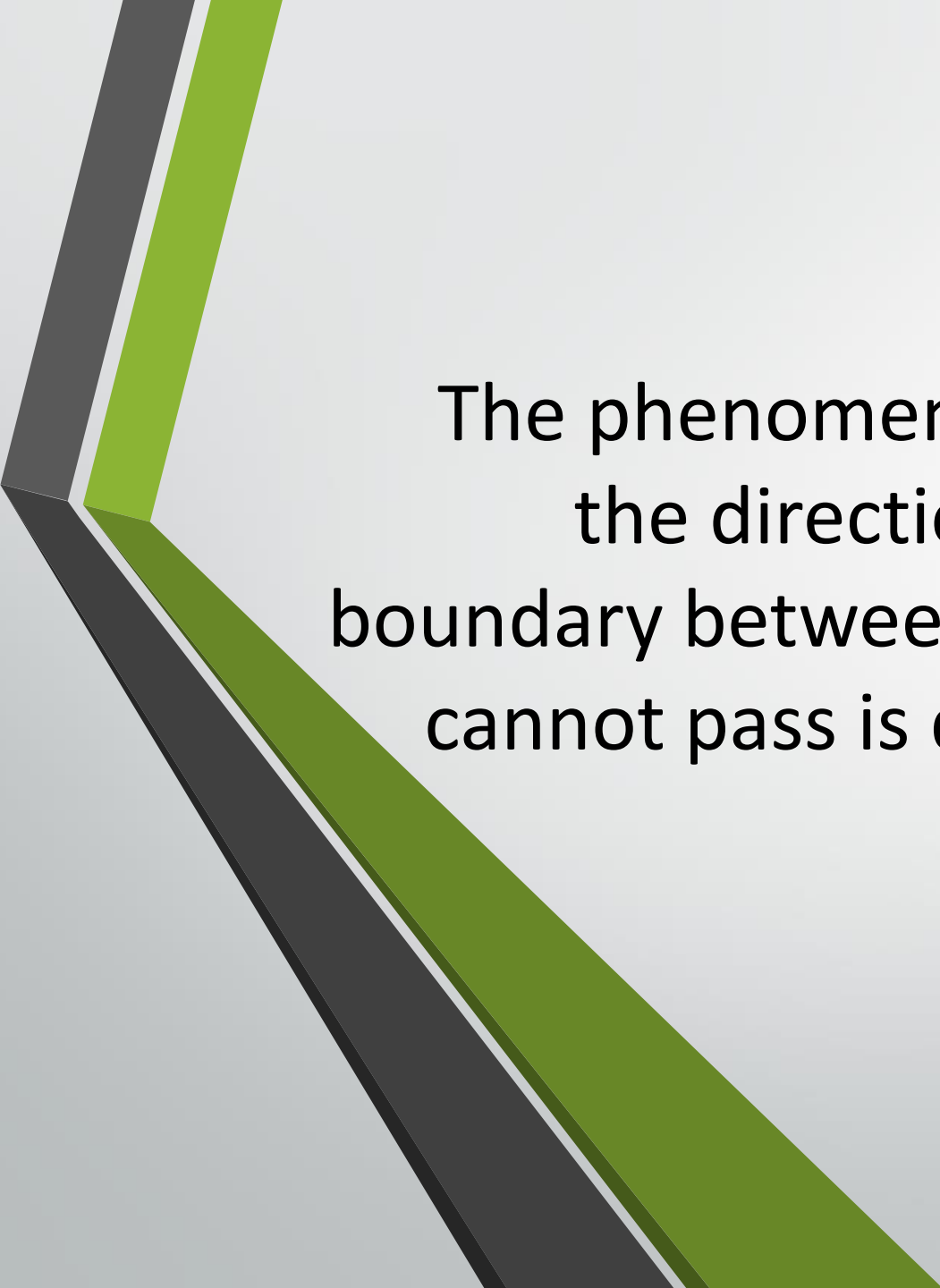


A decorative graphic on the left side of the slide. It shows a corner formed by two dark gray lines meeting at a point. A bright green line, representing a light ray, enters from the top left, hits the corner, and reflects downwards and to the right. The background is a light gray gradient.

Reflection of Light

The phenomenon by which a ray of light changes the direction of propagation when it strikes a boundary between different media through which it cannot pass is described as the reflection of light.

Spherical Mirrors

- A mirror whose polished, reflecting surface is a part of a hollow sphere of glass or plastic is called a spherical mirror.
- In a spherical mirror, one of the two curved surfaces is coated with a thin layer of silver followed by a coating of red lead oxide paint. Thus, one side of the spherical mirror is opaque and the other side is a highly polished reflecting surface
- Depending upon the nature of the reflecting surface of a mirror, the spherical mirror is classified as:
- Concave Mirror: Concave mirror is a spherical mirror whose reflecting surface is towards the centre of the sphere of which the mirror is a part.
- Convex Mirror: Convex mirror is a spherical mirror whose reflecting surface is away from the centre of the sphere of which the mirror is a part.

Parts of spherical mirror

Centre of Curvature is the centre of the sphere of which the spherical mirror forms a part. It is denoted by the letter C.

Radius of Curvature is the radius of the sphere of which the mirror is a part. It is represented by the letter R.

Linear aperture is the distance between the extreme points (X and Y) on the periphery of the mirror.

Pole is the midpoint of the aperture of the spherical mirror. It is represented by the letter P.

Principal axis is the straight line passing through the pole and the centre of curvature of a spherical mirror.

Principal Focus or Focus-The rays of light parallel to the principal axis of a mirror after reflection, either pass through a point (in case of a concave mirror) or appear to diverge from a point (in the case of a convex mirror) on the principal axis and this point is referred to as the principal focus or focal point of the mirror.

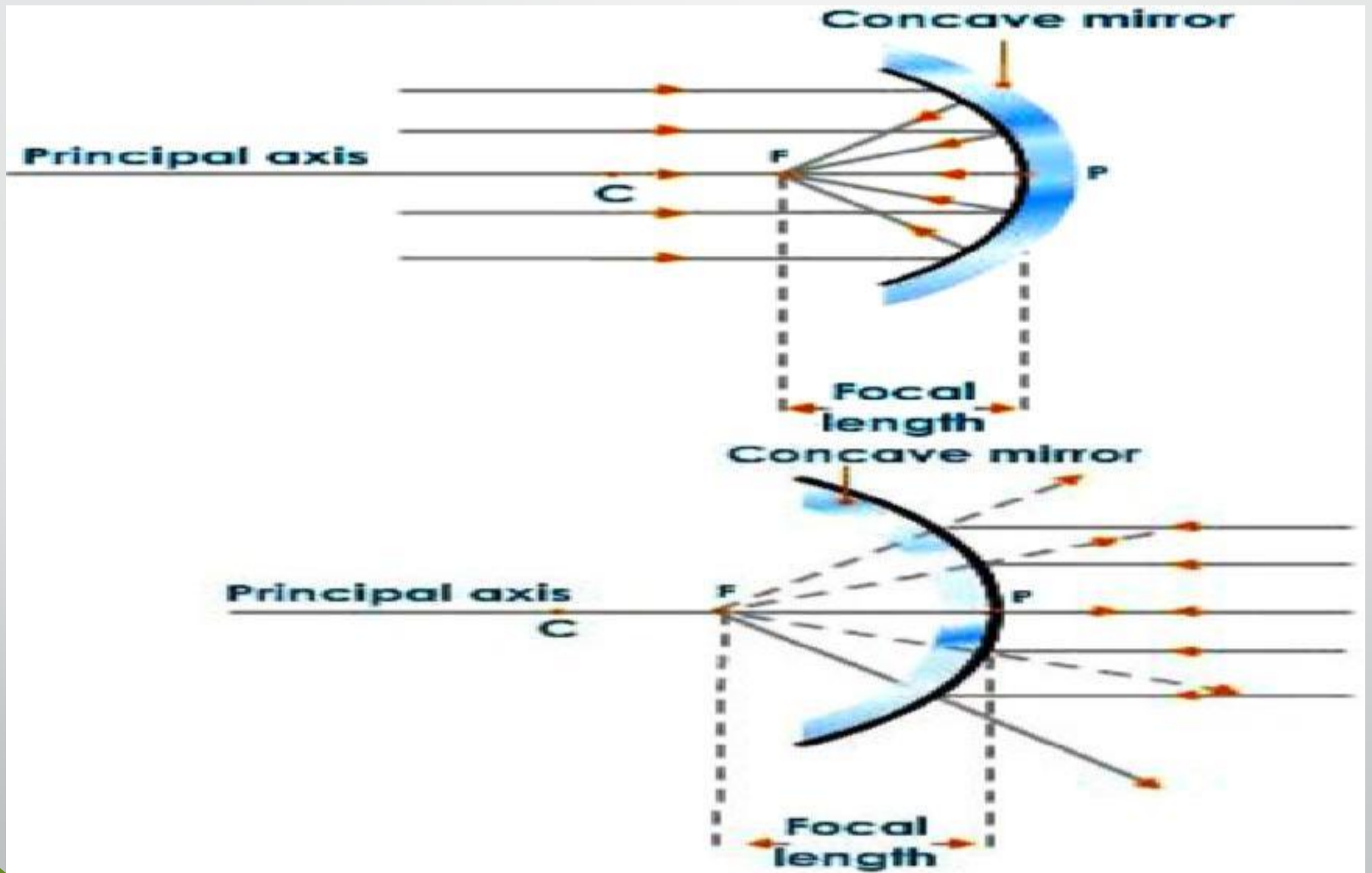
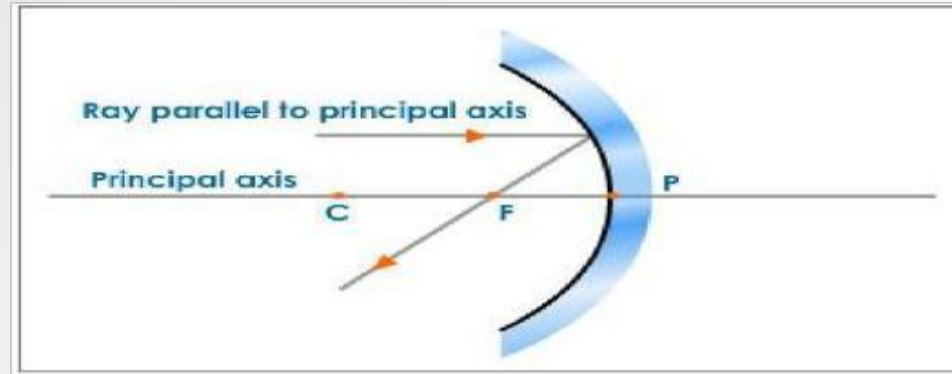


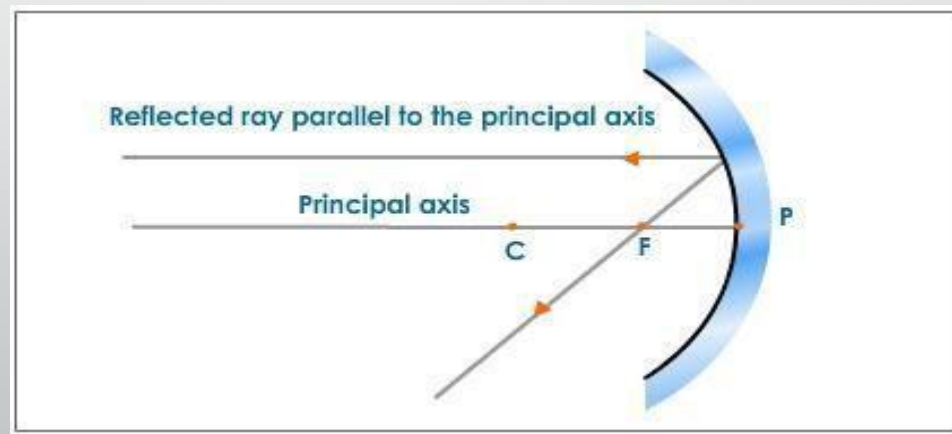
Image formation

- Formation of an image by mirrors is usually shown by constructing ray diagrams.
- To construct a ray diagram, we need at least two rays whose paths after reflection from the mirror are known.
- These rays must be chosen according to our convenience. Any two of the following rays can be considered to obtain the image.

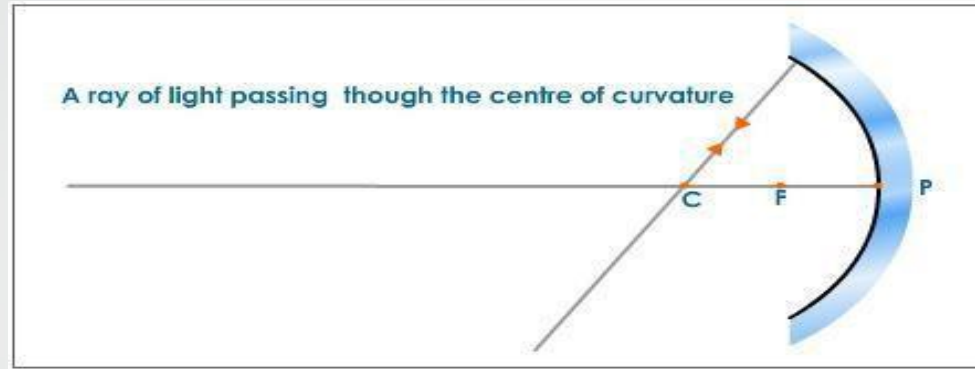
Rule 1 : A ray of light parallel to the principal axis after reflection from a concave mirror passes through its focus.



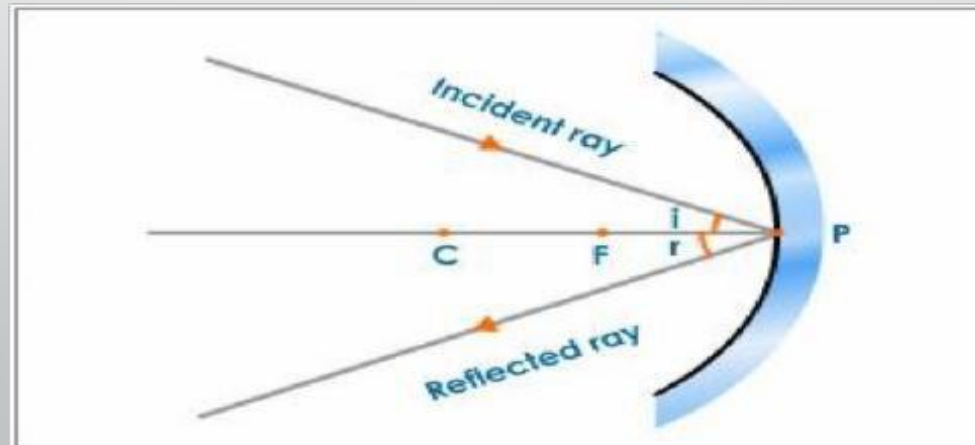
Rule 2 : A ray of light passing through the focus of a concave mirror after reflection emerges parallel to the principal axis.



Rule 3 : A ray of light passing through the centre of curvature of a concave mirror retraces its path after reflection as the ray passing through the centre of curvature acts as a normal to the spherical mirror.



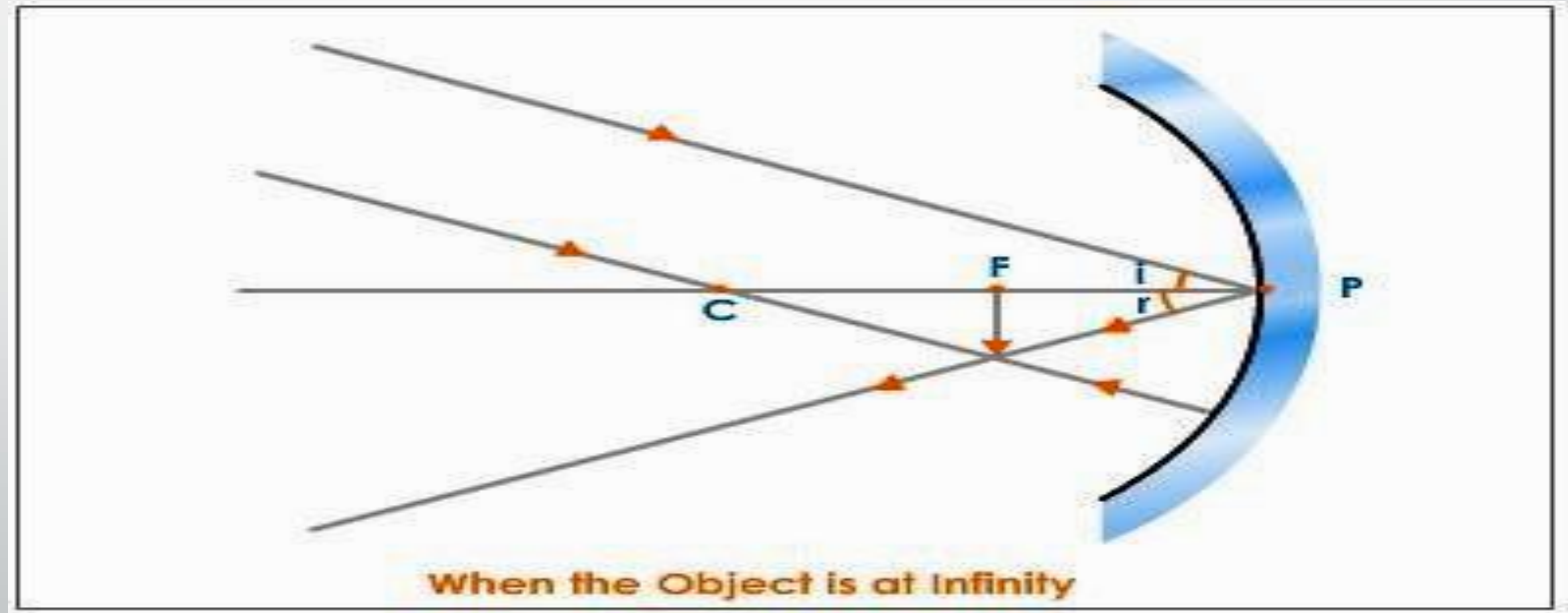
Rule 4 : A ray of light which strikes the mirror at its pole gets reflected according to the law of reflection.



Formation of Image by a Concave Mirror

Case 1: When the Object is at Infinity

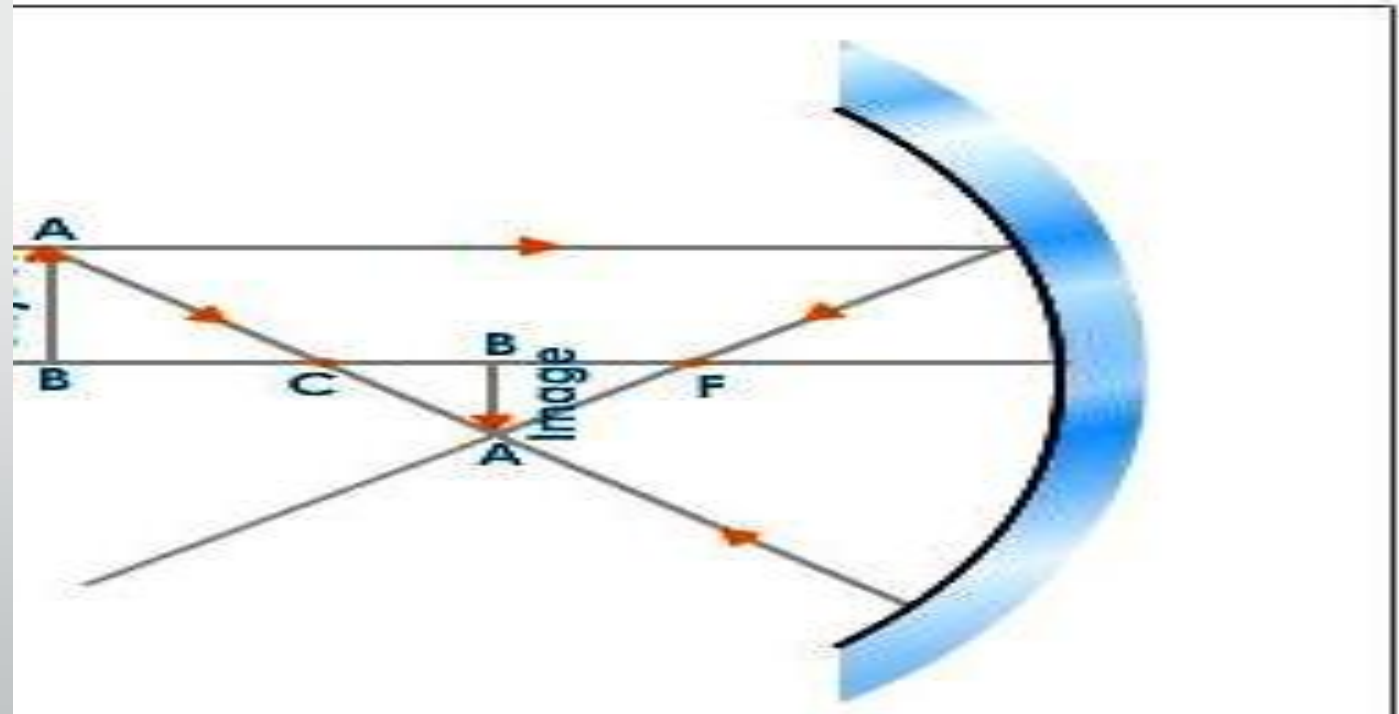
When an object is placed at infinity, the rays coming from it are parallel to each other. Let us consider two rays, one striking the mirror at its pole and the other passing through the centre of curvature.



Case 2 : When the Object Is Placed Beyond C --The two rays which are considered to obtain the image are:

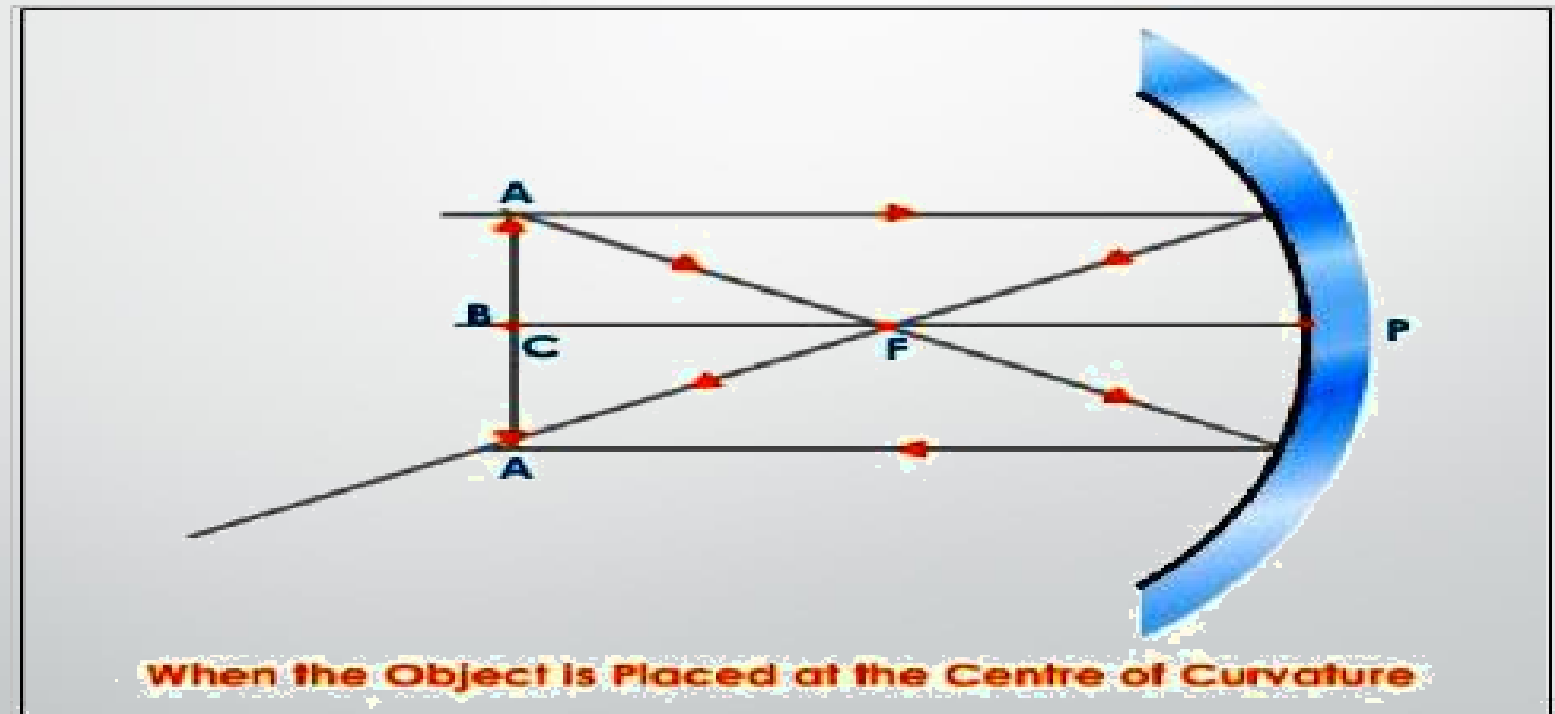
A ray passing through the centre of curvature.

A ray parallel to the principal axis.



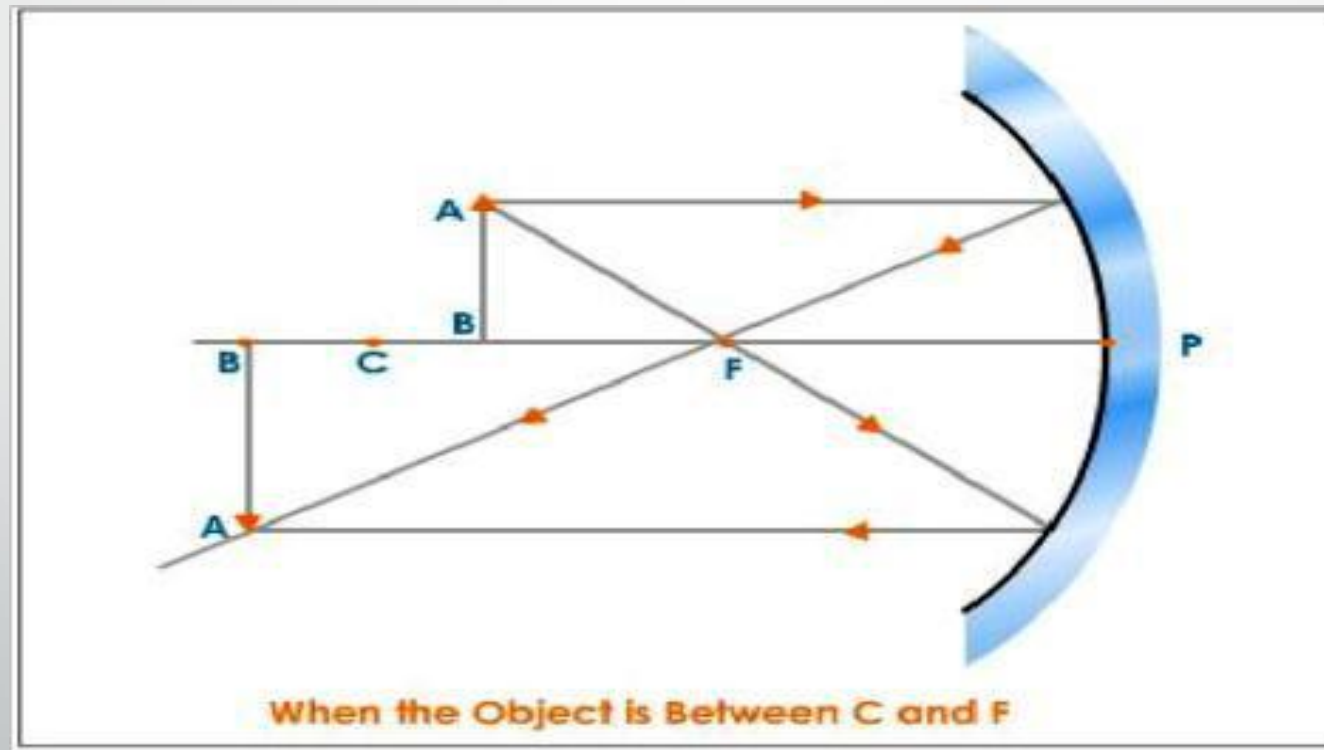
Case 3 : When the Object Is Placed At the Centre of Curvature

We consider the two rays, one parallel to the principal axis and the other passing through the focus.



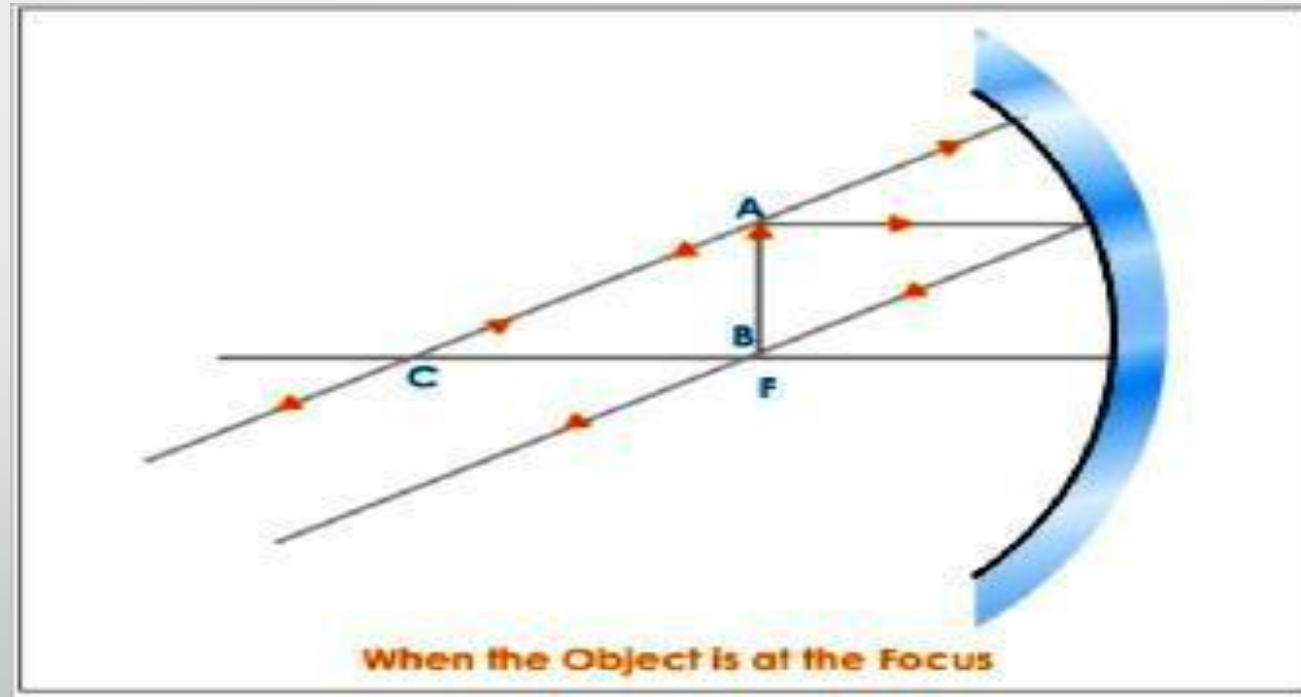
Case 4 : When the Object Is Between C and F

We consider a ray of light which is parallel to the principal axis and another ray passing through the focus.



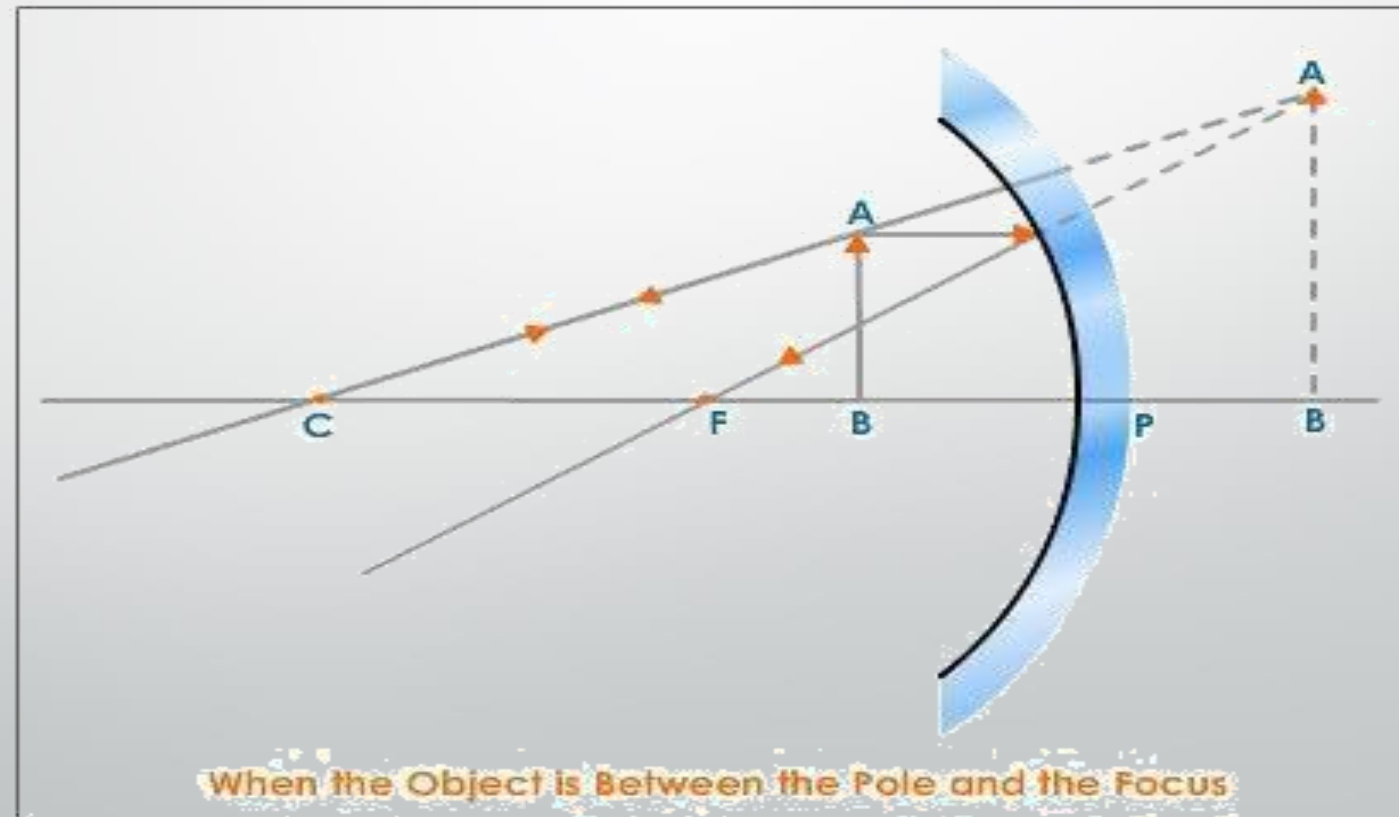
Case 5 : *When the Object Is at the Focus*

Here, we consider a ray of light which is parallel to the principal axis and another ray passing through the centre of curvature.



Case 6: When the Object Is Between the Pole and the Focus

Here we consider a ray of light which is parallel to the principal axis and another ray which is passing through the centre of curvature.



Uses of Concave Mirrors

- As reflectors in the head lights of cars, search lights in torches etc. to obtain a parallel beam of light. For this, the source of light is placed at the focus of the concave reflector.
- By dentist to focus light on the tooth to be examined.
- As shaving mirrors and as make up mirrors to get an enlarged erect image of the face
- To concentrate solar radiations in solar heating devices. For this the food or substance that has to be heated is placed at the focus of a large concave reflector. After reflection, sun light converges on the substance and heats it.

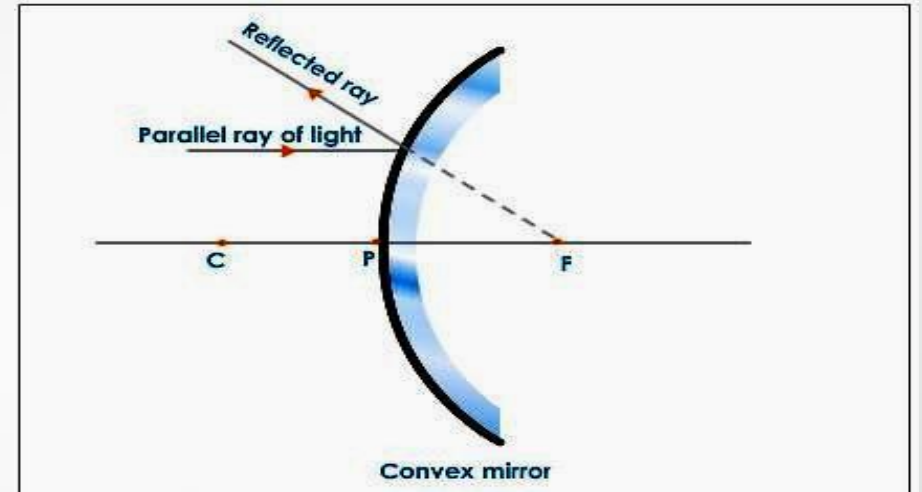
Table summarizing the various characteristics if image obtained by concave mirror when placed at different positions:

Position of the image	Position of the object	Nature and size of the image	Use
At infinity	At the focus	Real, Inverted and diminished	Used by ENT Surgeons and dentists
Beyond the center of curvature	Between the focus and the centre of curvature	Real, Inverted and diminished	Used in solar cookers
At the center of curvature	At center of curvature	Real, Inverted and same size as object	Used as an Erecting mirror in terrestrial telescopes
Between the focus and center of curvature	Beyond the centre of curvature	Real, inverted and magnified	Used in hospitals and clinics to see the internal parts of the body
At focus	At infinity	Real, inverted and magnified	Used in search lights and in head lights of motor cars
Between the pole of the mirror and the focus	Appears behind the mirror	Virtual, erect and magnified	Used as a shaving mirror

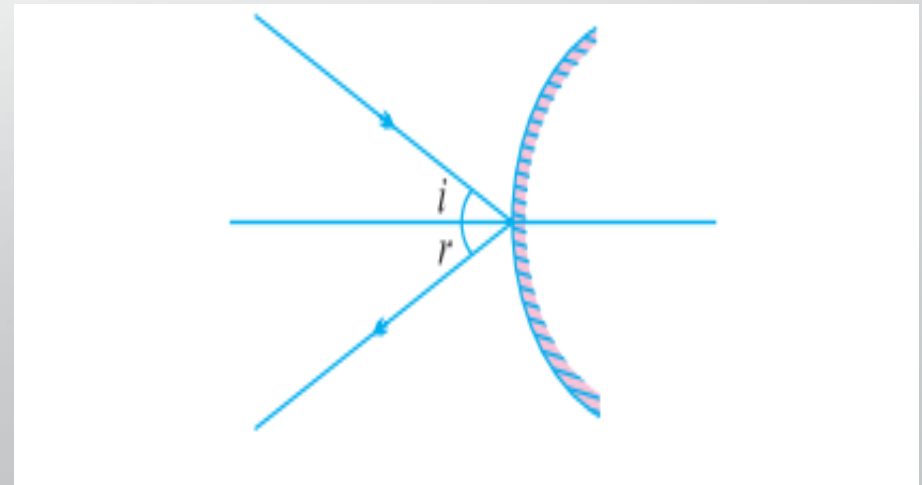
Convex Mirror

The following rays are considered while constructing ray diagrams.

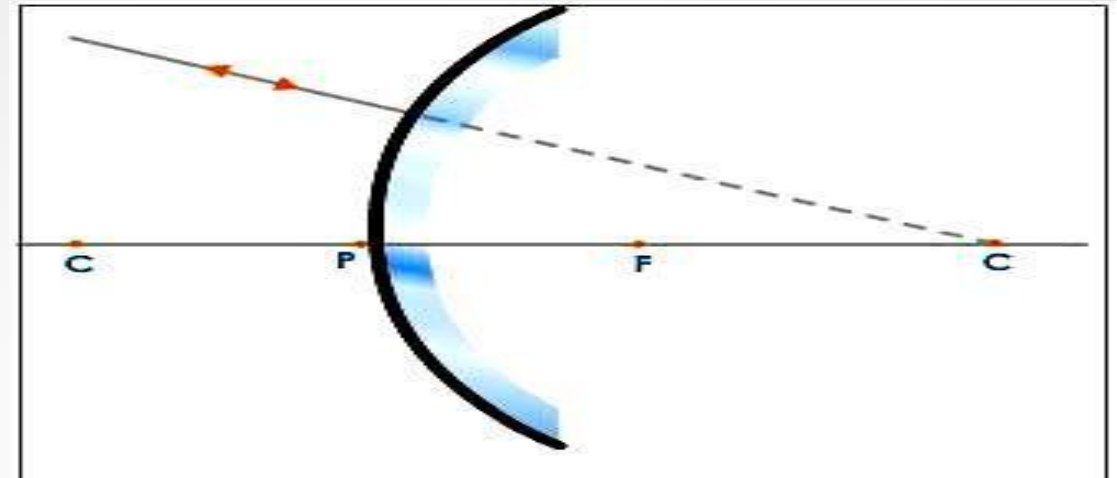
Rule 1: A ray of light travelling parallel to the principal axis after reflection from a convex mirror appear to come from its focus behind the mirror.



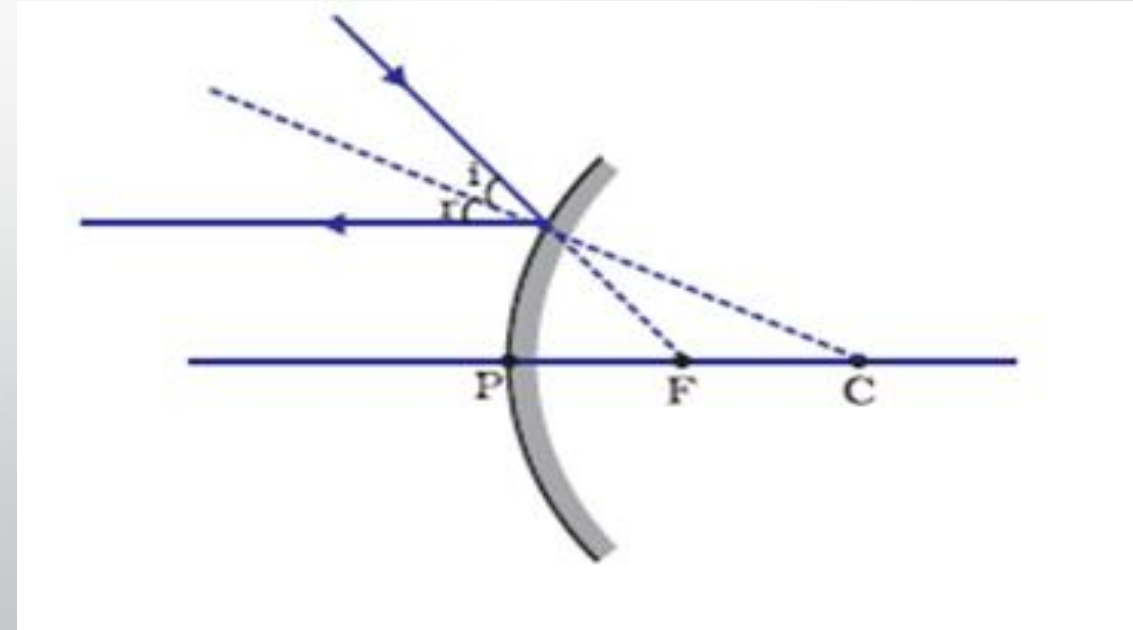
Rule 2: A ray of light incident obliquely to the principal axis, towards the pole of the mirror gets reflected according to the laws of reflection.



Rule 3 : A ray of light traveling towards the centre of curvature behind the mirror hits the mirror at 90° and is reflected along its path.

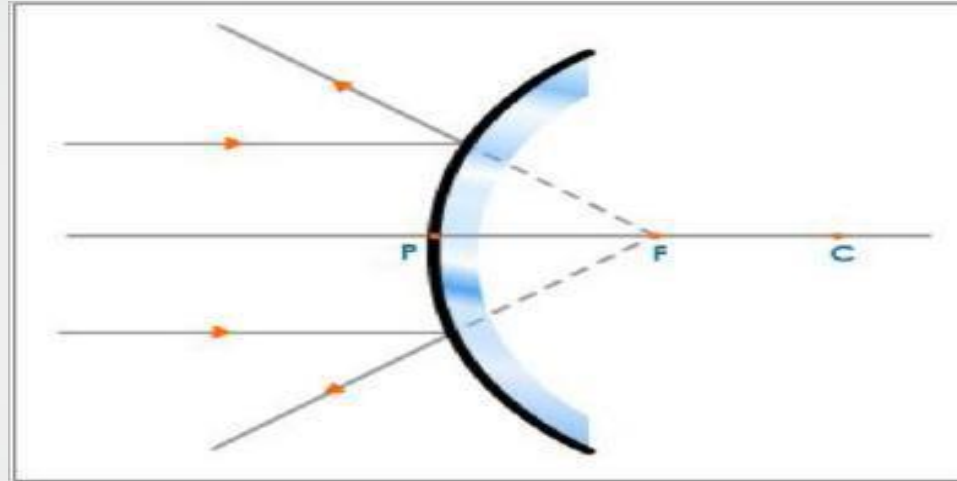


Rule 4: A ray of light which is directed towards the principal focus of a convex mirror, after reflection will emerge parallel to the principal axis.



Formation of Image in a Convex Mirror

Case 1: When the Object Is Placed Between Infinity and the Pole of the Mirror



Case 2 : When the Object Is At Infinity

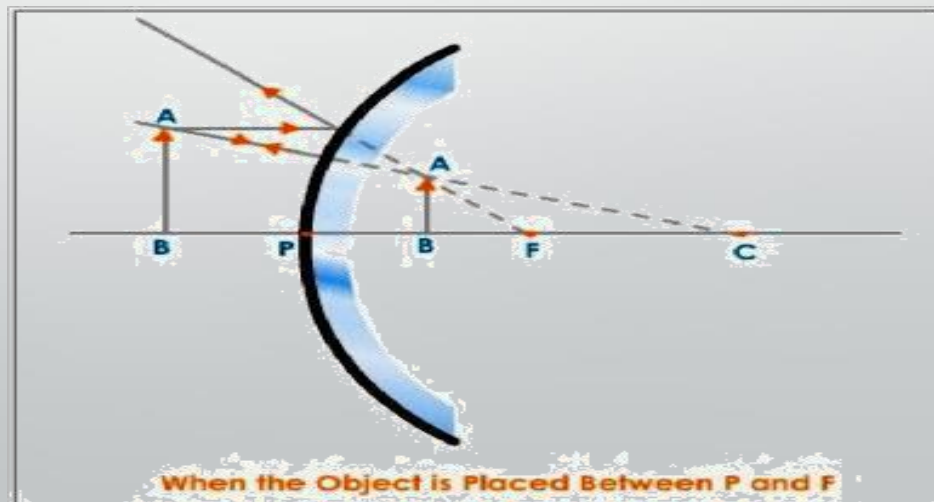
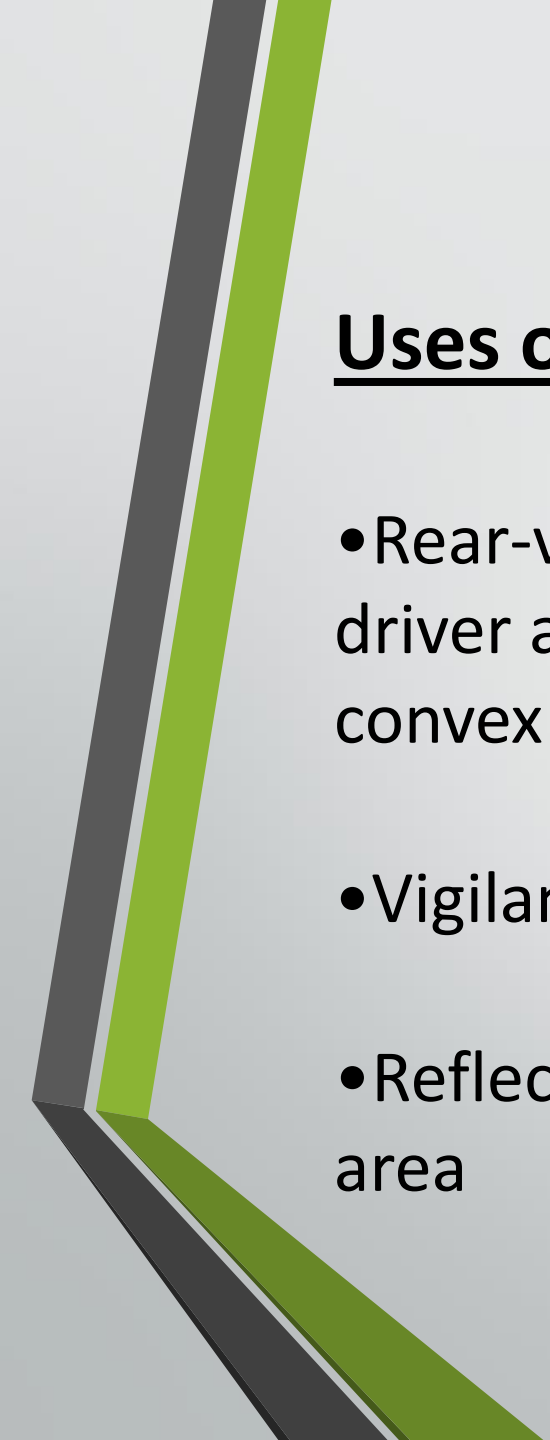


Table summarizing the various characteristics if image obtained by convex mirror when placed at different positions:

POSITION OF THE OBJECT	POSITION OF THE IMAGE	SIZE OF THE IMAGE	NATURE OF THE IMAGE
At infinity	At the focus F , behind the mirror	Highly diminished, point-size	Virtual and erect
Between infinity and pole P of the mirror	Between P and F , behind the mirror	Diminished	Virtual and erect



Uses of Convex Mirror

- Rear-view mirror in an automobile. This convex mirror gives the driver a clear view of the traffic approaching from behind as convex mirrors are curved outwards giving a wider field of view.
- Vigilance mirror in departmental stores
- Reflector in street lamps so as to diverge the light over a large area