Light

13 Chapter

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

Ans: In a dark room one cannot see things in a room, but things outside the room will be visible.

The reason for this is that the object is only visible when light from the object reaches the eye. In a dark room, we cannot see objects because the rays of light do not reach our eyes whereas in a lighted room, the rays of light reflected from the objects reach our eyes making them visible for us.

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

Ans: Difference between regular and diffused reflection is as follows:

Regular Reflection	Diffused Reflection
Regular Reflection takes place from a smooth and shiny surface.	Diffused Reflection takes place on a rough or irregular surface.
All rays are parallel after reflection.	The reflected rays are not parallel to each other.

Diffused reflection is not due to the failure of the laws of reflection. It is caused by the irregularities in the reflecting surface.

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

Ans: A polished surface means the surface is very smooth, thus regular reflection takes place.

b) Chalk powder

Ans: A diffused reflection takes place on a chalk powder because its surface is uneven.

c) Cardboard surface

Ans: The surface of cardboard which reflects light is not smooth, thus diffused reflection will take place from a cardboard surface.

d) Marble floor with water spread over it

Ans: The water spread over marble makes the surface very
Smooth which makes it act like a plane surface. Hence, regular reflection takes place.

e) Mirror

Ans: The surface of the mirror is very smooth and shiny. Therefore, regular reflection takes place.

f) Piece of paper

Ans: A piece of paper may look smooth, but it has many irregularities on its surface. Thus, diffused reflection takes place.

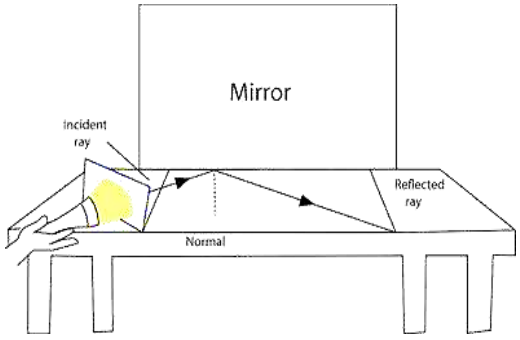
4. State the laws of reflection.

Ans: Laws of reflection can be stated as follows:

i. The angle of reflection and angle of incidence are always equal to each other.
ii. The incident ray, the normal at the point of incidence and the reflected ray all 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.

Ans: To perform this experiment take a plane mirror and place it on a plane sheet of paper in a standing position with a block. Then draw an incidence line AB on this paper. Mark the points on the paper by carefully looking on the mirror. The line that goes after it appears on the screen. Draw a perpendicular on the mirror line and then remove the mirror. Join the points to make the reflected ray on the paper. You will observe that incident ray, reflected ray and normal will be in the same plane, i.e. on the sheet of paper. This verifies the law of reflection.



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.

Ans: A person 1 m in front of a plane mirror seems to be 2 m away from his image.

b) If you touch your_____ear with your right hand in front of a plane mirror, it will be seen in the mirror that your right ear is touched with your_____.

Ans: If you touch your left ear with your right hand in front of a plane mirror, it will be seen in the mirror that your right ear is touched with your left hand.

c) The size of the pupil becomes_____when you see in dim light.

Ans: The size of the pupil becomes large when you see in dim light.

d) Night birds have_____cones than rods in their eyes.

Ans: Night birds have lesser cones than rods in their eyes.

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

a) Always
b) Sometimes
c) Under special conditions
d) Never

Ans: (a) Always
Since, the first law of reflection states that the angle of incidence and angle of reflection are always equal to each other.

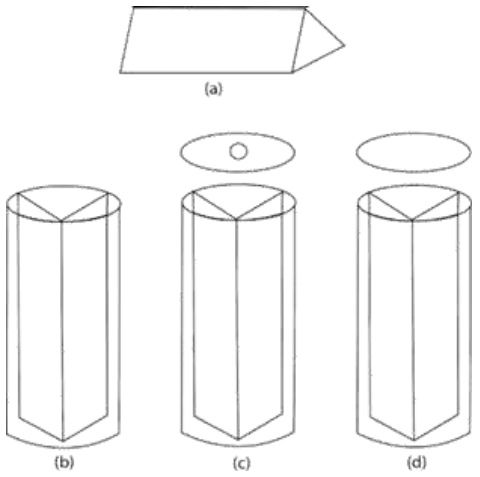
8. Image formed by a plane mirror is

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.

Ans: (b) Virtual, behind the mirror and of the same size as the object.
The image created by the plane mirror is built behind the mirror. This image cannot be created on screen, so it produces a virtual image of the size as that of the object.

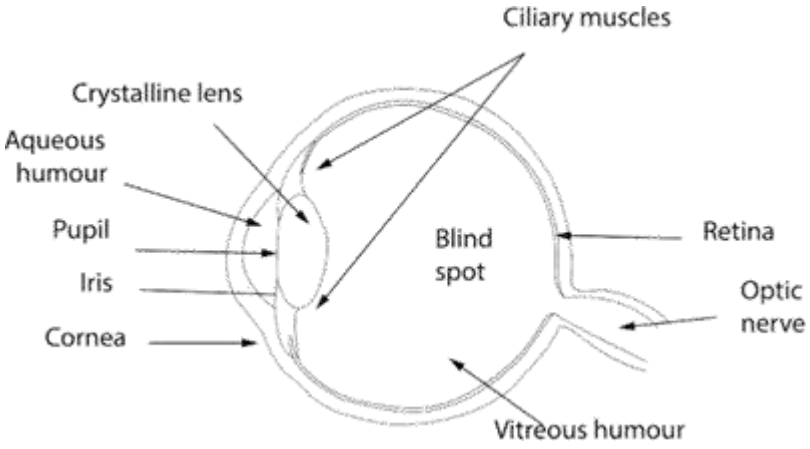
9. Describe the construction of a kaleidoscope.

Ans: The Kaleidoscope is made up of three rectangular squares each about 15 cm long and 4 cm wide which are joined together to build a prism. They are arranged in a circular cardboard tube. Note that the tube is slightly longer than the screen straps. One end of the tube is closed with a cardboard disc with a hole in the middle. To make the disk last longer, a piece of transparent plastic paper is attached to the bottom of the cardboard disk. At the other end, a round plate of the glass plane is fixed touching the mirrors.



10. Draw a labelled sketch of the human eye.

Ans:



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 teacher's advice?

Ans: The intensity of the laser light is very high which is harmful for eye and can cause a permanent defect in the eye. She can lose her eyesight also due to severe damage to the retina. Therefore, it is advisable not to look at a laser beam directly.

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

Ans: To protect our eyes, the following precautions should be taken:

i. Do not read in too little or too much light.
ii. Wash your eyes frequently with cold water.
iii. Do not read by bringing your book too close to your eyes or keeping it too far.
iv. Never rub your eyes.
v. If particles of dust go into our eyes, wash our eyes with clean water. If there is no improvement go to a doctor.

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

Ans: We know that, angle of incidence is equal to the angle of reflection. Therefore, twice of incidence angle is equal to 90° .

Thus, Angle of incidence $i = \frac{90^\circ}{2}$.

$\Rightarrow i = 45^\circ$

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

Ans: Since the mirrors are kept parallel to each other, Infinite no of images will be formed due to multiple reflection between them.

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.

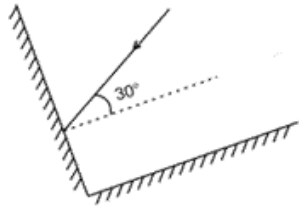
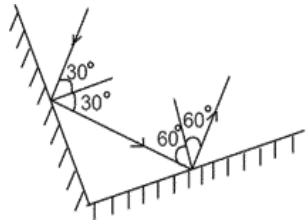


Fig 16.19

Ans. From the first law of reflection, The angle of reflection and angle of incidence are always equal to each other.

The diagram of the reflected ray from the second mirror is as follows:



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,R ?

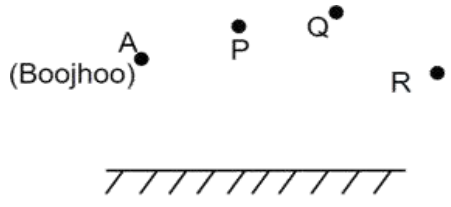
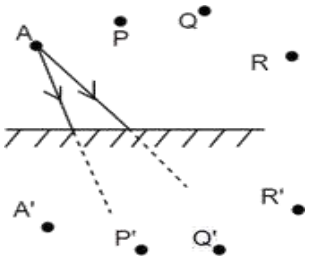


Fig 16.20

Ans: A cannot see his image as the length of the mirror is too short on his side. He can see the image of the objects at P and Q but cannot see the object at R as can be inferred from the ray diagram.



17. Solve the below referring to the given diagram.

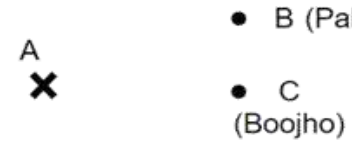
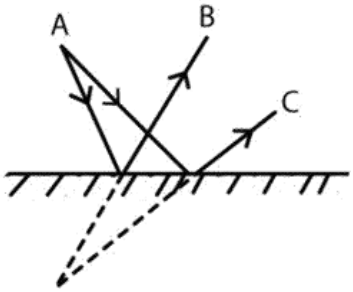


Fig 16.21

a) Find out the position of the image of an object situated at A in the plane mirror.

Ans: The image of A is formed at behind the mirror at the same distance as that of A from the mirror.



b) Can Paheli at B see this image?
Ans: Yes, Paheli at B can see the image.

c) Can Boojho at C see this image?
Ans: Yes, Boojho at C can see the image.

d) When Paheli moves from B to C , where does the image of A move?
Ans: The image of A is unaffected by the movement of B and C . Therefore, Paheli will be able to see the image of A while moving from B to C

Extended Learning — Activities and Project

1. **Make your own mirror. Take a glass strip or glass Slab. Clean it and put it on a white sheet of paper. See yourself in the glass. Next put the glass slab on a black sheet of paper. Again look into the glass. In which case do you see yourself better and why?**

Ans: You can see yourself better when the glass slab is kept on the black sheet of paper. This is because black colour being a good absorbers of light does not allow light to transmit through the glass slab. Most of the light gets reflected back by the glass slab and so, we see a clear image.

2. **Make friends with some visually challenged students. Inquire from them how they read and write. Also find out how they are able to recognise objects, hurdles and currency notes.**

Ans: Visually challenged people read and write through Braille System. Braille System has 63 dot patterns or characters. Each character represents a letter, a combination of letters, a common word or a grammatical sign. There is Braille code for common languages mathematics and constituent notation. Many Indian languages can be read using the Braille System. A visually challenged person tries to identify things, hurdles and currency notes by touching. They develop their other senses more shoofly. However, there are additional resources which can enable them to develop their capabilities further.

3 Meet an eye specialist. Get your eye sight checked and discuss how to take care of your eye?

Ans: 1. Wear sunglasses
2. Wear safety glasses
3. Eat healthy and stay healthy
4. Quit smoking
Explanation:
1. Wear sunglasses
Most people remember to apply sunscreen before going outside, but they often forget how important it is to protect their eyes from the sun.
UV exposure can contribute to:
Cata

4. Survey your neighborhood find out how many children below the age of 12 year use spectacles . find out from parents what in their view could be the reason for the weak eyesight of their children

Ans: Purpose of survey :

1. To investigate factors associated with spectacle wear in a group of primary school children

2. Survey report revealed that about five children out of 100 below 12 year age were found to wear glasses.

Various reasons were revealed like children spending more time watching TV, v