WORKSHEET 2

CHAPTER 5 – REFRACTION OF LIGHT

A. Tick (✓) the correct option.

1. When light travels from denser medium to rarer, it bends
   a. towards normal   b. away from normal   c. goes along the same path   d. none of these.

2. The speed of light is lowest in
   a. glass   b. water   c. vacuum   d. air.

3. Focal length of a concave lens is
   a. zero   b. positive   c. negative   d. none of these.

4. If a convex lens forms a virtual and erect image, the object is placed
   a. at F_1 b. at $2F_1$ c. at infinity   d. between O and F_1.

5. A lens of power 1 dioptre has focal length
   a. 1 m   b. 10 m   c. 100 m   d. 1 cm.

B. Fill in the blanks.

1. The refractive index of a transparent medium is always greater than _____

2. A _____ lens is used in a magnifying glass.

3. An image formed by a concave lens will always be _____ than the object.

4. The SI unit of power of lens is _____

5. The instrument used to measure power of a lens is called _____

C. State whether the given statements are true or false.

1. An object placed outside the focal point of a concave mirror forms a real image.

2. The angle of incidence is equal to angle of refraction.

3. One dioptre is the power of lens whose focal length is one metre.

4. Power of a concave lens is positive.

5. A concave lens has a virtual focus.

D. Match the following.

1. Positive power   optically denser

2. Negative power   dioptre meter

3. Instrument used to measure power   optically rarer

4. High refractive index   concave lens

5. Low refractive index   convex lens

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E. Answer the following questions.

Very Short Answer Questions

1. State the first law of refraction of light.

2. What happens when light travels from denser medium to rarer medium?

Short Answer Questions

1. What will be the resultant power of a combination of two lenses of power P_1 and P_2 respectively?

2. Which lens is used in photographic camera?

Long Answer Questions

1. List the new cartesian sign convention in case of refraction of light by a lens.

2. A concave lens of focal length 30 cm forms an image at 20 cm from the lens. How far is the object from the lens?

ANSWERS

A. Tick (✓) the correct option.

1. b   2. a   3. c   4. d   5. a

B. Fill in the blanks.

1. one
2. convex
3. smaller
4. dioptre (D)
5. dioptre meter

C. State whether the given statements are true or false.

1. T   2. F   3. T   4. F   5. T

D. Match the following.

1. Positive power   convex lens
2. Negative power   concave lens
3. Instrument used to measure power of a lens   dioptre meter
4. High refractive index   optically denser
5. Low refractive index   optically rarer

E. Answer the following questions.

Very Short Answer Questions

1. It states that the, incident ray, refracted ray and the normal at the point of incidence, all lie in the same plane.
2. The ray of light bends away from the normal.

Short Answer Questions

1. The resultant power of two lenses will be the algebraic sum of the individual powers P_1 and P_2 of the lenses.

$$P = P_1 + P_2$$

2. Convex lens is used in a photographic camera.

Long Answer Questions

1. According to the New Cartesian sign convention:

   - All distances are measured from the optical centre of the lens.

   - The distances measured in the direction of incident ray are taken as positive whereas the distances measured against the direction of incident ray are taken as negative.

   - The distances measured upwards and perpendicular to the principal axis are taken as positive whereas distances measured downwards and perpendicular to the principal axis are taken as negative.

2. $f = -30$ cm

   $v = -20$ cm

   According to the lens formula

   $$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$
   $$\frac{-1}{30} = \frac{-1}{20} - \frac{1}{u}$$
   $$\frac{1}{u} = \frac{-1}{20} + \frac{1}{30} = \frac{-3 + 2}{60} = \frac{-1}{60}$$

   $$= -60 \text{ cm}$$