CBSE NCERT Solutions for Class 8 Science Chapter 16

Back of Chapter Questions
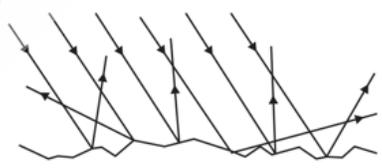
1. Suppose you are in a dark room. Can you see objects in the room? Can you see objects outside the room? Explain.

    Solution:

    We can see objects when the light that is reflected from them enters our eyes. In a dark room, there is no light that is reflected from any objects. Thus, we cannot see objects in a dark room. As there is light present outside the room, the reflected light from the objects will reach our eyes and thus, we will be able to see the objects outside the room.

2. Differentiate between regular and diffused reflection. Does diffused reflection mean the failure of the laws of reflection?

    Solution:

S. No	Regular Reflection	Diffused reflection
1	Regular reflection takes place on a regular or a smooth surface.	Diffused reflection takes place on an irregular or uneven surface.
2	In regular reflection, for parallel incident rays, the reflected rays are parallel to each other. Rays reflected from regular surface	In diffused reflection, for parallel incident rays, the reflected rays are not parallel to each other. Rays reflected from irregular surface
3	In the case of regular reflection, an image can be obtained.	In the case of diffused reflection, the image cannot be obtained as the reflected rays for parallel incident rays are in random directions.

    Diffused reflection is not the failure of laws of reflection because even though the normal for each ray are in different directions, each ray obeys the laws of reflection.

3. Mention against each of the following whether regular or diffused reflection will take place when a beam of light strikes. Justify your answer in each case.

    (A) Polished wooden table.

    (B) Chalk powder.

    (C) Cardboard surface.

(D)   Marble floor with water spread over it.

(E)   Mirror.

(F)   Piece of paper.

Solution:

(A)   A polished wooden table is an example of a smooth surface and thus, when the beam of light strikes on it, the light will undergo regular reflection.

(B)   Chalk powder is an example of an irregular surface and thus, when the beam of light strikes on it, the light will undergo diffused reflection.

(C)   Cardboard surface is an example of an irregular surface and thus, when the beam of light strikes on it, the light will undergo diffused reflection.

(D)   Marble floor with water spread over it is a smooth surface. Thus, when the beam of light strikes on it, the light will undergo regular reflection.

(E)   A mirror is a smooth surface. Thus, when the beam of light strikes on it, the light will undergo regular reflection.

(F)   Piece of paper appears to be a smooth surface. But there are many irregularities on the surface of the paper. So, when the beam of light strikes on it, the light will undergo diffused reflection.

4.   State the laws of reflection.

Solution:

The statements of the laws of reflection are:

    i.   The angle of incidence is always equal to the angle of reflection.

    ii.   The incident ray, the reflected ray and the normal to the surface at the point of incidence lie in the same plane.

5.   Describe an activity to show that the incident ray, the reflected ray and the normal at the point of incidence lie in the same plane.

Solution:

Activity:

i.   Fix a white sheet of paper on a table.

ii.   Take a comb and cover all its openings except one.

iii.   Keep the comb perpendicular to the paper and throw light through the opening of the comb on one side so that the path of light can be observed on the paper on the other side of the comb.

iv.   A piece of plane mirror is placed on the path of the light.

v.   The light ray that is incident on the plane mirror is the incident ray and the ray that is reflected from the plane mirror in a different direction is the reflected ray.

vi.   When the paper lies on the top of the table, the rays lie on the same plane.

vii.   Let the sheet of the paper extend a bit beyond the edge of the table.

viii.   Make sure the reflected ray extends to the projected portion of the paper.

ix.   Cut the projected portion of the paper in the middle and bend it.

The reflected ray won't be seen in the bent paper because it creates a different plane from the plane in which the incident ray, the reflected ray and the normal lie. Thus, it can be concluded that the incident ray, the reflected ray and the normal at the point of incidence lie in the same plane.

6.   Fill in the blanks in the following.

(A)   A person 1 m in front of a plane mirror seems to be _____ m away from his image.

(B)   If you touch your _____ ear with right hand in front of a plane mirror it will be seen in the mirror that your right ear is touched with _____.

(C)   The size of the pupil becomes _____ when you see in dim light.

(D)   Night birds have _____ cones than rods in their eyes.

Solution:

(A)   A person 1 m in front of a plane mirror seems to be **2** m away from his image.

     For a plane mirror, the object distance is equal to the image distance. Thus, the person will seem to be twice the distance away from the image.

(B)   If you touch your **left** ear with right hand in front of a plane mirror it will be seen in the mirror that your right ear is touched with **left hand**.

     The images formed by the plane mirror undergo lateral inversion.

(C)   The size of the pupil becomes **large** when you see in dim light.

     The pupil will dilate in the dim light in order to let in more light.

(D)   Night birds have **less** cones than rods in their eyes.

     Night birds need more rods than cones because cones are sensitive to dim light and hence is more useful to night birds.

7.   Angle of incidence is equal to the angle of reflection.

(A)   Always

(B)   Sometimes

(C)   Under special conditions

(D)   Never

Solution: (A)

According to the laws of reflection, the angle of incidence is always equal to the angle of reflection.

8. Image formed by the plane mirror is

   (A) Virtual, behind the mirror and enlarged.

   (B) Virtual, behind the mirror and of the same size as the object.

   (C) Real at the surface of the mirror and enlarged.

   (D) Real, behind the mirror and of the same size as the object.

   Solution: (B)

   The image formed by a plane mirror is virtual, behind the mirror and of the same size as the object.

9. Describe the construction of a kaleidoscope.

   Solution:

   Kaleidoscope is made of three rectangular mirror strips arranged to form a prism. Each mirror strip is about 15 cm long and 4 cm wide. Keep circular cardboard or a thick chart paper around the arrangement. The circular tube must be longer than the mirror strips. Close one end of the tube and keep the other end open. At the closed end of the arrangement, a plane glass plate of the circular shape is fixed. Broken coloured glass pieces are placed on the glass plate to form multiple images.

10. Draw a labelled sketch of the human eye.

    Solution:
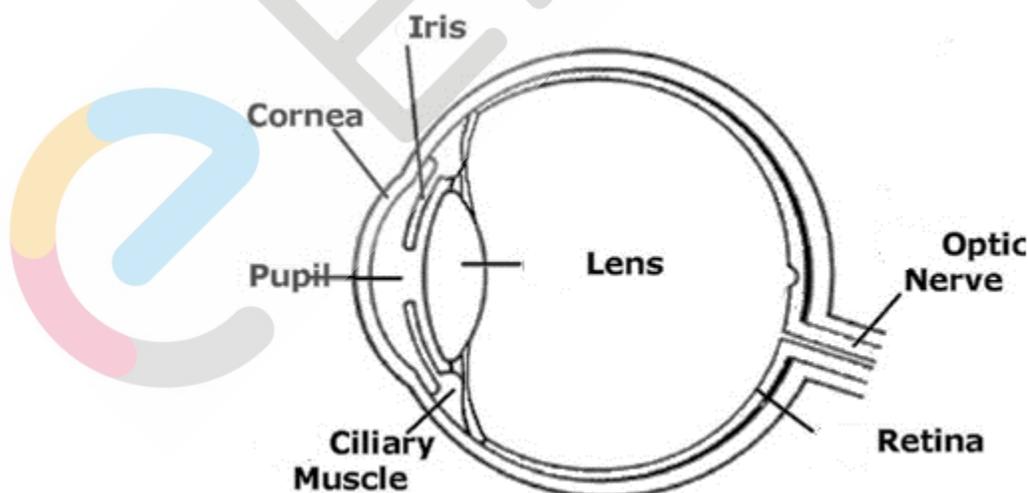
11. Gurmit wanted to perform Activity 16.8 using a laser torch. Her teacher advised her not to do so. Can you explain the basis of the teachers advise?

Solution:

In the activity, it is required to throw the torchlight to a friend's eye. If in place of the torchlight, laser light is used, it could be harmful to the eyes. Laser light has high intensity and could damage the retina of the eyes. This could lead to blindness.

12.   Explain how you can take care of your eyes.

Solution:

   i.   Use suitable spectacles if advised.

   ii.   Wash your eyes with clean water frequently.

   iii.   Avoid direct exposure to the sun like powerful sources.

   iv.   Keep your reading book at normal distance for vision while reading.

   v.   Avoid reading in dim light and very bright light.

   vi.   Never rub your eyes. If dust particles go into your eyes, wash with clean water.

13.   What is the angle of incidence of a ray if the reflected ray is at an angle of 90° to the incident ray?

Solution:

Given: The angle between the incident ray and the reflected ray $= \angle i + \angle r = 90^\circ$.

According to the laws of reflection, the angle of incidence is equal to the angle of reflection, $\angle i = \angle r$.

$\Rightarrow \angle i + \angle i = 90^\circ$

$\Rightarrow 2\angle i = 90^\circ$

$\Rightarrow \angle i = \dfrac{90^\circ}{2}$

$\Rightarrow \angle i = 45^\circ$

The angle of incidence of the ray is 45°.

14.   How many images of a candle will be formed if it is placed between two parallel plane mirrors separated by 40 cm?

Solution:

If an object is placed between two plane mirrors, an infinite number of images will be formed.

15.   Two mirrors meet at right angles. A ray of light is incident on one at an angle of 30° as shown in Fig. 16.19. Draw the reflected ray from the second mirror.
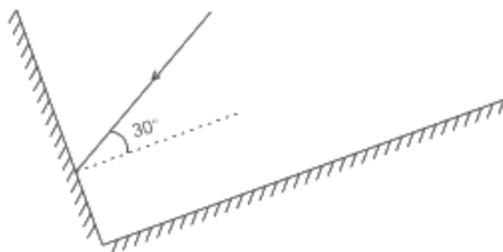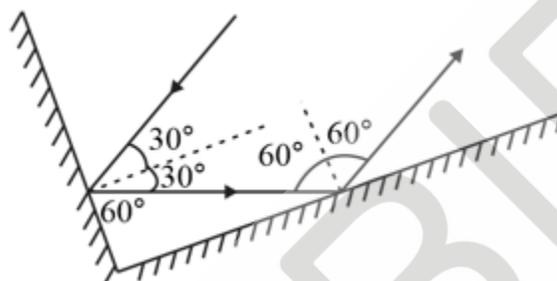
Fig. 16.19

Solution:

The reflected ray from the second mirror is shown below.

16.   Boojho stands at A just on the side of a plane mirror as shown in Fig. 16.20. Can he see himself in the mirror? Also, can he see the image of objects situated at P, Q and R?
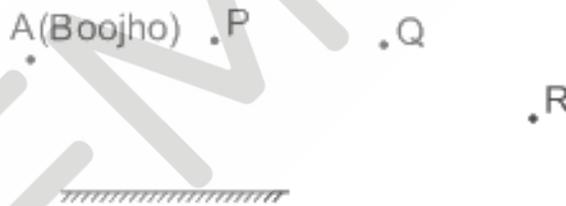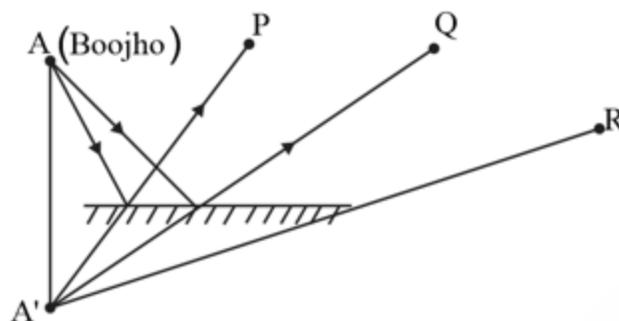

Fig. 16.20

Solution:

Boojho cannot see his image as he is not standing in front of the mirror.

He can see the objects situated at P and Q as the light from these points get reflected by the mirror and reaches his eyes. He cannot see the object at R.
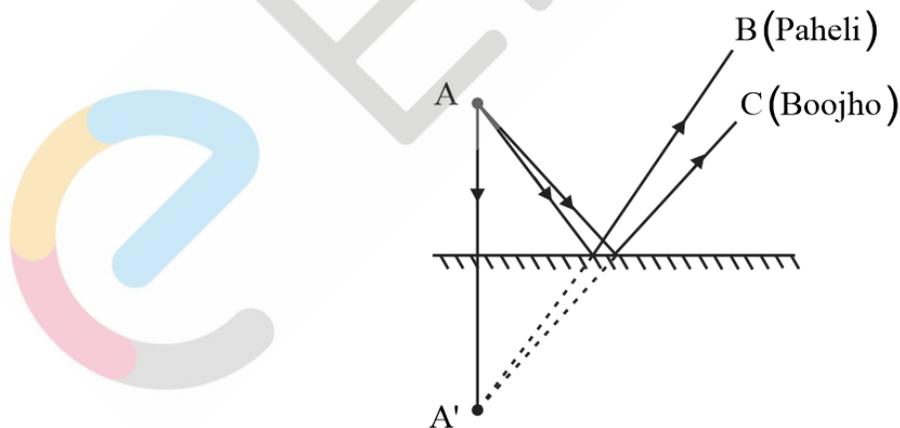
17.   (A)   Find out the position of the image of an object situated at A in the plane mirror (Fig. 16.21).

         (B)   Can Paheli at B see this image?

         (C)   Can Boojho at C see this image?

         (D)   When Paheli moves from B to C, where does the image of A move?

Fig. 16.21

Solution:

(A)   The image of the object placed at A will be formed behind the mirror and it will be at the same distance from the mirror as the object A is.

(B)   Yes, Paheli at B can see the image as the light from B gets reflected by the mirror and reaches A.

(C)   Yes, Boojho at C can see the image as the light from C gets reflected by the mirror and reaches A.

(D)   The image A will be stationary even if Paheli moves from B to C

❖ ❖ ❖