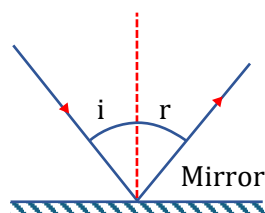


NCERT QUESTIONS WITH SOLUTIONS

1. A light ray is incident on a mirror and gets reflected by it. The angle made by the incident ray with the normal to the mirror is 40° . What is the angle made by the reflected ray with the mirror?



- (i) 40° (ii) 50° (iii) 45° (iv) 60°

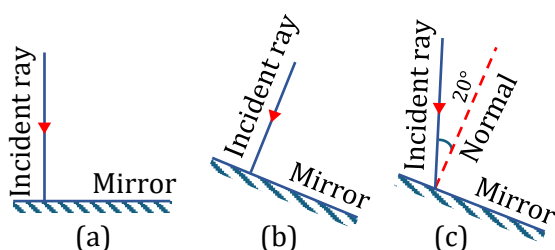
Solution Option(ii)

Given: $\angle i = 40^\circ$

So, by the law of reflection, $\angle i = \angle r = 40^\circ$

Now, the angle made by the reflected ray with the mirror = $90^\circ - 40^\circ = 50^\circ$

2. Fig. 10.22 shows three different situations where a light ray falls on a mirror:

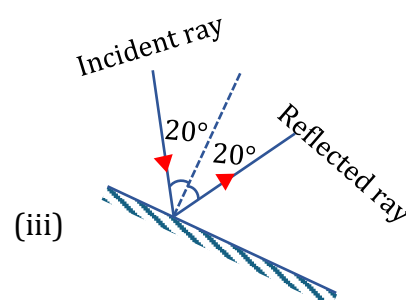
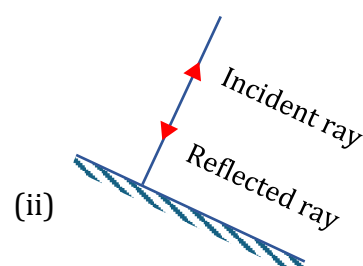
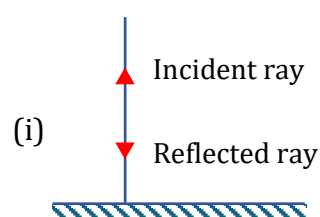


- (i) The light ray falls along the normal
 (ii) The mirror is tilted, but the light ray still falls along the normal to the tilted surface.

- (iii) The mirror is tilted, and the light ray falls at an angle of 20° from the normal.

Draw the reflected ray in each case (Use a ruler and protractor for accurate drawing). What is the angle of reflection in each case?

Solution



3. In figure, the cap of a sketch pen is placed in front of three types of mirrors.



Match each image with the correct mirror

Image	Mirror
(i)	Plane mirror
(ii)	Convex mirror
(iii)	Concave mirror

Solution

Image	Mirror	Image	Reason
(i)	Plane mirror		A plane mirror forms a virtual, erect, and the same size image of the object.
(ii)	Convex mirror		A convex mirror forms a virtual, erect, and diminished image of the object
(iii)	Concave mirror		A concave mirror forms a virtual, erect, and magnified image of the object

4. In figure the cap of a sketch pen is placed behind a convex lens, a concave lens, and a flat transparent glass piece — all at the same distance. Match each image with the correct type of lens or glass.

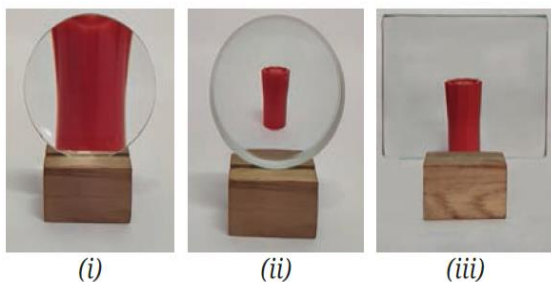


Image	Lens/glass type
(i)	Flat transparent glass piece
(ii)	Convex lens
(iii)	Concave lens

Solution

Image	Lens/glass type	Image	Reason
(i)	Flat transparent glass piece		A flat transparent glass piece creates an image that is the same size as the object.
(ii)	Convex lens		A convex lens forms a virtual, erect, and magnified image of an object.
(iii)	Concave lens		A concave lens forms a virtual, erect, and diminished image of the object.

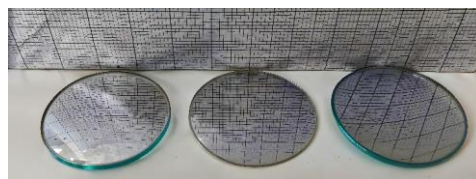
5. When the light is incident along the normal on the mirror, which of the following statements is true:
 (i) Angle of incidence is 90°
 (ii) Angle of incidence is 0°
 (iii) Angle of reflection is 90°
 (iv) No reflection of light takes place in this case

Solution

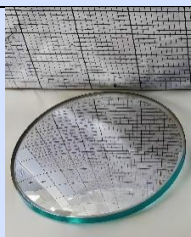
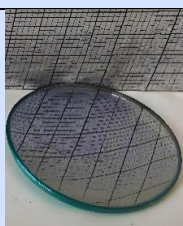
Option (ii)

When light is incident along the normal on a mirror, both the angle of incidence and the angle of reflection are 0° .

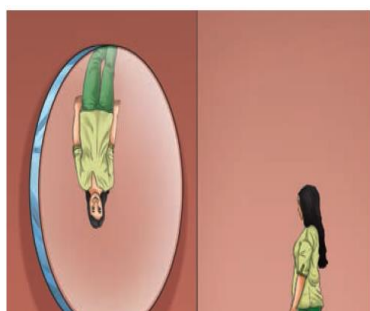
6. Three mirrors — plane, concave, and convex are placed in Fig. 10.25. On the basis of the images of the graph sheet formed in the mirrors, identify the mirrors and write their names above the mirrors.



Solution

Image	Given image	Mirror type	Reason
(i)		Convex Mirror	The grid lines seen through this lens are magnified , meaning the squares appear larger than the actual grid squares in the background. The lines also appear to bulge outwards from the center.
(ii)		Plane Mirror	The grid lines reflected in it are not distorted, magnified, or reduced in size. The reflected squares are the same size as the background grid squares.
(iii)		Concave Mirror	The grid lines seen through this lens are minified , meaning the squares appear smaller than the actual grid squares. The lines appear to curve inwards toward the center.

7. In a museum, a woman walks towards a large convex mirror (Fig. 10.26). She will see that:



- (i) her erect image keeps decreasing in size.
- (ii) her inverted image keeps decreasing in size.
- (iii) her inverted image keeps increasing in size, and eventually it becomes erect and magnified.
- (iv) her erect image keeps increasing in size.

Solution: option (iv)

She will see that her reflection is upright, virtual, and smaller than she is. As she continues to walk towards the mirror, her diminished reflection will appear to get larger, but it will always remain smaller than her actual size.

8. Hold a magnifying glass over the text and identify the distance at which you can see the text bigger than they are written. Now move it away from the text. What do you notice? Which type of lens is a magnifying glass?

Solution

When you hold a magnifying glass close to the text and slowly move it up and down, you'll notice that at a certain distance the letters appear bigger than their actual size. If you move the lens farther away, the letters become blurred or even appear inverted (upside down) depending on how far you go. This happens because a magnifying glass is a convex lens.

9. Match the entries in Column I with those in Column II.

	Column-I		Column-II
(i)	Concave mirror	(a)	Spherical mirror with a reflecting surface that curves inwards.
(ii)	Convex mirror	(b)	It forms an image which is always erect and diminished in size.
(iii)	Convex lens	(c)	An Object placed behind it may appear inverted at some distance.
(iv)	Concave lens	(d)	The object placed behind it always appears diminished in size.

Solution:

	Column-I		Column-II
(i)	Concave mirror	(a)	Spherical mirror with a reflecting surface that curves inwards.
(ii)	Convex mirror	(b)	It forms an image which is always erect and diminished in size.
(iii)	Convex lens	(c)	An Object placed behind it may appear inverted at some distance.
(iv)	Concave lens	(d)	The object placed behind it always appears diminished in size.

10. The following question is based on Assertion/Reason.

Assertion: Convex mirrors are preferred for observing the traffic behind us.

Reason: Convex mirrors provide a significantly larger view area than plane mirrors.

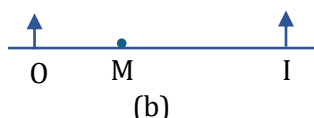
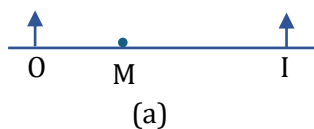
Choose the correct option:

- (i) Both Assertion and Reason are correct, and Reason is the correct explanation for Assertion.
- (ii) Both Assertion and Reason are correct, but Reason is not the correct explanation for Assertion.
- (iii) Assertion is correct, but Reason is incorrect.
- (iv) Both Assertion and Reason are incorrect.

Solution: Option (i)

A convex mirror is curved outwards. Due to its shape, it spreads the light rays and reveals a wider area than a plane mirror. That's why we can see more of the road and vehicles behind us. This makes driving safer. So, convex mirrors are used as rear-view mirrors in vehicles, since they give a larger field of view even though the image looks smaller.

11. In Fig. 10.27, note that O stands for object, M for mirror, and I for image. Which of the following statements is true?

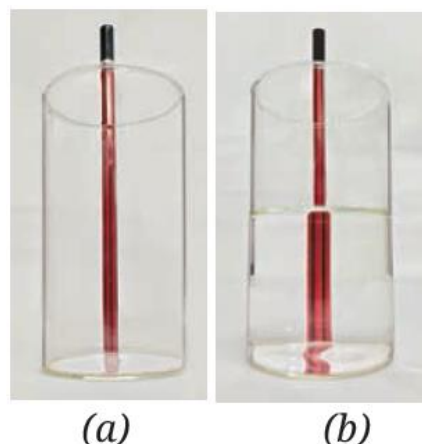


- (i) Figure (a) indicates a plane mirror, and Figure (b) indicates a concave mirror.
- (ii) Figure (a) indicates a convex mirror and Figure (b) indicates a concave mirror.
- (iii) Figure (a) indicates a concave mirror and Figure (b) indicates a convex mirror.
- (iv) Figure (a) indicates a plane mirror, and Figure (b) indicates a convex mirror.

Solution: Option (ii)

Figure (i) shows an erect, small image which can be formed only by a convex mirror. Figure (ii) shows an erect, large image which can be formed only by a concave mirror when the object is very close to the mirror. In both figures, a plane mirror cannot be used because it always forms an erect image of the same size as the object.

12. Place a pencil behind a transparent glass tumbler (Fig. 10.28a). Now fill the tumbler halfway with water (Fig. 10.28b). How does the pencil appear when viewed through the water? Explain why its shape appears changed.



Solution

In figure (a) when you place a pencil behind an empty transparent glass tumbler, it looks normal and now in figure (b) when you fill the tumbler halfway with water and look through it, the part of the pencil that is under the water looks magnified or thicker because that part of the tumbler filled with water behaves like a convex lens.