

## 11. Light, Shadows and Reflection

(By: J S Mishra)

**Source of light:** An object which emits light, is called a source of light. For example, sun, torch, etc.

**Luminous objects:** Objects that produce their own light are called Luminous Objects. Example, Sun, Fire

**Non-luminous objects:** These are the objects which do not emit light of their own. Such a body becomes visible when light falls on it. For example, the moon, the planets, etc.

**Ray of light:** A straight thin beam of light from a source to an object is called a ray of light.

**Obstacle:** An object which comes to the path of the light is called an obstacle.

### **Formation of a shadow**

Shadows are dark regions formed when an opaque object blocks the path of light. This formation is possible only because light only travels in a straight line.

- All the opaque objects seem to form a dark shadow of their own.

**Screen:** This is a surface on which the shadow is formed.

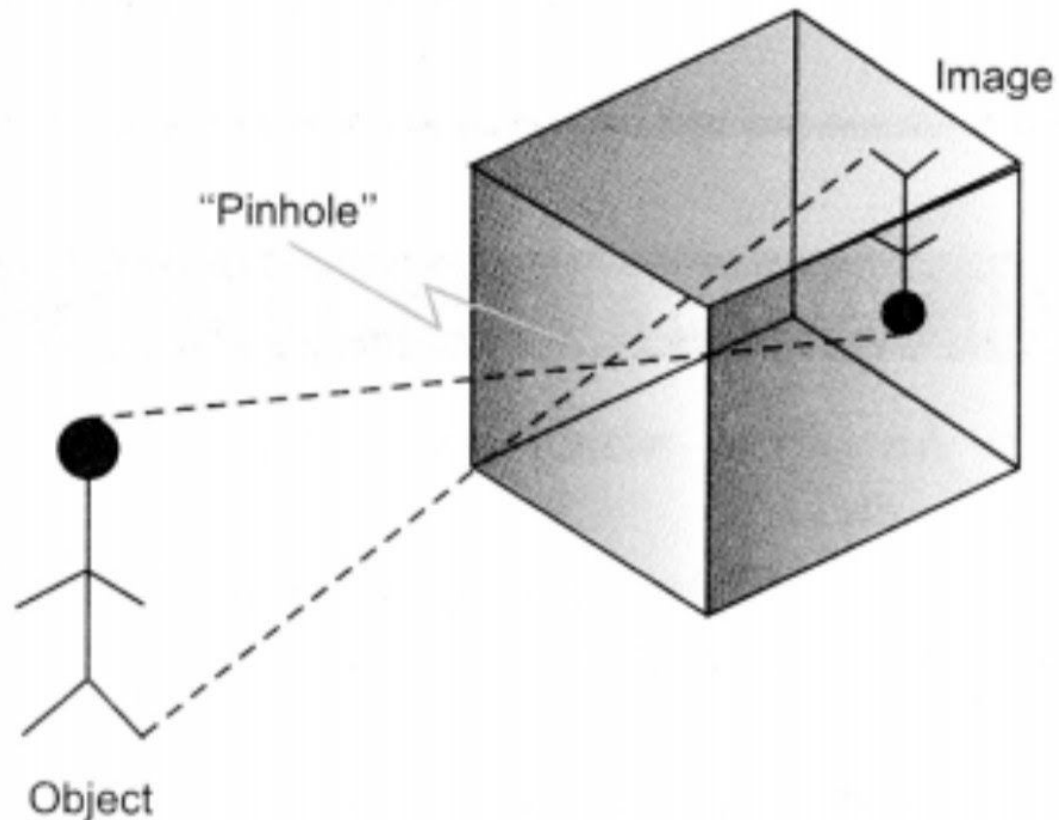
- Shadows give us some information about shapes of objects.

- The colour of the opaque object does not affect the colour of the shadow.

### **Image formed by a pinhole camera**

Images formed by a pinhole camera are upside down.

The following figure is showing the path of rays of light coming from an object far away to a pinhole and then to screen.



## Image formed by a pinhole camera

Ex-When sunlight passes through the leaves of a tree, the gaps between the leaves act as the pinholes. These natural pinholes cast nice round images of the sun.

### How to make a Pinhole Camera?

**Step 1:** Take two cardboard boxes one larger than the other such that one box slides into the other without any gap.

**Step 2:** Cut out open one side of each box. On the opposite side of the larger box cut a small hole in the centre.

**Step 3:** On the opposite side of the smaller box cut a square of about 5 cm and cover this open area with a tracing paper.

**Step 4:** Slide the smaller box inside the larger one such that the side with the tracing paper is on the inside.

**Step 5:** Cover the camera and your head with a black cloth and then get ready to observe the distant objects.

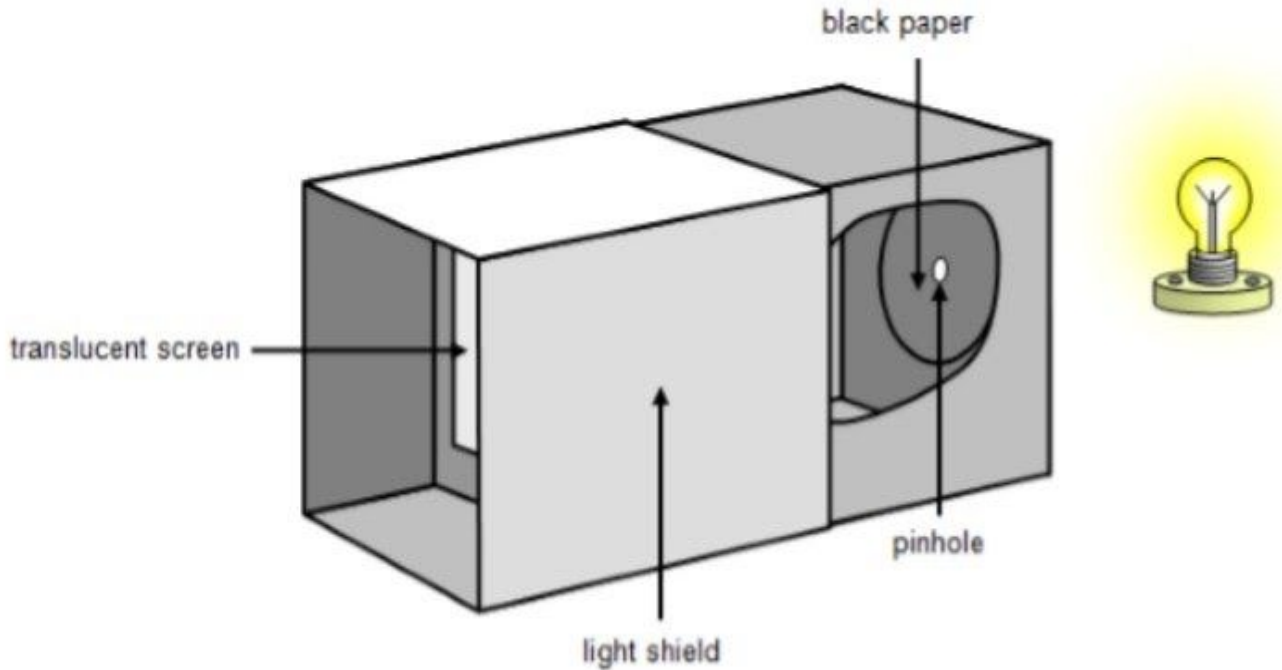


Fig: A Pinhole Camera

It is a simple camera with a small aperture and forms an inverted image of the object.

**Rectilinear propagation:** Light travels in a straight line. It is called rectilinear propagation of light.

**Image formation by a plane mirror:** We are able to see images through a mirror. Image formed by a mirror (flat) has following features:

- Reflected image retains the colour of the object.
- Image is erect but laterally inverted.

**Lateral inversion:** Right side of the object appears as left side in the image formed by a plane mirror. For example, if we show our right hand, image in the mirror will show as left hand.

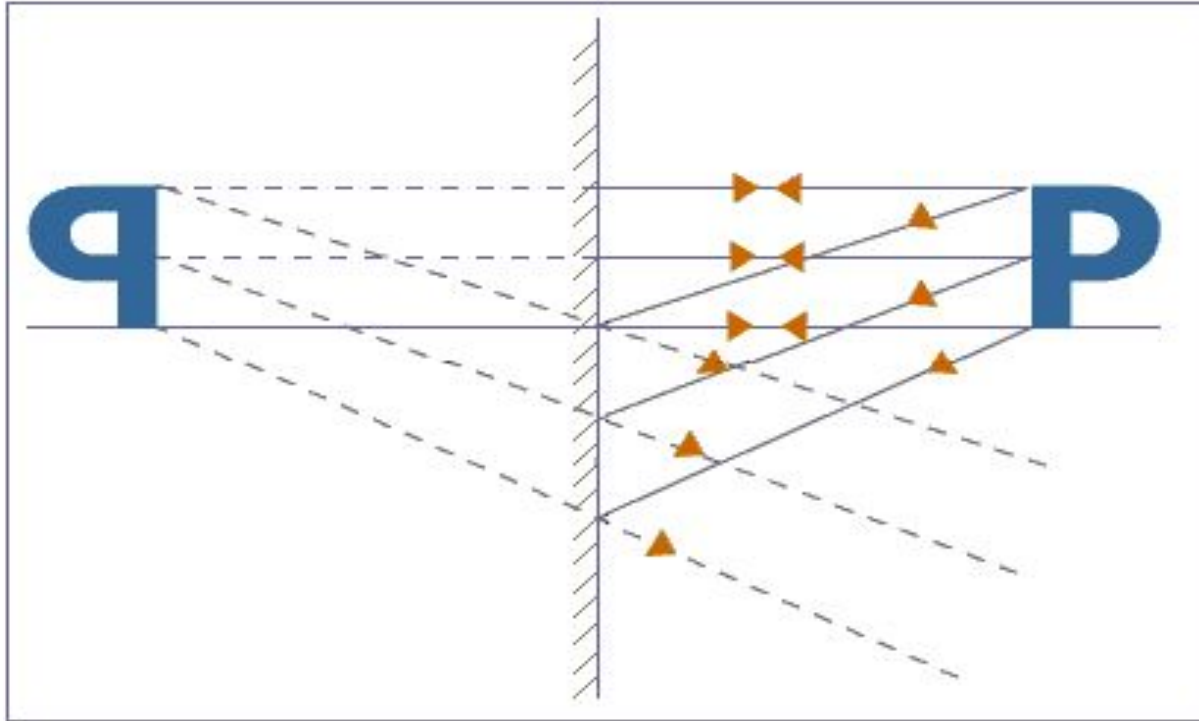


Fig-Lateral inversion by a plane mirror

- In a mirror, if you see another person, surely the other person can also see you in that mirror.

**Mirror:** A smooth or polished shining surface, which rebounds the light back is called a mirror.

### Reflection Surfaces

We say light is reflected when it bounces off a surface.

- Reflection of light helps us to see most of the things around us.
- Reflection of light by a surface depends on the nature of the surface.
- A rough surface reflects a parallel beam of light in different directions. This kind of reflection is called diffused reflection.

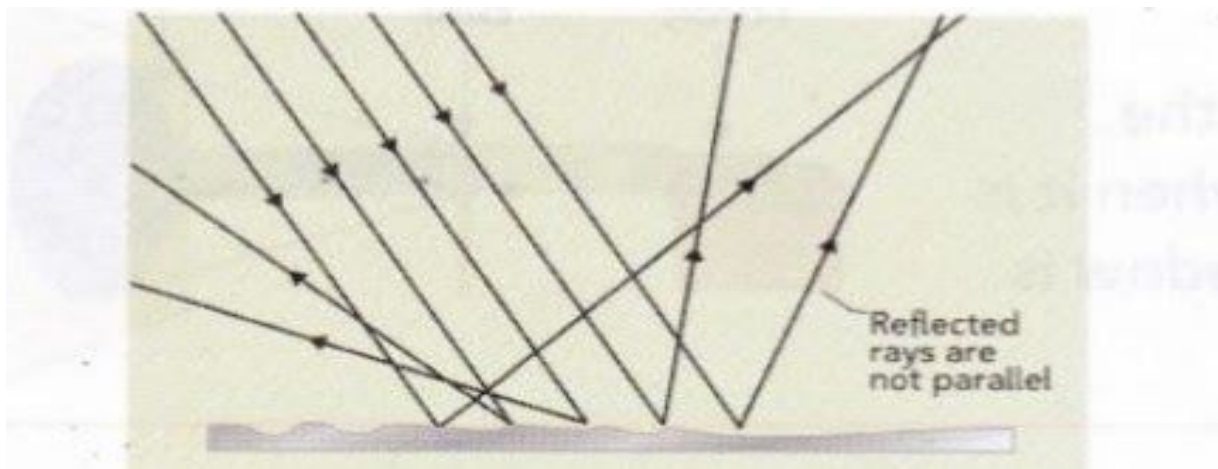


Fig- Reflection from a rough surface.

- A smooth surface is a highly polished surface that reflects a parallel beam of light in one direction.

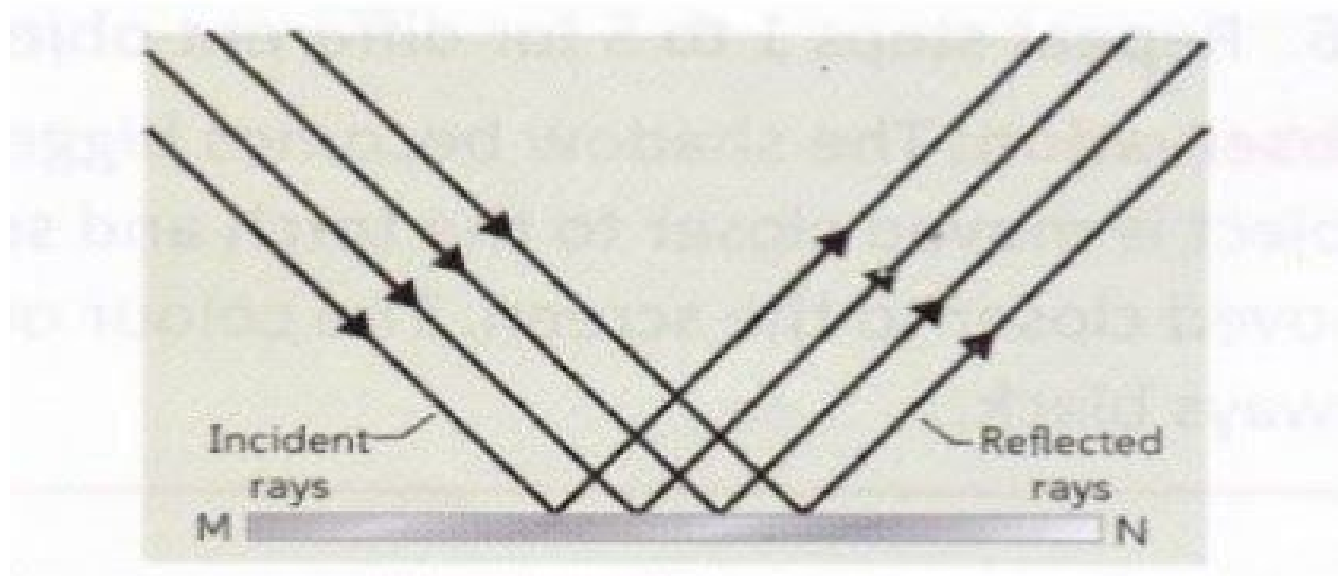
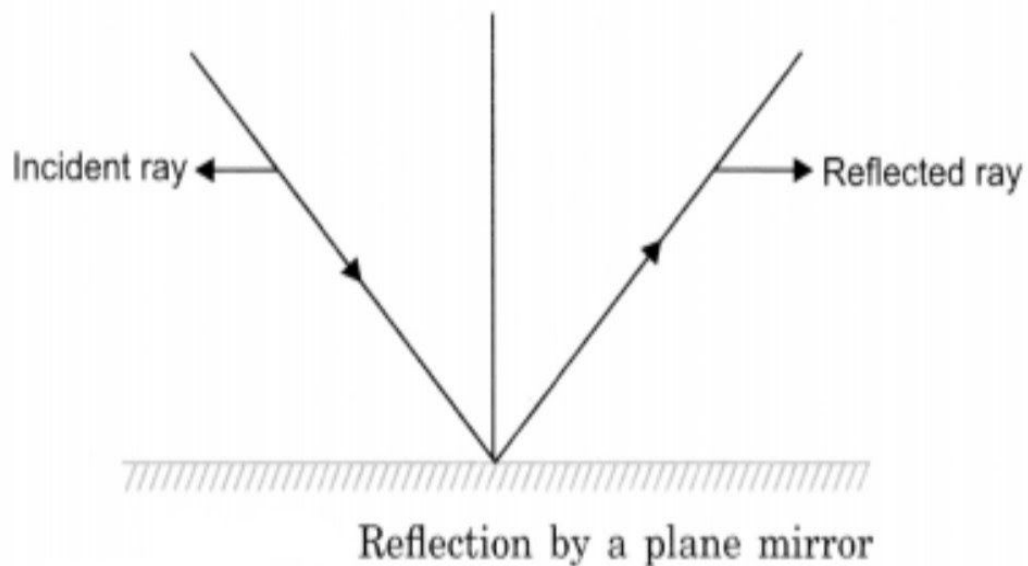


Fig- Reflection from a smooth surface

**Reflection of light:** When a ray of light falls on a smooth and polished surface, light returns back in the same medium. It is called reflection.



**Incident ray:** It is a ray of light that strikes a surface.

**Reflected ray:** It is the ray of light that represents the light reflected by the surface.

**Some important points:**

**Source of light:** An object that gives out light is called a source of light.

**Transparent material:** A material that transmits all the light is called a transparent material.

**Translucent material:** A material that transmits some amount of light is called a translucent material.

**Opaque material:** A material that completely blocks the light is called an opaque material.

**Shadow:** An area of darkness formed by an opaque object obstructing light is called a shadow.

★Objects can be transparent, translucent, or opaque, depending on how much light can pass through them.

**Characteristics of a Shadow:**

A shadow has the following three characteristics:

★It is always black, it does not show the colour of the object.

★It only shows the shape or outline of the object and not the details.

★The size of a shadow varies depending on the distance between the object and the source of light.