

CHAPTERWISE QUESTIONS

LIGHT - REFLECTION AND REFRACTION

CLASS X

Time : 1½ hrs.

SET A

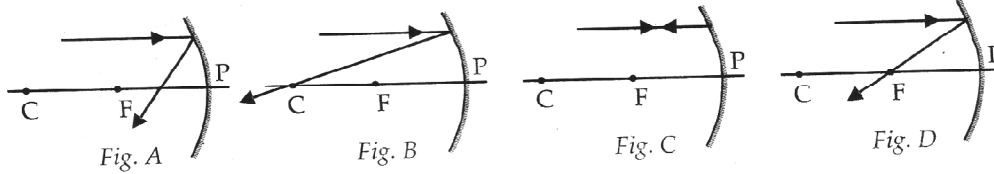
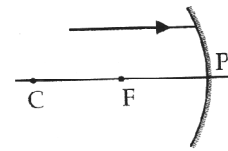
Mark : 40

SECTION - A

8 × 1 = 8

- Where should an object be placed in front of a convex lens to get a real image of the size of the object?
 - At the principal focus of the lens
 - At twice the focal length
 - At infinity
 - Between the optical centre of the lens and its principal focus.
- Velocity of light in air is 3×10^8 m/s. While its velocity in a medium is 1.5×10^8 m/s. Then, refractive index of this medium is
 - 3
 - 5
 - 0.5
 - 2
- Which of the following lenses would you prefer to use while reading small letters found in a dictionary?
 - A convex lens of focal length 50 cm
 - A concave lens of focal length 50 cm
 - A convex lens of focal length 5 cm
 - A concave lens of focal length 5 cm
- An object is placed at the radius of curvature of a concave spherical mirror. The image formed by the mirror is
 - located at the focal point of the mirror
 - located between the focal point and the radius of curvature of the mirror
 - located at the center of curvature of the mirror
 - located out beyond the center of curvature of the mirror
- An object of height 10 cm is placed in front of a convex lens having focal length of 12 cm. The object is placed at a distance of 36 cm in front of the lens. How many times is the image likely to be magnified?
 - 1/2 times
 - 2 times
 - 3 times
 - 4 times
- A student studies that speed of light in air is 300000 kms/ sec where that of speed in a glass slab is about 197000 kms/ sec. What causes the difference in speed of light in these two media?
 - difference in density
 - difference in temperature
 - difference in amount of light
 - difference in direction of wind flow
- A student studies that convex lens always forms virtual image irrespective of its position. What causes the convex mirror to always form a virtual image?
 - because the reflected ray never intersects
 - because the reflected ray converges at a single point
 - because the incident ray traces its path back along the principal axis
 - because the incident ray of a convex mirror gets absorbed in the mirror

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



- a) Fig. A b) Fig. B c) Fig. C d) Fig. D

In the following questions (No. 9-10) a statement of Assertion followed by a statement of Reason is given. Choose the correct answer out of the following choices. $2 \times 1 = 2$

- a) If both the assertion and the reason are true and the reason is a correct explanation of the assertion.
 b) If both the assertion and reason are true but the reason is not a correct explanation of the assertion.
 c) Assertion is true but reason is false.
 d) Assertion is false but reason is true.
9. Assertion (A) : Concave mirrors are used as make-up mirrors.
 Reason (R) : When the face is held within the focus of a concave mirror, then a diminished image of the face is seen in the concave mirror.
10. Assertion (A) : For observing traffic at back, the driver mirror is convex mirror.
 Reason (R) : A convex mirror has much larger field of view than a plane mirror.

SECTION - B

11. A pencil when dipped in water in a glass tumbler appears to be bent at the interface of air and water. Will the pencil appear to be bent to the same extent, if instead of water we use liquids like, kerosene or turpentine. Support your answer with reason. **2**
12. Sudha finds out that the sharp image of the window pane of her science laboratory is formed at a distance of 15 cm from the lens. She now tries to focus the building visible to her outside the window instead of the window pane without disturbing the lens. In which direction will she move the screen to obtain a sharp image of the building? What is the approximate focal length of this lens? **2**
13. Size of image of an object by a mirror having a focal length of 20 cm is observed to be reduced to 1/3rd of its size. At what distance the object has been placed from the mirror? What is the nature of the image and the mirror? **2**

OR

A convex lens forms a real and inverted image of a needle at a distance of 50 cm from the lens. Where is the needle placed in front of the convex lens, so that this image is of the same size as that of the object? Also, find the power of the lens.

SECTION - C

14. An object 2 cm high is placed at a distance of 16 cm from a concave mirror, which produces a real image 3 cm high.

i) What is the focal length of the mirror?

ii) Find the position of the image.

3

15. A student focused the image of a candle flame on a white screen by placing the flame at various distances from a convex lens. He noted his observations:

3

Distance of flame from the lens (cm)	Distance of screen from the lens (cm)
60	20
40	24
30	30
24	40
15	70

a) From the above table, find the focal length of lens without using lens formula.

b) Which set of observations is incorrect and why?

c) In which case the size of object and image will be same? Give reason for your answer.

16. One half of a convex lens is covered with a black paper.

a) Show the formation of image of an object placed at 2Fp of such covered lens with the help of ray diagram. Mention the position and nature of image.

b) Draw the ray diagram for same object at same position in front of the same lens, but now uncovered. Will there be any difference in the image obtained in the two cases? Give reason for your answer.

3

17. Draw the ray diagram in each the position, nature of image formed when the object is placed:

3

a) at the centre of curvature of a concave mirror

b) within focal length of a convex lens

c) between pole and focus of concave mirror

18. **Answer the following:** **3**
- a) Write one advantage and disadvantage of using a convex mirror for seeing traffic at the rear?
 - b) The refractive index of diamond is 2.42. What is the meaning of this statement?
 - c) What is the radius of curvature of a plane mirror?

SECTION - D

19. State the laws of refraction of light. Explain the term 'absolute refractive index of a medium' and write an expression to relate it with the speed of light in vacuum. **5**

OR

- a) Under what condition, a concave mirror produces a virtual and magnified image? Draw a labelled ray diagram to show the formation of image in the above case. Also, state the position of object to produce magnified and real image.
- b) A ray of light moving along principal axis is falling on a concave mirror. Draw the path of reflected ray. Also, state the values of angle of incidence and reflection in this case.

SECTION - E

20. **Read the following and answer the questions.**

A transparent material bound by 2 surfaces of which one or both surfaces are spherical, forms a lens may have 2 spherical surfaces, bulging outward or curved inward. Such a lens is called the double concave or convex lens. A lens may be a convex lens or a concave lens. The centre of curvature usually represents by letter C_1 and C_2 . If parallel rays are passed from the opposite surface of lens another principle focus on the opposite is observed.

- i) Where is a diverging lens is used? **1**
- ii) What is the characteristics of image formed? when an object is kept at any distance in front of a concave lens. **1**
- iii) Which lens/mirror can form a virtual image which is always smaller than the object? **1**
- iv) A convex lens ray of light, while a concave lens is ray of light. **1**

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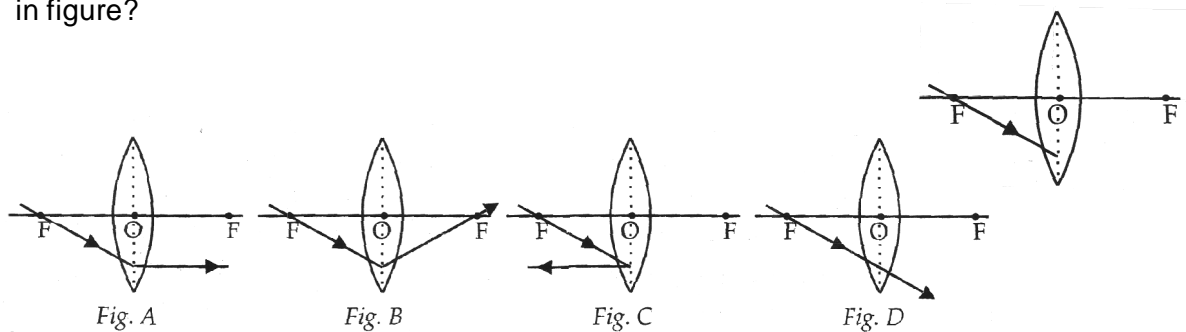
Mark : 40

SECTION - A

8 × 1 = 8

- An object is placed 60 cm in front of a concave mirror. The real image formed by the mirror is located 30 cm in front of the mirror. What is the object's magnification?
a) +2 b) -2 c) +0.5 d) -0.5
- A spherical mirror and a thin spherical lens have each a focal length of -15 cm. The mirror and the lens are likely to be
a) both concave b) both convex c) the mirror is concave and the lens is convex
d) the mirror is convex, but the lens is concave
- An object is placed in front of a screen and a convex lens is placed at a position such that the size of the image formed is 9 cm. When the lens is shifted through a distance of 20 cm, the size of the image becomes 1 cm. The focal length of the lens and the size of the object are respectively.
a) 7.5 cm and 3.5 cm b) 7.5 cm and 4.5 cm
c) 6 cm and 3 cm d) 7.5 cm and 3 cm
- A convex lens *A* of focal length 20 cm and a concave lens *B* of focal length 5 cm are kept along the same axis with a distance *d* between them. If a parallel beam of light falling on *A* leaves *B* as a parallel beam, then the distance *d* in cm will be
a) 25 b) 15 c) 30 d) 50
- A student conducts an experiment using a convex lens. He places the object at a distance of 60 cm in front of the lens and observed that the image is formed at a distance of 30 cm behind the lens. What is the power of the lens?
a) 0.005 dioptre b) 0.05 dioptre c) 5 dioptre d) 50 dioptre
- A student conducts an experiment using a convex lens of focal length 20 cm and an object of height 15 cm. He placed the object at 25 cm from the lens. Can the image be formed on a screen?
a) yes, because a real image will be formed
b) no, because a virtual image will be formed
c) yes, because an erect image will be formed
d) no, because an inverted image will be formed

7. Rekha placed a juice bottle at a distance of 20 cm in front of a convex mirror which has a focal length of 20 cm. Where is the image likely to form?
- at focus behind the mirror
 - at focus in front of the mirror
 - at a distance of 10 cm behind the mirror
 - at a distance of 10 cm in front of the mirror
8. Which of the following ray diagrams is correct for the ray of light incident on a lens shown in figure?



- Fig. A
- Fig. B
- Fig. C
- Fig. D

In the following questions (No. 9-10) a statement of Assertion followed by a statement of Reason is given. Choose the correct answer out of the following choices. $2 \times 1 = 2$

- If both the assertion and the reason are true and the reason is a correct explanation of the assertion.
 - If both the assertion and reason are true but the reason is not a correct explanation of the assertion.
 - Assertion is true but reason is false.
 - Assertion is false but reason is true.
9. Assertion (A) : The mirrors used in search lights are concave spherical.
Reason (R) : In concave spherical mirror the image formed is always virtual.
10. Assertion (A) : The angle of incidence for a ray of light having zero angle of reflection is two.
Reason (R) : Refracting surfaces follow Snell's Law.

SECTION - B

11. A convex lens of focal length 20 cm can produce a magnified virtual as well as real image. Is this a correct statement? If yes, where shall the object be placed in each case for obtaining these images? **2**
12. Under what condition in an arrangement of two plane mirrors, incident ray and reflected ray will always be parallel to each other, whatever may be angle of incidence. Show the same with the help of diagram. **2**

13. The image of a candle flame formed by a lens is obtained on a screen placed on the other side of the lens. If the image is three times the size of the flame and the distance between lens and image is 80 cm, at what distance should the candle be placed from the lens? What is the nature of the image at a distance of 80 cm and the lens? **2**

OR

A convex lens has focal length of 30 cm. Calculate at what distance should the object be placed from the lens so that it forms an image at 60 cm on the other side of the lens? Find the magnification produced by the lens in this case.

SECTION - C

14. What will happen when a convex lens is dipped in a liquid of refractive index.
- a) greater than that of the lens?
 - b) less than that of the lens?
 - c) equato to that of the lens? **3**
15. An object is kept at a distance of 45 cm from a screen. Where should a converging lens of focal length 10 cm be kept in order to obtain a sharp image on the screen? **3**
16. a) State Snell's law of refraction.
- b) When a ray of light travelling in air enters obliquely into a glass slab, it is observed that the light ray emerges parallel to the incident ray but it is shifted sideways slightly. Draw a ray diagram to illustrate it. **3**
17. a) Define radius of curvature and focal length of a spherical mirror and show it on a figure.
- b) Write relation between radius of curvature and focal length of a spherical mirror. **3**
18. **Answer the following.** **3**
- a) How is the refractive index of a medium related to the speed of light? Obtain an expression for refractive index of a medium with respect to another in terms of speed of light in these two media?
 - b) An object is held at the principal focus of a concave lens of focal length f . Where is the image formed?

SECTION - D

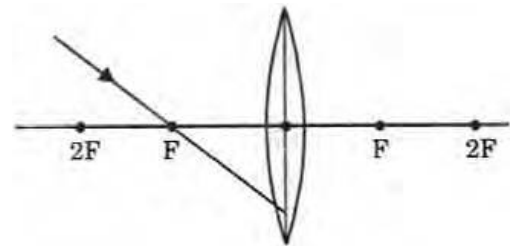
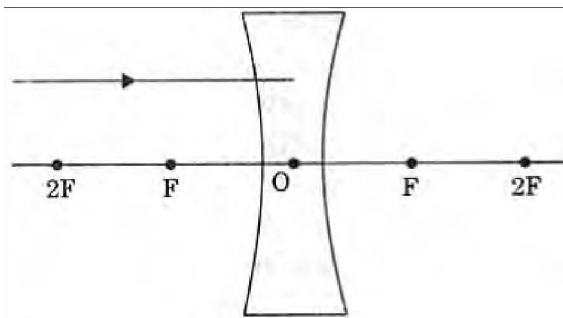
19. 24. a) A thin converging lens forms a
- Real magnified image.
 - Virtual magnified image of an object placed in front of it.

Write the positions of the objects in each case.

- b) Draw labelled ray diagrams to show the image formation in each case.
- c) How will the following be affected on cutting this lens into two halves along the principal axis?
- i) Focal length ii) Intensity of the image formed by half lens. **5**

OR

- a) The refractive index of diamond is 2.42. What is the meaning of this statement?
- b) Redraw the diagram given below in your answer book and complete the path of ray.



- c) What is the difference between virtual images produced by concave, plane and convex mirrors?
- d) What does the negative sign in the value of magnification produced by a mirror indicates about a image?

SECTION - E

20. **Read the following and answer the questions.**

In the concave mirror, the nature, position and size of the image formed depend on the position of the object in relation to pole, the centre of curvature and focus. The image is real for some position of the object and virtual for another position. The image is either magnified, reduced, or has the same size, depending on the object's position.

- i) What will be the position of the image if the object is placed at infinity? **1**
- ii) For an image to be the same size as the object what will be the position of the object? **1**
- iii) If the image formed behind a concave mirror what will be the nature of the image? **1**
- iv) Highly diminished point-size image is formed **1**