

Light

- Light is a form of energy. It enables us to see things around us.
- We cannot see any object in the darkness. To make it visible we need a source of light.
- During the day time we can see an object because of sun's natural light.
- At night we can see with the help of artificial lights like bulbs, LED etc.
- Objects that radiate light on their own are called luminous objects. Such as sun, tube light, bulb etc.
- Objects that do not emit light on their own and requires a source of light to become visible is called non-luminous objects. Such as car, building, animals, tree etc.

Transparent, Opaque and Translucent objects

Depending on behaviour of objects towards light, all materials can be classified into three types:

- **Transparent:** the materials or objects that allow light to completely pass through them and are easily visible are called Transparent objects.
- For example, glass, polythene, water air etc.
- We see many transparent objects around us. Such as car windscreen, wind panes at homes and offices, spectacles, glass tumbler, glass apparatus in science laboratory etc.
- **Translucent:** the materials or objects that allow some light to pass through them are called translucent objects. We can see through them but not very clearly.
- For example, butter paper, tissue paper, muddy water, clouds etc.
- The windows of washrooms are made of translucent glass so that some light passes through them but nothing is clearly visible from outside.
- Clouds are also translucent. Although on a cloudy day we cannot see through but still light is there.
- **Opaque:** the materials or objects that do not allow any light to pass through them are called opaque objects.
- For example, metal objects, cardboard, wooden articles, some plastic objects, etc.
- We cannot see anything through a wooden door or metal sheet because they do not allow any light to pass through them.

Light travels in a straight line

- There are many examples around us that indicate that light travel in a straight line. Such as a beam of search light, a beam of light coming from the projection rooms in a cinema hall, a torch light etc.
- This is also confirmed by appearance of shadows because light cannot travel in curved lines otherwise it could travel behind the objects and no shadow will be formed.

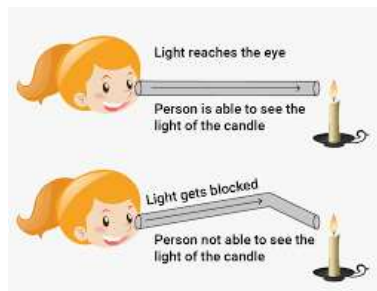
- **Activity 1:**

1. take three cardboards of same length and make a hole in the centre. Fix these on a table in such a way that their holes are in a straight line.
2. Place a burning candle behind the farthest cardboard. The flame should be at the height of the hole.
3. Look at the flame through the hole of the first cardboard. We can see the flame through the three holes because they are in a straight line.
4. Now move the middle cardboard slightly from its position. You will notice that now you cannot see the flame.
5. This experiment proves that light travels in a straight line.



- **Activity 2:**

1. Light a candle and fix it on a table. Take a piece of pipe or a rubber tube.
2. Now stand at the other end and try to look at the candle through the pipe. You can easily see the candle burning.
3. Now bend the pipe a little while looking at the candle. You cannot see the burning candle now.
4. This proves that the light travels in a straight line.

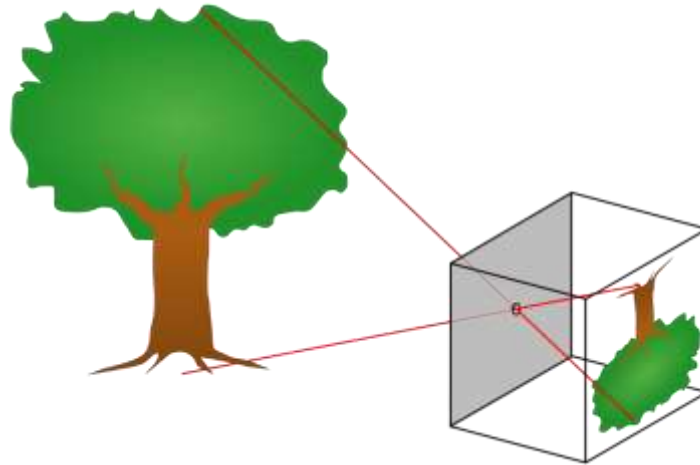


Shadow

- When an object is placed in front of a light source, it blocks the light and produces a dark area or shade behind it. This is called a shadow.
- A shadow is always casted on a screen such as wall or ground etc.
- An opaque object gives a dark shadow because it blocks all the light from the source.
- A translucent object produces a weak shadow because it allows some light to pass through it.
- A transparent object casts no shadow because light completely passes through it.
- The shape of a shadow is always similar to the object but the size varies.
- The sunlight also casts shadow of the objects. If we stand in the sunlight, our body casts shadow on the ground.
- Shadows are formed because light cannot bend round the corners of the objects. It only travels in a straight line.

Pinhole Camera

- Take two boxes of cardboard such that one box can slide into another and there is no gap between them.
- Cut open one side of each box. On the opposite face of the larger box, make a small hole in the middle.
- In the smaller box, in the middle cut out a square with a side of about 5 to 6 cm.
- Now, cover this square in the box using a tracing paper (translucent screen)
- Slide the smaller box inside the larger one with the hole, such that the side with the tracing paper is inside. This is pinhole camera.
- The box should be painted black from outside and inside for a clear image.
- The object whose image is to be seen should be present in bright light.
- The smaller the hole, sharper is the image obtained.
- If a tracing paper is used, temporary black and white images are formed on the screen. Permanent coloured and b & w images can be obtained using photographic films in the place of tracing paper.
- The upside-down image obtained on the translucent screen of the inner box is called an inverted image.
- The inverted image is formed because the light rays coming from the top and bottom of the object cross over at the pinhole.



Natural Pinhole

- When we pass under a tree covered with large number of leaves, we notice small bright patches of sunlight on the ground.
- These circular images are, actually the pinhole images of the Sun. The gaps between the leaves, act as the pinholes.
- These gaps are all kinds of irregular shapes, but we can see circular images of the Sun.
- In this case the sun is the object, the gaps in the leaves act as pinholes and the ground is the screen.



Mirrors and reflections

- Any object that reflects light is called a mirror. A highly polished and shiny surface reflects light well and acts like a mirror.
- Silver metal is one of the best reflectors of light. It is used to make the mirrors that we commonly use at home.
- The mirrors used for household is a plane mirror. A plane mirror is a thin, flat and smooth glass sheet with a shiny coating of silver metal on one side.
- The smooth surface produces proper reflections and helps in forming a clear image.
- The silver coating is painted red from outside to protect the delicate silver covering. It also reduces the transmission of light through the mirror.

Irregular reflection

- Most of the objects reflect light in all directions because they have rough surfaces.
- A piece of white reflects light in all directions. This is why we cannot see the image of our face on the piece of a paper.
- A mirror has a smooth and shiny surface. Therefore, it reflects light falling on it in the same direction. A mirror reflects a light ray at the same angle at which it falls on it. This is called regular reflection.
- When this reflected light enters our eyes, we can see the image of that object.