

Light

In text Questions

Page No. 176

1. Does the mirror change the direction of light that falls on it?

Ans. Yes, when a light ray falls on a mirror it changes the direction of reflecting light, i.e. bounces back the light in the same medium by changing its direction.

2. What makes things visible to us?

Ans. When a light ray falls on an object, then reflected light ray which comes from the object when falls on our eyes, allows us to see things around us.

Page No. 177

3. Is the image formed by a plane mirror is always upright?

Ans. Yes, the image formed by the plane mirror is always upright. The image formed by the plane mirror is virtual, erect, same size as that of object and at the same distance from the mirror as the distance of object from the mirror.

Page No. 178

4. Why in ambulance words are written laterally inverted?

Ans. In case of mirror, the image formed by it is laterally inverted, i.e. left seems to be right and right seems to be left.

So, in ambulance there is emergency for patients to reach hospital and by viewing in rear mirror, it can be easily identified of a vehicle and everyone give him a way.

Page No. 180

5. Why are concave and convex mirrors called spherical mirrors?

Ans. Concave and convex mirrors are the parts of sphere whose one side is polished or silvered. So, they are called spherical mirrors.

Page No. 181

6. Is it possible to obtain the image on the screen when the candle is too close to the concave mirror?

Ans. When the candle is too close to the concave, mirror, it means that object is in between focus and centre of curvature. Thus, at this position, image formed will be virtual and cannot be obtained on the screen.

Page No. 182

7. Can you get a real image at any distance of the object from the convex mirror?

Ans. No, we cannot get a real image for any position of an object from the mirror because convex mirror always forms virtual, erect and diminished image inspite of the position of object.

Page No. 183

8. Can you name the mirrors used as side mirrors in scooters?

Ans. In the side mirror of scooters, convex mirror is used to have a wider field of view of the traffic.



Exercises

Page No. 189

- 1. Fill in the blanks.
 - (a) An image that cannot be obtained on a screen is called..............
 - (b) Image formed by a convex is always virtual and smaller in size.
 - (c) An image formed by a mirror is always of the same size as that of the object.
 - (d) An image which can be obtained on a screen is called a image.
 - (e) An image formed by a concave cannot be obtained on a screen.
- Ans. (a) virtual image
 - (b) mirror
 - (c) plane
 - (d) real
 - (e) lens
- 2. Mark T if the statement is true and F if it is false.
 - (a) We can obtain an enlarged and erect image by a convex mirror.
 - (b) A concave lens always form a virtual image.
 - (c) We can obtain a real, enlarged and inverted image by a concave mirror.
 - (d) A real image cannot he obtained on a screen.
 - (e) A concave mirror always form a real image.
- Ans. (a) F (b) T (c) T (d) F (e) F

3. Match the items given in Column I with one or more items of Column II.

	Column I		Column II
(a)	A plane mirror	(i)	Used as a magnifying glass.
(b)	A convex mirror	(ii)	Can form image of objects spread over a large area.
(c)	A convex lens	(iii)	Used by dentists to see enlarged image of teeth.
(d)	A concave mirror	(iv)	The image is always inverted and magnified.
(e)	A concave lens	(v)	The image is erect and of the same size as the object.
		(vii)	The image is erect and smaller in size than the object.

Ans. (a) - (v), (b) - (ii), (vi); (c) - (i), (d) - (iii), (e) - (vi)

4. State the characteristics of the image formed by a plane mirror.

Ans. Characteristics of the image formed by the plane mirror are as follows :

- (i) It is virtual.
- (ii) It is erect.
- (iii) It is same in size.
- (iv) It is at same distance from the mirror as the distance of an object from the mirror.

- 5. Find out the letters of English alphabet or any other language known to you in which the image formed in a plane mirror appears exactly like the letter itself. Discuss your findings.
- Ans. Image formed by the plane mirror shows lateral inversion, i.e. left seems to be right and *vice-versa*. In case of alphabetic letters A, H, I, M, O, T, U, V, W, X, Y show same image in the plane mirror.

Page No. 190

- 6. What is a virtual image? Give one situation, where a virtual image is formed.
- Ans. An image that cannot be obtained on a screen is called virtual image. In case of plane mirror, virtual image is formed.

7. State two differences between a convex and concave lens.

Ans. Convex lens

- (a) It can form real and virtual image both.
- (b) It can form inverted image of an object.

Concave lens

- (a) It always form virtual image.
- (b) Image formed by concave lens is always diminished.

8. Give two uses each of a concave and a convex mirror.

Ans. Concave mirror

- (a) It is used by doctors to examine eyes, ears, etc.
- (b) It is also used by dentists to see an enlarged image of the teeth.

Convex mirror

- (a) It is used in side mirrors of vehicles.
- (b) It is used in reflector of torch.

9. Which type of mirror can form a real image?

Ans. A concave mirror can form a real image of an object.

10. Which type of lens forms always a virtual image?

- Ans. A concave lens always forms a virtual image.
- 11. A virtual image larger than the object can be produced by a
 - (a) concave lens (b) concave mirror
 - (c) convex mirror (d) plane mirror
- Ans. (b) Concave mirror can form real image and virtual image of larger size than the object.
- David is observing his image in a plane mirror. The distance between the mirror and his image is 4 m. If he moves 1 m towards the mirror, then the distance between David and his image will be
 (a) 3 m
 (b) 5 m
 (c) 6m
 (d) 8 m
- Ans. (a) As we know that in case of plane mirror, an image distance is equal to the object distance, so his image will be at 4 1 = 3 m.
- 13. The rear view mirror of a car is a plane mirror. A driver is reversing his car at a speed of 2 m/s. The driver sees in his rear view mirror, the image of a truck parked behind his car. The speed at which the image of the truck appears to approach the driver will be

(a) 1 m/s	(b) 2 m/s
(c) 4 m/s	(d) 8 m/s

Ans.	(b) The speed at which the image of the truck appears to approach the driver will be same as that the reverse
	speed of the car, i.e. 2 m/s.



Multiple Choice Questions

- 1. Boojho and Paheli were given one mirror each by their teacher. Boojho found his image to be erect and of the same size, whereas Paheli found her image erect and smaller in size. This means that the mirrors of Boojho and Paheli respectively are
 - (a) plane mirror and concave mirror
 - (b) concave mirror and convex mirror
 - (c) plane mirror and convex mirror
 - (d) convex mirror and plane mirror
- Ans. (c) As in case of plane mirror image is virtual, erect and of same size and in case of convex mirror is smaller, virtual and erect.
- 2. Which of the following can be used to form a real image?
 - (a) Only concave mirror
 - (b) Only plane mirror
 - (c) Only convex mirror
 - (d) Both concave and convex mirrors
- Ans. (a) Only concave mirror can form a real image
- 3. If an object is placed at a distance of 0.5 m in front of a plane mirror, the distance between the object and the image formed by the mirror will be
 - (a) 2m (b) 1 m
 - (c) 0.5m (d) 0.25m
- Ans. (b) The distance between object and mirror is given by 0.5 + 0.5 = 1m.
- 4. You are provided with a concave mirror, a convex mirror, a concave lens and a convex lens. To obtain an enlarged image of an object, you can use either
 - (a) concave mirror or convex mirror
 - (b) concave mirror or convex lens
 - (c) concave mirror or concave lens
 - (d) concave lens or convex lens
- Ans. (b) Concave mirrors and convex lens can only form enlarged image.
- 5. A rainbow can be seen in the sky
 - (a) when the sun is in front of you
 - (b) when the sun is behind you
 - (c) when the sun is overhead
 - (d) only at the time of sunrise
- Ans. (b) A rainbow can only be seen in the sky when the sun is behind you in rainy season.
- 6. An erect and enlarged image can be formed by

- (a) only a convex mirror
- (b) only a concave mirror
- (c) only a plane mirror
- (d) both convex and concave mirrors
- Ans. (b) An erect and enlarged image can only be formed by concave mirror and it is virtual in nature.
- 7. You are provided with a convex mirror, a concave mirror, a convex lens and a concave lens. You can get an inverted image from
 - (a) both concave lens and convex lens
 - (b) both concave mirror and convex mirror
 - (c) both concave mirror and convex lens
 - (d) both convex mirror and concave lens
- Ans. (c) A real and inverted image can only be formed by concave mirror and convex lens.

8. An image formed by a lens is erect. Such an image would be formed by a

- (a) convex lens provided the image is smaller than object
- (b) concave lens provided the image is smaller than object
- (c) concave lens provided the image is larger than object
- (d) concave lens provided the image is of the same size
- Ans. (b) Image formed by a concave lens is erect provided the image is smaller than object.

Very Short Answer Type Questions

- 9. The image formed by a lens is always virtual, erect and smaller in size for an object kept at different positions in front of it. Identify the nature of the lens.
- Ans. Such types of lenses which always form virtual, erect and smaller image in spite of the different positions of an object are called concave lens.
- 10. Fill in the blanks.
 - (a) The inner surface of a steel spoon acts as a mirror.
 - (b) The outer surface of a flat steel plate acts as a mirror.
 - (c) The outer shining surface of a round bottom steel bowl acts as a mirror.
 - (d) The inner surface of the reflector of a torch acts as a mirror.
- Ans.(a) concave(b) plane(c) convex(d) concave
- **11.** State whether the following statements are True or False.
 - (a) A concave lens can be used to produce an enlarged and erect image.
 - (b) A convex lens always produces a real image.
 - (c) The sides of an object and its image formed by a concave mirror are always interchanged.
 - (d) An object can be seen only if it emits light.
- Ans. (a) False (b) False (c) True (d) False

Short Answer Type Questions

- 12. What type of mirror is used as a side mirror in a scooter? Why is this type of mirror chosen?
- Ans. Convex mirror is used as a side mirror in a scooter because it can form images of objects spread over a larger area. So, this helps the driver to view the traffic over a large area behind them.

13. Observe the figures, given as figure carefully.



The given figures show the path of light through lenses of two different types, represented by rectangular boxes A and B. What is the nature of lenses A and B?

- Ans. Since, in first case light rays are converging towards a point, so the lens A will be convex and in case of lens B. light rays diverge or spread out. So, the lens will be concave lens.
- 14. Boojho made light from a laser torch to fall on a prism. Will he be able to observe a band of seven colours? Explain with a reason.



- Ans. No, he will not observe band of seven colours because laser light consists of monochromatic light of Single colour. But seven colours of bands are only observed, when a white light is passed through a prism and dispersion takes place.
- 15. State the correct sequence (1-7) of colours in the spectrum formed by the prisms A and B shown in figure.
- Ans. When a white light is passed through a prism, it disperses into its seven constituent colours.
 - For A
 - $1. \rightarrow \text{Red}$ $1. \rightarrow \text{Violet}$

For B

- $2. \rightarrow \text{Orange} \qquad 2. \rightarrow \text{Indigo}$
- $3. \rightarrow$ Yellow $3. \rightarrow$ Blue
- $4. \rightarrow \text{Green} \qquad 4. \rightarrow \text{Green}$
- 5. \rightarrow Blue 5. \rightarrow Yellow
- 16. The side mirror of a scooter got broken. The mechanic replaced it with a plane mirror. Mention any inconvenience that the driver of the scooter will face while using it?
- Ans. As we know that the side mirror of a scooter must be of convex mirror so that we can view a wide range of traffic spread over a large area.

But if plane mirror is used, we are not able to see large area of traffic which may be difficult for driving vehicle and can cause accident.

- 17. The concave reflecting surface of a torch got rusted. What effect would this have on the beam of light from the torch?
- Ans. If the reflecting surface of a torch got rusted, it produces diffused light with lower intensity and the objects are not clearly visible in this diffused and lower intensity of light.
- 18. An erect and enlarged image of an object is formed on a screen. Explain how this could be possible.

- Ans. An erect and enlarged image of an object is formed only by the concave mirror or convex lens when object is inverted and placed between F and 2F.
- **19.** Two different types of lenses are placed on a sheet of newspaper. How will you identify them without touching?
- Ans. On identifying the letters of newspaper, we can differentiate the two types of lenses. If image is large or magnified, then the lens is a convex lens and if the image is smaller or diminished in size for all the positions of object, then the lens is concave.
- 20. A shopkeeper wanted to fix a mirror which will give a maximum view of his shop. What type of mirror should he use? Give reason.
- Ans. If a shopkeeper wanted to fix a mirror which will give him maximum view of his shop, he should use convex mirror.

In case of convex mirror, it will give a wider field of view, i.e. it can collect light from a large area spread over them.

- 21. The distance between an object and a convex lens is changing. It is noticed that the size of the image formed on a screen is decreasing. Is the object moving in a direction towards the lens or away from it?
- Ans. In case of convex lens, when we move the object far away from the lens, the size of image decreases and ultimately, when object is at infinity, it will form a point image at focus.

Long Answer Type Questions

- 22. Suppose we wish to obtain the real image of a distant tree. Explain two possible ways in which we can do it.
- Ans. In first case, we will use a concave mirror, as we know that concave mirror can form real image, i.e. image on screen. The image of distant tree will be at focus in case of concave mirror.
 In second case, we can use a convex lens, as it forms real image of a distant object at focus, i.e. image of distant tree in case of convex lens will be formed at focus.
- 23. It was observed that when the distance between an object and a lens decreases, the size of the image increases. What is the nature of this lens? If you keep on decreasing the distance between the object and the lens, will you still able to obtain the image on the screen? Explain.
- Ans. On decreasing distance between the object and lens, the size of the image increases, the nature of the lens will be convex type.

If the distance between object and lens is less than the focus of the lens, then it forms a virtual image and this image cannot be obtained on a screen but formed on the same side of the object.

24. You are given three mirrors of different types. How will you identify each one of them?

- Ans. We can identify the mirrors by forming image of an object.
 - (i) Plane mirror In case of plane mirror, image will be virtual, erect and of same size as that of object.
 - (ii) Concave mirror In case of concave mirror, image may be real, virtual and magnified or diminished.
 - (iii) Convex mirror In case of convex mirror, image formed will always be virtual, erect and diminished.