NDA-CDS 1 2025

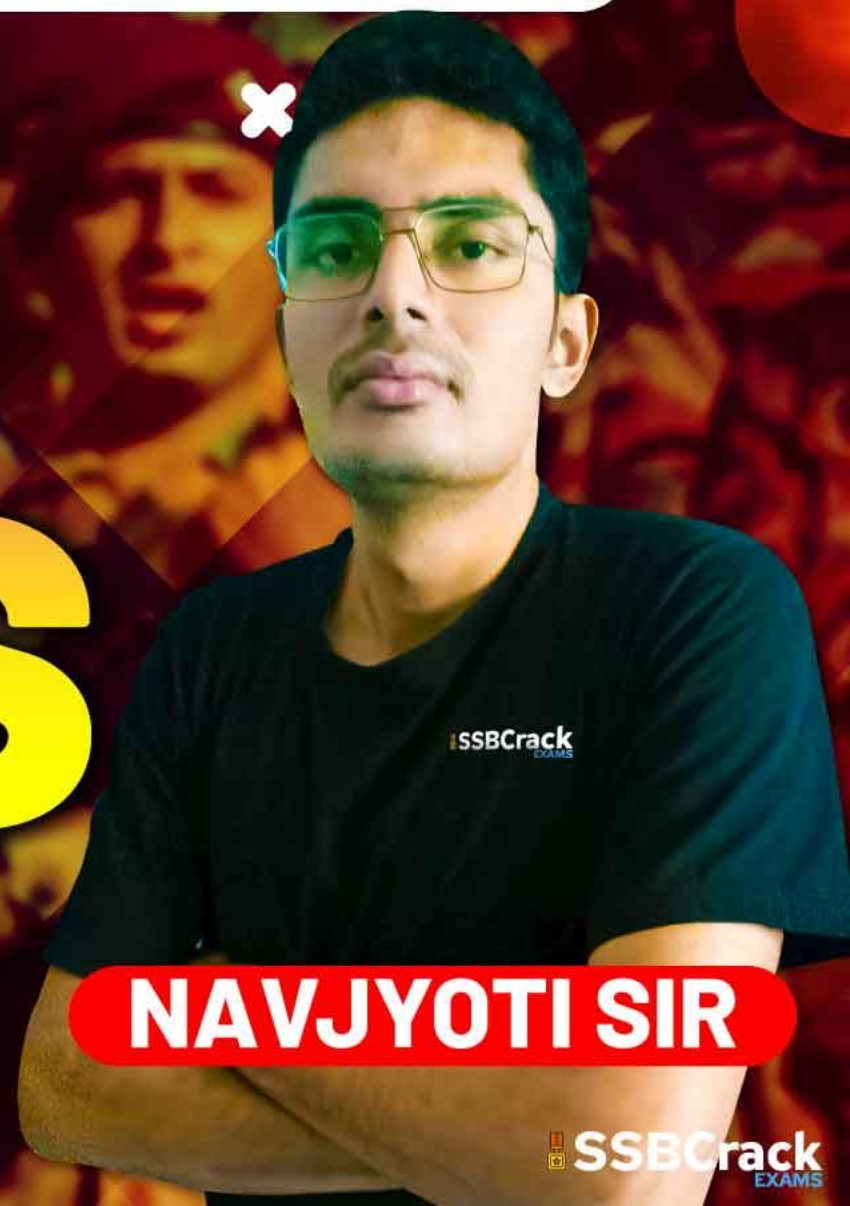
GS

LIVE

PHYSICS

REFLECTION OF LIGHT

CLASS 1



NAVJYOTI SIR

SSBCrack EXAMS

28 Nov 2024 Live Classes Schedule

9:00AM	28 NOVEMBER 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

NDA 1 2025 LIVE CLASSES

1:00PM	PHYSICS - REFLECTION OF LIGHT - CLASS 1	NAVJYOTI SIR
4:30PM	ENGLISH - COMMONLY USED WORDS - CLASS 2	ANURADHA MA'AM
5:30PM	MATHS - LIMITS & CONTINUITY - CLASS 1	NAVJYOTI SIR

CDS 1 2025 LIVE CLASSES

1:00PM	PHYSICS - REFLECTION OF LIGHT - CLASS 1	NAVJYOTI SIR
4:30PM	ENGLISH - COMMONLY USED WORDS - CLASS 2	ANURADHA MA'AM
7:00PM	MATHS - TRIGONOMETRY - CLASS 2	NAVJYOTI SIR

SSBCrack EXAMS

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LIGHT - REFLECTION

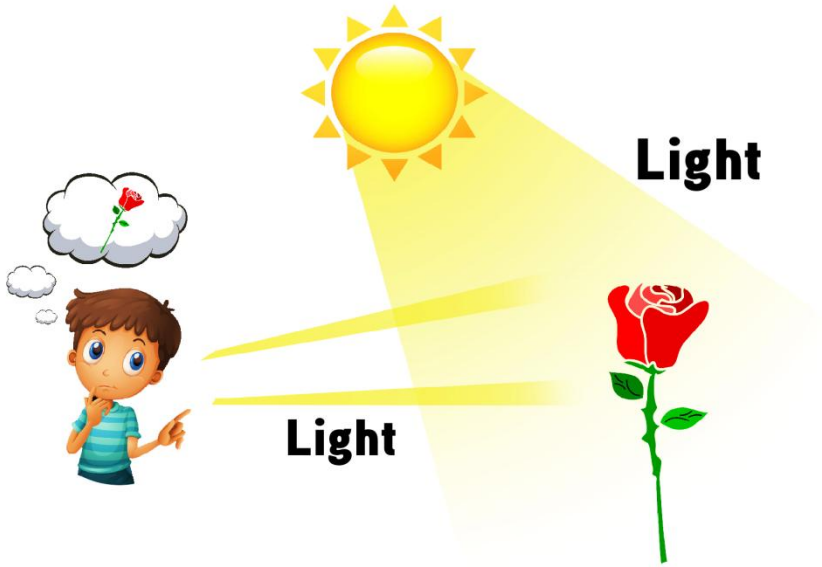
WHAT WILL WE STUDY ?

- Light - Introduction
- Reflection
- Plane Mirror And Image Formed
- Spherical Mirrors - Concave And Convex Mirror
- Sign Convention And Mirror Formula
- Magnification

Light - Introduction

- A Form Of Energy Which Enables Human Beings And Creatures To ‘See’ Things.
- Light Rays Travel In A Straight Line.

Ray

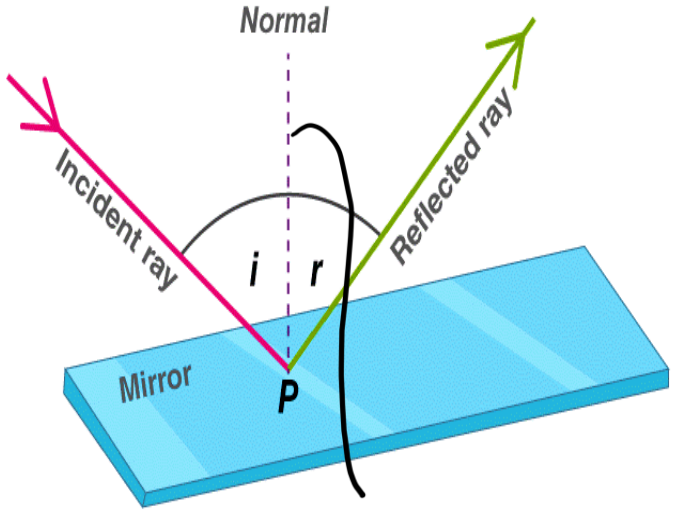


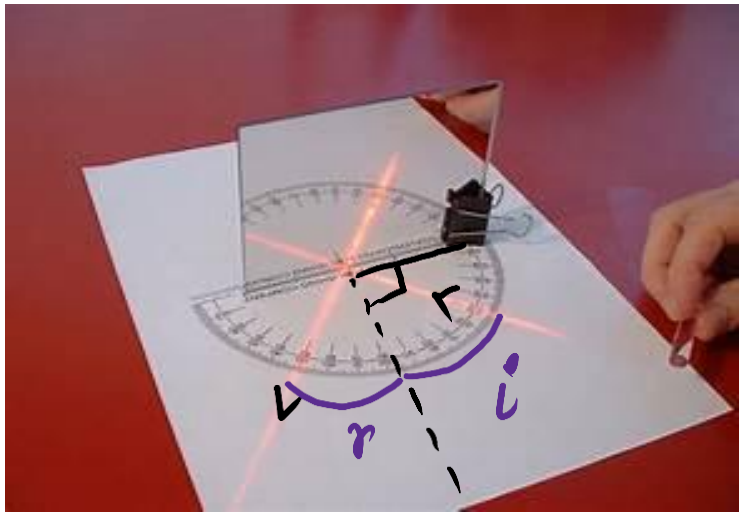
Reflection

- **Light Rays Bounce Off A Surface, Generally Shiny.**
- **It Happens In A Single Medium.**

LAWS OF REFLECTION

1. The incident ray, normal at the point of incidence , and reflected ray, all lie on the same plane.
2. angle of incidence = angle of reflection.





imaginary and perpendicular to mirror's surface.

EXAMPLE

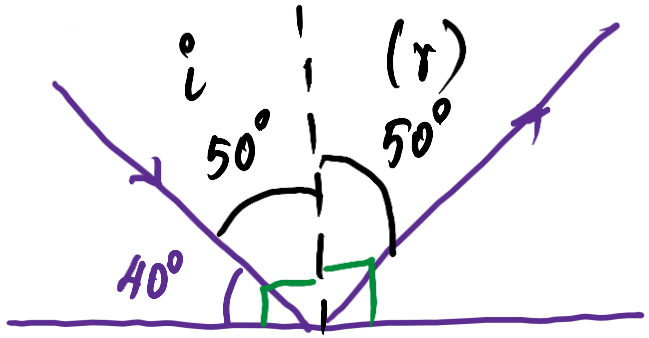
A ray of light strikes a plane mirror at an angle of 40° with the mirror surface. What is the angle of reflection?

(a) 40°

(b) 50° ✓

(c) 80°

(d) 90°



EXAMPLE

A beam of light strikes a plane mirror at an angle of incidence of 30°. If the mirror is rotated by 15° clockwise, by how much does the angle between the incident and reflected beam change?

(a) 15°

(b) 30°

(c) 45°

(d) 60°

$2\theta = 2 \times 15^\circ = 30^\circ$

EXAMPLE

A ray of light traveling in air is incident at an angle of 45° on the surface of a plane mirror. If the mirror is tilted by 10° while keeping the incident ray fixed, what will be the change in the angle of reflection?

(a) 5°

(b) 10°

(c) 20°

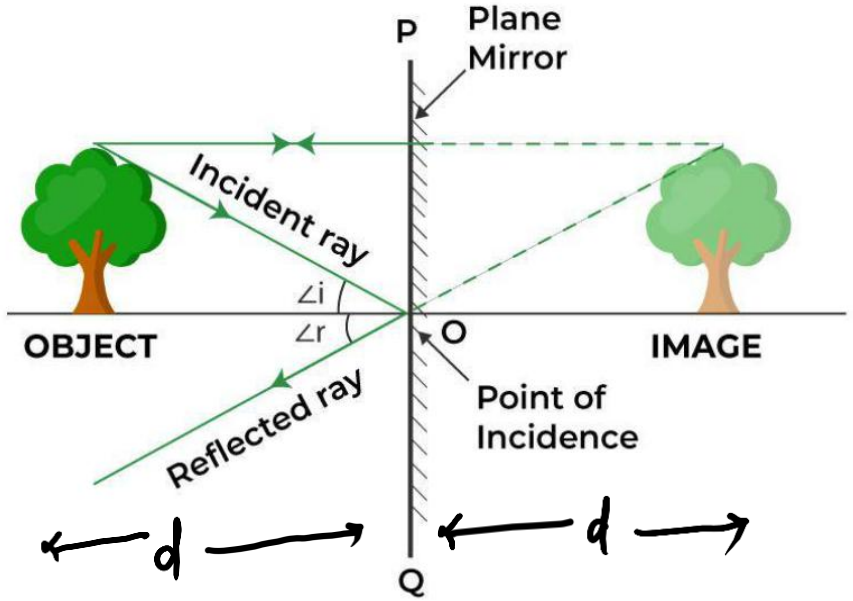
(d) 45°

2θ, where θ is angle of tilt,

$= 2 \times 10^\circ = 20^\circ$

Plane Mirror and Image Formed

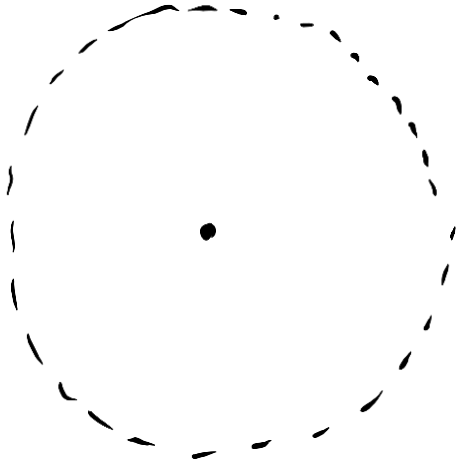
- Erect (Upright). ✓
- the same size as the object.
- laterally inverted (Left side of object appears on right of image) — Lateral inversion,
- At the same distance behind the mirror as the object is in front of mirror.
- virtual (the image cannot be formed on a screen).

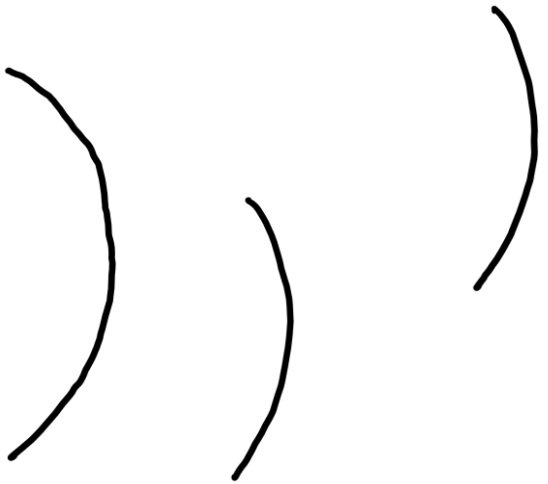


real image - can be obtained on screen (Movie Hall)

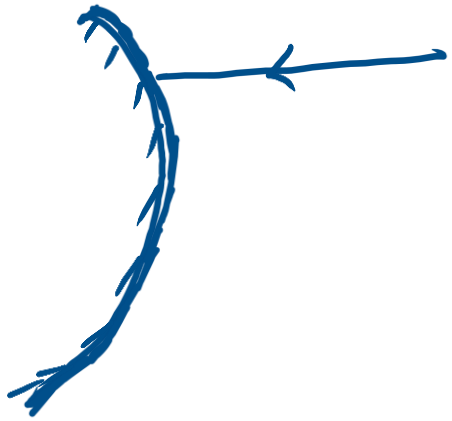
SPHERICAL MIRRORS

→ portion of sphere





Concave

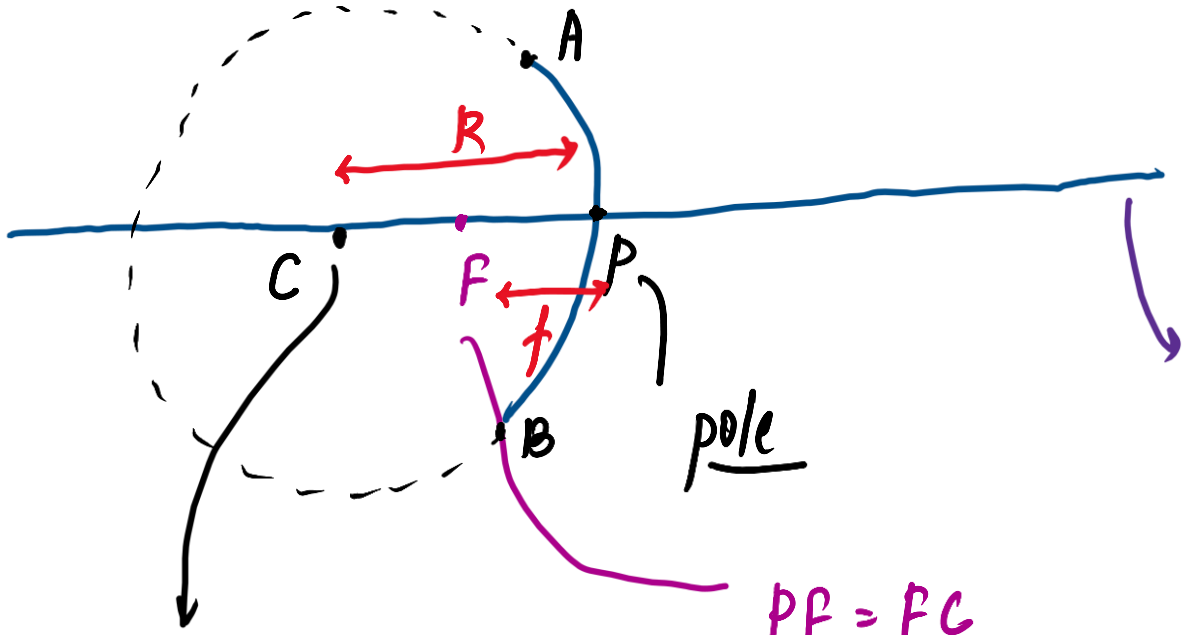


Convex

TERMS ASSOCIATED WITH SPHERICAL MIRROR

- Centre of Curvature
- Pole
- Principal Axis
- Focus
- Aperture

diameter — (AB)



PF = FC

(F - focus)

R = 2f

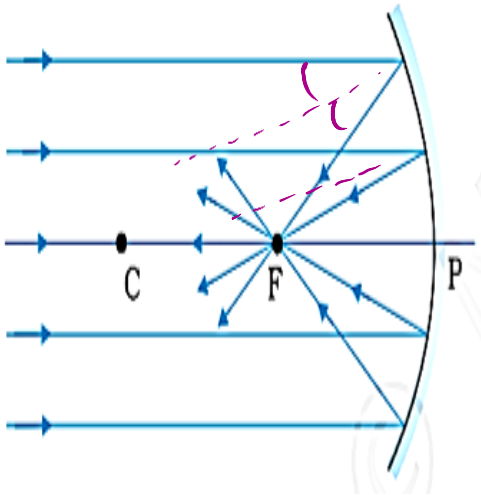
centre of curvature

(centre of sphere of which mirror is a part)

PC → Radius of (R) curvature

PF – focal (f) length

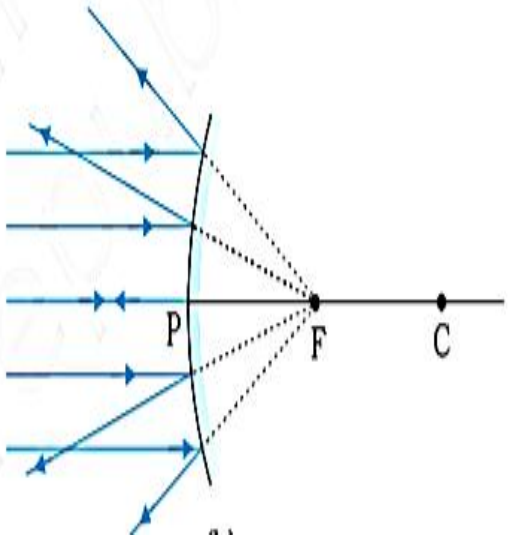
IMAGE FORMED BY CONCAVE AND CONVEX MIRROR



concave

(rays incident parallel on mirror, converges at F)

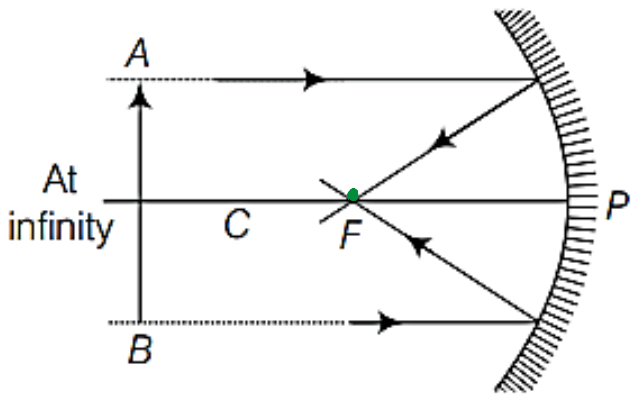
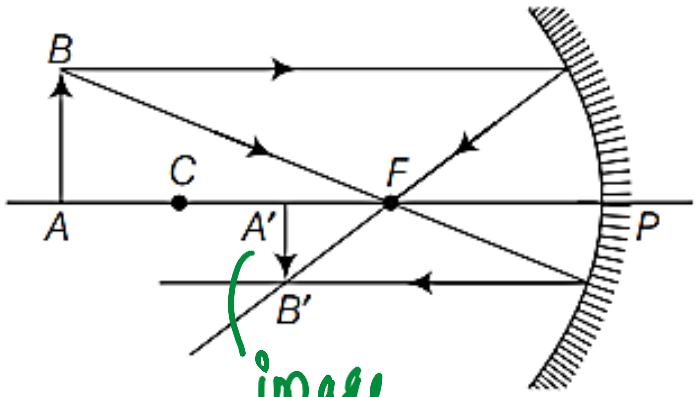
converging mirror.



convex (rays incident parallel on mirror, diverges, over F)

diverging mirror.

IMAGE FORMED DUE TO DIFFERENT POSITION OF OBJECTS

Position of object	*Ray Diagram*	*Position of image*	*Nature and size of image*
At infinity		At focus or in the focal plane	Real, inverted, extremely diminished point size
Beyond the centre of curvature but at finite distance		Between focus and the centre of curvature	Real, inverted and diminished

Very small in size

image

Virtual – erect

real – inverted

IMAGE FORMED DUE TO DIFFERENT POSITION OF OBJECTS

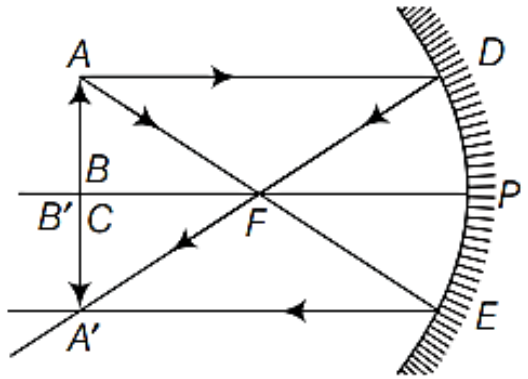
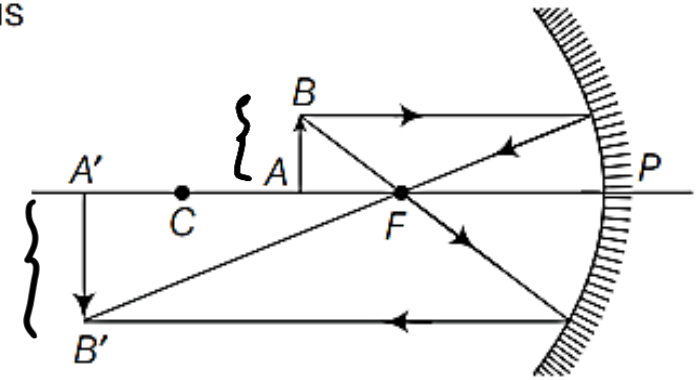
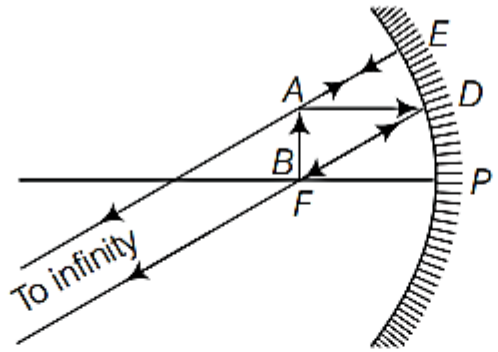
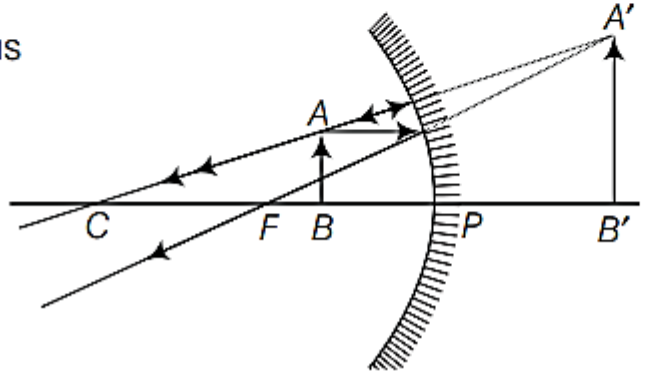
Position of object	*Ray Diagram*	*Position of image*	*Nature and size of image*
At the centre of curvature		At the centre of curvature	Real, inverted and equal to the object
Between focus and centre of curvature		Beyond the centre of curvature	Real, inverted and bigger than object

IMAGE FORMED DUE TO DIFFERENT POSITION OF OBJECTS

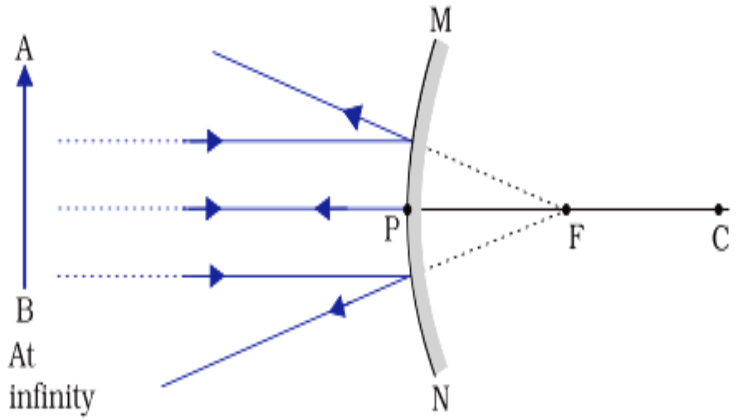
Position of object	*Ray Diagram*	*Position of image*	*Nature and size of image*
At the focus		At infinity	Real, inverted and extremely magnified
Between the pole and focus		Behind the mirror	Virtual, erect and magnified

CONVEX MIRROR

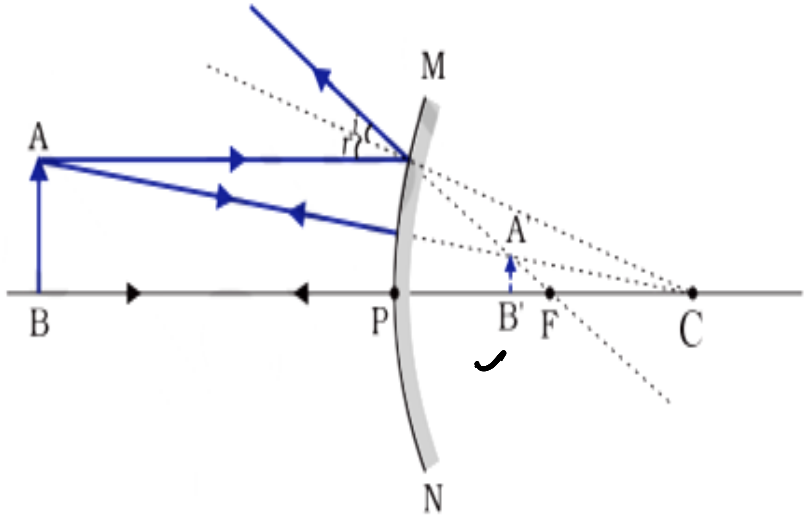
Position of the object	Position of the image	Size of the image	Nature of the image
Any where between pole (P) and in finity (∞)	Between P and F back of the mirror	Small	Virtual and erect
At in finity	At F	Very small in size	Virtual and erect

(b)

(a)



(a)



(b)

EXAMPLE

The image formed by a concave mirror for an object placed between the pole and the focus is:

(a) Real, inverted, and diminished.

(b) Real, inverted, and enlarged.

(c) Virtual, upright, and enlarged. ✓

(d) Virtual, inverted, and diminished.

USE OF CONCAVE MIRRORS

Shaving Mirrors and Makeup Mirrors

→ enlarged image

→ strong parallel beams of light

Used in Torches, Beam lights

Dentist mirrors

Used in Solar Furnaces to Produce Heat

→ At the focus, massive heat is generated.

(converging mirror)

USE OF CONVEX MIRRORS

→ generates very small images.

↓

wide area can be shown.

Rear-view mirror in vehicles.

SIGN CONVENTION

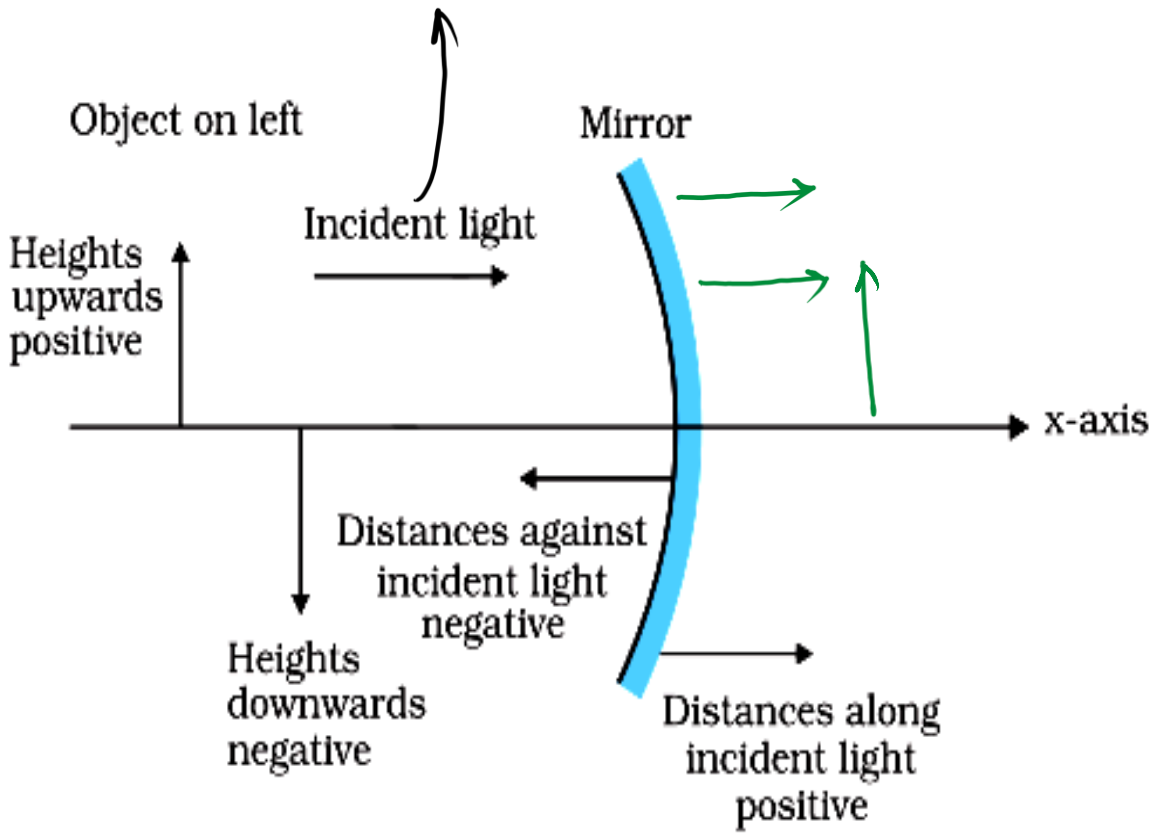
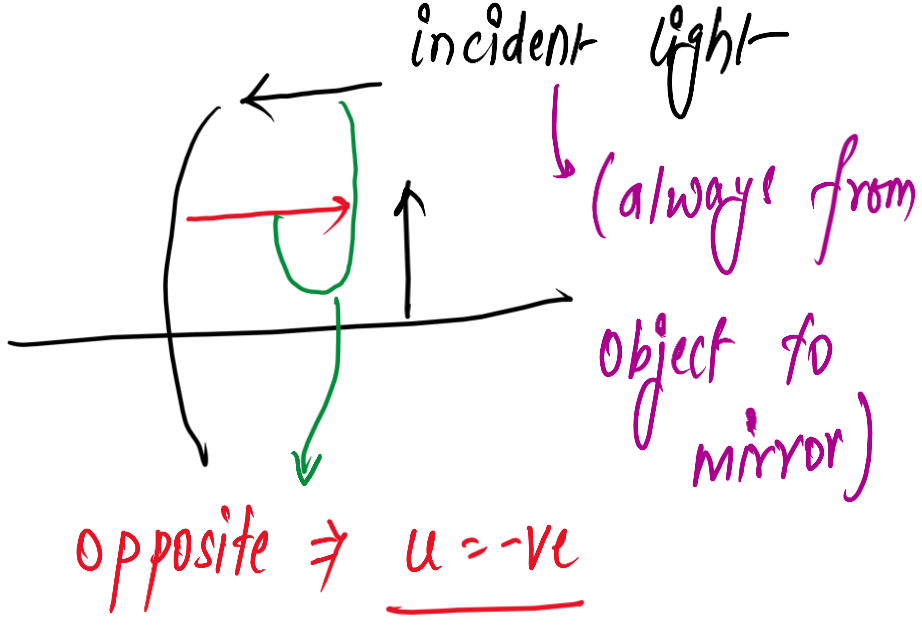
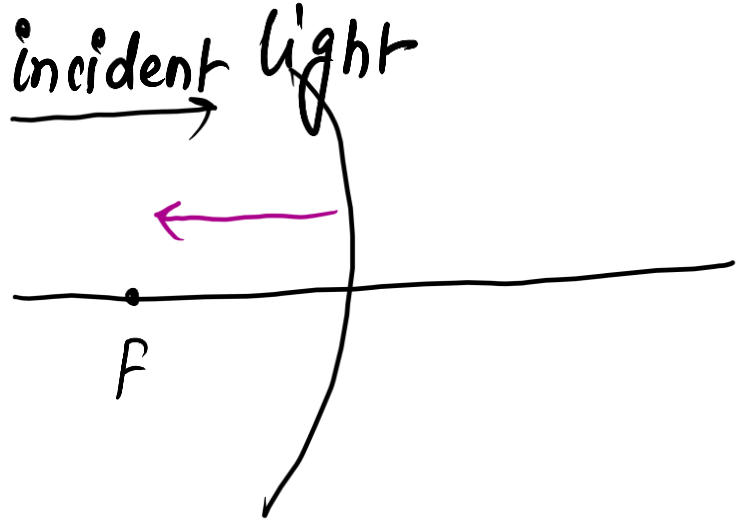


Image distance = v = +ve (generally)

object distance = -ve (u) (generally)

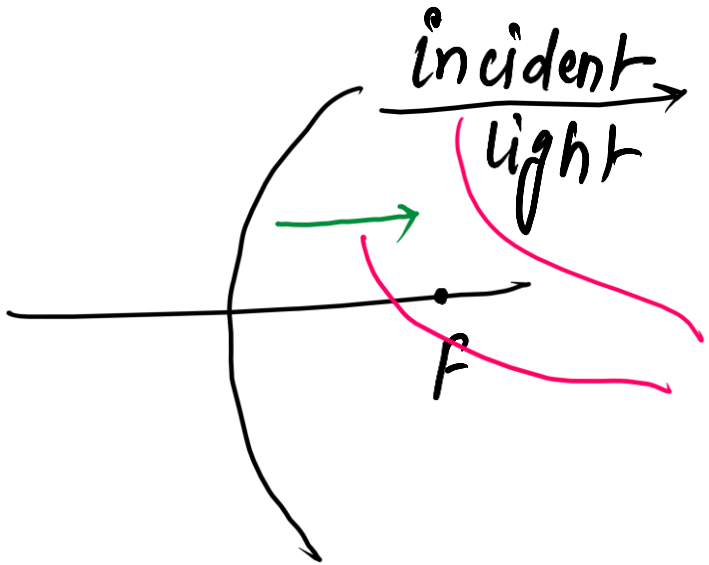


Focal Length



(concave)

f = -ve



(convex)

f = +ve

same direction

⇓

distances are positive.

EXAMPLE

Which of the following statements is correct regarding spherical mirrors?

1. A concave mirror can produce a real image.
2. A convex mirror always produces a virtual image.
3. The focal length of a convex mirror is negative.
4. The focal length of a concave mirror is positive.

Options:

(a) 1 and 2 only

(b) 1, 3, and 4 only

(c) 2, 3, and 4 only

(d) 1, 2, 3, and 4

MIRROR FORMULA

$$\frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

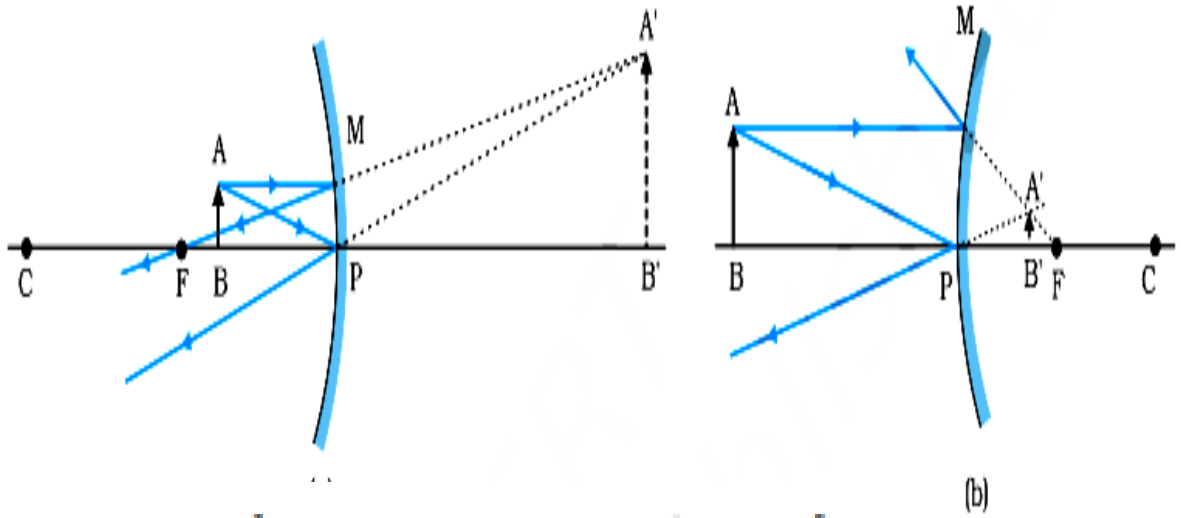
$v \longrightarrow$ image distance

$u \longrightarrow$ object distance

$f \longrightarrow$ focal length

MAGNIFICATION (m)

- **The ratio of the height of the image (h') to the height of the object (h).**



(b)

→(+ve means erect image)

→(–ve means inverted image)

→(|m| >1 means large image)

→(|m| < 1 means small image)

SUMMARY

- Reflection of Light
- Plane and Spherical Mirrors
- Image formed by Concave and Convex Mirrors
- Uses of Spherical Mirrors
- Mirror Formula and Magnification

NDA-CDS 1 2025

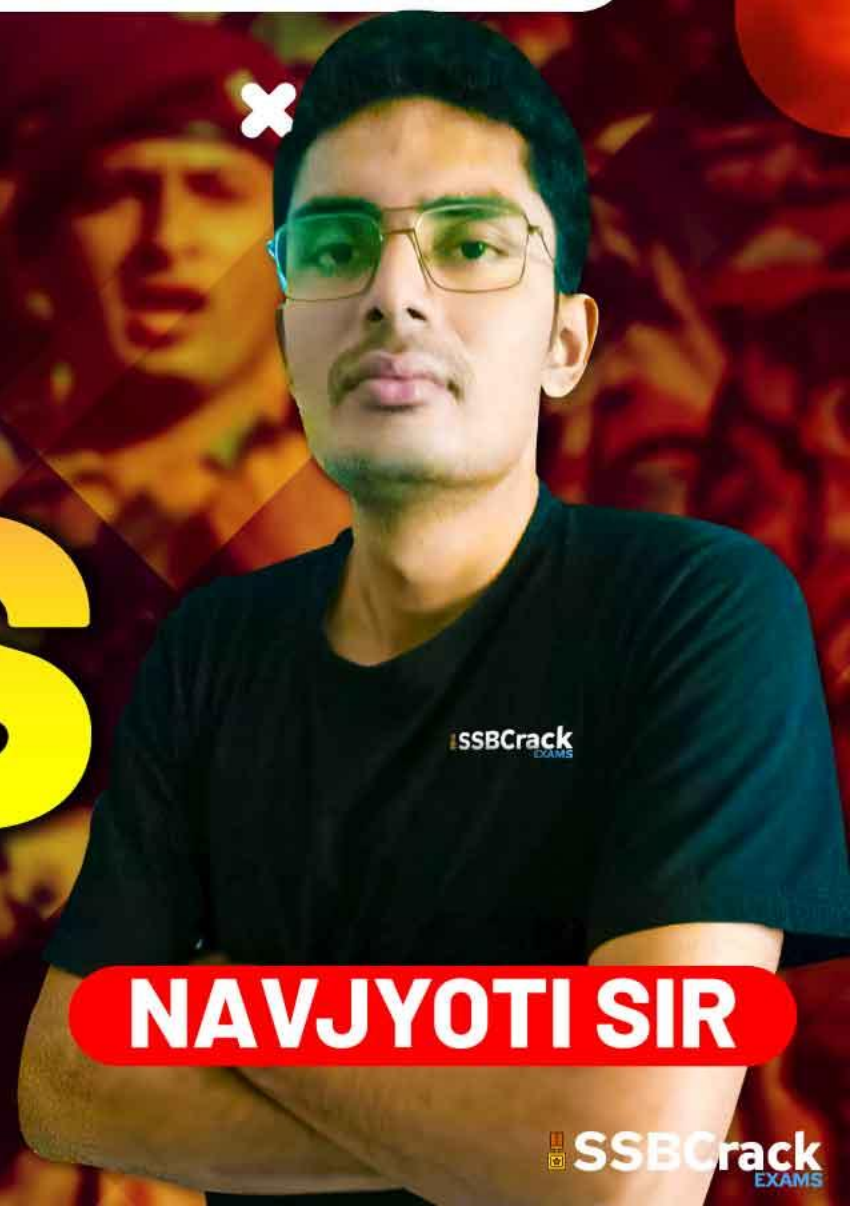
GS

LIVE

PHYSICS

REFLECTION OF LIGHT

CLASS 2



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