RADIANT 2026

Physics

Light

Lecture – 03

By – Akash Shravan Sir

Topics *to be covered*

1. Formation of Image by Reflection
2. Real and Virtual Image
3. Image of a Point Object Formed By a Plane Mirror
4. Uses of Plane Mirror

Topics *to be covered*

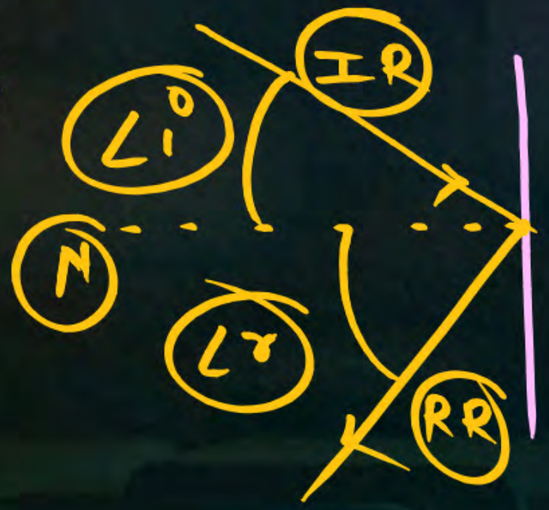
5. Concave mirror
6. Convex mirror
7. Definition related to mirrors
8. QUESTIONS

Recap *of previous lecture*

1. Formation of Image by Reflection
2. Real and Virtual Image
3. Image of a Point Object Formed By a Plane Mirror
4. Uses of Plane Mirror

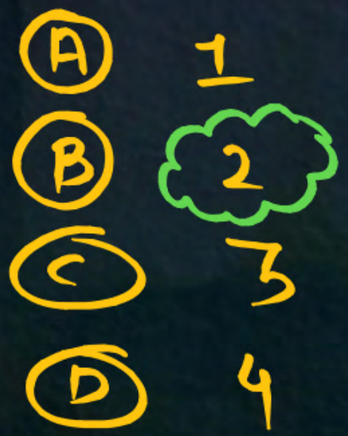
AKASH SIR
JOIN MY OFFICAL
TELEGRAM CHANNEL
@AKASHKETAARE
JOIN NOW
hysics Wallah

① light → 3×10^8 m/s

② 

$\angle i = \angle r$

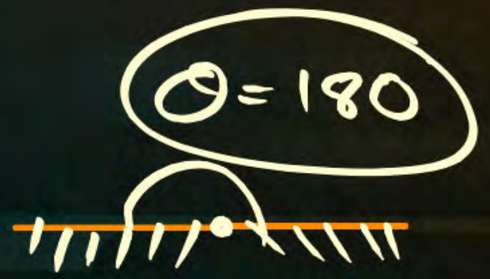
Image → Real → Inverted → [Behind]
↳ Virtual → [In front]


A
1
B
2
C
3
D
4

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

Images Formed In Two Inclined Mirrors

The object and the images formed by the two inclined mirrors lie on the circumference of a circle whose centre lies at the point of intersection of the two mirrors and radius is equal to the distance of object from the point of intersection.



Images Formed In Two Inclined Mirrors

Case (1):

If angle theta deg between the mirrors is such that $n = \frac{360^\circ}{\theta^\circ}$ is odd,

(i) the number of images is n, when the object is placed asymmetrically between the mirrors.

(ii) the number of images is n - 1 when the object is placed symmetrically (i.e., on the bisector of the angle) between the mirrors.

Example: If θ is 72° then $n = \frac{360^\circ}{72^\circ} = 5$. So images formed will be $n = 5$ for placed asymmetrically between the mirrors and images formed will be $(n - 1) = 4$, if the object is placed symmetrically (on the bisector) between the mirrors because two images now overlap.

Images Formed In Two Inclined Mirrors

$n = \frac{360}{0} = \infty$ $\quad \theta = 0°$

Case (2):

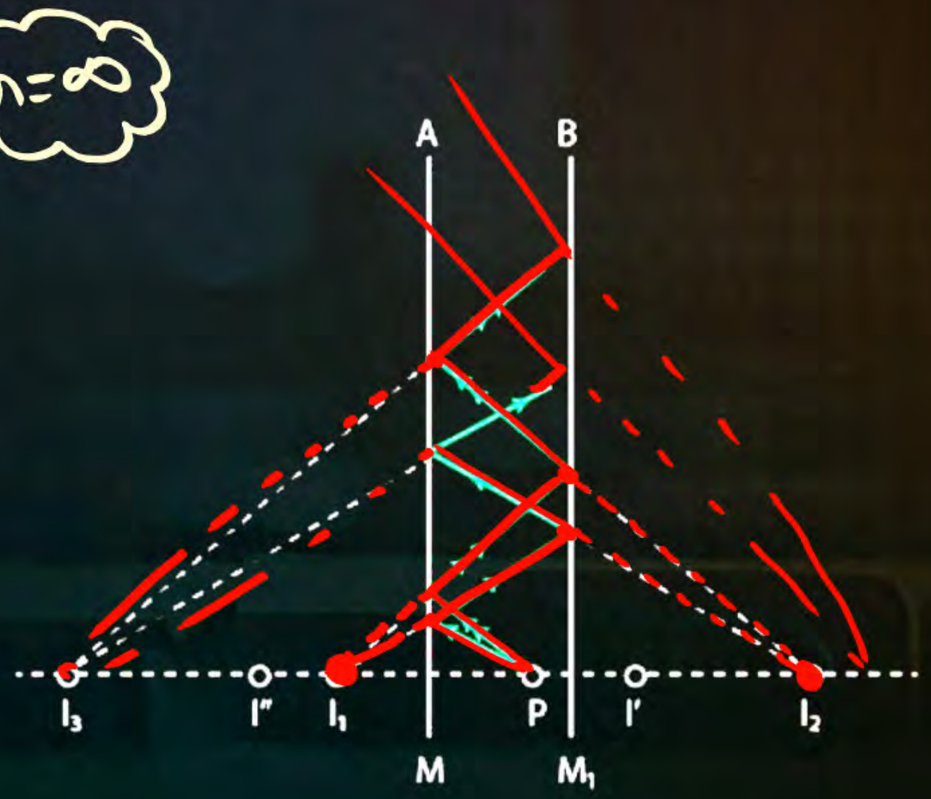
If $n = \frac{360°}{\theta°}$ is even, the number of images is always $n = 1$ for all - positions of object in between the mirrors.

Example: If the angle between two mirrors is 60°, $n = \frac{360°}{60°} = 6$, the number of images is $(n - 1) = 5$, i.e. five images will be formed for all positions of the object in between the mirrors..

IMAGES FORMED IN A PAIR OF MIRRORS PLACED PARALLEL TO EACH OTHER

When two mirrors are kept parallel to each other, i.e., ($\theta = 0°$), then

$n = \frac{360°}{\theta°} = \frac{360°}{0°} = \infty$ (infinite), so the number of images of an object kept in between the two parallel mirrors will be infinite. Thus For two mirrors kept parallel to each other, an infinite number of images are formed for an object kept in between them.



IMAGES FORMED IN A PAIR OF MIRRORS PLACED PARALLEL TO EACH OTHER

Use: In a showroom and in a barber's shop, mirrors are arranged in this manner.

Note: A thick plane mirror also forms a multiple number of images due to multiple reflections within the glass from front surface and back reflecting surface. Out of these, the second image formed due to reflection from the back reflecting surface is brightest.

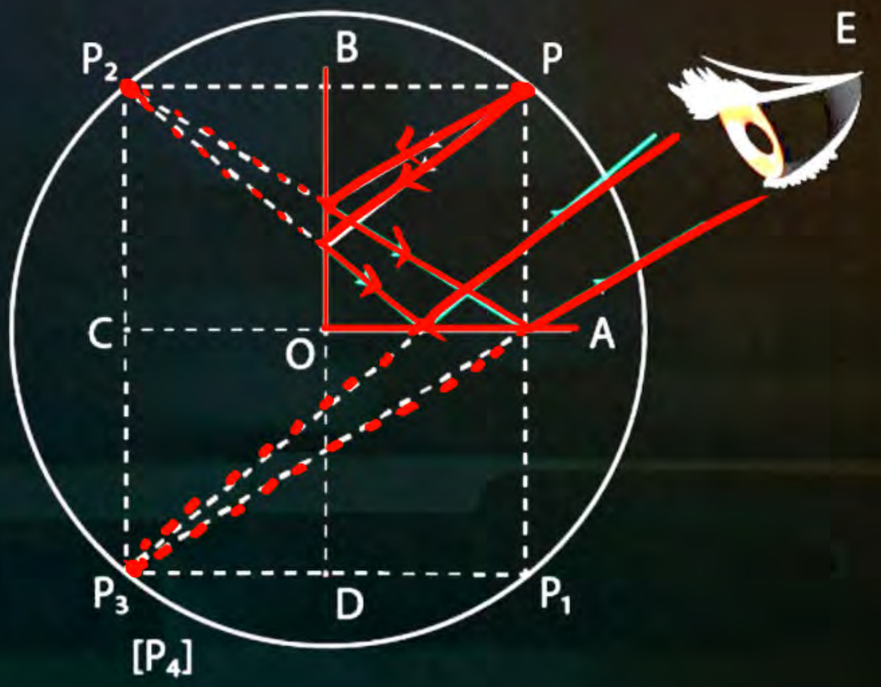
IMAGES FORMED IN A PAIR OF MIRRORS PLACED PARALLEL TO EACH OTHER

When two mirrors are kept perpendicular to each other, i.e., $\theta = 90°$, then

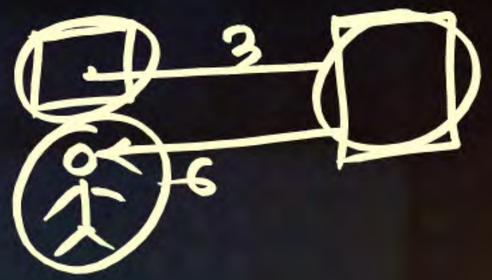
$$n = \frac{360°}{\theta°} = \frac{360°}{90°} = 4$$

$\therefore$ for an object placed in between the two perpendicular mirrors, the number of images formed will be $n - 1 = 3$. Thus

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



Uses of Plane Mirror



The plane mirrors find wide applications in our daily life. Some of the applications of a plane mirror are given below.

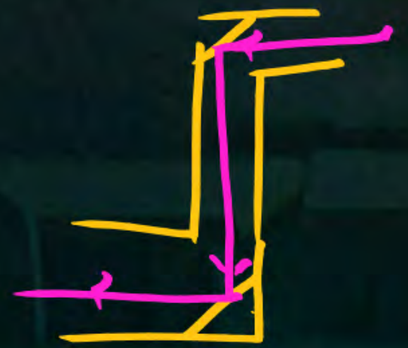
(1) The most common and wide use is as a looking glass.

(2) In the optician's room to increase the effective length of the room. It is done by keeping a plane mirror on the front wall and the sign board on the opposite wall, just behind the patient. For the patient, the sign board is at nearly double the length of the room.

Uses of Plane Mirror

(3) In the barber's shop for seeing the hairs at the back of head. Here two mirrors facing each other are fixed on the opposite walls at the front and back of the viewer.

(4) In a periscope, two parallel plane mirrors each inclined at 45° with the vertical walls are placed facing each other.



Uses of Plane Mirror

(5) In a kaleidoscope, three plane mirrors inclined with each other at 60° are used. If small coloured bangle pieces are kept between the mirrors, beautiful hexagonal patterns are seen on rotating the tube.

(6) In solar heating devices such as solar cooker, solar water heater, etc., a plane mirror is used to reflect the incident light rays from sun on the substance to be heated.

Question

According to the law of reflection:

A. i/r = constant

B. $\sin i/\sin r$ = constant

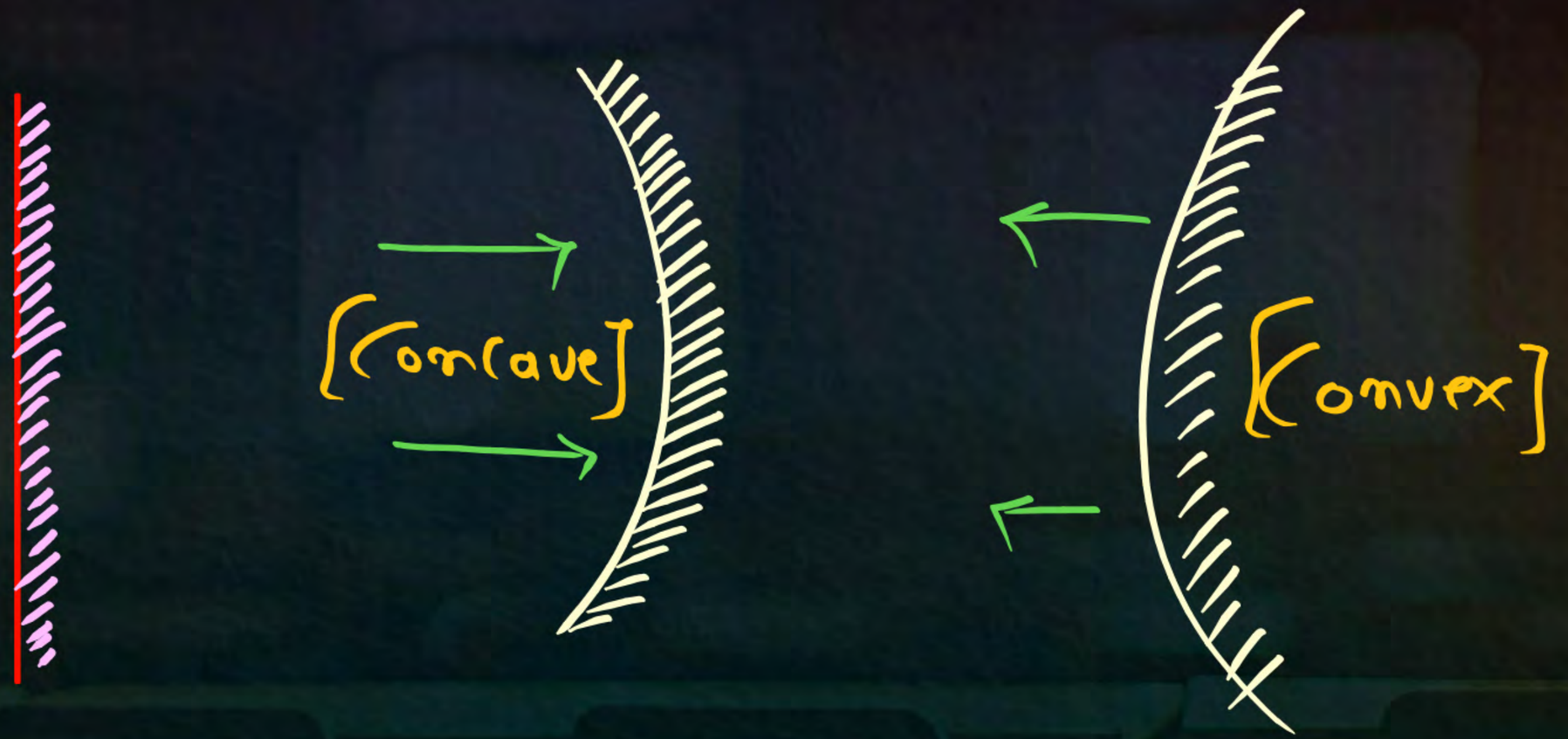
C. $i + r$ = constant

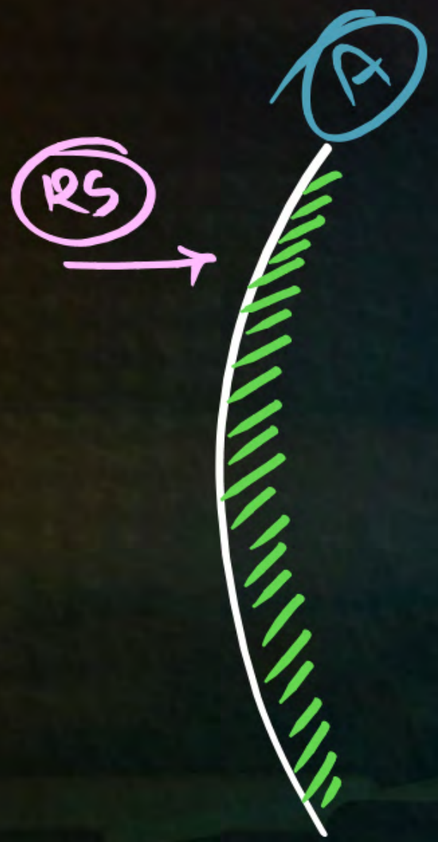
D. $i = r$

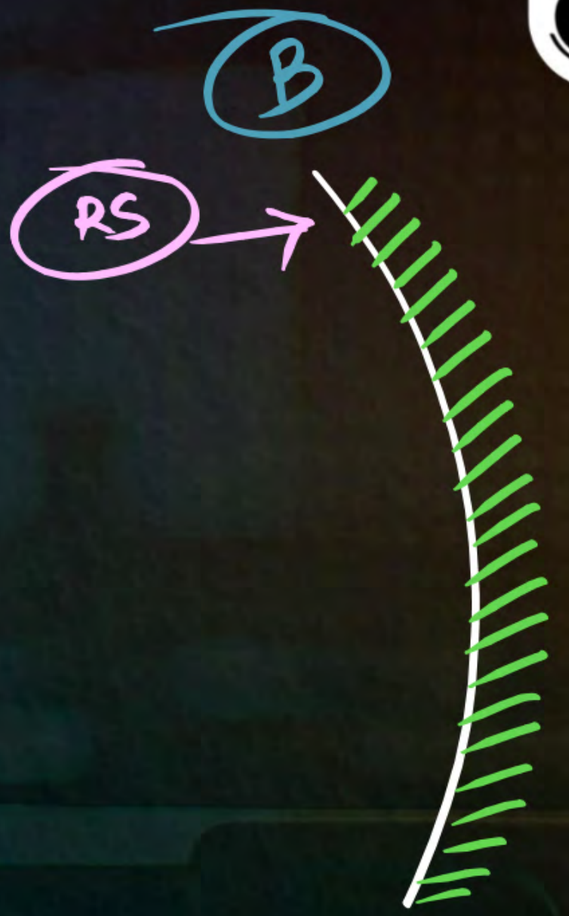
Spherical Mirrors

A spherical mirror is made by silvering a part of a hollow glass sphere. Thus

A reflecting surface which is a part of a sphere is called a spherical mirror.


Concave
Convex


A
RS


B
RS

Concave Mirror

A concave mirror is made by silvering the outer (or bulging) surface of the piece of a hollow sphere such that the reflection takes place.

Convex Mirror

A convex mirror is made by silvering the inner surface of the piece of a hollow sphere such that the reflection takes place from the outer (or bulging) surface.

Brief Introduction of Terms Related to a Spherical Mirror

(1) Centre of curvature

The centre of curvature of a mirror is the centre of the sphere of which the mirror is a part.

(2) Radius of curvature

The radius of sphere of which the spherical mirror is a part, is called the radius of curvature of the mirror.

Brief Introduction of Terms Related to a Spherical Mirror

(3) Pole

The geometric centre of the spherical surface of mirror is called the pole of mirror.

(4) Aperture

The plane surface area of the mirror through which the light rays enter and fall on the mirror is called its aperture.

Thus for the mirror, AB is the diameter of aperture.

Brief Introduction of Terms Related to a Spherical Mirror

(5) Principal axis

It is the straight line joining the pole of the mirror to its centre of curvature.

Focus and Focal Length

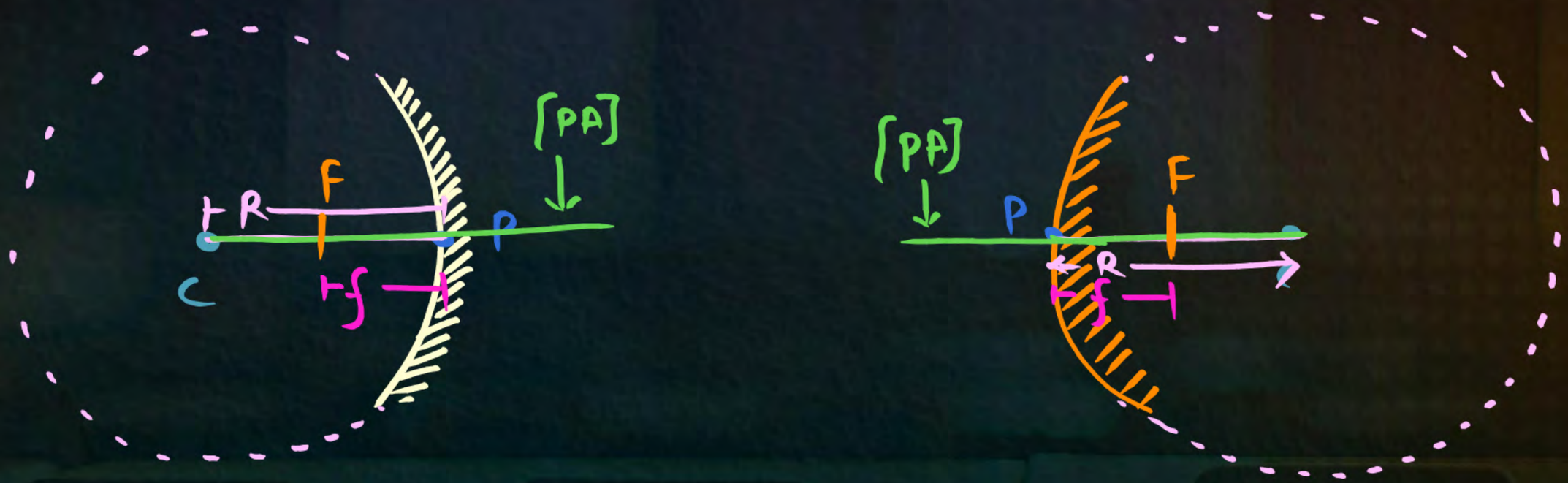
The focus of a concave mirror is a point on the principal axis through which the light rays incident parallel to the principal axis, pass after reflection from the mirror.

$f = \frac{R}{2}$

$R = 2f$

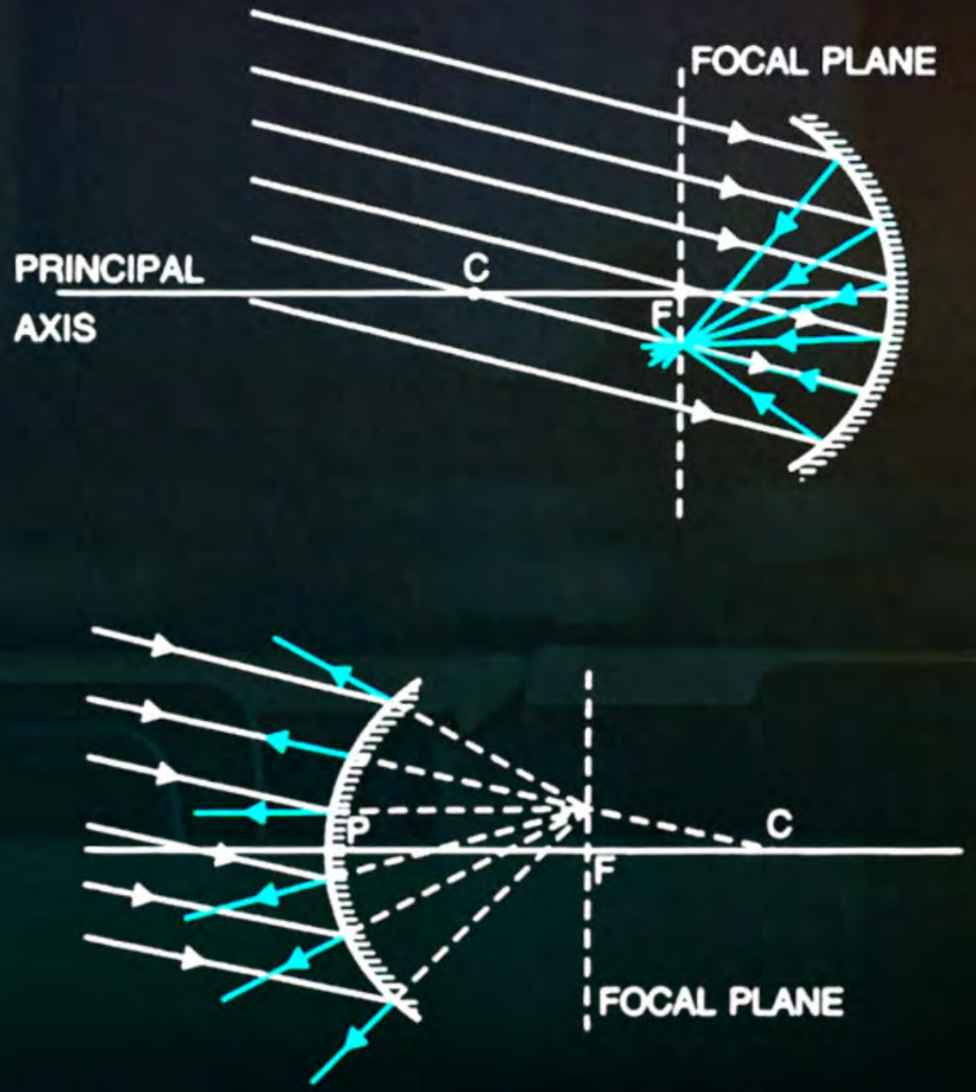
Focus and Focal Length

The focus of a convex mirror is a point on the principal axis from which, the light rays incident parallel to the principal axis, appear to come, after reflection from the mirror.


[PA]
F
R
P
C
f
[PA]
P
F
R
f

Focal Plane

A plane passing through the focus and normal to the principal axis of the mirror, is called focal plane. A parallel beam of light inclined to the principal axis get focused at a point in this plane [Figure]. It is the point where the ray passing through the centre of curvature meets the focal plane.



Convenient Rays For The Construction Of Image By Ray Diagram

(1) A ray passing through the centre of curvature,
(2) A ray parallel to the principal axis,
(3) A ray passing through the focus,
(4) A ray incident at the pole.

Thank You