

Introduction

- One of the most important senses is sense of light.
- We see beam of sunlight, beam of headlight, beam of light from torch. Beam of light from LED.
- Because of the light we are able to see things around us. Like mountains, rivers, trees, sentences printed on paper, moons and stars etc.

What makes things visible

- We notice that we are only able to see things around us when there is some light present around us but we cannot see things in dark.
- When light gets reflected or emitted by an object and enters our eyes then only, we can see that object.
- Light travels in a straight line.
- When the light falls on a mirror the direction of the light changes in another direction.

Laws of reflection

➤ Activity 1

1. Take a comb and cover all the slits except the one in the middle.
 2. Take a mirror and place it on a table.
 3. Now put the comb in perpendicular direction of the table in front of the mirror.
 4. Now pass the light from the slit of the comb.
 5. You will find that ray of light is reflected in another direction.
- The ray of light that fall on any surface is called the incident ray.
 - The ray of light that bounce back from the surface in a different direction is called the reflected ray.
 - The line perpendicular to the reflecting surface from the point where the incident ray strike is called the normal.
 - Angle of incidence is the angle between the incident ray and the normal and it is represented by $\angle i$
 - Angle of reflection is the angle between the reflected and the normal ray and it is represented by $\angle r$
 - Angle of reflection is equal to incidence($\angle i = \angle r$) and this is known as the law of reflection.
 - The incident ray, the normal and the reflected ray all lie in the same plane.
 - From the above activity we conclude that mirror changes the path of light and it is known as the reflection of light.
 - One more thing that we conclude that when the reflect light from an object reaches to our eyes then only the object is visible to us.
 - The image formed by the plane mirror is erect.

- The size of the image formed is same as object.
- The distance of the image from the mirror is same as the distance of the object from the mirror.
- The image formed by a plane mirror cannot be obtain on a screen.

➤ **Activity2**

1. In front of a plane mirror PQ place a torch as the source of light O
 2. Now incident two rays OA and OC on the mirror PQ.
 3. Draw the normal at A and C and then draw the reflected rays at these point B and D respectively.
 4. Now AB and CD are the reflected rays.
 5. These reflected rays will never meet if you extend these lines AB and CD.
 6. If you extend them back you will find that these points now meet. Mark this point as I
 7. the reflected rays appear to come from the point I for viewer's eye.
- Lateral inversion means the left side of the object will appear to be in right and the right side of the object will appear to be in left in the image formed by the plane mirror.

Regular and diffused reflection

- When the incident ray falls on a plane surface or smooth surface like a mirror then the image is formed by the regular reflection where all the reflections are parallel to each other.
- When the incident ray falls on a rough surface or on an irregular surface then the reflected rays are not parallel such reflection are called irregular or diffused reflection.
- The moon reflects the sun's light therefore we can see the moon. Objects that reflect other object's light are called illuminated objects.
- Objects which emit their own light like sun, fire, flame of a candle are called luminous object.

Reflected light can be reflected again

- By using two mirrors we can make periscope that enables us to see which is not directly visible to us by the law of reflection.
- We can see our back portion in the mirror placed in front of us if someone holds another mirror behind us just like the barber holds a mirror behind us to show us the haircut.
- Periscope is used in tanks by soldiers to see the outside things.

Multiple images

- The combination of two plane mirrors placed at an angle can enable us to see our back just like the hair dressers help us to see the hair back of our head.

- These plane mirror placed at an angle form number of images.
- multiple images of an object can be formed by these types of set up of plane mirrors.
- Kaleidoscope is one of the examples of these arrangements of plane mirrors.
- Kaleidoscope shoes beautiful multiple images of an objects.
- Kaleidoscope never repeats the same pattern of an object this feature is used by designers and artists to get idea of some new pattern.

Sunlight white or coloured

- have often seen rainbows when notice it carefully we can see that there are seven colours in the rainbow and they are red, orange, yellow, green, blue, indigo and violet.
- We also noticed many in the soap bubbles, and a compact disc is also seen colourful when light is reflected from its surface.

➤ Activity 3

1. Take a prism and place it on a table.
 2. Place a screen in front of the mirror.
 3. Let a narrow beam of sunlight pass through the prism.
 4. You will notice that the sunlight that was seem to be white in colour gets split into seven colours.
- The white light is composed of seven colours

What is inside our eyes?

- One of the most important sense organs is eye.
- When the light enters our then only, we can see the things around us.
- The white is the outer part of the eye and it is tough so that it can protect the inner part of the eye.
- Shape of the eye is roughly spherical.
- Cornea the transparent front part of the eye.
- Iris is the dark muscular part behind the cornea.
- The small opening in the iris is called the pupil. Iris control the size of the pupil.
- The distinctive colours of the eye is given by the eye. Like some people have green eyes some have black eyes these colours are the colour of iris.
- The amount of light enters in the eye is controlled by the iris.
- retina is a layer on back of the eye which contains several nerve cells. These nerve cells transmit the sensation felt by retina to the brain through the optic nerve.
- There are two types of cells
 1. Cones which are colour and bright light sensitive.
 2. Rods which are dim light sensitive.

- Blind spot is that spot where no vision is possible as it is at the junction of the optic nerve and the retina.
- The impression of an image persists in the retina for about $1/16^{\text{th}}$ of a second. So if the still images of an object move across the eye faster than 16 per second then the eye perceives the object as moving
- Eyelids are to protect the eyes from any objects entering to the eyes.
- Eye can see the objects nearby as well as the distant object.
- A healthy and normal eye can see the objects clearly at the distance of 25cm.
- Some persons can see the distant object but not the nearby objects while some persons can see the nearby objects but not the distant objects these defects can be corrected with the help of suitable corrective lenses.
- Persons are said to have cataract when their eyesight becomes foggy and the eye lens becomes cloudy. This defect is curable. The opaque lens is replaced by the new artificial lens.

Care of the eyes

- We need to take proper care of eyes. Suitable spectacles should be used if advised.
- Insufficient and too light affects the eyesight and causes headache.
- We should keep our eye clean by washing it and should not rub our eyes.
- Vitamin A is very important to keep our eye healthy. Therefore, we should include foods in our meal that are rich in vitamin A such as raw carrots, broccoli, green vegetables and cod liver oil.
- Different animals have different types of eyes in terms of shapes and features.

Visually challenged persons can read and write

- Some people are visually challenged by birth while some lose their eyesight in the course of time.
- These people develop their sense of touching, smelling, listening to identify things.
- Some other aids are also there to help them to develop their capabilities. Like tactual aids (uses the senses of touch), auditory aids and electronic aids.

What is braille system

- Visually challenged people use braille to read and write.
- Braille system has a pattern of dots. It has 63 dot patterns or characters and each pattern represents a letter.