

SCIENCE

LIGHT: REFLECTION AND REFRACTION

INTRODUCTION

Light is a form of energy that provides sensation of vision. The light ray may be the object's self light or reflected light.

LUMINOUS OBJECTS: are the objects which emit their own light such as sun, bulb, tubelight.

NON-LUMINOUS OBJECTS: are the objects which reflect light from other sources. They do not emit light of their own. Eg, Moon, tree, table, painting.

PROPERTIES OF LIGHT

- (1) Light does not require any medium to travel.
- (2) Light tends to travel in a straight line.
- (3) Light has dual nature i.e, wave as well as particle.
- (4) Light casts shadow.
- (5) Speed of light is maximum in vacuum. It's value is 3×10^8 m/s
- (6) When light falls on surface, following may happen:
 - (a) Reflection
 - (b) Refraction

RAY OF LIGHT: A line drawn in the direction of light is called a ray of light.

BEAM OF LIGHT: A group of rays of light emitted by source of light is called a beam of light.

A light beam is of three types:

- (1) **Parallel beam of light-** A group of light rays parallel to each other is known as parallel beam of light.
 - (2) **Divergent beam of light-** A group of light rays spreading out from a source of light.
 - (3) **Convergent beam of light-** A group of light rays meeting at a point.
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REFLECTION OF LIGHT

Bouncing back of light when it strikes on a polished surface like a mirror. In other words, the phenomena of sending the light back in the same medium by a surface is called reflection of light.

TYPES OF REFLECTION

- (1) **Regular reflection** When the reflection surface is smooth and well polished, the parallel rays falling on it are reflected parallel to another one. The reflected light goes in one particular direction and is also parallel to each other. This is regular reflection, eg: plane mirror.
- (2) **Diffused reflection** when the reflecting surface is rough, the parallel rays falling on it are reflected in different directions. Such a reflection is known as diffuse or irregular reflection. Eg: reflection of light from the tree.

LAWS OF REFLECTION

1. The incident ray, the reflected ray and the normal ray at the point of incidence , all lie in the same plane.
2. Angle of incidence is always equal to the angle of reflection.

IMAGE : When light rays meet or appear to meet after reflection from a mirror then it is called an image.

REAL IMAGE	VIRTUAL IMAGE
Formed when light rays actually meet	Formed when light rays appear to meet
Can be obtained on screen	Cannot be obtained on screen
Inverted image	Erect image
Eg: image formed on cinema screen and by concave mirror	Eg: image formed by plain mirror or convex mirror

PLANE MIRROR

- It is a piece of glass whose one side is polished by using silver paint, which is covered by a coating of red paint to protect the silver layer.
- A highly polished surface such as a mirror reflects most of the lighting falling on it.
- Shiny or smooth surfaces reflect more light whereas dull or rough surfaces reflect less light.

CHARACTERISTICS OF IMAGE FORMED BY PLANE MIRROR

- (1) Image is formed as far behind the mirror as the object is in front of it.
- (2) Size of the image is equal to the size of the object.
- (3) Virtual and erect
- (4) Laterally inverted

Lateral inversion and its application- the right side of the object appears on the left side of the image and the left side of the image appears right side of the image.

The word AMBULANCE is written in reverse direction so that it can be read correctly in the rear view mirror of vehicles going in front of it.

Uses of plane mirror

- (1) To see ourselves
- (2) To make periscopes
- (3) To decorate shops

SPHERICAL MIRROR

Mirrors whose reflecting surface is curved. It is a part of a hollow glass sphere whose one surface is polished.

There are 2 types of spherical mirrors:

- (1) Concave mirror
- (2) Convex mirror

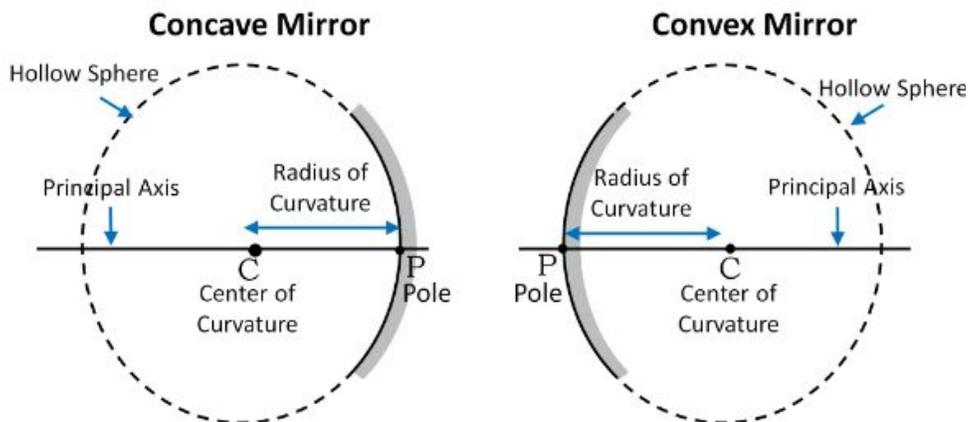
PROPERTIES OF CONCAVE MIRROR

- It is a spherical mirror whose outer surface is polished and inner or concave side is reflecting surface.
- Reflecting surface is curved inwards.
- It is also known as a converging mirror as it converges the incident rays after reflection.

PROPERTIES OF CONVEX MIRROR

- It is a spherical mirror whose inner surface is polished and the outer side or convex side is the reflecting surface.
- Reflecting surface is curved outwards.
- It is also known as a diverging mirror.

COMMON TERMS FOR SPHERICAL MIRRORS



PRINCIPAL AXIS : The imaginary line joining the pole and centre of curvature.

POLE (P) : The centre of the spherical mirror.



APERTURE (MN) : It is the effective diameter of the spherical mirror.

CENTRE OF CURVATURE (C) : The centre of the hollow sphere glass sphere of which the mirror was a part.

RADIUS OF CURVATURE (R) : The distance between the pole and the centre of curvature.

FOCUS (F) : The point on the principal axis where all the parallel light rays actually meet or appear to meet.

FOCAL LENGTH (f) : The distance between the pole and the focus of the mirror is called its focal length.

Relationship between focal length and radius of curvature $f = R/2$

