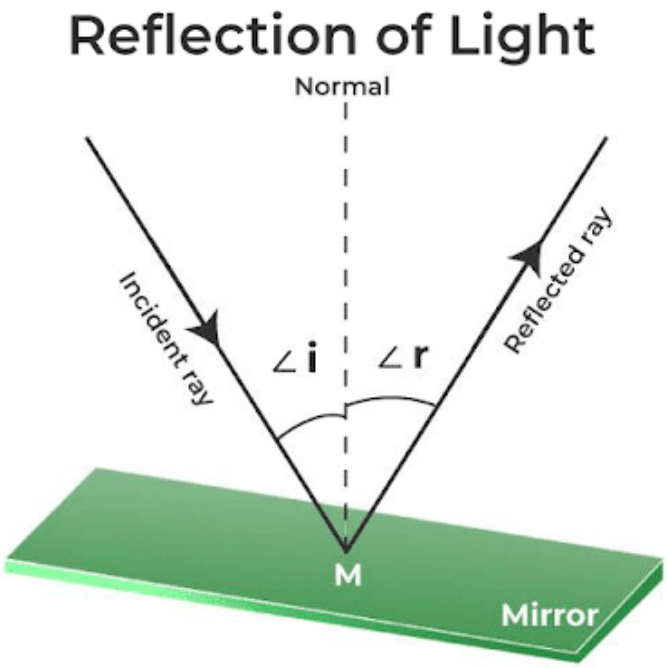
The process through which light rays fall on the surface and get bounced back is known as a reflection of light.

Angle of incidence

The angle of incidence <i of a ray is the angle measured from the incident ray to the normal surface.

Angle of Reflection

The angle of reflection <r of a ray is the angle measured from the reflected ray to the normal surface.



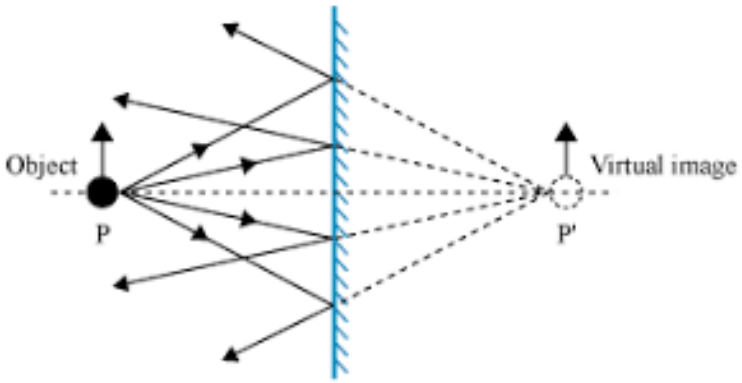
Laws of reflection

(i) When the light rays fall on the smooth surface, the angle of reflection is equal to the angle of incidence.

(ii) The incident ray, the reflected ray, and the normal to the surface all lie in the same plane.

Characteristics of the image formed by a plane mirror:

- It is virtual, i.e., it is formed behind the mirror without the actual intersection of light rays.
- It is erect, which means up straight.
- The image is laterally inverted, i.e., it is reversed from left to right.
- The size of the image is the same as the size of the object.
- The distance of the object from the plane mirror is the same as the distance of the image from the plane mirror.

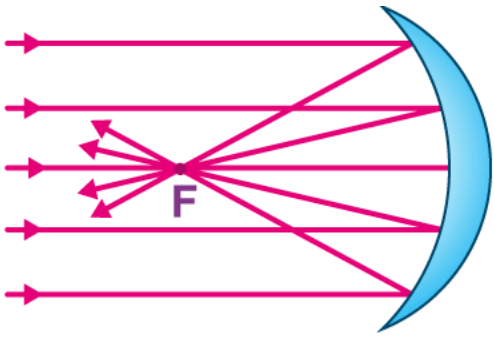


Concave Mirrors:

By reflection of light, concave mirrors give

(i) real, inverted images if the object is beyond the focus and

(ii) a virtual, erect, enlarged image if the object has a distance less than the focal length from the pole of the mirror.



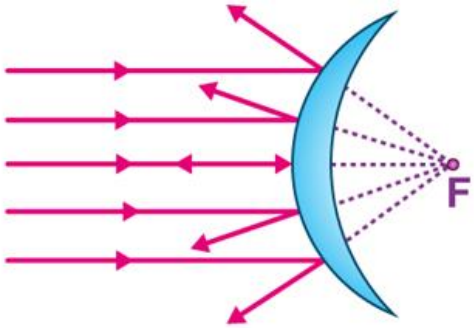
Concave Mirrors reflect light inwards to one focal point

Uses of Concave Mirrors:

1. Concave mirrors are used in torches, searchlights, and headlights of vehicles to get powerful parallel beams of light.
2. Concave mirrors are also used as shaving mirrors to see a larger image of the face.
3. Dentists use concave mirrors to see bigger images of the teeth of the patients.
4. Large concave mirrors are used to focus sunlight to produce heat in the solar furnaces.

Convex Mirrors:

By the reflection of light convex Mirrors always give a virtual, erect, diminished image of the object kept in front of the mirror.



The bulging surface of the convex mirror reflects light outwards

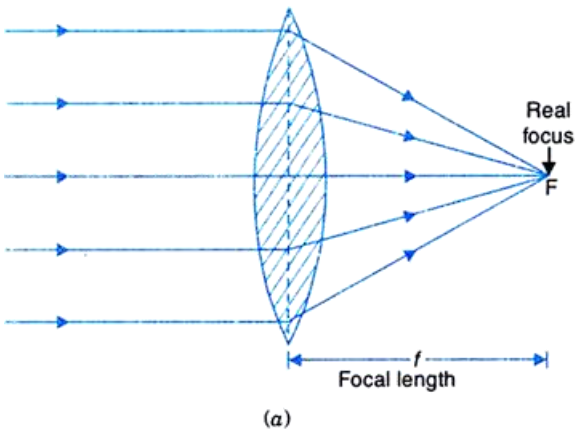
Uses of Convex Mirrors:

1. The convex mirror is used as a side-view mirror in vehicles to give a smaller view of the vehicles coming from behind.
2. They are used in shops and supermarkets and any other place where there is a requirement for detecting burglars.
3. Convex mirrors are used in making lenses for sunglasses.
4. Convex mirrors are used in magnifying glasses, and telescopes.
5. Convex mirrors are used to reflect street light; because they can reflect over a wide area.
6. Convex mirrors are kept at the street corners to avoid collisions.

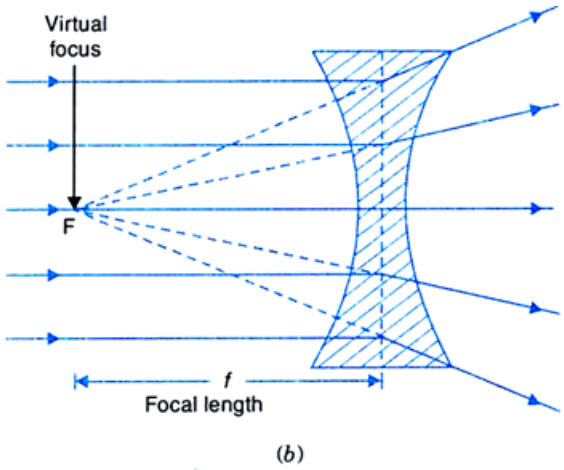
Lenses

A lens is a part of a reflecting material like glass or plastic but curved from both sides. Lenses are unlike mirrors that have a reflecting surface only on one side. Depending upon its shape a lens can be categorized as:

Convex Lens - A Convex Lens is curved outwards. It is thicker in the centre and narrows down at the edges. It merges the light rays passing through it at a certain point. Therefore, it is also called a Converging lens.



Concave Lens - A Concave Lens is curved inwards. It has wider edges and a thinner centre. It reflects back the light that travels through it in different directions. Therefore, it is also called a Diverging lens.



Images formed by Convex and Concave Lenses

A Convex lens forms an image that is:

- real
- inverted
- the image is large and appears close to the lens

A Concave lens forms an image that is:

- virtual
- erect
- small and appears far away

Rainbow

A rainbow is a natural phenomenon in which the light rays of the sun are reflected and refracted by the water droplets present in the atmosphere.

Spectrum

A rainbow appears as an arc on the sky that contains a band of seven colours – Red, orange, yellow, green, blue, indigo and violet. This also means that the white light of the sun contains seven coloured lights in it that separate out due to refraction (called a Spectrum of Lights). This spectrum of white light can be seen in the following:

- Rainbows
- Soap bubbles
- Surface of a CD
- Prisms