

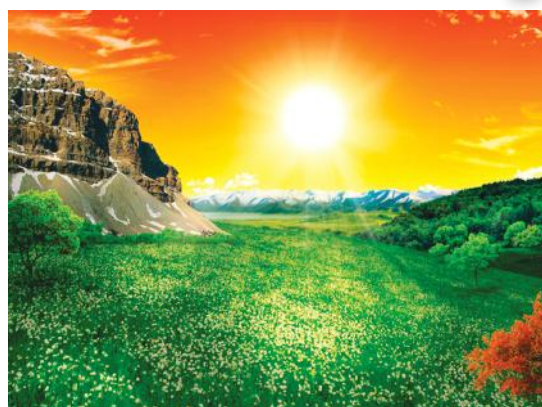
### IN THIS CHAPTER

- Luminous sources of light
- Non-luminous sources of light
- Rectilinear propagation of light.
- Reflection of light
- Real and virtual image

Light is a form of energy. With the help of light, we are able to see an object. Those objects which emit light are called source of light. The sun is the biggest natural source of light. Other natural sources of light are, fireflies, stars, moon etc. Man made sources are bulb, tube, candle, CFL etc.

There are two types of sources of light :

- Luminous sources of light
- Non-luminous sources of light



### LUMINOUS SOURCES OF LIGHT

Those objects which give out light of their own are called luminous objects. The sun, stars, bulb, candle, lamp etc. are the examples of luminous objects.



Sun



Stars



Bulb



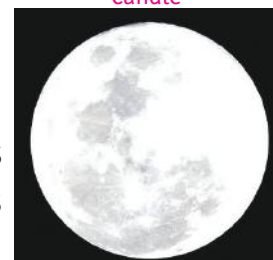
CFL



Candle

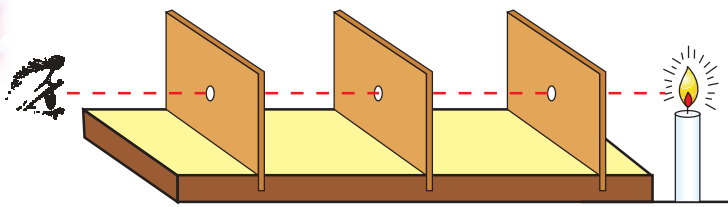
### Non-luminous Sources of Light

Those objects which do not give out light of their own are called non-luminous objects. These objects become visible when light from a luminous body falls on them and these objects reflect some part of light on our eye retina.



Moon

## Rectilinear Propagation of Light

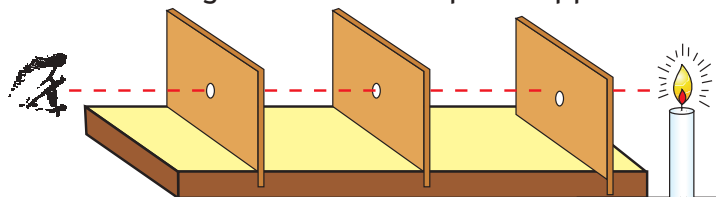


Visible candle light

three holes on the cupboards at same point. Keep a burning candle on the table, with its flame at the level of the holes. Now you will see the flame of candle through holes. If you displace one cardboard then you will not see the flame of candle. It provides that light travels in a straight line.

When a light is travelling in a straight line it is known as rectilinear propagation of light. It can be proved by a simple activity.

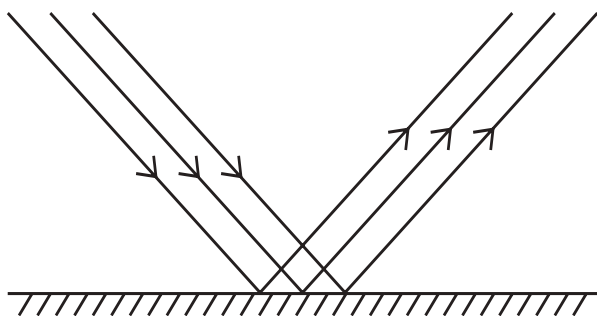
Take three square pieces of cardboard make them straight with the help of support. Make



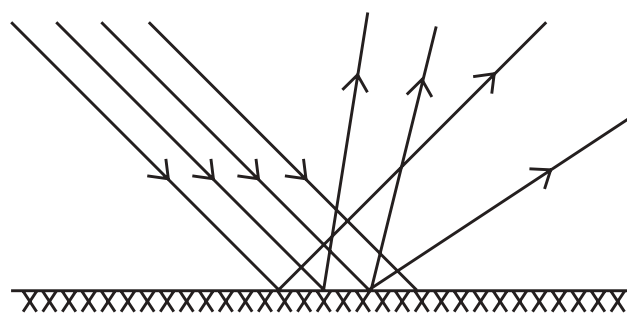
Not visible candle light

## REFLECTION OF LIGHT

A mirror bounces off light from its surface. This bouncing off of light from a surface is known as reflection. A shining stainless steel plate or surface of water can also act as a mirror and change the path of light. A smooth shiny surface is a good reflector of light as it reflects the entire beam of light falling on it in one direction only. This is called regular reflection. When the rays in a beam of light fall on an object with an uneven surface, they get reflected, in different directions. This is called irregular reflection when we see our reflection in the mirror then 'right' appears 'left' and the 'left' appears 'right'. Only sides are interchanged the image does not appear upside down.



Regular reflection



Irregular reflection

## Real and Virtual Images

In mirrors, images are formed behind the mirror when we move back then our image also moves back. If we move behind the mirror will disappear. This image seems to be imaginary. Such an image which can be not formed on a screen is called a virtual image.

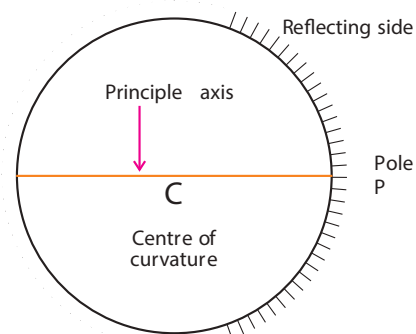
The cinema hall image is a real image because it is formed on a screen.

## Spherical Mirrors :

We use normally plane mirrors. However we use curved mirror and these curved mirror are called spherical mirror. A spherical mirror is of two types :

### Concave Mirror

The reflecting surface of a spherical mirror can either be on the outside or inside. If the reflecting surface is on the inside the mirror is called a concave mirror. The centre of the mirror is called its pole. The center of the sphere of which the mirror forms a part is called the centre of curvature. The radius of the sphere of which the mirror forms a part is called the radius of curvature. The line passing through the centre of curvature of the mirror and the pole is called the principle axis of the mirror.



Concave mirror

### Use of Concave Mirror

Concave mirrors are used in torches, cars and bikes headlights to reflect the light of the bulb to form a powerful beam of light.

Shaving mirrors are concave mirrors in which we see magnified image of our face.

A doctor use it to examine eyes, ears, nose, throat and teeth.

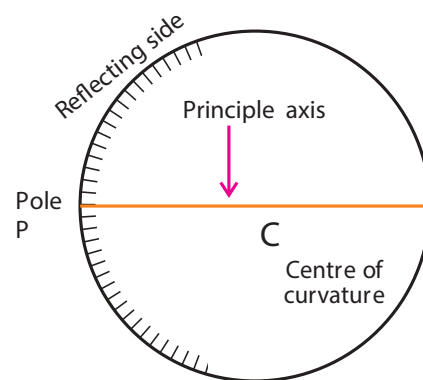
The astronomical telescope is an instrument used to view stars and planets. It uses a large concave mirror to form an image of the star or the planet. This image is then magnified in the telescope.



Telescope

## CONVEX MIRRORS

If the reflecting surface is on the outside, the mirror is called a convex mirror. The centre of the mirror is called pole. The center of the sphere of which the mirror forms a part is called the centre of curvature. The radius of sphere of which the mirror forms a part is called the radius of curvature. The line passing through the centre of the curvature of the mirror and the pole is called the principle axis of the mirror.



Convex mirror

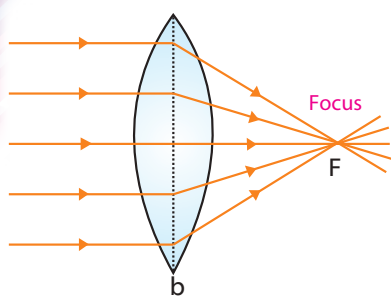
### Use of Convex Mirror

Convex mirrors are used as rear view mirrors in vehicles. Since a convex mirror forms smaller images of objects, it can be used to view a much larger area than would be possible with a plane mirrors so these mirrors help the drivers to see the traffic behind them.



Convex Mirror as side view mirror





Convex lens



A magnifying glass

## Lens

A transparent medium bounded by two surfaces of which at least one is spherical is called lens.

There are two types of lens :

### Convex lens or Converging Lens

A convex lens is thick in the middle and becomes thinner at the edges. A magnifying lens is a converging lens because all the rays parallel to axis, converges at one point.

So, it is called converging lens. The point at which rays meet' is called focus of the lens. it is used to read newspaper, magazines etc. It is also used to observe the body parts of small animals and insects.



Image by a Convex lens

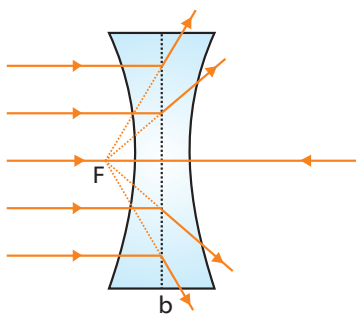
Fix a convex lens on a stand and place it on the table. Take a white sheet and fix it in front of mirror, this white sheet acts as a screen. Keep a lighted candle at a distance of 30 cm from the lens. What do you observe ?

We observe an image of flame on screen. Adjust screen in such a way that image should be sharp.

Now place the lighted candle near the lens about 15 cm. Now image of flame will be larger than first image.

### Concave Lens or Diverging Lens

A concave lens is thin in the middle and thicker at the edges. It is also called diverging lens because it has a property of bending ray of light passing through it outwards. Concave lenses make parallel rays spread out or diverge as if they were coming from a point called the focus of the lens.



Concave lens



Image by a concave lens

Fix a concave lens on stand and keep a lighted candle in front of it. The image formed by a concave lens is always virtual, erect and smaller in size than the object.

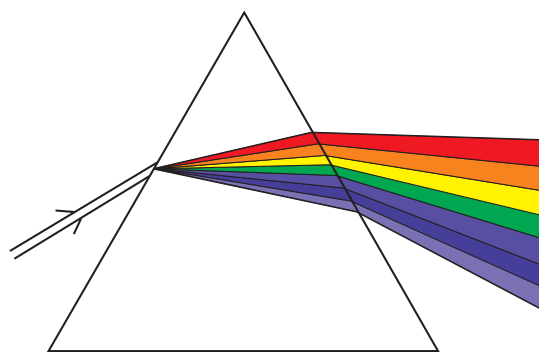


A rainbow

## THE SPECTRUM

You have seen a rainbow in the sky after the rain. You might have noticed that it appears usually after the rain when the sun is low in the sky. The rainbow is seen as a large arc in the sky with many colours.

A great scientist, 'Issac Newton' who lived in the 18th century was the first to show that ordinary 'white light' is made up of seven of colours. Light can be split into its different colours. These different colours are Violet, Indigo, Blue, Green, Yellow, Orange and Red. The short form of these colours is VIBGYOR. The pattern formed by these colours is called a spectrum. When the sun shines through water droplets in the air after it rains or near a water fall. It gets spilt into its different colours. This is how a rainbow is formed. A diamond cut in a special way can also produce a spectrum.



A prism splits sunlight into seven colours

### Know the Keywords :

Luminous bodies : The bodies emitting light of their own.

Light : It is an invisible form of energy, which causes the sensation of vision.

Reflection : The bouncing back of the ray of light by the second medium into the first medium.

Real image : The image formed due to the actual meeting of the rays of light at a point or the image which can be taken on the screen.

Virtual image : The image which can not be obtained on a screen.

Lenses : Lenses are made of any transparent material having polished curved surfaces.

Convex lens : A lens which is thick in the middle and thin at edges.

Concave lens : A lens which is thicker at the edges and tapering in the middle.

### Point to Remember

- Those objects which give out light of their own are called luminous objects.
- Those objects which do not give out light of their own are called non-luminous objects.
- If the reflecting surface is on the inside the mirror is called a concave mirror.
- If the reflecting surface is on the outside, the mirror is called a convex mirror.

## EXERCISE TIME

### A. Answer the following questions :

1. Write the full form of VIBGYOR.
2. Difference between luminous and non-luminous objects.
3. Light moves in a straight line, how can you prove it ?
4. What are real and virtual images ?
5. Write any three use of concave mirror.
6. Define spectrum.
7. Define the terms : pole, center of curvature and principle axis.
8. Why do we call convex lens as a converging lens ?
9. A convex rear view mirror is preferred over a plane mirror in cars why ?

### B. Match the following :

#### Column 'A'

1. Light
2. White light
3. Polished surface
4. Bulb
5. Concave mirror

#### Column 'B'

- (i) real or virtual
- (ii) luminous object
- (iii) several colours
- (iv) acts as a mirror
- (v) straight line

### C. Fill in the blanks :

1. Rectilinear propagation of light means that light travels in \_\_\_\_\_ line.
2. Image formed by a convex \_\_\_\_\_ is always virtual and smaller in size.
3. \_\_\_\_\_ reflection occurs when light falls on uneven surface.
4. A image that cannot be obtained on a screen is called \_\_\_\_\_.
5. A \_\_\_\_\_ lens is thicker in the middle than at the edges.
6. A \_\_\_\_\_ lens always forms a virtual image of an object.

### D. Tick (✓) the correct option :

1. The real image formed by a concave mirror is formed by :  
(i) sunlight  (ii) coloured light  (iii) reflected light
2. An image formed by a concave lens is always :  
(i) real  (ii) large  (iii) virtual

3. An image formed by a convex lens can be :

- (i) only virtual  (ii) only real  (iii) both of them

4. Which of the following is not a luminous body :

- (i) sun  (ii) moon  (iii) both of them

5. Bouncing off light from a surface is known as :

- (i) reflection  (ii) refraction  (iii) none of these

6. When light falls on a uneven surface then reflection is :

- (i) irregular  (ii) lateral  (iii) regular

7. The image which cannot be formed on a screen is called :

- (i) real image  (ii) virtual image  (iii) none of these

8. The mirror used in a telescope is :

- (i) convex mirror  (ii) plane mirror  (iii) concave mirror



## Creative Work

- Draw diagrams showing focus of converging and diverging lens in the space below.