

SCIENCE • CLASS 10

CHAPTER 9

Light - Reflection and Refraction

NCERT SOLUTIONS



LENS MATERIALS AND FOCAL LENGTH

Exercise 1 — Which material cannot be used to make a lens?

- (a) Water (b) Glass (c) Plastic (d) Clay

Answer: (d) Clay.

A lens must transmit light. Ordinary clay is opaque; clear water, glass or plastic can transmit light.

Exercise 4 — A spherical mirror and a thin lens each have focal length -15 cm. They are likely to be:

- (a) Both concave (b) Both convex
(c) Concave mirror and convex lens (d) Convex mirror and concave lens

Answer: (a) Both concave.

Under the Cartesian sign convention, both have negative focal lengths.

OBJECT POSITION AND IMAGE TYPE

Exercise 2 — A concave mirror forms a virtual, erect and enlarged image. Where is the object?

- (a) Between focus and centre of curvature
- (b) At the centre of curvature
- (c) Beyond the centre of curvature
- (d) Between the pole and focus

Answer: (d) Between the pole and focus.

Reflected rays diverge; their backward extensions meet behind the mirror.

Exercise 3 — Where must an object be placed before a convex lens to form a real image of the same size?

- (a) At the focus
- (b) At twice the focal length
- (c) At infinity
- (d) Between optical centre and focus

Answer: (b) At twice the focal length.

The image forms at twice the focal length on the other side.

ERECT IMAGES AND MAGNIFIERS

Exercise 5 — Your image remains erect however far you stand from a mirror.
It is likely to be:

- (a) Only plane
- (b) Only concave
- (c) Only convex
- (d) Either plane or convex

Solution: Answer: (d) Either plane or convex.

Both form erect images of ordinary real objects at all object distances.

Exercise 6 — Which lens is best for reading small dictionary letters?

- (a) Convex, $f = 50$ cm
- (b) Concave, $f = 50$ cm
- (c) Convex, $f = 5$ cm
- (d) Concave, $f = 5$ cm

Solution: Answer: (c) Convex lens, $f = 5$ cm.

With letters inside its focal length, it forms an enlarged, erect, virtual image. Its shorter focal length gives greater magnifying power.

ERECT IMAGE IN A CONCAVE MIRROR

Exercise 7 — A concave mirror has focal length 15 cm. For an erect image, what is the object's distance range? State the image's nature and size, and draw a ray diagram.

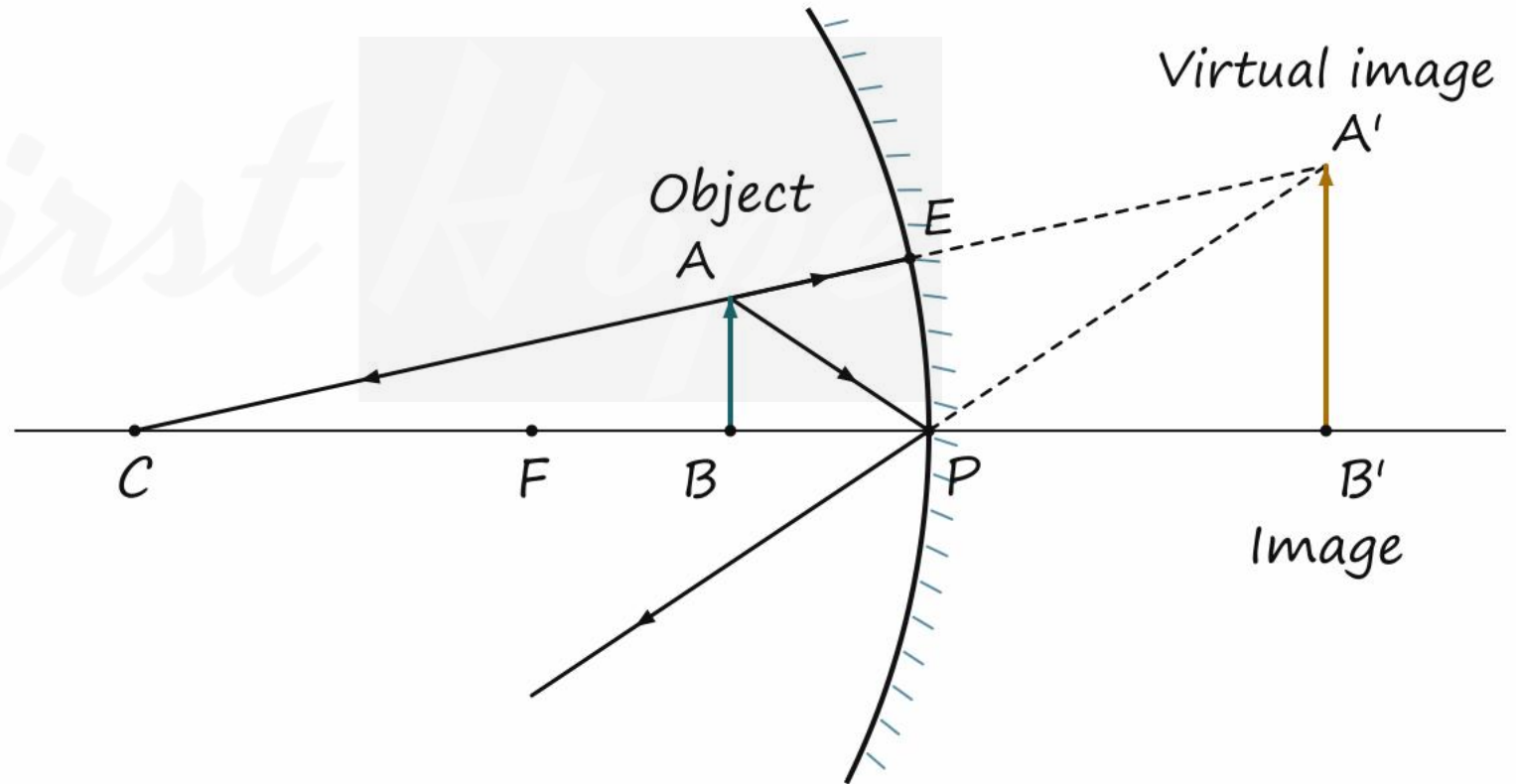
Solution:

Answer: Place the object between the pole and the focus.

$$0 < \text{object distance} < 15 \text{ cm}$$

The image is virtual, erect and enlarged, behind the mirror.

Dotted lines are backward extensions of reflected rays.



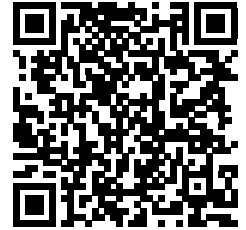


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