

LIGHT, SHADOW & REFLECTION

Light is a form of energy which excites our sense of sight.

Sources of light

- The primary source of light is the Sun.
- Secondary source is the brightness of the sky.
- Other common sources are flames, electric bulbs, tube lights (fluorescent tubes), compact fluorescent lamps (CFLs) and light emitting diodes (LEDs).

Luminous objects

- The objects which emit their own light are called 'luminous objects'.
- Examples : Sun and other stars, lamp (bulb), tube light, candle flame, etc.

Non-luminous objects

- The objects which do not emit their own light but only reflect the light which falls on them are called 'non-luminous' Objects (or illuminated objects).
- Examples : Table, chair, animals, plants, planets, satellites, moon, etc.



Types of Objects

Opaque object

An opaque object or material only absorbs and reflects light, no light passes through it.

You cannot see through opaque objects.



Translucent Object

Object or material that allows small portion of light to pass through them are described as translucent.

you cannot see clearly through the translucent objects.



Transparent object

Transparent object or material transmits almost all the light striking them.

You can see objects clearly through them.



Properties of light

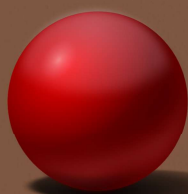
- Light is a form of energy that travels in the form of waves.
- Light waves spread out in all directions as they move away from a source.
- Light can travel through empty space (vacuum), without needing a solid, liquid, or gas medium.
- Light rays from any source always travel in straight lines. This is called **rectilinear propagation of light**.
- Light travels through space at the fastest speed, about 300000 km/s or 3×10^8 m/s.

Shadows

A shadow is a dark area produced by an opaque object blocking the passage of light.

Characteristics of shadow

- Shadow formed is always dark and does not depend on the colour of object and the colour of light.
- Shadow is always formed in the direction opposite to the light source.
- Shadow shows only outline of objects and does not give any detail about the object.
- The size of shadow depends on the distance between the object and the screen.



Formation of Images

An image of an object is formed when light rays coming from the object meet or appear to meet at a point after reflection from a mirror or refraction from a lens.

Real image

A real image is one formed when the light rays actually meet at a point and which can be obtained on a screen.



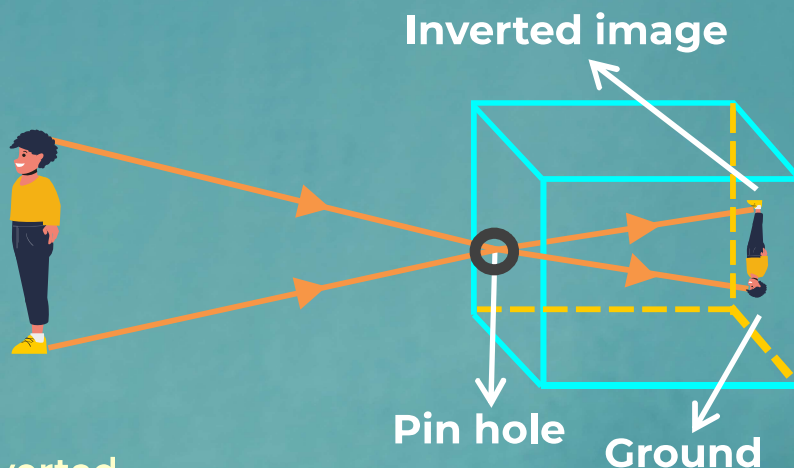
Virtual image

A virtual image is one formed when the rays do not actually meet at a point but they appear to meet at a point. Such images cannot be obtained on the screen.



Pin hole camera

- It is a device used to obtain image of an object on the screen. It is based on principle of 'rectilinear propagation of light'.
- Image formed is real and inverted



Size of image formed by pin hole camera Depend on the following factors

- (1) Distance of the object from the pin hole camera.
- (2) Length of the pin hole camera.



Reflection of light

Reflection is the bouncing of light rays off a surface. In other words 'reflection is the sending back of all or a part of a beam of light as it strikes a surface'.

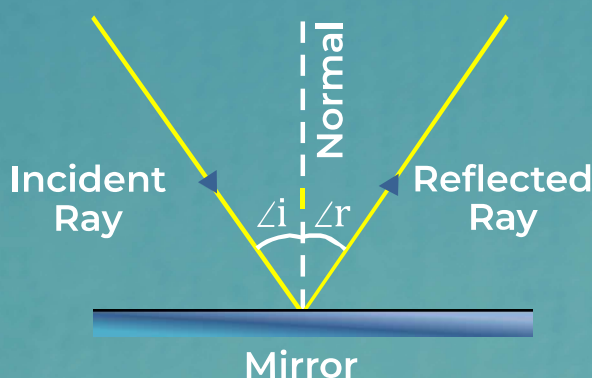
Laws of reflection

First Law

The incident ray, the reflected ray and the normal at the point of incidence, all lie in the same plane.

Second Law

Angle of incidence is always equal to the angle of reflection. $\angle i = \angle r$



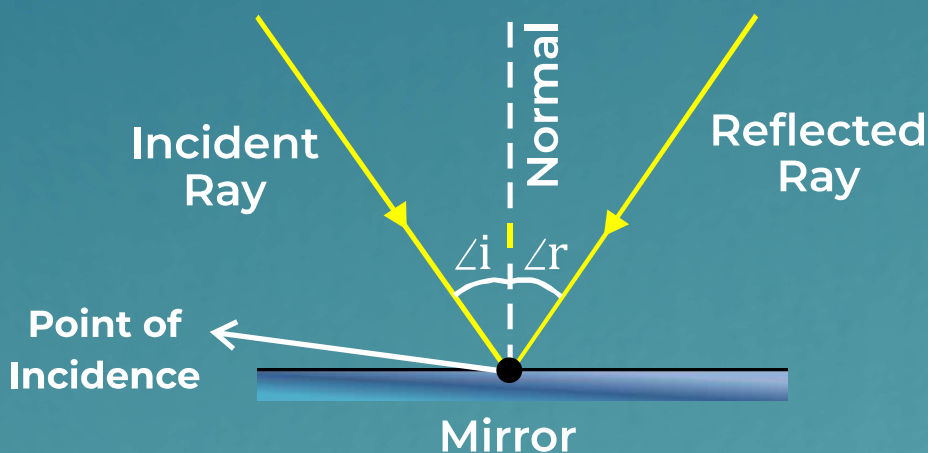
Mirrors

A mirror is an object with a polished surface that forms reflected images.

A **plane mirror** has a flat surface. Plane-mirror images appear as exact copies.



Some basic terms related to reflection of light



Incident ray

The ray of light which falls on the mirror surface is called incident ray.

Reflected ray

The ray of light which is sent back by the mirror is called 'reflected ray'.

Point of incidence

The point at which the incident ray falls on the mirror is called 'point of incidence'.

Normal

A line perpendicular to the surface of mirror passing through the point of incidence is called 'normal'.

Angle of incidence

The angle made by incident ray with the normal at the point of incidence is called 'angle of incidence'.

Angle of reflection

The angle made by reflected ray with the normal at the point of incidence is called 'angle of reflection'.

Image formed by a plane mirror are

- (1) The image is **virtual and erect**.
- (2) The distance of image from mirror is equal to distance of object from mirror.
- (3) The size of image is exactly equal to the size of object.
- (4) The image is **laterally inverted**.



Reflected light can be reflected again

Kaleidoscope



Periscope



Uses of mirror

As a dressing mirror



In the optician's room.



Used as reflector



In barber's shop

