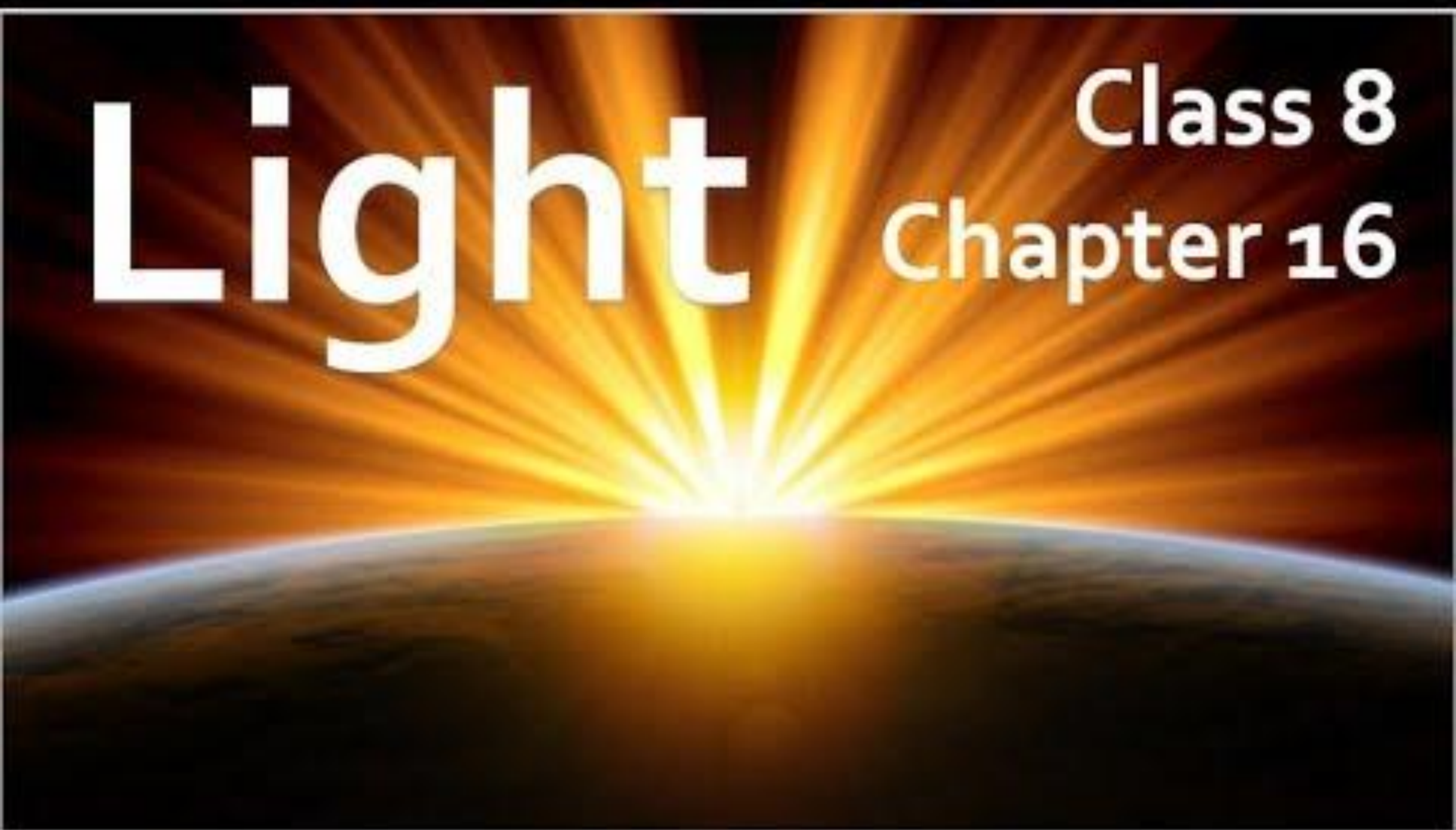


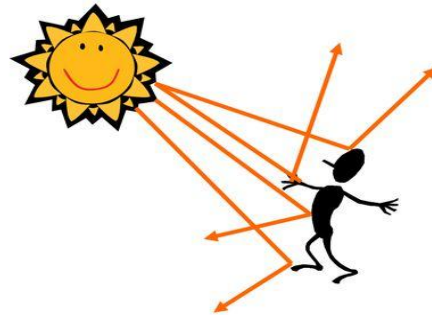
Light

Class 8
Chapter 16



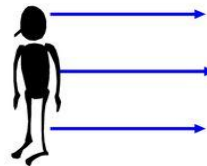
INTRODUCTION

- Light is a form of energy.
- This form of energy gives us the sensation of sight.
- When light falls on any surface, some part of the light is reflected back by the surface. When this reflected light enters our eyes we can see the object.

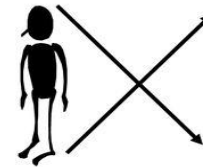


Millions of **light rays** reflect from objects and enter our eyes – that's how we see them!

When we study the formation of images, we will isolate just a few useful rays:

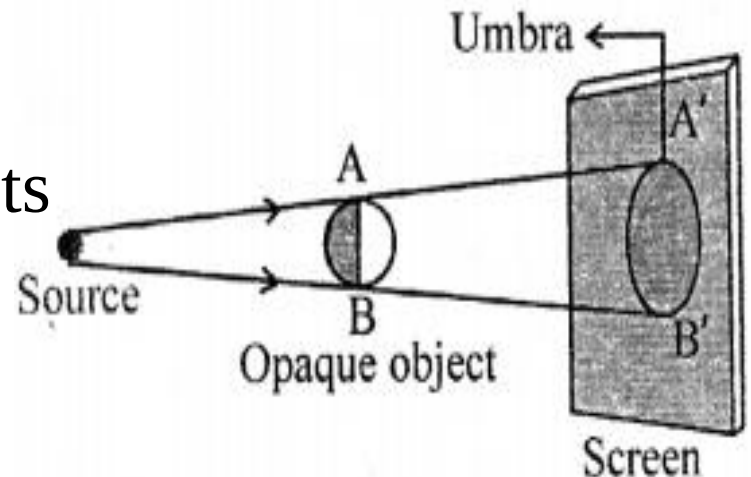


or



Properties of Light

- Light is a form of energy.
- Light is a electromagnetic wave.
- Light travels in a straight line through a homogenous medium. This property of light is known as **rectilinear propagation of light**.
- Light can form **shadows** when its path is obstructed by any opaque object.
- The property of formation of shadow by light also signifies its property of travelling in a straight line.

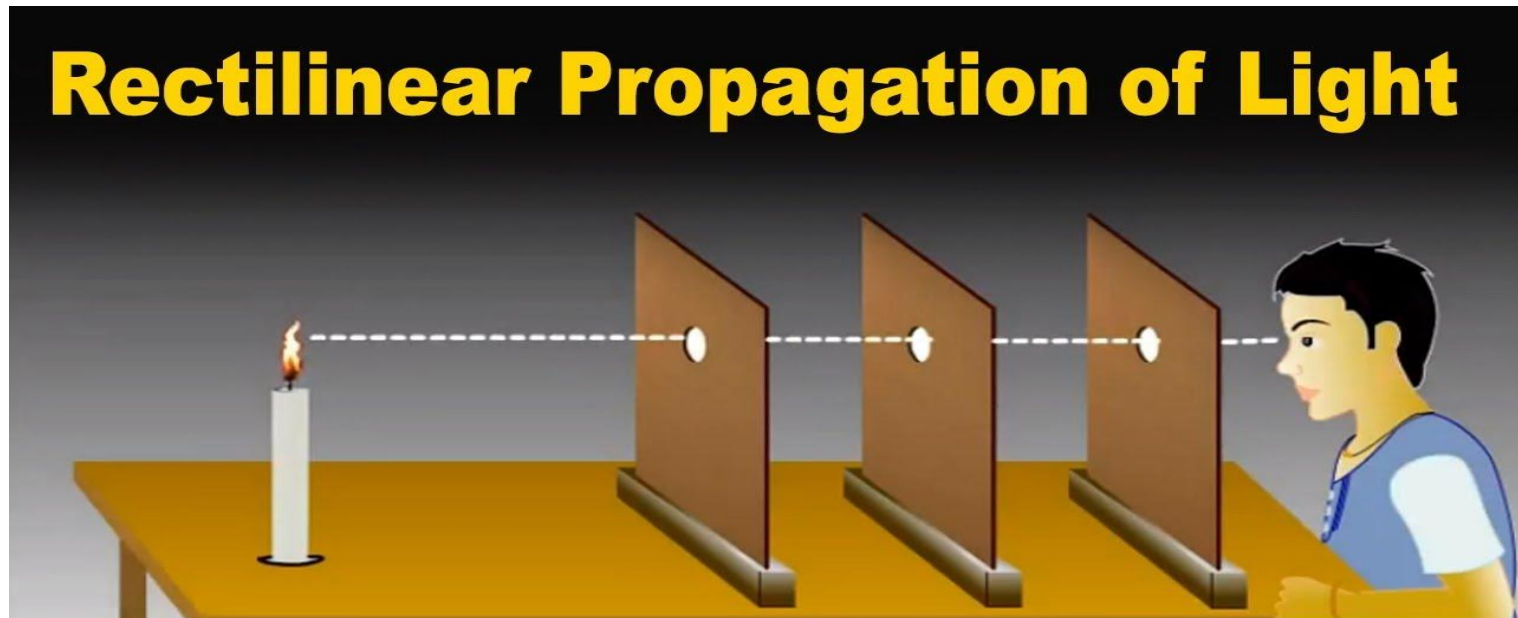


Activity to show Rectilinear Propagation of Light

- Take three cardboards, a small candle.
- The activity needs to be performed in dark room.
- In each of the three cardboards a hole is to be made.
- In a dark room the candle is to be lighted up.
- Now the three cardboards should be held in front of the lighted candle in a such a way that the holes in each of the cardboard are in a straight line.
- Now an attempt should be made to see lighted candle through the holes of the three cardboard.
- It is found that if the three holes of the cardboards are not in the same straight line, the lighted candle can't be seen.

Activity to show Rectilinear Propagation

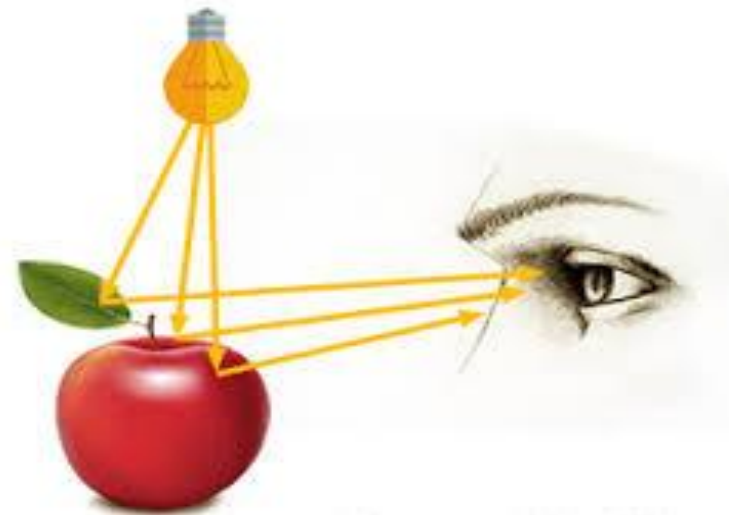
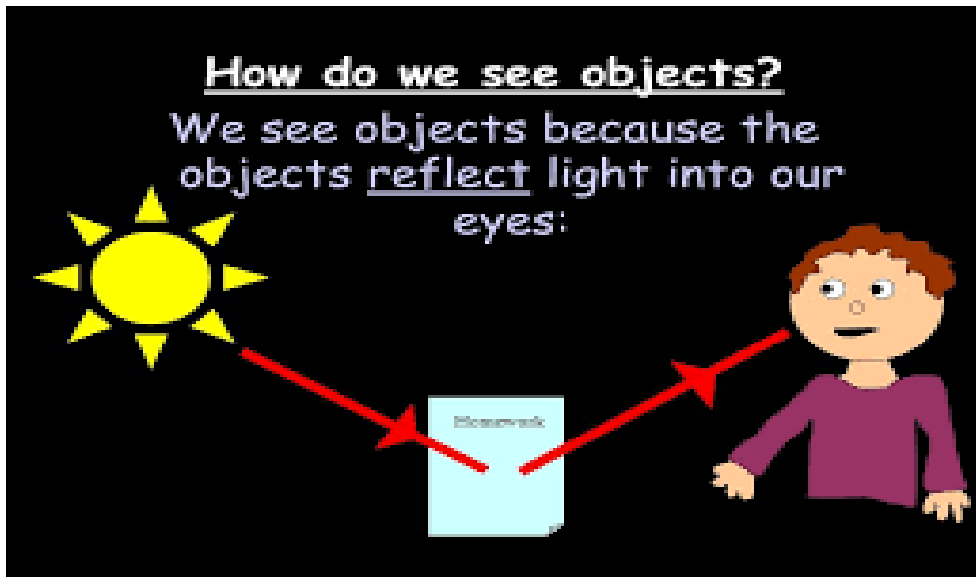
- The lighted candle will be visible only when the three holes of the three cardboards are in same line (straight).
- This suggest that light travels in a straight line.
- If it were not so then the lighted candle would be visible even if the three holes of the cardboard were not in the same line.





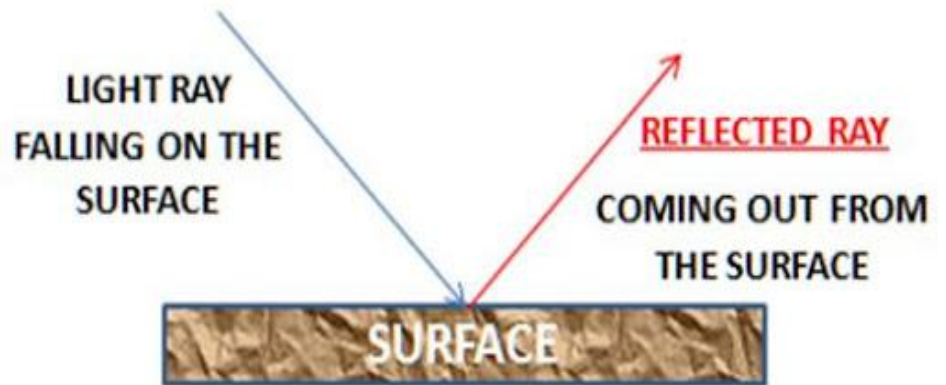
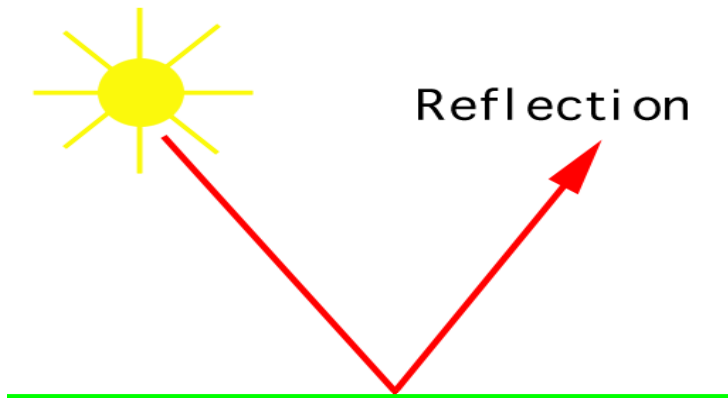
What makes things visible ?

- It is light that makes things visible.
- When light falls on any surface from any source, some part of the light is reflected back by the surface. When this reflected light enters our eyes, the signals are passed to the brain and the brain decodes or interprets the signal, as a result of which we can see the object.



Reflection of Light

- Reflection of light means bouncing back of light when it falls on the surface of any object.
- Reflection of light is defined as a phenomenon of sending back the light rays when it strikes the surface of an object.
- Reflection may also be defined as a process that changes the direction of a light ray at the boundary of two different media such that the ray of light returns back into the same medium.

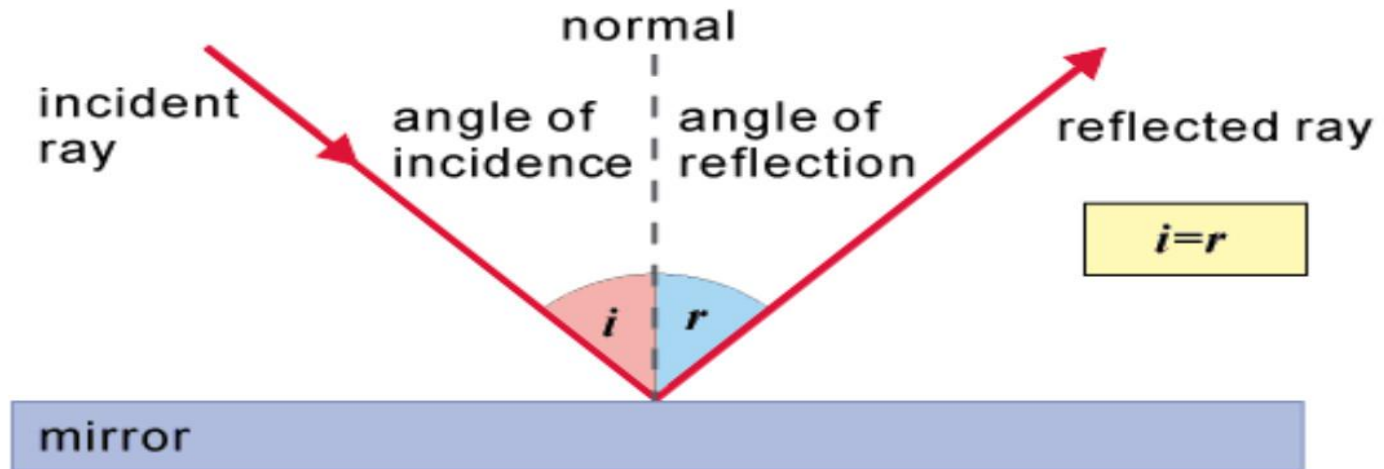


Laws of Reflection

- The angle of incidence (i) is equal to the angle of reflection (r).

$$\angle i = \angle r$$

- The incident ray, the reflected ray and the normal to the mirror at the point of incidence, all lie in the same plane.



Terms associated with laws of reflection

- **Incident ray** : The ray of light that is falling on the reflecting surface.
- **Reflected Ray** : The ray of light that is bouncing back into the same medium after striking the reflecting surface.
- **Point of Incidence** : The point on the reflecting surface where the incident ray strikes and the reflected ray bounces back.
- **Normal at the point of incidence** : It is a line drawn perpendicularly on the reflecting surface at the point of incidence.

Terms associated with laws of

- **Angle of reflection** : The angle that a reflected ray makes with a perpendicular to the surface at the point of reflection.
- **Angle of incidence** : The angle that an incident ray makes with a perpendicular to the surface at the point of incidence.

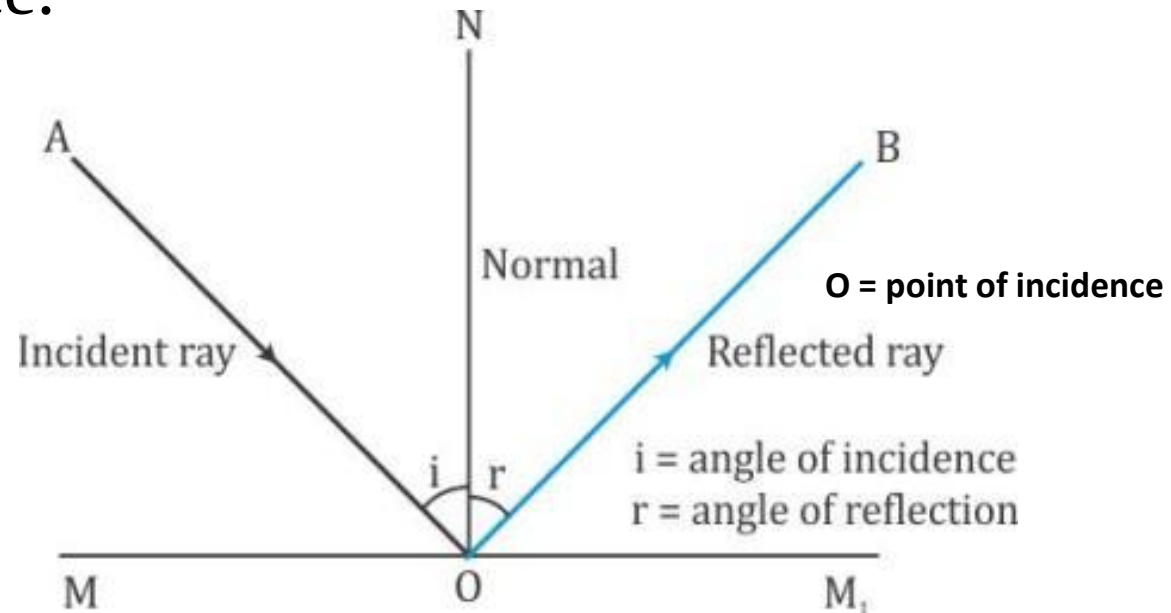
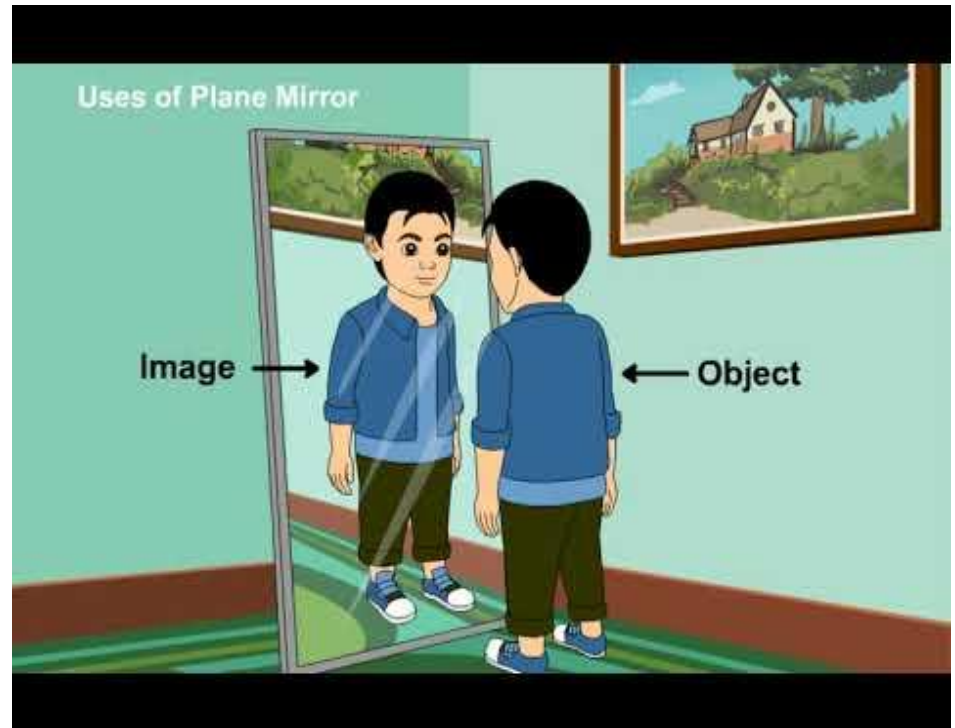


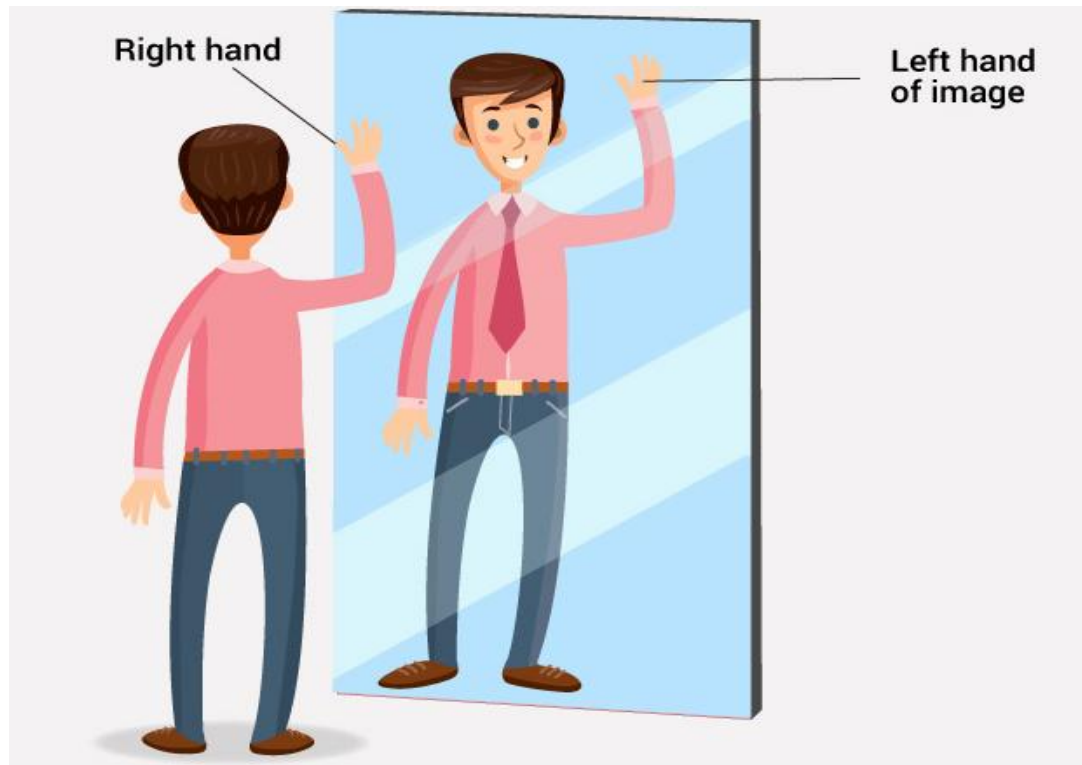
Image formation by a plane mirror

- The image formed by a plane mirror is always virtual (i.e. the image cannot be obtained on the screen).
- The image is erect and is formed behind the mirror.
- The image is laterally inverted.
- The image is of the same size as the object.
- The image is at the same distance behind the mirror as the object is in front of the mirror.



Lateral Inversion

- The phenomenon of changing left to right or right to left at the time of formation of image by a plain mirror, is called **Lateral Inversion**.



Regular Reflection

- When the surface is smooth and shiny, like the surface of glass, water or polished metal, the light gets reflected at the same angle as it hit the surface i.e., the angle of reflection is equal to the angle of incidence. This is called **Regular reflection**.



Diffused Reflection

- When light hits an irregular rough surface, the parallel rays falling on it are reflected in different direction i.e., the angle of incidence is not equal to the angle of reflection. Such a reflection is known as **Diffused Reflection**.

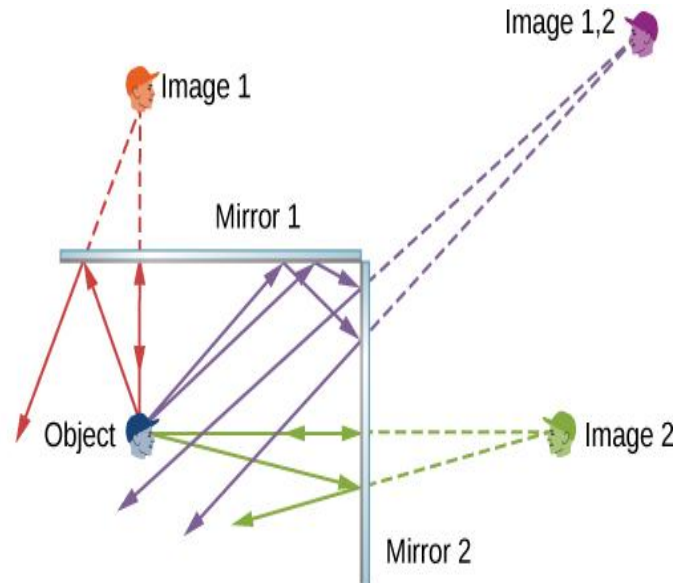
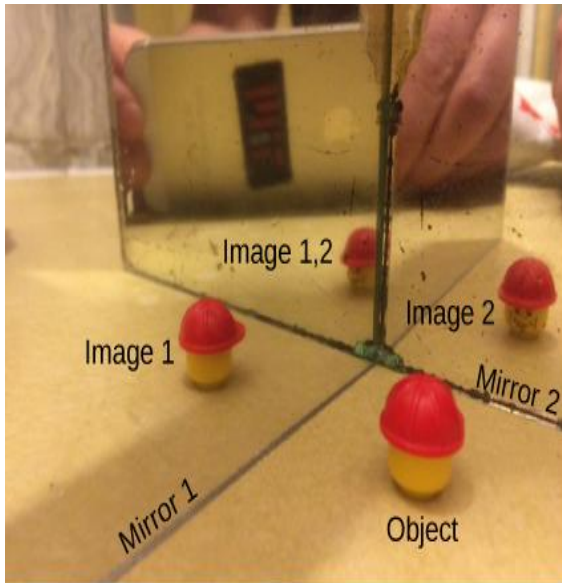


Multiple Images

- When two mirrors are placed at an angle to one another and an object is placed in between, we can see multiple images of an object due to reflection from one mirror on to the other mirror.
- The image in one mirror would act as an object for another mirror and this sequence would continue. This will result in the formation of multiple images.
- The best example is the saloon or hair dresser shop. In this shop two mirrors are placed opposite to each other. When a man is sitting between the mirrors, his image is formed in both the mirrors.

- When two mirrors are placed opposite and parallel to one another, infinite number of images are formed.
- The number of images formed when two mirrors are placed at an angle to one another, is given by the relation :

$$\text{Number of Images} = (360 / \text{Angle}) - 1$$



Kaleidoscope

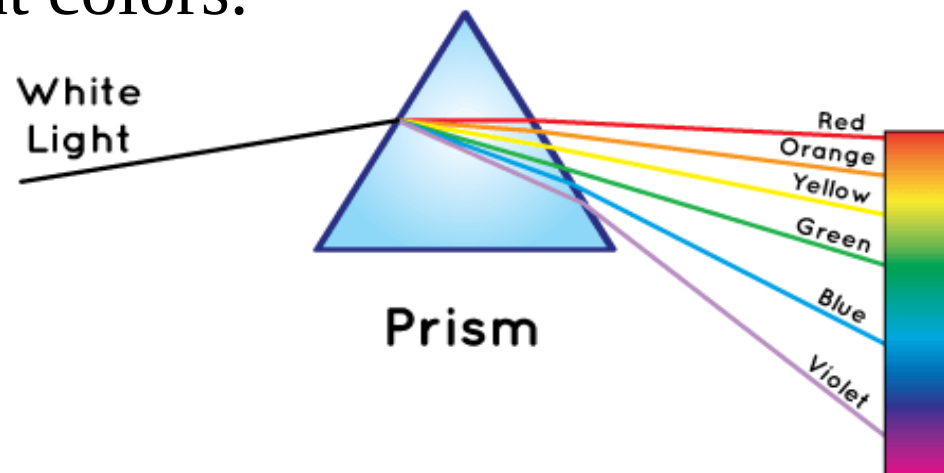
- The principle of multiple image formation by a plane mirror, is used in **Kaleidoscope**.
- It is an optical instrument with two or more reflecting surfaces placed at angle with one another.
- It is used by the fashion designer to produce beautiful patterns.



Sunlight- White or colored?



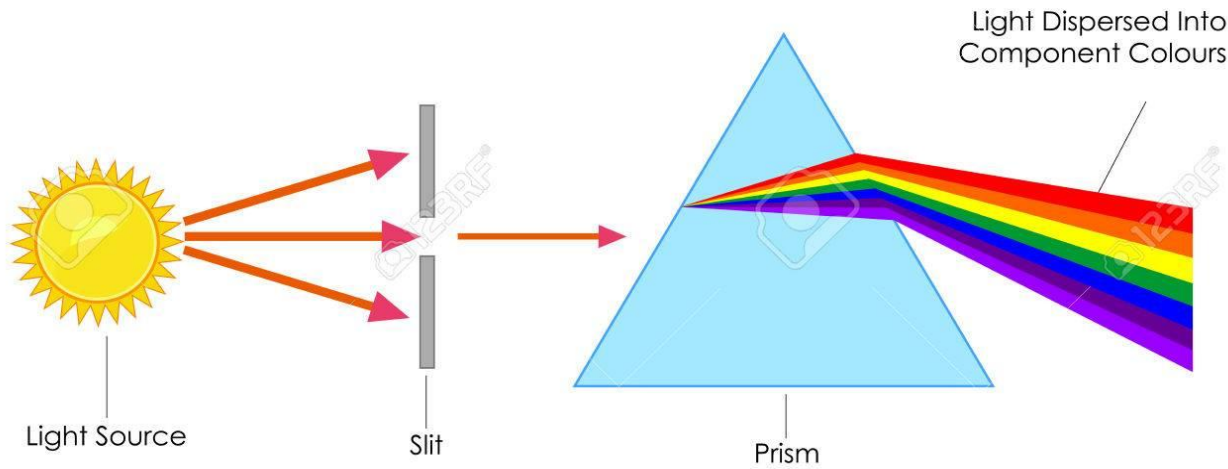
- Sunlight though visible as white light, consists of seven colors – violet, indigo, blue, green, yellow, orange and red.
- These seven colors are termed as **VIBGYOR**.
- When sunlight is passed through a prism it splits up into seven different colors.



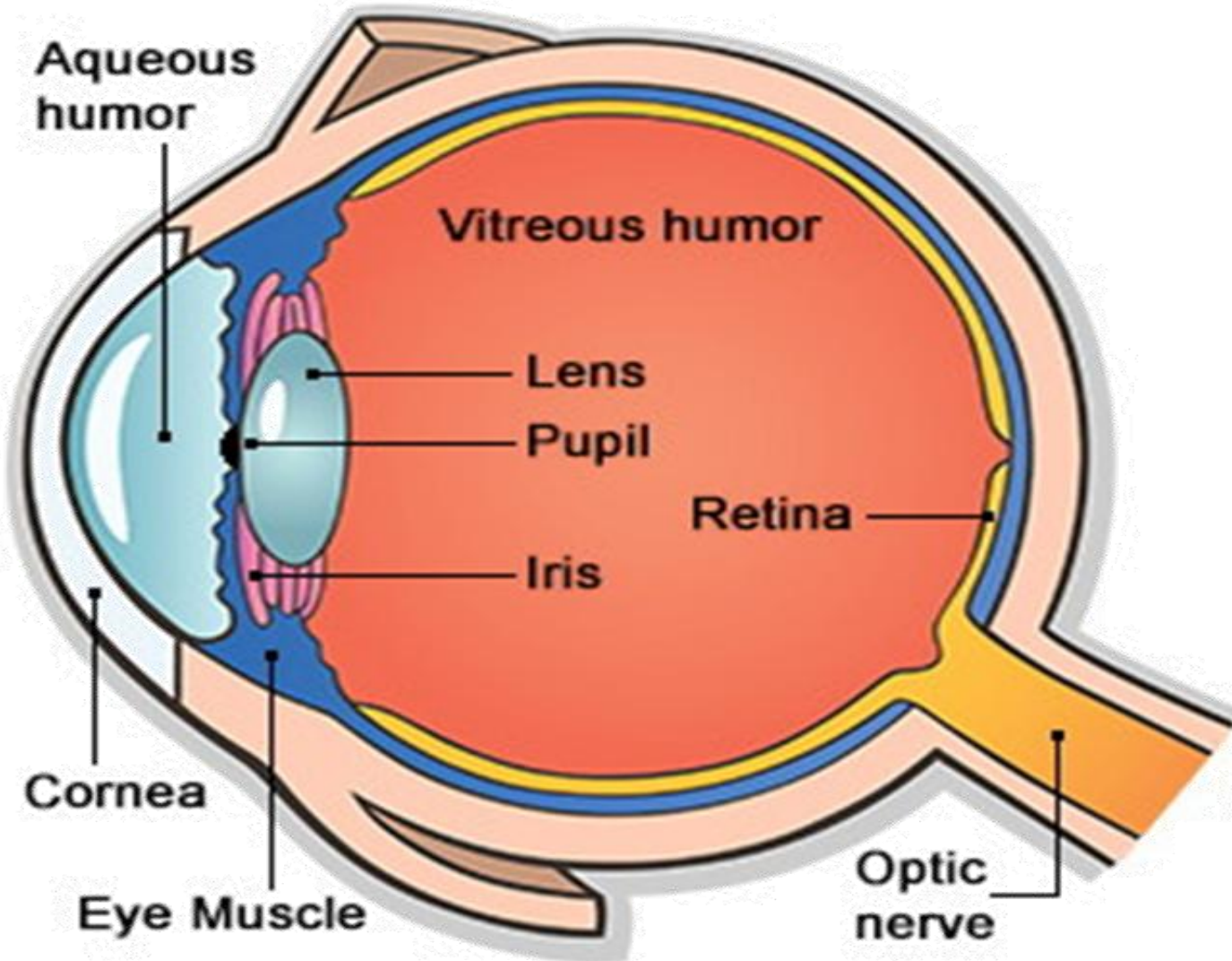
Dispersion of Light

- The phenomenon of splitting up of white light into its constituent spectrum of colors when passed through a glass prism is called dispersion of light.

Dispersion of Light Through Prism



Structure of Human Eye



Parts of Eye

- **Cornea:** It is the transparent front portion of the eye that covers pupil, iris and is responsible for maximum refraction of light entering our eye.
- **Iris:** It is a thin structure in eye which is responsible for controlling the size and diameter of pupil and thus the amount of light entering the retina.
- **Pupil:** It is a hole in the iris of the eye that allow light to fall on the retina.
- **Lens:** It is a biconvex structure in the eye that help in refraction of light entering the eye.
- **Retina:** It is a light sensitive tissue at the back of our eye. It converts the light rays entering the eye into impulses that travel to the brain with the help of optic nerve.
- **Optic nerve:** It connects eye to the brain.
- **Blind Spot:** It is the portion where the optic nerve and retina meet. No image is formed at this point.

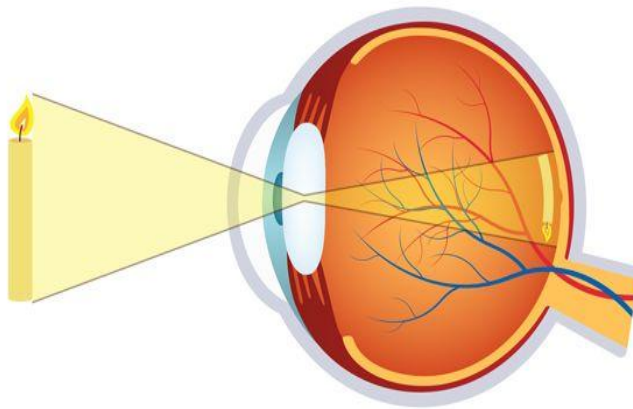
Care of Eye

- Do not read in too dim or too bright light.
- Do not read in moving vehicles.
- Consult a eye specialist in case of any eye problem.
- Don't look at any high intensity light directly.
- Don't rub eyes.

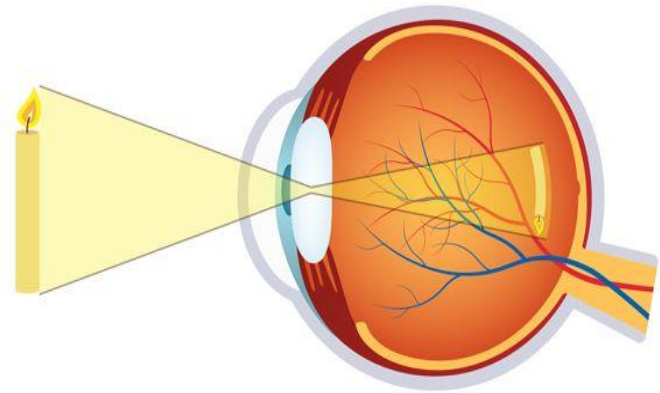


Vision Defects

- **Myopia:** In this type of vision defect a person can see near objects clearly but distant objects appear blurred to him. This disease is also named as short sightedness.



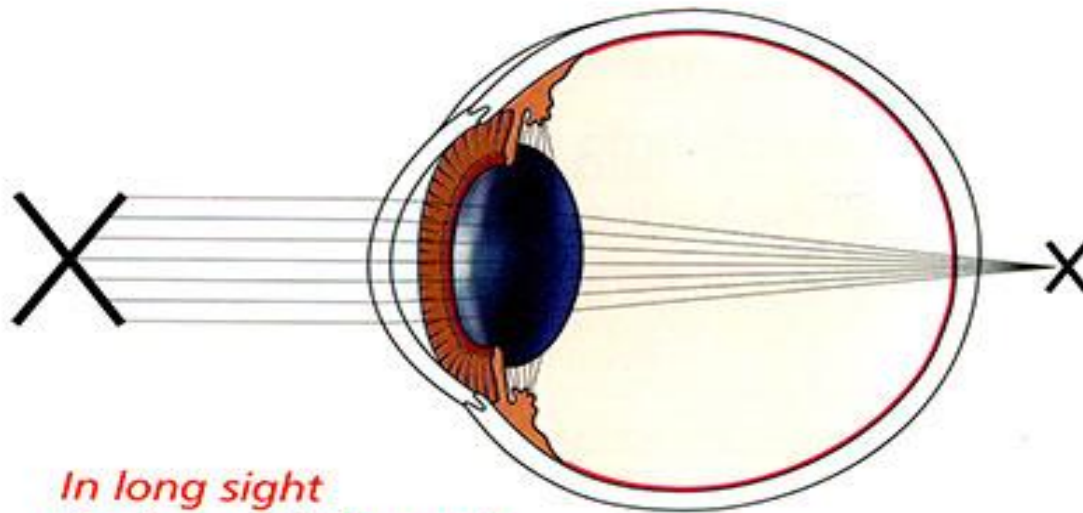
Normal vision



Myopia

Vision Defects.....

- **Hypermetropia:** In this type of vision defect a person can see distant objects clearly but nearby objects appear blurred to him. This disease is also named as long sightedness.



*In long sight
the image is focused
behind the retina*

Vision Defects.....

- **Cataract:** This defect of eye occurs mainly because of aging. It may also happen because of any injury. In this disease the lens becomes milky and cloudy as a result of which thus the patient cannot see clearly.

Visually Challenged Person

- Persons who have difficulty in seeing are called visually challenged persons.
- There are many individuals including children who cannot see since birth.
- Since the sense organ eye, is less active , the other sense organs of the visually challenged person are very sensitive.
- Visually challenged persons use their sense of touching or hearing to recognize the objects around them.



Braille System

- Braille system is used by the blind persons for reading.
- The Braille Script consists of alphabets that are used by the blind persons for reading.
- This system was invented by French blind person, named Louis Braille.

