Handout -Class X, Chapter-10, Light

(1/2: Reflection of Light)

- When a set of parallel rays fall on a plane mirror , they get reflected parallelly, An erect, virtual Image of same size as that of object & at same distance from the mirror will be formed

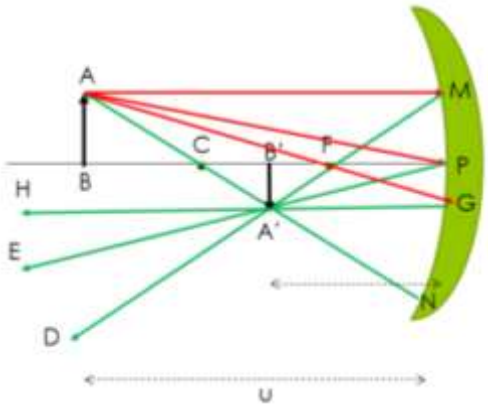
- **Concave Mirror**: (i) *rays parallel to the principal axis, after reflection… will pass through the principal focus in case of a concave mirror*

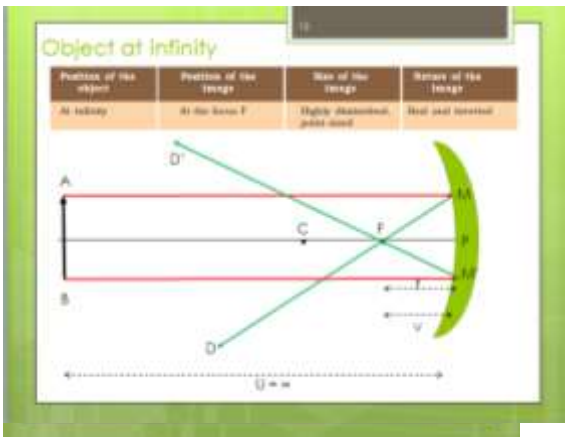
- (ii) *A ray passing through the principal focus* of a concave Mirror…… after reflection, will emerge parallel to the principal axis.

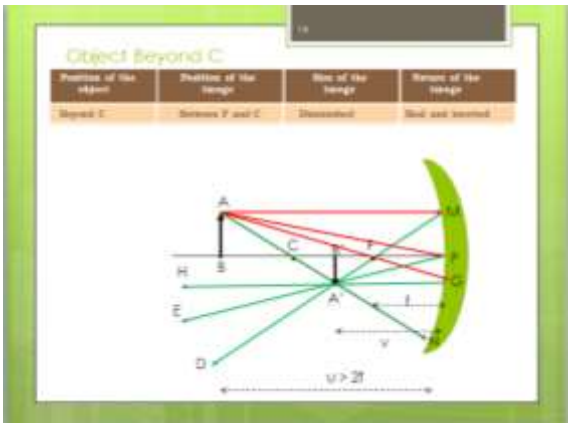
- (iii) *A ray passing through the centre of curvature* of a concave mirror, after reflection, is reflected back along the same path.

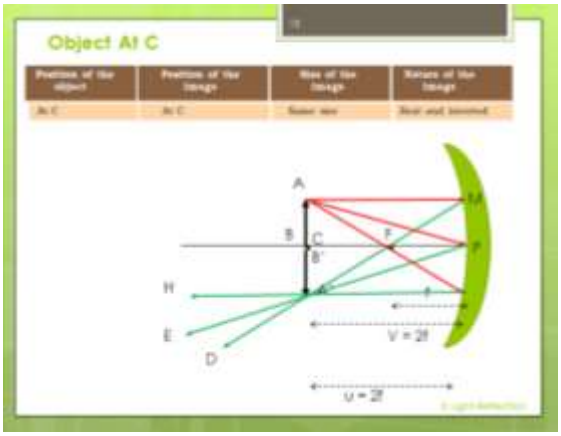
- (iv) *A ray incident obliquely to the principal axis*, towards a point P (pole of the mirror), on the concave mirror, Is reflected obliquely. The incident and reflected rays follow the laws of reflection at the point of incidence (point P), making equal angles with the principal axis.

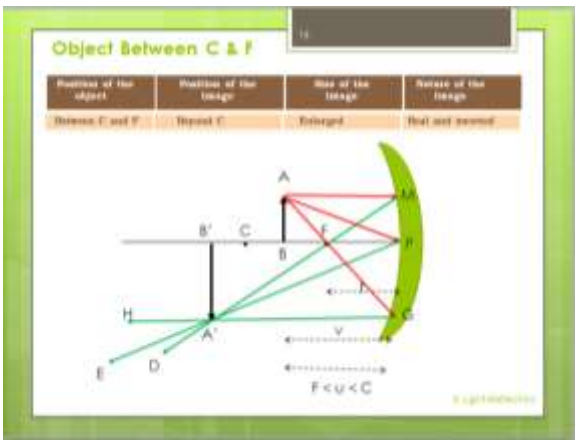
- Figure shows the ray diagram considering three rays. It shows the image **A'B'** (in this case, real) of an object **AB** formed by a concave mirror. It does not mean that only three rays emanate from the point **A**. An infinite number of rays emanate from any source, in all directions. Thus, point **A'** is image point of **A** if every ray originating at point **A** and falling on the concave mirror after reflection passes through the point **A'**.

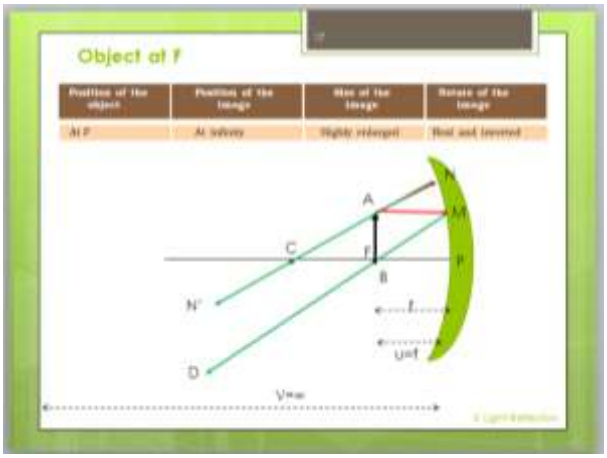












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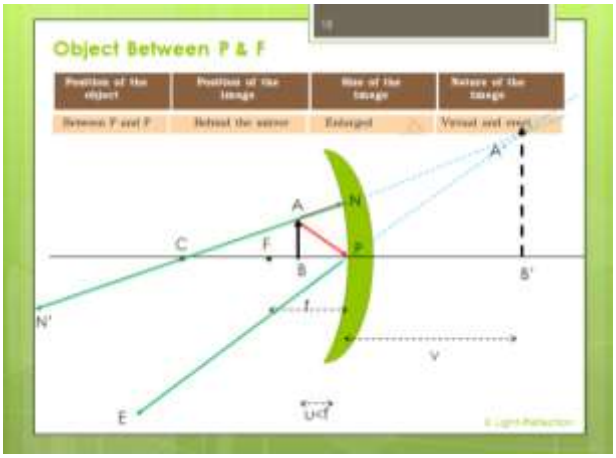


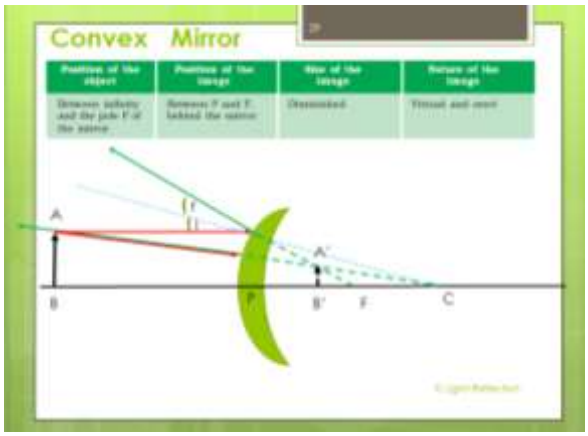
- **Uses of Concave Mirrors:** They are often used as **shaving mirrors** to see a larger image of the face. The **dentists** use concave mirrors to see large images of the teeth of patients. torches, search-lights Large concave mirrors are used to concentrate sunlight to produce heat in solar furnaces.

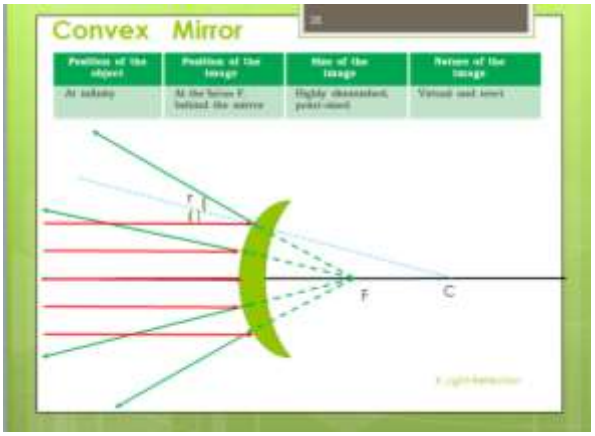
- **Convex Mirror:** (i) *rays parallel to the principal axis, after reflection…they appear to diverge from a point on the principal axis on the other side which is called Principal Focus (F)*

- (ii) *a ray which is directed towards the principal focus of* a convex mirror, after reflection, will emerge parallel to the principal axis. Here also i=r.

- (iii) *a ray* directed in the direction of the centre of curvature of a convex mirror, after reflection, is reflected back along the same path. Here i = r = 0. The light rays come back along the same path because the incident rays fall on the mirror along the normal to the reflecting surface.

- (iv) *a ray which is directed towards the principal focus of* a convex mirror, after reflection, will emerge parallel to the principal axis. Here also i=r.





- **Uses of Convex** Mirrors: These mirrors are commonly used as rear-view (wing) mirrors in vehicles. They are fitted on the sides of the vehicle, enabling the driver to see traffic behind him/her to facilitate safe driving. Convex mirrors are preferred because they always give an erect, though diminished, image. Also, they have a wider field of view as they are curved outwards. Thus, convex mirrors enable the driver to view much larger area than would be possible with a plane mirror.

- **Relation between F & R:** From the geometry of the diagram , **f = R/2,** where R is the Radius of curvature and f is the focal length.

- **Mirror Formula:** $\frac{1}{v}+\frac{1}{u}=\frac{1}{f}$ **and magnification,** $m = -\frac{v}{u}$ where v is the image distance, u is the object distance and f is the focal length.