

NTSE

NCERT Solutions for Class 10 Science
PHYSICS – Light



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NCERT ANNEXURE

Given below are subjective questions and answers for your reference:

1. **The radius of curvature of a spherical mirror is 20 cm. What is its focal length?**

Ans. Radius of curvature, $R = 20$ cm

Radius of curvature of a spherical mirror = $2 \times$ Focal length (f)

$$R = 2f$$

$$f = R/2 = 20/2 = 10 \text{ cm}$$

Hence, the focal length of the given spherical mirror is 10 cm.

2. **A ray of light travelling in air enters obliquely into water. Does the light ray bend towards the normal or away from the normal? Why?**

Ans. The light ray bends towards the normal.

When a ray of light travels from an optically rarer medium to an optically denser medium, it gets bent towards the normal. Since water is optically denser than air, a ray of light travelling from air into the water will bend towards the normal.

3. **From table, find out which of the medium having the highest optical density. Also, find the medium with lowest optical density.**

Material medium	Refractive index
Air	1.0003
Canada Balsam	1.53
Ice	1.31
Water	1.33
Rock salt	1.54
Alcohol	1.36
Kerosene	1.44
Carbon di-sulphide	1.63
Fused quartz	1.46
Dense flint glass	1.65

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Turpentine oil	1.47
Ruby	1.71
Benzene	1.50
Sapphire	1.77
Crown glass	1.52
Diamond	2.42

Ans. Highest optical density = Diamond

Lowest optical density = Air

Optical density of a medium is directly related with the refractive index of that medium. A medium which has the highest refractive index will have the highest optical density and vice-versa.

It can be observed from table that diamond and air respectively have the highest and lowest refractive index. Therefore, diamond has the highest optical density and air has the lowest optical density.

4. The image formed by a concave mirror is observed to be virtual, erect and larger than the object. Where should be the position of the object?

- Between the principal focus and the centre of curvature
- At the centre of curvature
- Beyond the centre of curvature
- Between the pole of the mirror and its principal focus.

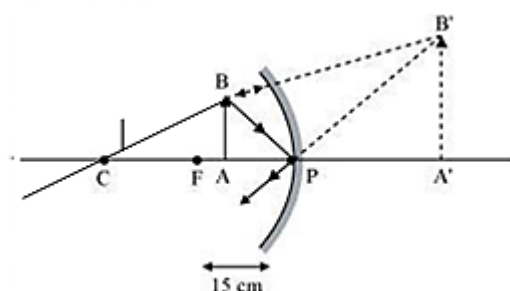
Ans. (d) When an object is placed between the pole and principal focus of a concave mirror, the image formed is virtual, erect, and larger than the object.

5. We wish to obtain an erect image of an object, using a concave mirror of focal length 15 cm. What should be the range of distance of the object from the mirror? What is the nature of the image? Is the image larger or smaller than the object? Draw a ray diagram to show the image formation in this case.

focal length = 15 cm. Range of object distance = 0 cm to 15 cm

A concave mirror gives an erect image when an object is placed between its pole (P) and the principal focus (F).

Hence, to obtain an erect image of an object from a concave mirror of focal length 15 cm, the object must be placed anywhere between the pole and the focus. The image formed will be virtual, erect, and magnified in nature, as shown in the given figure.



Success STORY

I still wonder how one man has such a deep understanding of an examination. It becomes the truth what ever Vipin Sir says about NTSE.

M. Pareek

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NCERT EXEMPLAR

1. Which of the following can make a parallel beam of light when light from a point source is incident on it?
- Concave mirror as well as convex lens
 - Convex mirror as well as concave lens
 - Two plane mirrors placed at 90° to each other
 - Concave mirror as well as concave lens

Ans: (a) Concave mirror as well as convex lens

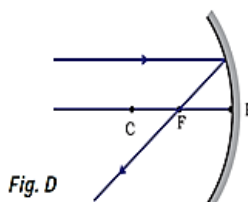
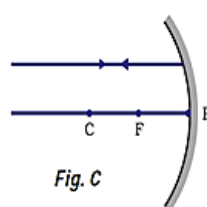
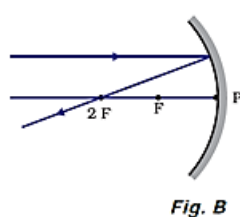
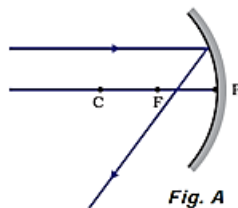
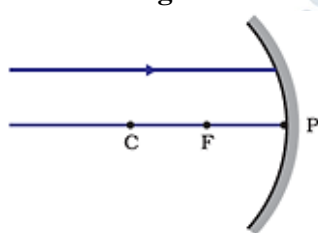
2. A 10 mm long awl pin is placed vertically in front of a concave mirror. A 5 mm long image of the awl pin is formed at 30 cm in front of the mirror. The focal length of this mirror is
- 30 cm
 - 20 cm
 - 40 cm
 - 60 cm

Ans: (b) – 20 cm

3. Under which of the following conditions a concave mirror can form an image larger than the actual object?
- When the object is kept at a distance equal to its radius of curvature
 - When object is kept at a distance less than its focal length
 - When object is placed between the focus and centre of curvature
 - When object is kept at a distance greater than its radius of curvature

Ans: (b), (c)

4. Which of the following ray diagrams is correct for the ray of light incident on a concave mirror as shown in Figure?



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(a) Figure A

(b) Figure B

(c) Figure C

(d) Figure D

Ans: (d) Figure D

5. A child is standing in front of a magic mirror. She finds the image of her head bigger, the middle portion of her body of the same size and that of the legs smaller. The following is the order of combinations for the magic mirror from the top.

(a) Plane, convex and concave

(b) Convex, concave and plane

(c) Concave, plane and convex

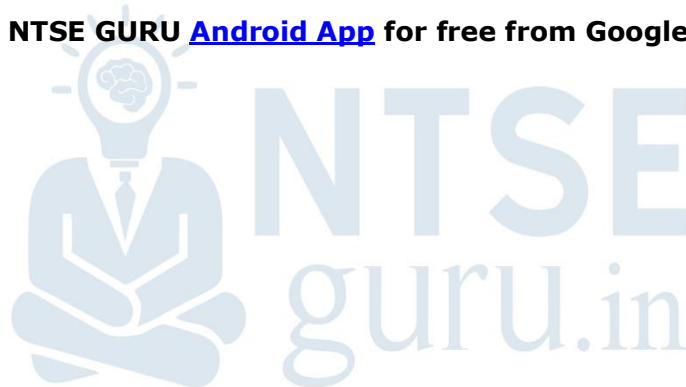
(d) Convex, plane and concave

Ans: (c) Concave, plane and convex

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