ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

SOLUTION TO WORK SHEET: 42.

Subject : PHYSICS

Date : 30.11.2020

CLASS : XII

Chapter: Refraction of light at Spherical surface

Topic: Lens maker's formula, combination of lens, convex lens

1: The focal length of a lens made of glass in air is 10 cm. What will be the focal length of the lens in water ? Refractive index of glass = 1.51 and refractive index of water = 1.33.

(a) 18.84 cm (b) 36 cm (c) 18 cm (d) 37.7 cm

Ans. (d) 37.7 cm

2: If a lens is surrounded by a medium denser than air, the focal length of the lens

(a) decreases (b) increases (c) remains same (d) cannot be determined

Ans. (b) increases

3: If the focal length of a symmetrical convex lens is equal to the radius of curvature of the lens, the refractive index of the material of the lens is

(a) 0.5 (b) 1.1 (c) -1.5 (d) 1.5

Ans. (d) 1.5

4: The refractive index of the material of a double equi-convex lens is 1.5. If R be its radius of curvature then its focal length is

(a) 0 (b) infinity (c) $2R$ (d) R

Ans. (d) R

5: What type of lens is used in sunglass ?

(a) a concavo-convex lens whose radii of curvature of the two surfaces are equal

(b) a biconcave lens whose radii of curvature of the two surfaces are equal

(c) a biconcave lens whose radii of curvature of the two surfaces are unequal

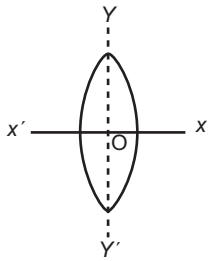
(d) plano-concave lens

Ans. (a) a concavo-convex lens whose radii of curvature of the two surfaces are equal

6: An equi-convex lens is divided into two halves along (i) XOX' and (ii) YOY' as shown in the Fig. Suppose f, f', f'', are the focal lengths of the complete lens, of each half portion of case (i) and of each half portion of case (ii), respectively. In this case the correct statement is

(a) $f' = 2f;\ f'' = f$ (b) $f' = f;\ f'' = f$

(c) $f' = 2f;\ f'' = 2f$ (d) $f' = f;\ f'' = 2f$



Ans. (d) $f' = f;\ f'' = 2f$

7: A convex lens is immersed in a liquid whose refractive index is equal to that of the material of the lens. Under this condition the focal length of the lens

(a) will decrease but will not be zero (b) will remain unchanged

(c) will be zero (d) will be of infinite value

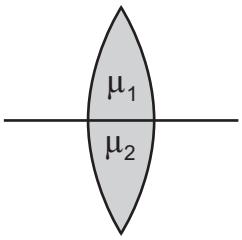
Ans. (d) will be of infinite value

8: A convex lens made of glass has focal length 0.15 m in air. If the to refractive indices of glass and water are respectively 3/2 and 4/3, then focal length of the lens immersed in water will be

(a) 0.45 m (b) 0.15 m (c) 0.30 m (d) 0.6 m

Ans. (d) 0.6 m

9: Which of the following is true for rays coming from infinity incident on the lens shown in fig.



(a) two images are formed.
(b) continuous image is formed between focal points of upper and lower lens
(c) one image is formed
(d) none of the above

Ans. (a) two images are formed.

10: A beam of parallel rays after refraction in a convex lens converges at a point. If a concave lens of same focal length be placed in contact with the convex lens where will the image be shifted?

(a) at infinity (b) at $2f$ (c) between 0 and f (d) between f and $2f$

Ans. (a) at infinity

11: The ratio of powers of a thin convex and a thin concave lens. 3/2 When they are in contact, the equivalent focal length is 30 cm Their individual focal lengths are

(a) 75 cm, -50 cm (b) 10 cm, -15 cm (c) 15 cm, -10 cm (d) 50 cm, -75 cm

Ans. (b) 10 cm, -15 cm

12: Two thin equi-convex lenses each of focal length 0.2 m are placed coaxially with their optical centres 0.5 m apart. Then the focal length of the combination is

(a) -0.4 m (b) 0.4 m (c) -0.1 m (d) 0.1 m

Ans. (b) 0.4 m

13: Mercury (Hg) is coated on the plane part of a plano-convex lens. Refractive index of the lens is μ and the radius of curvature is R. The system behaves as a concave mirror whose radius of curvature is

(a) μR (b) $\frac{R}{2(\mu - 1)}$ (c) $\frac{R^2}{\mu}$ (d) $\frac{\mu + 1}{(\mu - 1)} R$

Ans. (b) $\frac{R}{2(\mu - 1)}$

14: A convex lens forms a real image of an object for its two different positions on the screen. If height of the images in two cases are 8 cm and 2 cm, then the height of the object will be

(a) 2 cm (b) 4 cm (c) 8 cm (d) 16 cm

Ans. (b) 4 cm

15: If x_1 be the size of the magnified image and x_2 the size of the diminished image in lens displacement method, then the size of the object is

(a) $\sqrt{x_1 x_2}$ (b) $x_1 x_2$ (c) $x_1^2 x_2$ (d) $x_1 x_2^2$

Ans. (a) $\sqrt{x_1 x_2}$