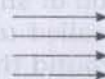


## Lesson at a Glance

- **Light:** A form of energy that helps us to see objects.
- **Sources of Light:** The objects which emit light are called *sources of light*. For example: sun, stars, torch, etc.
- On the basis of production of light the objects are classified into two groups: (i) luminous objects, (ii) non-luminous objects.
- **Luminous Objects:** The objects which produce light of their own are called *luminous objects*. For example: sun, stars, firefly etc.
- **Non-luminous Objects:** The objects which do not produce light of their own are called *non-luminous objects*. For example: table, chair, planets, moon etc.
- **Types of Objects:** On the basis of the passing of light through the objects are classified into the following three groups: (i) transparent objects (ii) translucent objects (iii) opaque objects.
- **Transparent Objects:** The objects which allow the light to pass through them are called *transparent objects*. For example: glass sheets, water, and air etc.
- **Translucent Objects:** The objects which allow only a part of light to pass through them but not all the light, are called *translucent objects*. For example: thin paper, oily paper, etc.
- **Opaque Objects:** The objects which do not allow the light completely to pass through them are called *opaque objects*. For examples: walls, book, cement sheet.
- **Shadow:** When any opaque objects come in the path of light, they do not allow light to pass so they cast dark patches behind them. These dark patches are called *shadows*.
- **Ray of Light:** The path along which light travels in a given direction is called *ray of light*. It is shown as a straight line with arrow on it, e.g.  $\rightarrow$  ray of light

- **Beam of Light:** Large number of rays of light which travels in a given direction is called *beam of light*.



Beam of light

- **Obstacle:** The object which comes in the way of light is called *obstacle*.
- **Formation of Shadow:**
  - (i) All opaque objects cast shadows.
  - (ii) When an opaque object is kept in the path of light, it casts shadow which can be seen on a screen.
  - (iii) Shadows give us some information about the shapes of objects.
  - (iv) The black colour of shadow is not affected by the colour of opaque objects.

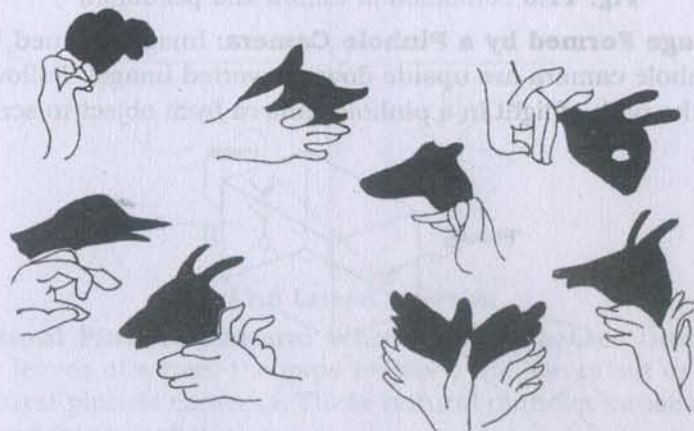


Fig. 11.1 Shadows of animals hidden in your hand

- **Pinhole Camera:** The device which forms a photograph like image of a bright object on a screen is called *pinhole camera*.

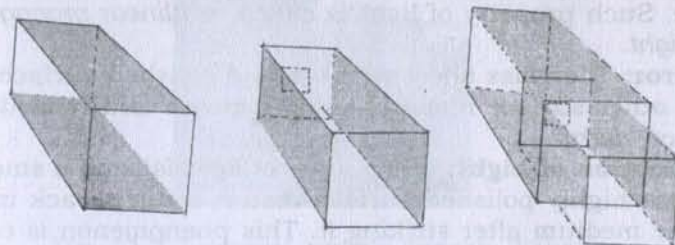


Fig. 11.2 A sliding pinhole camera



- **Screen:** The objects like paper, wall or ground on which shadow is formed are called *screen*.
- **Umbra:** The darkest region of shadow where light does not reach from any point is called *umbra*.
- **Penumbra:** The region around the umbra where some light reaches is called *penumbra*.

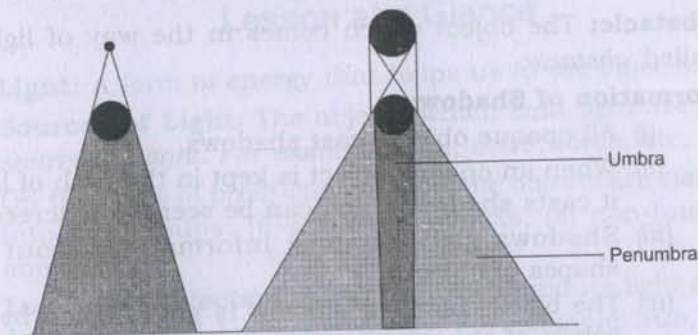


Fig. 11.3 Formation of umbra and penumbra

- **Image Formed by a Pinhole Camera:** Images formed by a pinhole camera are upside down (inverted image). Following is the path of light in a pinhole camera from object to screen.

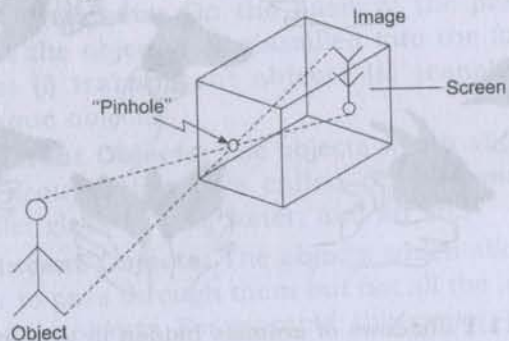


Fig. 11.4 Image formation by pinhole camera

- **Rectilinear Propagation of Light:** Light travels in straight line. Such property of light is called *rectilinear propagation of light*.
- **Mirror:** The glass sheet which has a polished surface and the other surface remains shiny, smooth and reflective is called *mirror*.
- **Reflection of Light:** When a ray of light falls on a smooth, shiny, highly polished surface then it returns back in the same medium after striking it. This phenomenon is called *reflection of light*.

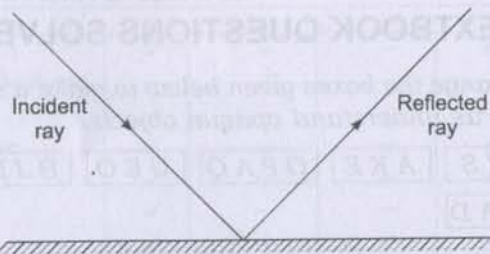


Fig. 11.5 Reflection by a plane mirror

- **Image Formation by Plane Mirror:** Image formed by plane mirror has the following characteristics: (i) Image is erect but laterally inverted, (ii) Image retains the colour of the object, (iii) Image is of same size as that of the object.
- **Lateral Inversion:** The right side of object appears as left side in the image formed by plane mirror. The image changes its side.

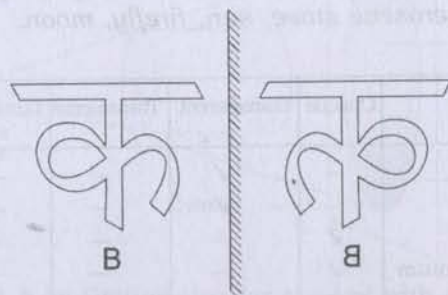


Fig. 11.6 Lateral inversion

- **Natural Pinhole Camera:** When sunlight passes through the leaves of a tree, the gaps between the leaves act as the natural pinhole cameras. These natural pinholes cause nice round images of sun.



Fig. 11.7 A natural pinhole camera. Pinhole images of the sun under a tree



## TEXTBOOK QUESTIONS SOLVED

**Q.1.** Rearrange the boxes given below to make a sentence that helps us understand opaque objects.

OWS   AKE   OPAQ   UEO   BJEC   TSM  
SHAD

**Ans.** OPAQ UEO BJEC TSM AKE SHAD OWS

**Q.2.** Classify the objects or materials given below as opaque, transparent or translucent and luminous or non-luminous:

Air, water, a piece of rock, a sheet of aluminium, a mirror, a wooden board, a sheet of polythene, a CD, smoke, a sheet of plane glass, fog, a piece of red hot iron, an umbrella, a lighted fluorescent tube, a wall, a sheet of carbon paper, the flame of a gas burner, a sheet of cardboard, a lighted torch, a sheet of cellophane, a wire mesh, kerosene stove, sun, firefly, moon.

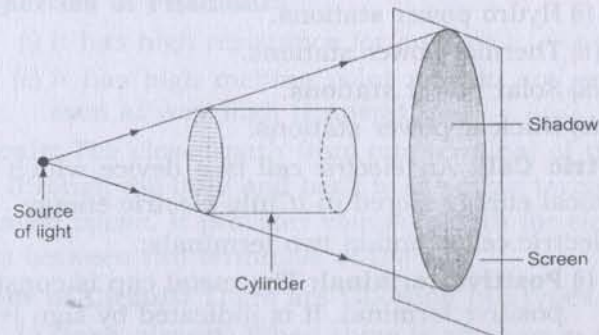
**Ans.**

Object	Opaque	Transparent	Translucent	Luminous	Non-Luminous
Air	—	✓	—	—	✓
Water	—	✓	—	—	✓
A piece of rock	✓	—	—	—	✓
A sheet of aluminium	✓	—	—	—	✓
A mirror	✓	—	—	—	✓
A wooden board	✓	—	—	—	✓
A sheet of polythene	—	—	✓	—	✓
A CD	✓	—	—	—	—
Smoke	—	—	✓	—	✓
A sheet of plane glass	—	✓	—	—	✓
Fog	—	—	✓	—	✓
A piece of red hot iron	✓	—	—	✓	✓
An umbrella	✓	—	—	—	✓
A lighted fluorescent tube	✓	—	—	✓	—
A wall	✓	—	—	—	✓
A sheet of carbon paper	✓	—	—	—	✓
The flame of a gas burner	✓	—	—	✓	—
A sheet of card board	✓	—	—	—	✓

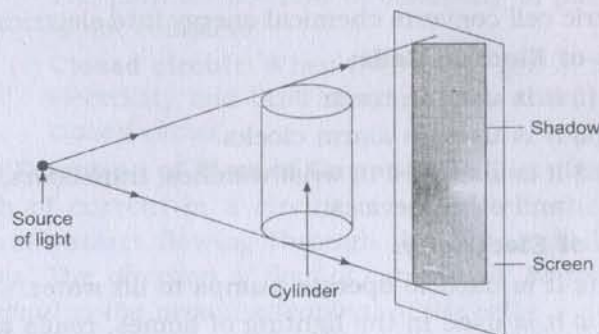
A lighted torch	✓	—	—	✓	—
A sheet of cellophane	—	✓	—	—	✓
A wire mesh	—	—	—	—	✓
Kerosene stove	✓	—	—	✓	—
Sun	✓	—	—	✓	—
Fire fly	✓	—	—	✓	—
Moon	✓	—	—	—	✓

**Q.3.** Can you think of creating a shape that would give a circular shadow if held in one way and a rectangular shadow if held in another way?

**Ans.** Yes, there are many things which give a circular shadow if held in one way and a rectangular shadow if held in another way. For example: a cylinder, a circular disc etc.



**Fig. 11.8 (a)** Getting circular shadow with a cylinder



**Fig. 11.8 (b)** Getting a rectangular shadow with a cylinder.

**Q.4.** In a completely dark room, if you hold up a mirror in front of you, will you see a reflection of yourself in the mirror?

**Ans.** No, in a completely dark room no image will be formed because there is no light in the room so no reflection of light takes place and no image will be formed.