Class 12 Physics · Chapter 9: Ray Optics and Optical Instruments

Worksheet · 20 marks · about 40 minutes · based on NCERT

Name _____ Class and section _____ Date _____

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1. An object on the axis of a concave mirror of focal length 10 cm is moved from 30 cm to 20 cm in front of the mirror. During this move the image shifts through [1]

(a) 5 cm, towards the mirror
(b) 10 cm, away from the mirror
(c) 10 cm, towards the mirror
(d) 5 cm, away from the mirror

2. The refractive indices of glass and of water with respect to air are 3/2 and 4/3. The refractive index of glass with respect to water is [1]

(a) 8/9
(b) 2
(c) 17/6
(d) 9/8

3. The refractive index of a piece of glass with respect to air depends on [1]

(a) the wavelength of the light
(b) the angle of incidence
(c) the thickness of the glass
(d) the angle of refraction

4. A ray of light travelling towards the centre of curvature of a convex mirror strikes the mirror. After reflection the ray [1]

(a) passes through the principal focus
(b) travels parallel to the principal axis
(c) appears to come from the principal focus
(d) retraces its path

5. A refracting telescope in normal adjustment is 93 cm long and has a magnifying power of 30. The focal length of its eyepiece is [1]

(a) 3.0 cm
(b) 90 cm
(c) 3.1 cm
(d) 2.9 cm

6. The critical angle of diamond with respect to air is about 24°, against about 41° for crown glass. Explain why a well-cut diamond sparkles far more than a piece of glass cut to the same shape. [2]

7. A ray of light passes through an equilateral glass prism (n = 1.5) in the position of minimum deviation. Find the angle of incidence and the angle of minimum deviation. (Take sin 48.6° ≈ 0.75.) [2]

8. Distinguish between a real image and a virtual image. Give one example of each formed by a concave mirror. [2]

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9. A plano-convex lens is made of glass of refractive index 1.5, the radius of curvature of its curved face being 15 cm. (a) Find its focal length and power. (b) Where must an object be placed so that the lens forms a real image of the same size as the object? [3]

10. A concave mirror forms a real image, three times the size of the object, on a screen placed 80 cm from the object. Find the object distance, the image distance and the focal length of the mirror. [3]

11. An object 2.0 cm tall is placed 30 cm in front of a convex lens of focal length 20 cm. A concave lens of focal length 10 cm is to be placed coaxially on the other side of the convex lens so that the light leaving the concave lens is a parallel beam. How far from the convex lens must the concave lens be placed? Find the size and nature of the image formed by the convex lens alone. [3]