Chapter - 15
Light

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 are, respectively

(a) plane mirror and concave mirror.
(b) concave mirror and convex mirror.
(c) plane mirror and convex mirror.
(d) convex mirror and plane mirror.

Soln:

Answer is (c) plane mirror and convex mirror.

Explanation:

Plane mirror always forms image of same size and erected image. Convex mirror forms erected and smaller image.

2. Which of the following can be used to form a real image?
(a) Concave mirror only.
(b) Plane mirror only.
(c) Convex mirror only.
(d) Both concave and convex mirrors

Soln:

Plane mirror

Explanation:

An image formed by a plane mirror is erect and of the same size as the object. Convex mirror forms erected and smaller image. Concave mirror forms an enlarged 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) 2 m
(b) 1 m
(c) 0.5 m
(d) 0.25 m

Soln:

Answer is (b) 1 m

Explanation:

The image formed by a plane mirror is at the same distance behind the mirror as the object is in front of it. Therefore, the distance between object and image is given by distance between object and mirror + distance between mirror and image = 0.5 m+ 0.5 m = 1 m

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.

Soln:

(b) concave mirror or convex lens.

Explanation:

Concave mirror and convex lens forms enlarged images whereas convex mirror and concave lens forms diminished images.

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 sun rise.

Soln:

Answer is (b) when the sun is behind you.

Explanation:

Rainbow is formed after rain and when the sunlight is low. Rainbow appears when is your back is towards the sun.

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

Soln:

Answer is (b) only a concave mirror.

Explanation:

Concave mirror always formed virtual image which is erected and enlarged in size whereas convex mirror forms diminished and erected image.

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.

Soln:

Answer is (c) both concave mirror and convex lens.

Explanation:

Concave mirror and convex lens can only form real and inverted image of an object. As convex mirror and concave lens always form a virtual and erect image of an object.

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

Soln:

Answer is (b) concave lens provided the image is smaller than object.

Explanation:

Virtual, erect and diminished image of an object is formed by concave lens. Convex lens forms magnified, erect and virtual image.

Very Short Answer 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.

Soln:

Answer is **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.

Soln:

(a) The inner surface of a steel spoon acts as a **concave** mirror. (b) The outer surface of a flat steel plate acts as a **plane** mirror. (c) The outer shining surface of a round bottom steel bowl acts as a **convex** mirror. (d) The inner surface of the reflector of a torch acts as a **concave** mirror.

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.

Soln:

a) False- A concave lens can be used to produce an diminishedand erect image.
b) False- A convex lens always produces a virtual image
c) True
d) False- An object can be seen if it reflects light falling on it.

Short Answer Questions

12. What type of mirror is used as a side mirror in a scooter? Why is this type of mirror chosen?

Soln:

Convex mirrors are used as a side mirror in a scooter because in Convex mirrors image formed is spread over large area. This will help the drivers to see the large area behind in the traffic.

13. Observe the figures given as Figure 15.1 carefully.

Fig 15.1

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?

Soln:

a) Convex lens
b) 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.

Soln:

No, Boojho cannot observe a band of colours because laser light gives torch of only one color.

15. State the correct sequence (1-7) of colours in the spectrum formed by the prisms A and B, shown in Figure 15.2.

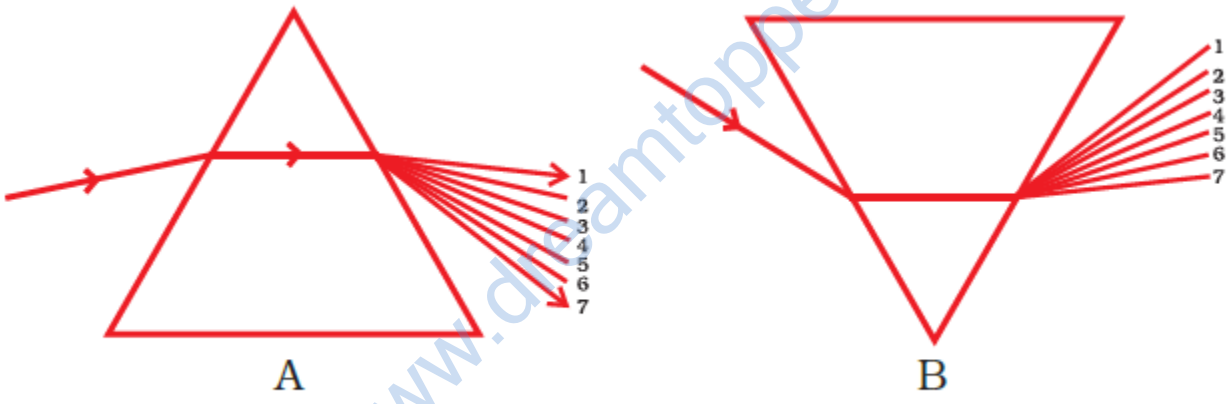

Fig 15.2

Soln:

	1 →	Red	← 7	
	2 →	Orange	← 6	
	3 →	Yellow	← 5	
A	4 →	Green	← 4	B
	5 →	Blue	← 3	
	6 →	Indigo	← 2	
	7 →	Violet	← 1	

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?

Soln:

Driver cannot see the traffic spread over large area behind him.

17. The concave reflecting surface of a torch got rusted. What effect would this have on the beam of light from the torch?

Soln:

If the concave reflecting surface of a torch got rusted, beam of light will be diffused with lower intensity.

18. An erect and enlarged image of an object is formed on a screen. Explain how this could be possible.

Soln:

An erect and enlarged image of an object is formed on a screen if the object is placed upside down between F and 2F of the lens.

19. Two different type of lenses are placed on a sheet of newspaper. How will you identify them without touching?

Soln:

The lens is a convex lens if the letters appear magnified and the lens is concave if the image appear shortened.

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.

Soln:

Shopkeeper fixes convex mirror because forms images of object spread from large areas.

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?

Soln:

Object is moving away from lens.

Long Answer Questions

22. Suppose we wish to obtain the real image of a distant tree. Explain two possible ways in which we can do it.

Soln:

Two possible ways in which the real image of a distant tree can be obtained are given below :

(i) By using a concave mirror and a screen- By using concave mirror, a real image is formed if the distance between the mirror and the object is beyond the focus.

(ii) (ii) By using a convex lens and a screen- In a convex lens, when the object is far away from the lens, the image is very close to the lens forming real and inverted image.

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.

Soln:

It is a convex lens.

No, when the object is placed close to a convex lens then the image formed is virtual which cannot be obtained on screen.

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

Soln:

We can identify the mirrors by forming images of an object which are given as below:

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 or virtual, inverted or erect and magnified or diminished depending upon the position of object.
iii) Convex mirror In case of convex mirror, image formed will always be virtual, erect and diminished in spite of the position of object.