WORKSHEET 1

CHAPTER 4 – REFRACTION OF LIGHT

A. Tick (✓) the correct option.

1. Speed of light is maximum in

   a. air. b. water. c. alcohol. d. ruby.

2. Relationship between refractive index and the speed of light in a medium is

   a. $\mu = \frac{v}{c}$. b. $c = \mu v$. c. $\mu = \frac{c}{v}$. d. none of these.

3. If refractive index of glass with respect to air is 5/3, then refractive index of air with respect to glass is

   a. 5/3. b. 8/3. c. 3/5. d. none of these.

4. Which of the following colours has the least refractive index?

   a. Red b. Blue c. Indigo d. Yellow

5. If incident angle is increased, lateral displacement will

   a. decrease. b. increase. c. remains same. d. none of these.

B. Fill in the blanks.

1. A substance in which light travels or tries to travel is known as _____
2. If a reflected or refracted ray is reversed in direction, it will _____ its original path.
3. The stars seem higher than they actually are due to _____
4. _____ are used in telecommunications for transmitting signals.
5. Lateral displacement is _____ proportional to the thickness of the glass slab.

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

1. Lateral displacement is inversely proportional to the wavelength of the incident light.
2. If incident ray falls normally on the surface of a glass, then refracted ray bends away from normal.
3. Refractive index has no units.
4. The angle between the emergent ray and the direction of the incident ray is called critical angle.
5. A coin placed at the bottom of a vessel full of water appears to be raised.

D. Match the following.

1. Glass slab	$\angle i > \angle r$
2. Ray of light goes from rarer to denser medium	$\angle i = \angle r = 0°$
3. Snell's law	$\angle i_1 = \angle r_2$
4. Normal incident ray	$\frac{\sin i}{\sin r}$ = constant
5. Ray of light goes from denser to rarer medium	$\angle i < \angle r$

Name: ..... Teacher's signature: .....

Class: X Date: .....

E. Answer the following questions.

Very short answer questions

1. State Snell's law of refraction of light.
2. What is SI unit of refractive index?

Short answer questions

1. What is a prism?
2. The refractive index of glass with respect to air is 1.6. Find the refractive index of air with respect to glass.

Long answer questions

1. The velocity of light in air is 3×10^8 m/s and flint glass 2×10^8 m/s. Find the refractive index of flint glass.
2. A coin is placed at a depth of 20 cm in beaker containing water. The refractive index of water is 1.33. Calculate the height through which the image of coin is raised.

ANSWERS

WORKSHEET 1

A. Tick (✓) the correct option.

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

B. Fill in the blanks.

1. medium
2. retrace
3. atmospheric refraction
4. Optical fibres
5. directly

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

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

D. Match the following.

1. Glass slab — $\angle i_1 = \angle r_2$
2. Ray of light goes from rarer to denser medium — $\angle i > \angle r$
3. Snell's law — $\frac{\sin i}{\sin r}$ = constant
4. Normal incident ray — $\angle i = \angle r = 0°$
5. Ray of light goes from denser to rarer medium — $\angle i < \angle r$

E. Answer the following questions.

Very short answer questions

1. Snell's law of refraction of light states that the ratio of the sine of the angle of incidence to the sine of the angle of the refraction is a constant for a given pair of media.
2. Refractive index is a ratio of two similar quantities, it has no units. If is a pure number.

Short answer questions

1. A prism is a homogeneous transparent refracting medium bounded by at least two non-parallel plane surfaces inclined at an angle.
2. $${}^{air}\mu_{glass} = 1.6$$
$${}^{glass}\mu_{air} = \frac{1}{{}^{air}\mu_{glass}} = \frac{1}{1.6} = \frac{5}{8}$$

Long answer questions

1. Velocity of light in air $= 3 \times 10^8$ m/s

Velocity of light in flint glass $= 2 \times 10^8$ m/s

$$\mu_{\text{flint glass}} = \frac{\text{Velocity of light in air}}{\text{Velocity of light in flint glass}}$$
$$= \frac{3 \times 10^8}{2 \times 10^8}$$
$$= 1.5$$

2.

$$\text{Real depth} = 20 \text{ cm}$$

$$\mu_{water} = 1.33$$

$$\text{Apparent depth} = \frac{\text{Real depth}}{\mu_{water}} = \frac{20}{1.33} = 15.04 \text{ cm}$$

$$\text{Height through which image of coin is raised} = \text{real depth} - \text{apparent depth}$$

$$= 20 - 15.04$$

$$= 4.96 \text{ cm}$$