8th Class

Light

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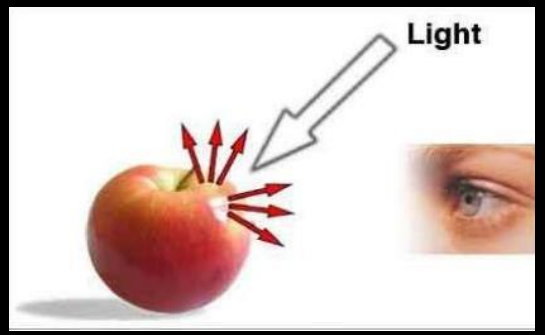
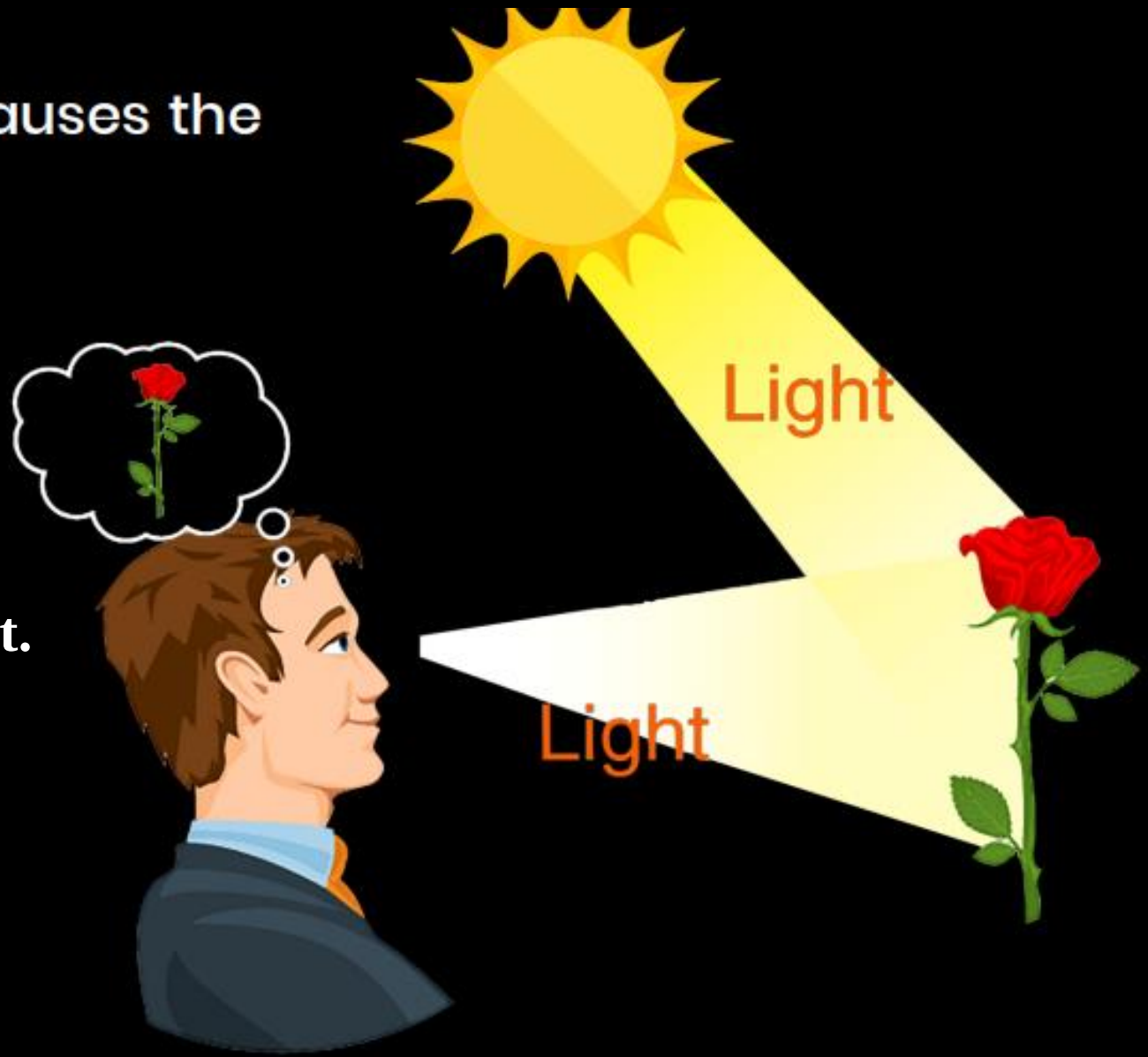
What makes Things

Light is a form of energy which causes the sensation of vision.

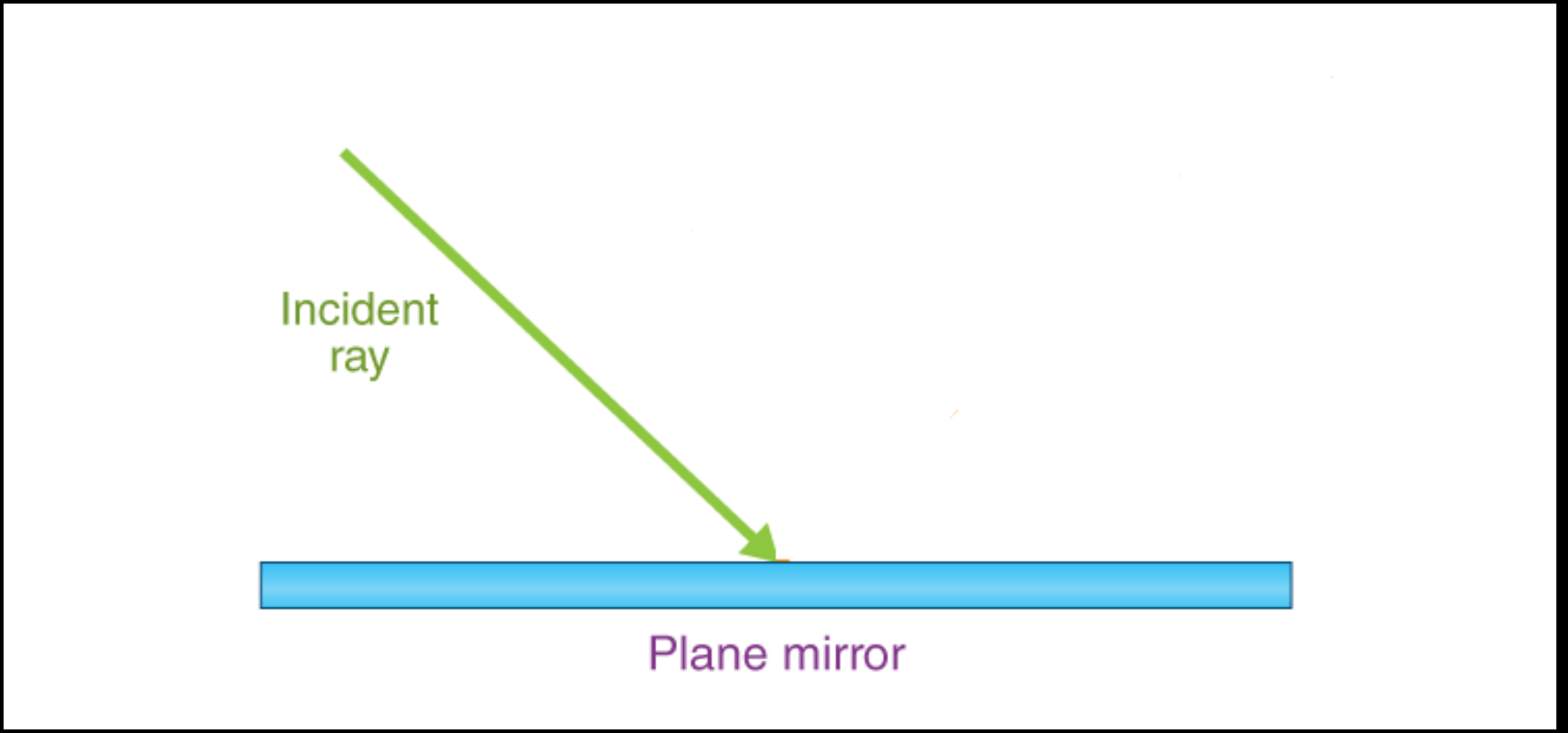
- Eyes alone cannot see any object.
- Eyes can see, when light come from an object and enters in our eyes.
- The light may have been emitted by the objects, or may have been reflected by it.





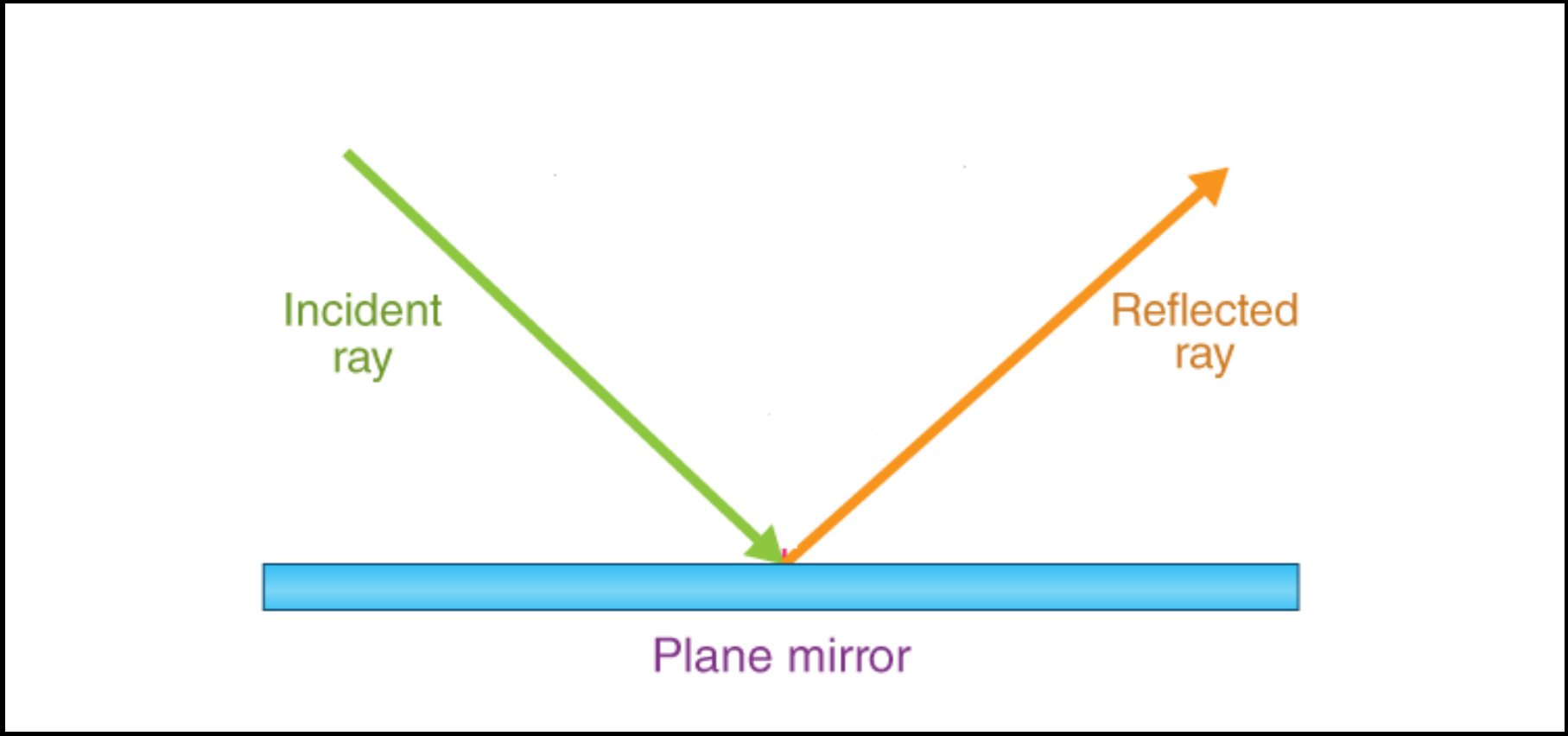
Reflection of Light

Incident ray -The light ray, which strikes any surface, is called the incident ray.



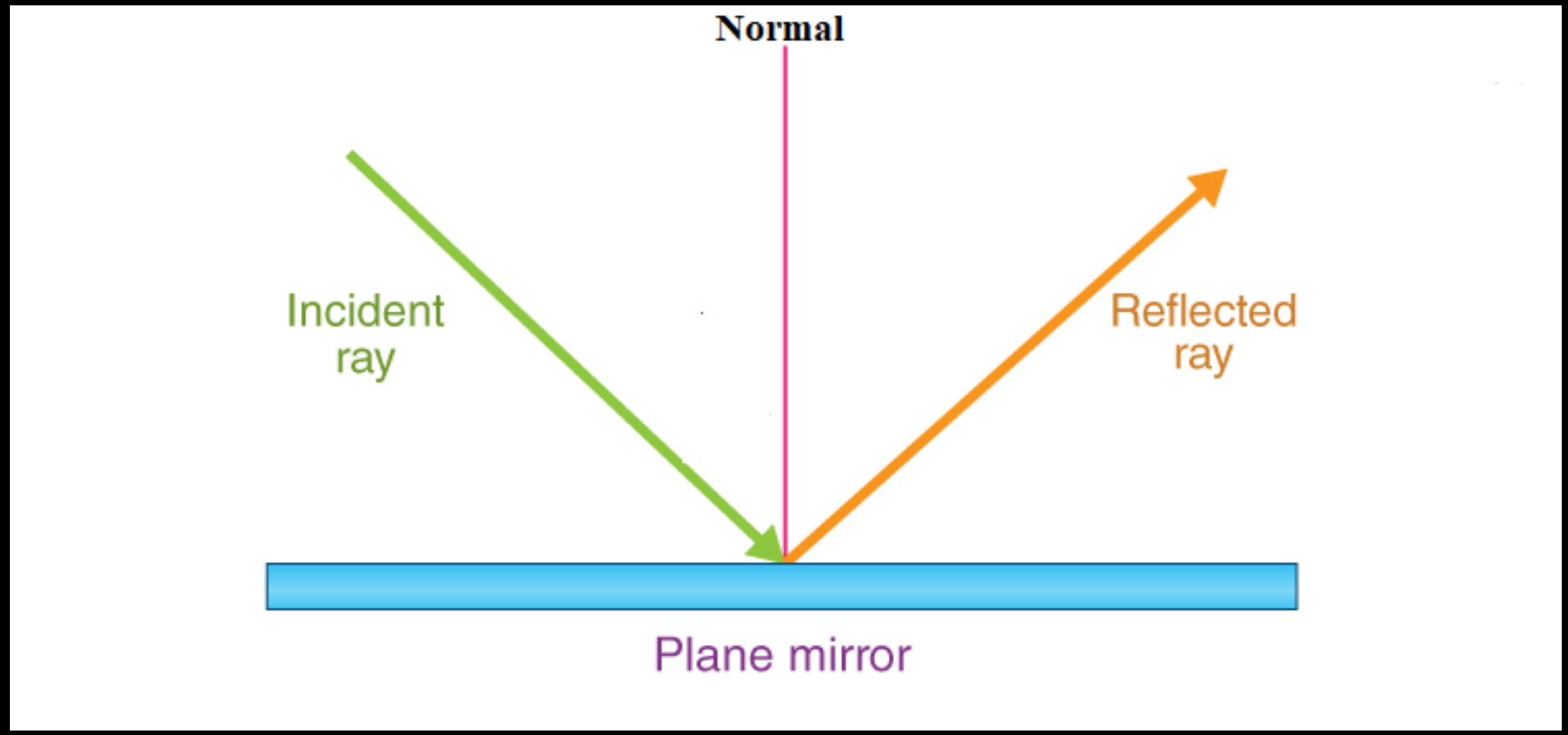
Reflection of Light

Reflected ray -The ray that comes back from the surface after reflection is known as the reflected ray.



Reflection of Light

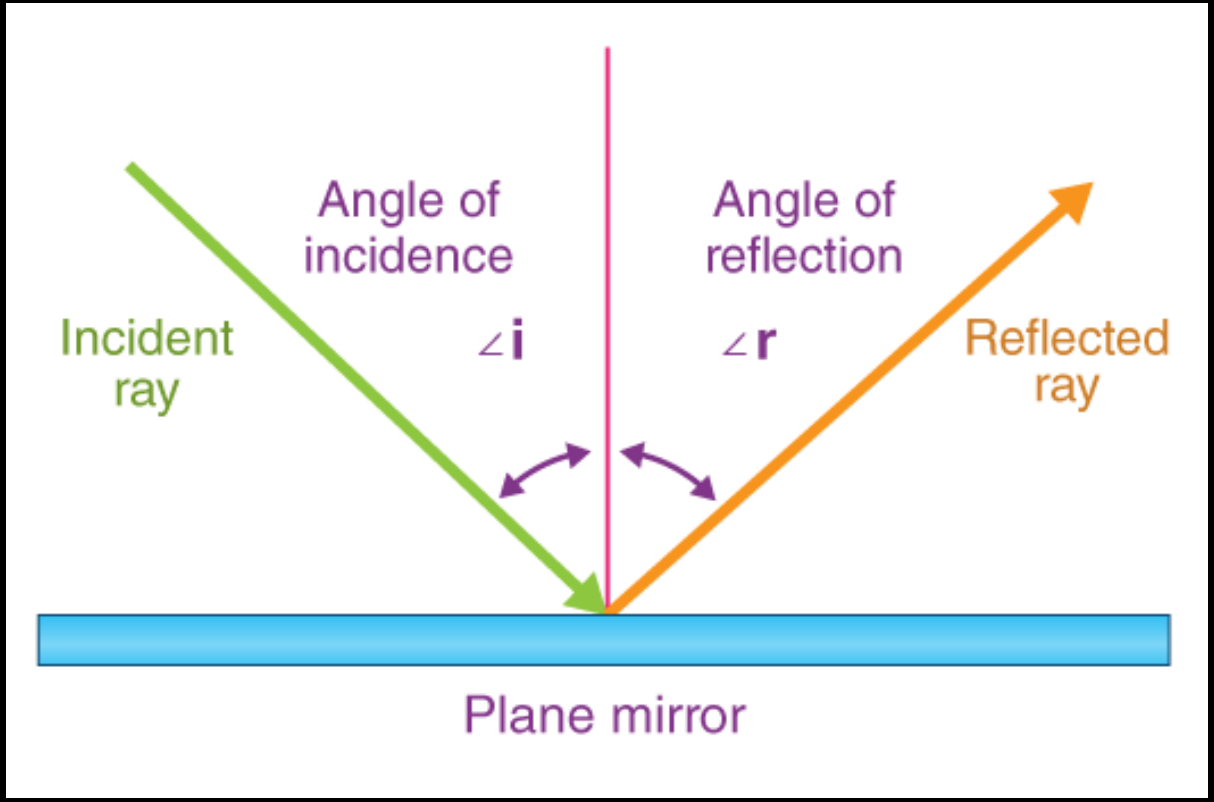
Normal- An imaginary line making an angle of 90º to the line representing the mirror at the point where the incident ray strikes the mirror. This line is known as the normal to the reflecting surface at that point



Reflection of Light

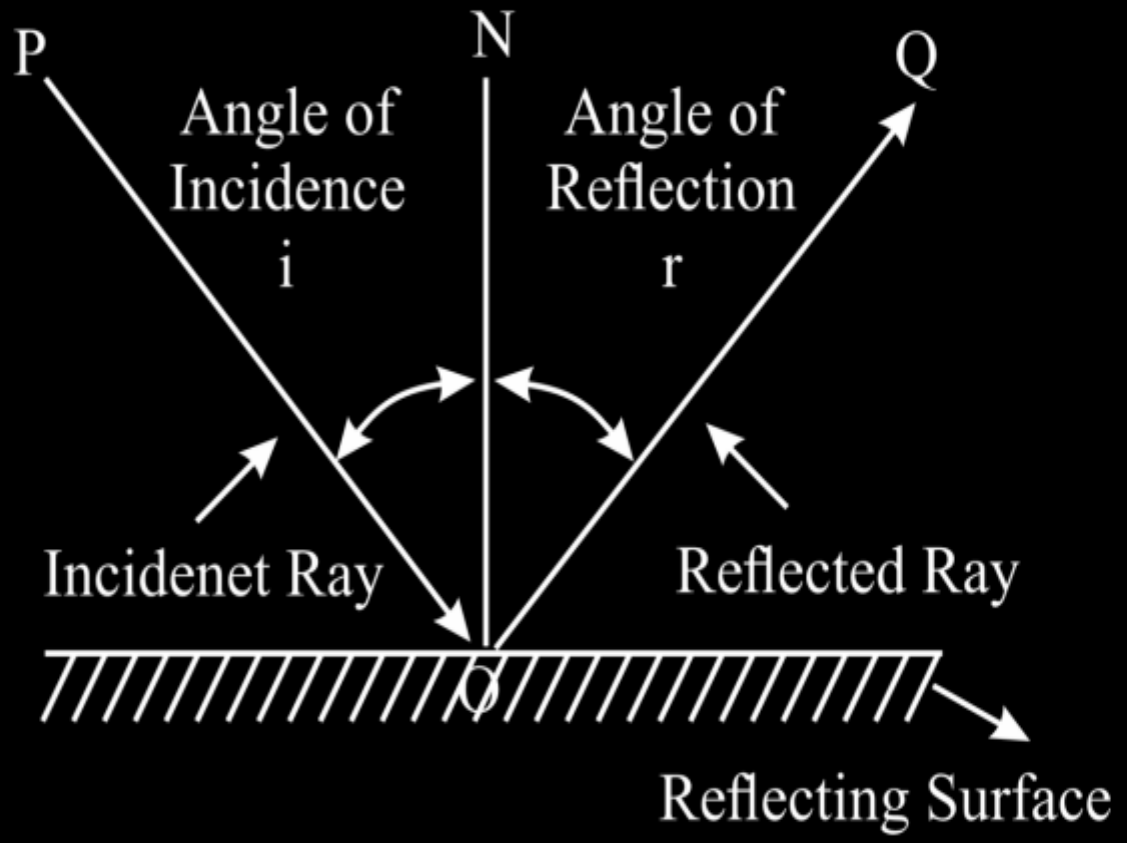
Angle of incidence -The angle between the normal and incident ray is called the angle of incidence (∠i).

Angle of reflection -The angle between the normal and the reflected ray is known as the angle of reflection (∠r)



Reflection of Light

When rays of light are incident on an opaque smooth polished surface, they are bounced back in the same medium. This phenomenon of bouncing back of ray of light in the same medium is called reflection of light.



Laws of Reflection

First law of reflection

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

Second law of reflection

Incident ray, reflected ray and the normal drawn at the point of incidence to the reflecting surface, lie in the same plane.

Regular and Diffused Reflection

When all the parallel rays reflected from a rough or irregular surface are not parallel, the reflection is known as diffused or irregular reflection.

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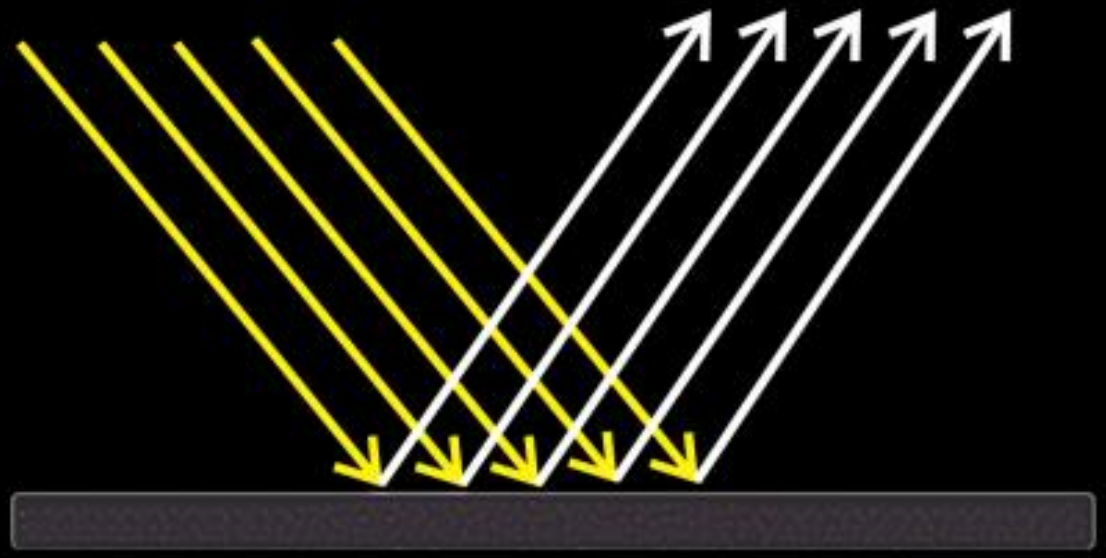
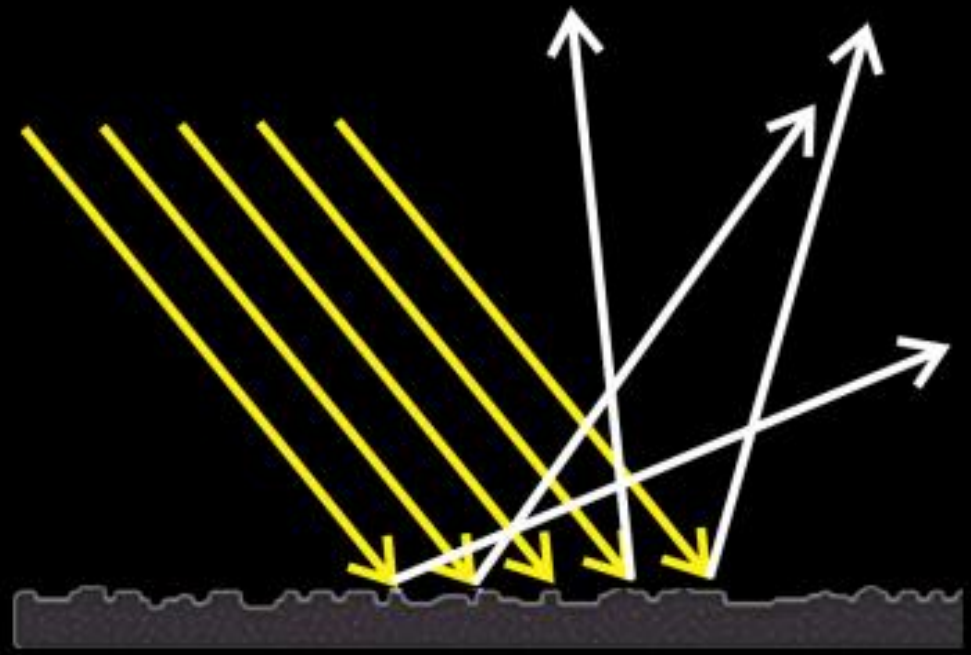


Regular reflection



Diffused reflection

Regular and Diffused Reflection

Regular Reflection	Diffused Reflection
When parallel rays of light fall on a smooth surface, they are reflected back as parallel rays only. This is called regular reflection.	When parallel rays of light fall upon an irregular surface, they are reflected back into all the directions. This is called diffused reflection.
It is also called specular reflection.	It is also called irregular reflection.
It leads to the formation of an image.	It enables us to view different objects present in our environment.
For example, the image formed by a plane mirror.	For example, the reflection of rays of light through a wall.

Real and Virtual image

Real Image	Virtual Image
1. Light rays actually meet to form a real image.	1. Light do not actually meet to form a virtual image.
2. The image is generally inverted.	2. The image is generally erect.
3. Image can be obtained on the screen.	3. Image cannot be obtained on the screen.
4. This image is in front of mirror and behind the lens.	4. This image is behind the mirror and in front of the lens.
5. We can reach to it.	5. We can't reach to it.

Image formation by Plane mirror

Characteristics of the image formed by a plane mirror:

(i) The image formed by a plane mirror is virtual and erect.

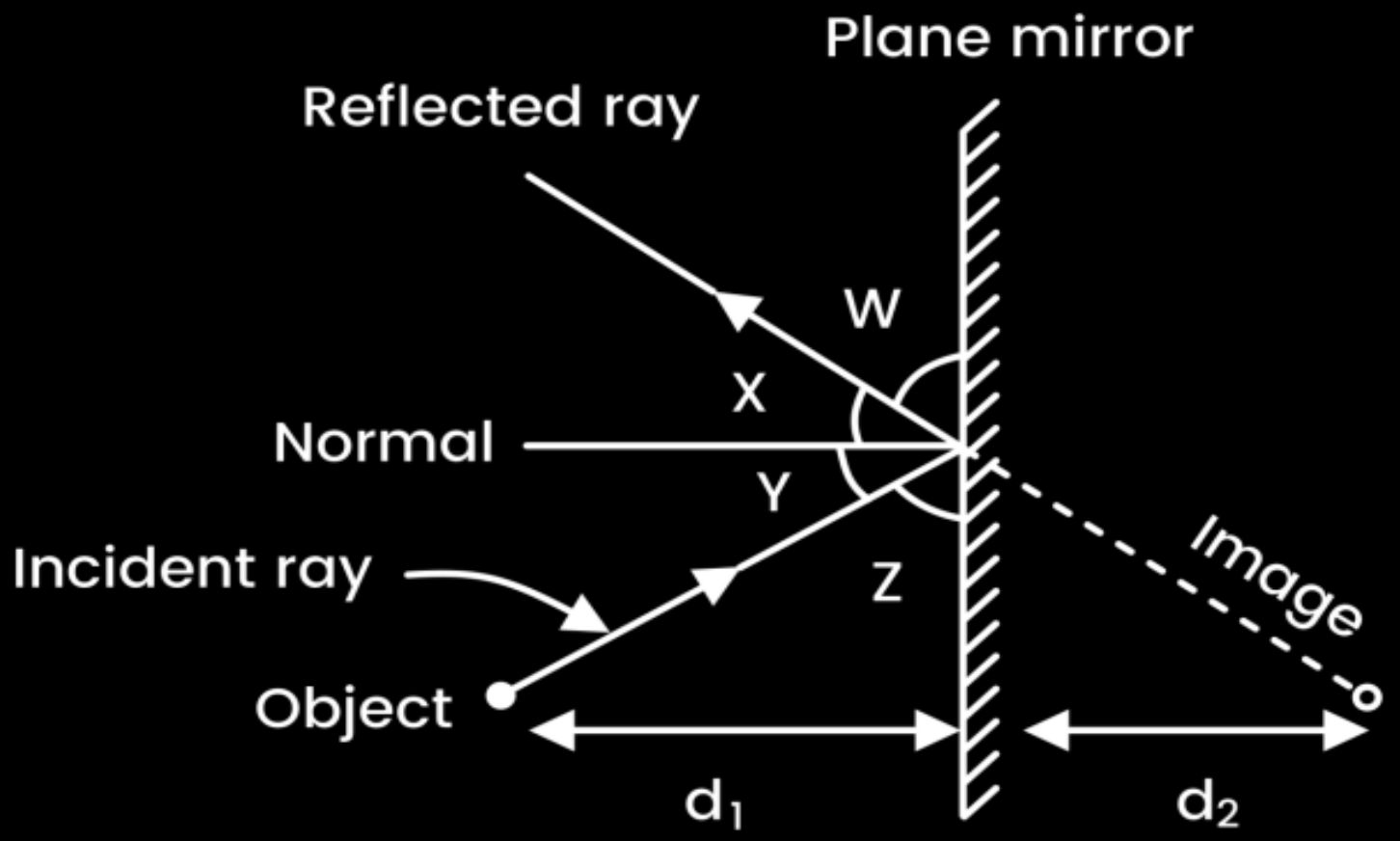
(ii) The image formed by a plane mirror is laterally inverted.

(iii) The size of the image formed by a plane mirror is equal to the size of the object.

(iv) The image formed by a plane mirror is at the same distance behind the mirror as the object is in front of it.

Image formation by Plane mirror

An image of an object is formed in a plane mirror as shown below.



Lateral inversion

What is lateral inversion?

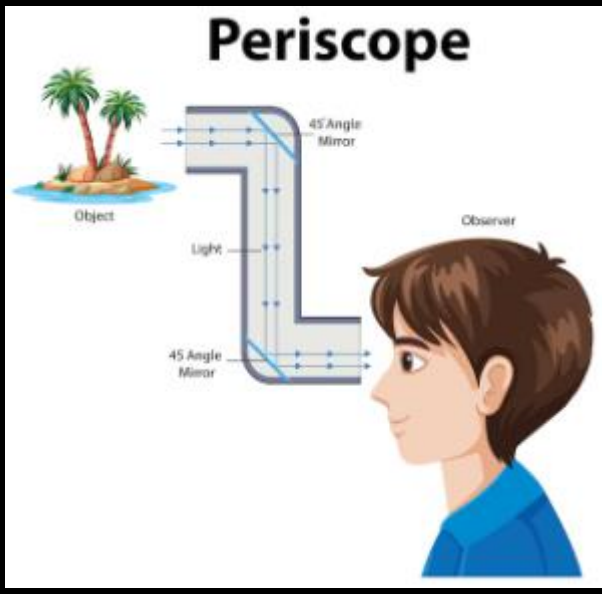
When an image is formed in a mirror the, the left side of the object appears at the right side of the image and vice versa. This is called a lateral inversion.

Reflected Light Can be Reflected Again

Mirror at the hair dresser shop

Reflected Light Can be Reflected Again

Periscope



- A **periscope** uses **two plane mirrors** fixed at **45° angles**.
- Light rays from the object strike the **top mirror**.
- The top mirror **reflects light downward** inside the tube.
- The light then strikes the **bottom mirror**.
- The bottom mirror **reflects light into the observer's eyes**.
- Due to **two successive reflections**, objects **not directly visible** can be seen.

Uses of Periscope

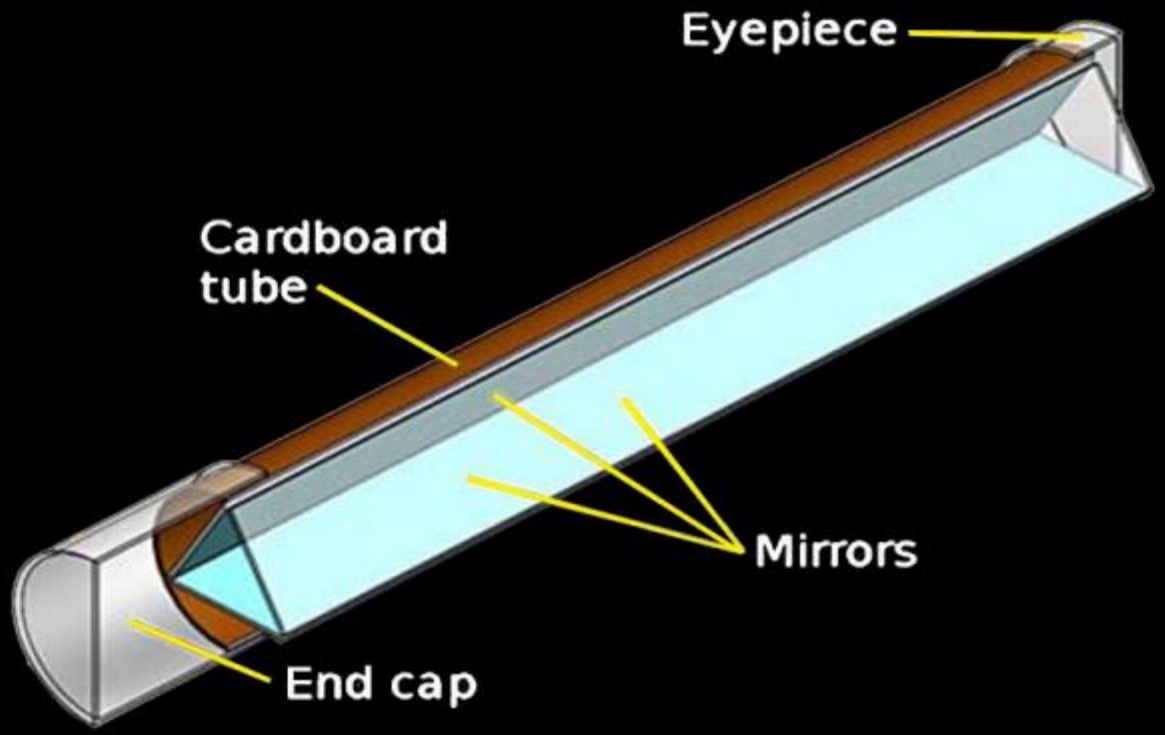
- ✓ Submarines – to see above water
- ✓ Tanks – to observe surroundings safely
- ✓ Soldiers in bunkers – to see outside without exposure

Multiple Images

Number of images formed by combination of two plane mirrors depends on the angle between the mirrors.

Kaleidoscope

A kaleidoscope contains two or more reflecting surfaces tilted towards each other at a certain angle for obtaining a symmetrical pattern when viewed from the other end. This happens due to the phenomenon of repeated reflection.



Kaleidoscope

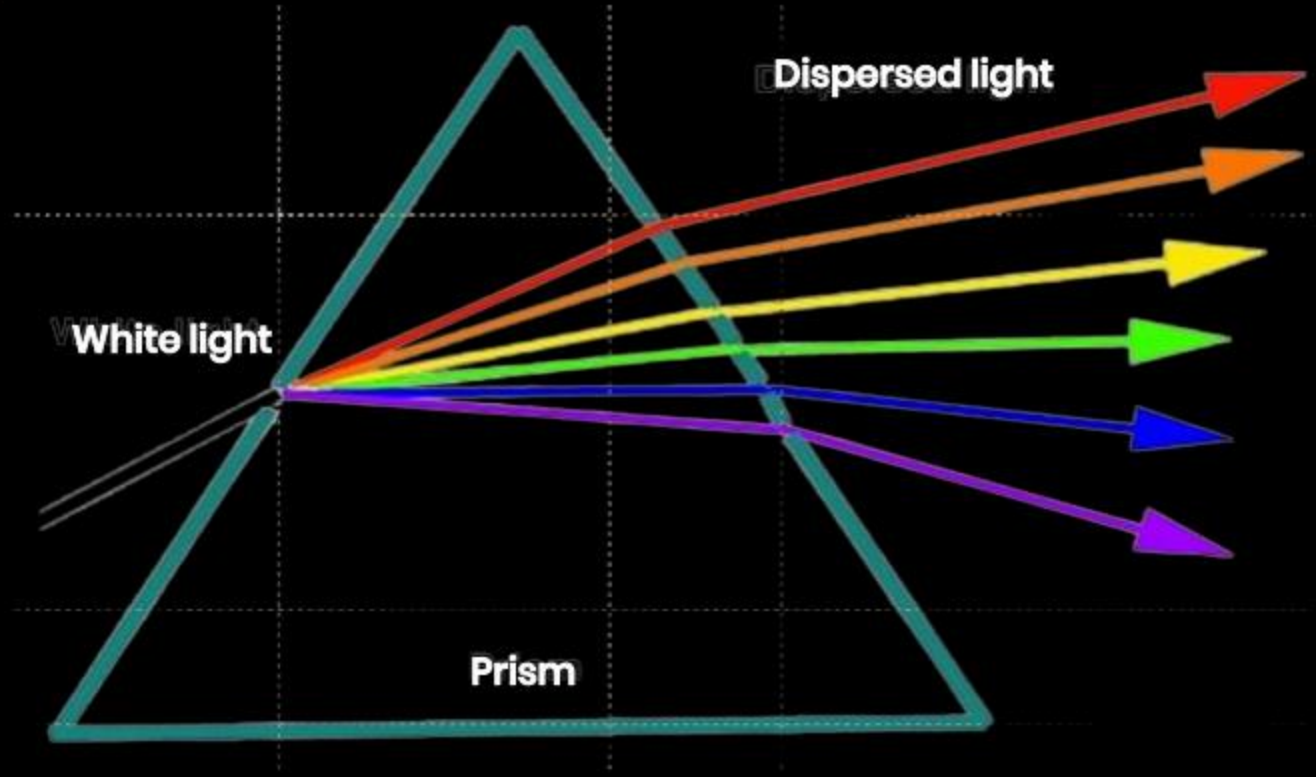
When the light falls on the surface of a mirror, it gets reflected in a way that the angle of incidence is equivalent to the angle of reflection. According to the second principle, the white light, a combination of seven colours, passes through the coloured objects in a kaleidoscope. Due to this most of the light gets absorbed by these objects. As a result of the multiple reflections of light, there is a creation of beautiful and innovative patterns.

Sunlight — White or Coloured

- The sun is the biggest source of light on the earth.
- The sunlight is white in colour however this white light often disperses into several colours which results in different colours of the sky at different times of the day.
- The white light consists of seven colours namely VIBGYOR (violet, indigo, blue, green, yellow, orange and red).
- This arrangement of seven colours of a white light is called as Spectrum.

Sunlight — White or Coloured

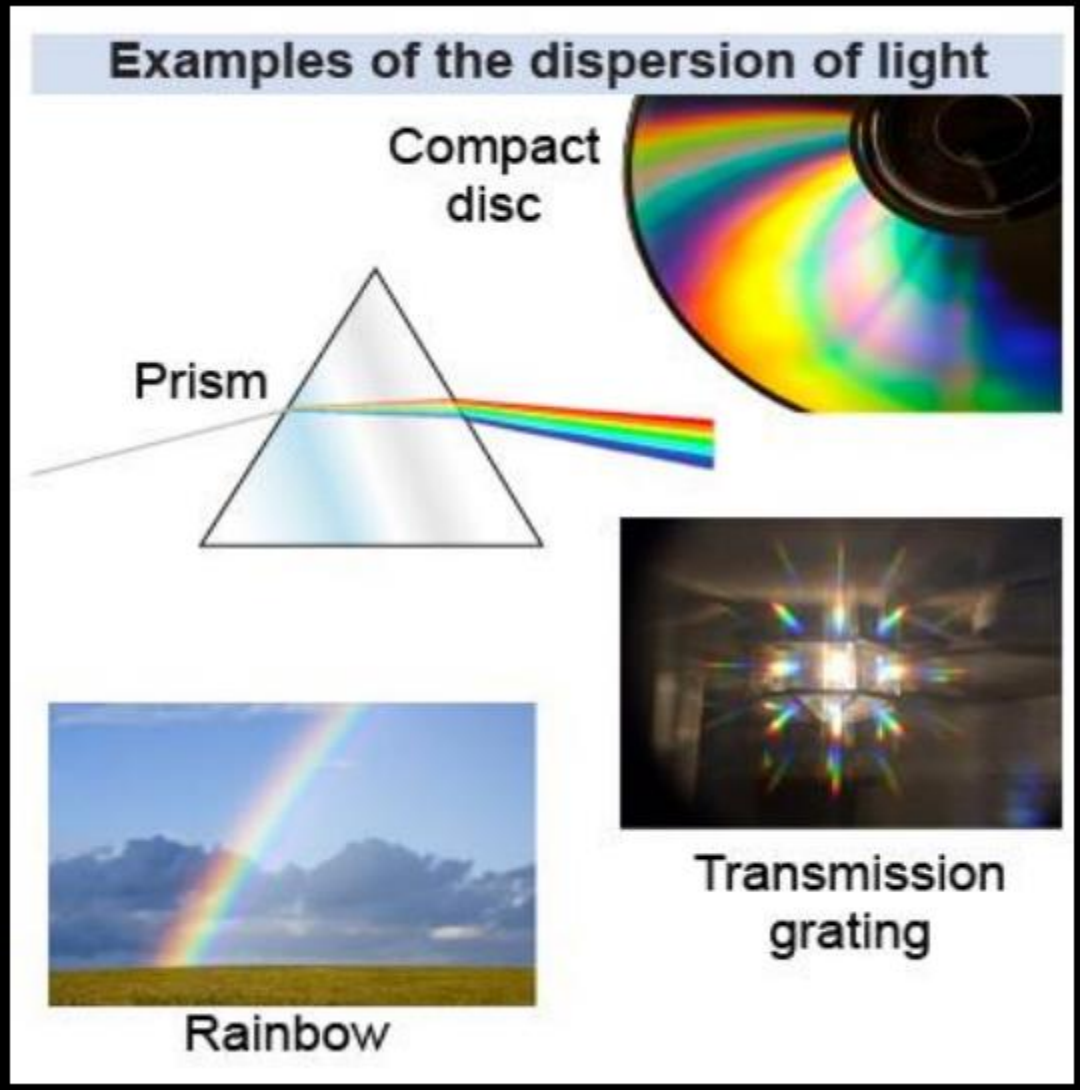
- This phenomenon of the splitting of light into its constituents is called Dispersion of light.



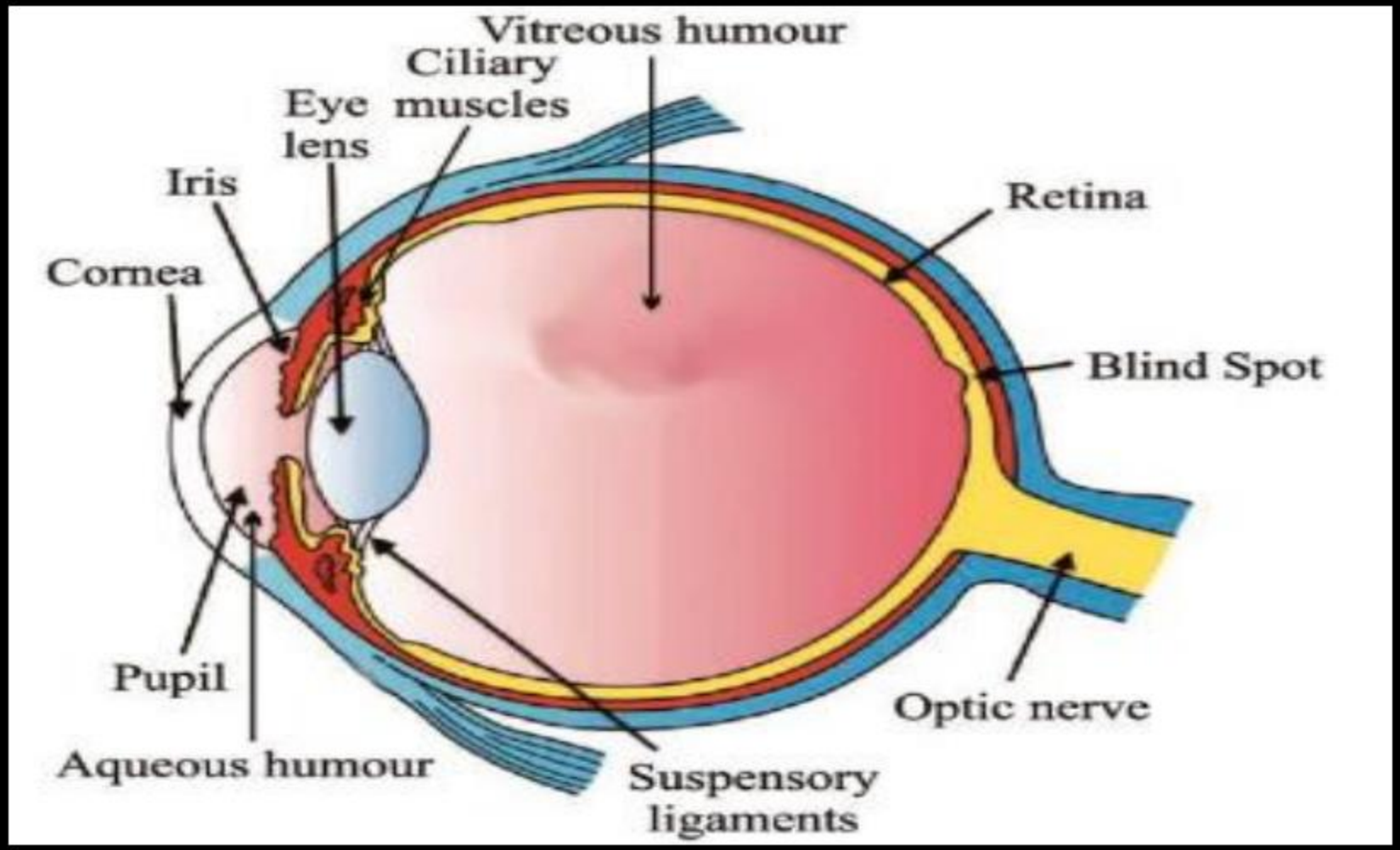
- Splitting of light into its colors is known as dispersion of light.
- Rainbow is a natural phenomenon showing dispersion.

Sunlight — White or Coloured

- Formation of rainbow due to the dispersion of white light through the water droplets.
- Passing of Sunlight through a prism
- Dispersion of light through the soap Bubbles
- Dispersion of light on the CDs



What is inside Our Eyes?



What is inside Our Eyes?

The parts of the human eye :

- **Cornea –** It is a transparent covering present on the outer side of the eyes. It consists of 6 layers. Tear fluid covers cornea and protects the eye.
- **Iris –** It is a dark coloured muscular structure present in the centre of the cornea. The Iris consists of a small opening call Pupil through which the light enters into the eye. The Iris has colourful pigments like grey, blue, black, green, brown etc. The amount of light that enters the eye is controlled by the Iris. In other words, Iris controls the Pupil.
- **Lens –** It is like a sphere of liquid present inside the eye. The eye lens is located behind the Pupil which helps in the formation of an image in the eye.

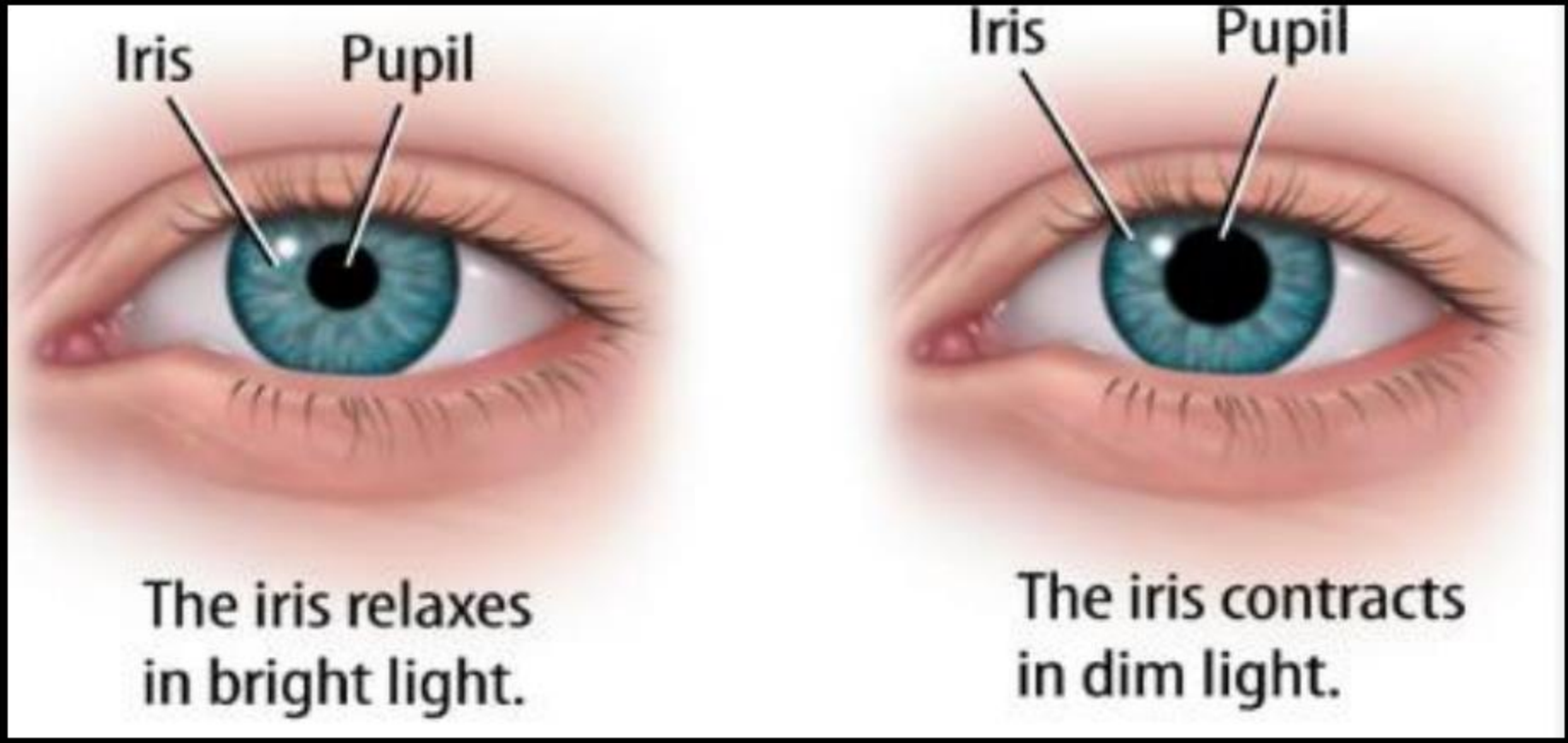
What is inside Our Eyes?

Retina- Retina is a layer located behind the lens at the back of the eye. The eye lens focuses the light that enters into the eye over the retina. The retina consists of different Nerve cells that perform different tasks. There are sensory cells that detect the light. They then transform that information into an electrical impulse. These electrical impulses are sent to the brain via the optic nerve. Two types of vision cells in the retina are:

- **Rods or chopsticks** - They get activated in darkness or dim-light and the responsible for light-dark vision.
- **Cones** - they react to bright light and therefore sense colour in an object

What is inside Our Eyes?

The eye is spherical in shape and has a diameter of 2.3 cm on average. The internal structure of the eye includes- the cornea, iris, pupil, lens, ciliary muscles, retina, nerve cells, optic nerve, yellow spot, aqueous and vitreous humor.



What is inside Our Eyes?

The human eye operates similar to a digital camera in several ways:

- Light focuses mainly on the cornea, which acts like a camera lens.
- The iris controls the light that reaches the eye by adjusting the size of the pupil, and thus it functions like the diaphragm of a camera.
- The lens of the eye is located behind the pupil, and it focuses light. This lens helps the eye to automatically focus on near and distant objects, and also the approaching objects, like an autofocus camera lens.
- The cornea and lens focus light to reach the retina, which is a light-sensitive zone present on the inner lining of the back of the eye.
- The retina converts optical illusion images into electronic signals, and thus it acts as an electronic image sensor of a digital camera. These electric signals are then transmitted by the optic nerve to the visual cortex, which is responsible for the sense of sight.

Care of the Eyes

- One should go for a regular eye check up.
- Wear spectacles if the eyesight is found weak.
- Always study or watch TV in a sufficient light. Excess or insufficient light both can lead to problems. Insufficient light can cause strain and leads to a headache.
- Do not look at the sharp source of light like the sun directly. Excess of light can damage the eyes.
- If dust enters into the eye one should not rub them and rather wash them straightway.
- Maintain a normal distance while reading or watching TV.
- Take a balanced diet to ensure that you get the right nutrients.

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Visually Impaired Persons Can Read and Write

- Some people have **very limited vision**
- Some are **blind since birth**
- Some lose eyesight due to **disease or injury**
- They identify objects using:
  - **Touch**
  - **Hearing**
- Other senses become **more developed**
- **Special resources** help them:
  - Read and write
  - Improve abilities
  - Live independently

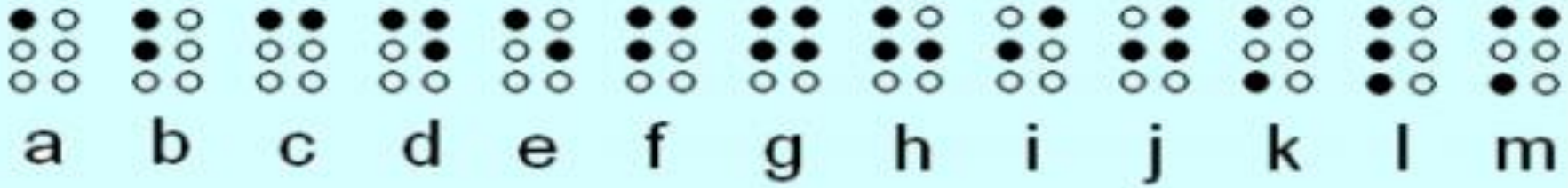
What is the Braille System?

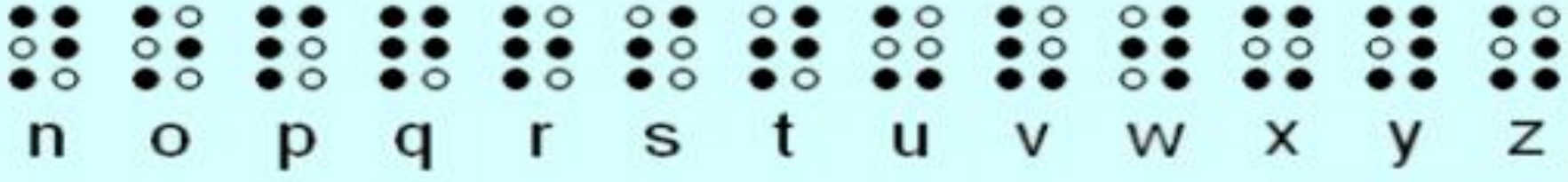
- Braille is a tactual aid for visually challenged people that allow them to read and write.
- It was developed by a visually challenged person called **Louis Braille**. This system was published by him in 1821 however the present Braille System was adopted in 1932.
- For many common languages including Hindi, Sanskrit, Tamil, Telugu, Mathematics and scientific notations a Braille code is present.
- In the Braille code, there are **63 Dots or 63 Characters**.
- These are arranged in a cell of two vertical rows having three dots each.

What is the Braille System?

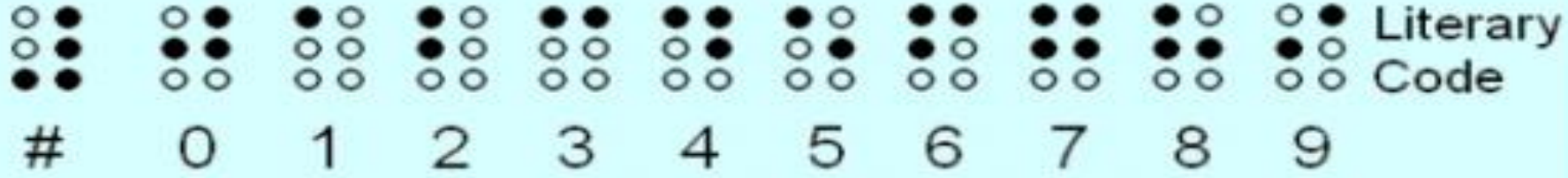
- The patterns are embossed on a **Braille Sheet** that allows a person to read by touching the pattern. Each character in the Braille system can represent:
  1. a letter
  2. a combination of letters or a word
  3. a grammatical sign

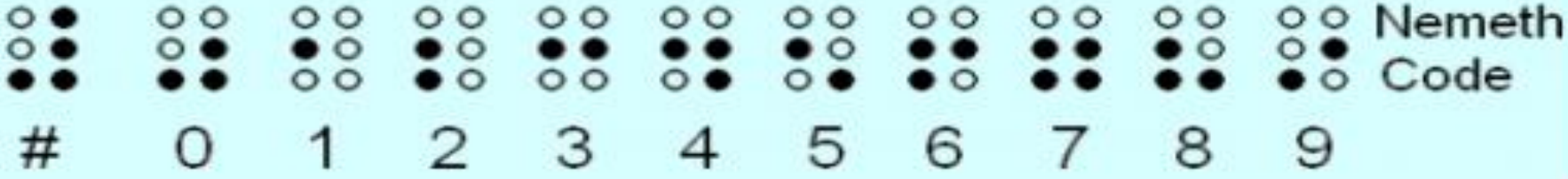
THE BRAILLE ALPHABET





NUMBERS






thank you