

**Debate:** Use of Biotechnology in Human Welfare .

**Activity:** To study vestigial organs in Human beings . Students define vestigial organs and discuss the use of every part of the body. Then come to the conclusion.

## CHAPTER :5 REFLECTION AND REFRACTION

### **Key concepts and terms:**

**1) Light:** light is a form of energy. It brings the sensation of sight. It is a form of electromagnetic radiation. It also provides us means of communication (fiber-optics).

**2) Light wave:** light wave travels with a speed of  $3 \times 10^8 \text{ ms}^{-1}$  in free space. Its speed depends on the medium.

**3) Ray and beam:** the straight line indicating the path of the light (arrow- direction is called a ray. A bundle of rays originating from the same source of light in a particular direction is called a beam of light.

**4) Reflection:** when light falls on a surface and gets back the same medium, it is called reflection.

**5) Image:** the point of convergence or the point from where the light appears to diverge after reflection or refraction is called image.

**6) Angle of incidence:** the angle between the incident ray and the normal at the point of incidence is called angle of incidence.

**7) Angle of reflection:** the angle between the reflected ray and the normal at the point of reflection is called angle of reflection.

**8) Laws of reflection:** 1) the incident ray the reflected ray and the normal at the point of incidence, all lie in the same plane.

2) The angle of reflection and the angle of incidence are equal.

**9) Aperture:** the width of the reflecting surface is called aperture.

**10) Focus:** the point on the principle axis where all parallel rays meet after reflection is called principle focus.

**11) focal length:** the length or separation between the pole and the focus is called focal length (PF = f)

**12)** In order to draw ray diagram, two rules are used:

- 1) The rays of light passing parallel to the principle axis will converge at the focus after reflection.
- 2) The rays of light passing through the focus will emerge parallel to the principle axis after reflection.
- 3) The rays of light passing through the center of curvature will all retrace their path after reflection. (as it is normal at the point of incidence)
- 4) The rays of light falling at the pole get reflected at the same angle on the other side of principle axis. (Laws of reflection)

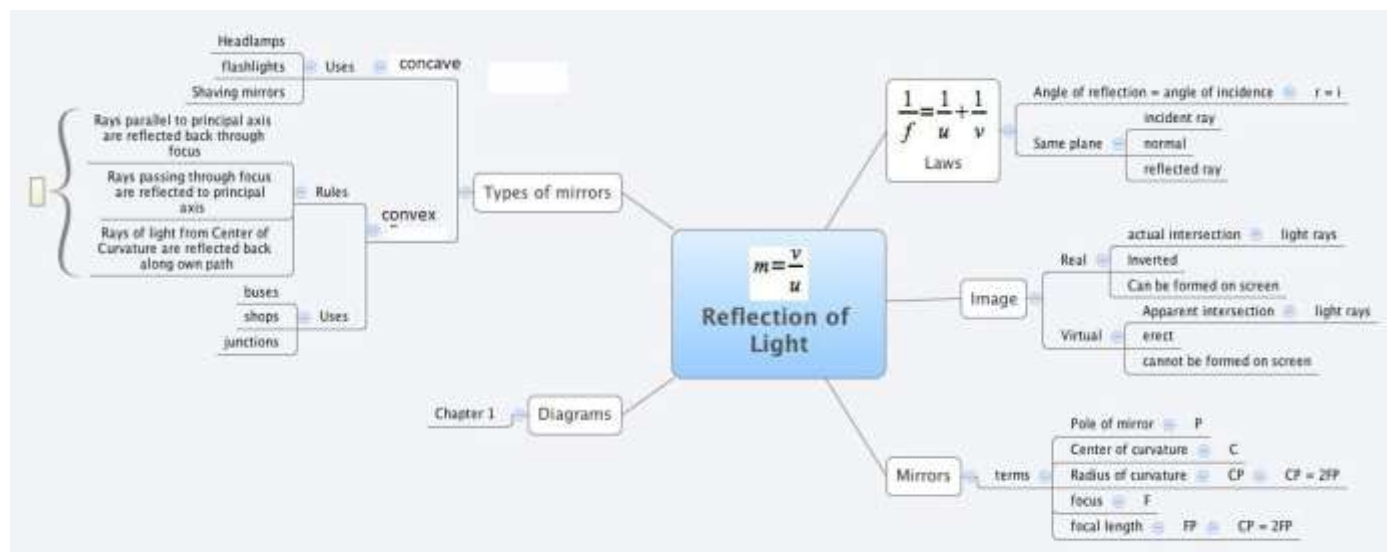
**13) Relation between radius of curvature and focal length** It is two times the focal length i.e.  $R=2f$ .

**14) Mirror formula:**  $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$  where f, v and u are the focal length, image distance and object distance.

**15) Lens formula:** if  $u$ ,  $v$  and  $f$  are the object distance, image distance and focal length respectively then  $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

**16) Magnification of a lens:**  $M = \text{size of image } (h_1) / \text{size of object } (h_0)$  also  $m = (h_1) / (h_0) = v/u$ .

## MIND MAP



## FORMATIVE ASSESSMENT –III (Pen Paper Test)

- 1) If the speed of light in a medium is  $2 \times 10^8$  m/s, then its refractive index is:  
a) 1   b) 10 cm   c) 1.5   d) 0.5
- 2) The power of sunglasses is  
a) 0   b) 10cm   c) 25cm   d) zero
- 3) The refractive index of diamond is 2.42. What is the meaning of this statement in relation to the speed of light?

- 4) Draw a ray diagram and show the image formed by a concave mirror when the object is kept at focus.
- 5) An object is placed at a distance of 10cm in front of convex mirror of focal length 15cm. find the nature and position of image.
- 6) 1) Two thin lenses of power +3.5D and -2.5 D are placed in contact. Find the power & focal length of lens combination?
- 1) Define 1) Snell's law of refraction of light. 2) Pole of a concave mirror.
- 7) An object of size 4cm is kept at a distance of 20cm from the optical center of a converging lens of a focal length 10cm. calculate the distance of image from the lens and the size of the image.
- 8) a) Define magnification. Write the sign convention used for expressing it.  
b) Using lens formulae, find the position of image, its nature and magnification formed by a concave lens of focal length 20cm and the object is at 15cm.

#### **FORMATIVE ASSESSMENT –IV**

##### **1) QUIZ:**

- 1) Name the place where image is formed in the eye?
- 2) Name the muscular diaphragm that controls the size of the pupil?
- 3) What is the cause of dispersion of light?
- 4) Which color has got more wave length?
- 5) How many colors evolve when white light disperses?
- 6) What is the reason for the different deviation?
- 7) Who discovered that white light consists of seven colors?
- 8) What makes bees respond the ultraviolet light?

##### **Oral questions:**

- 1) What is a ray?
- 2) A Lemon placed in water appears larger in size due to \_\_\_\_\_
- 3) What does the negative sign of magnification of a mirror indicate?
- 4) What is the relation between focal length and radius of curvature of a spherical mirror?
- 5) What is the range of vision of normal human eye?
- 6) What do you mean by lateral displacement?

- 7) Magnification produced by convex mirror for object of size 5cm is  $\frac{1}{2}$  what is the size of image?
- 8) What is the real image?
- 9) A ray of light strikes at 45 degree on a mirror. what is a angle of incidence and reflection?
- 10) What is power of accommodation?

**Home assignment:**

1. What do you mean by Power of the lens?
2. What is the lens formula? Write the sign convention for various mirror and lens.
3. Name the lens/ mirror in the following situations;  
i) Rear View mirror ii) magnifying Glass iii) Mirror with Dentist iv) Correction of Myopia .
4. The power of the lens is -2D .What is the focal length and nature of the lens?

**Project Work ;**

1. To find the focal length of the given concave mirror using candle light.
2. Study the phenomena of refraction of light in different medium( Glass slab, Plastic, etc)

### MIND MAP

