Practice set 1

Answers

SECTION A   **[1 × 10 = 10]**

1. Three students A,B and C focused a distant building on a screen with the help of a concave mirror. To determine focal length of the concave mirror they measured the distances as given below:

   Student A : From mirror to the screen
   Student B : From building to the screen
   Student C : From building to the mirror
   Who measured the focal length correctly?

   (a) Only A
   (b) Only B
   (c) A and B
   (d) B and C

Ans. **(a) Only A**

2. In case of concave mirror, the minimum distance between the real object and its real image is
   (a) F
   (b) 2f
   (c) 4f
   (d) Zero

Ans. Zero

3. If the refractive index of water with respect to air is 4/3 , then the refractive index of air with respect to water is
   (a) 3 / 4
   (b) 4 /3
   (c) 16 /9
   (d) 9 /16

Ans. (a) 3 / 4

4. How will the image formed by the a convex lens be affected if the upper half of the lens is wrapped with a black paper ?

Black
Paper
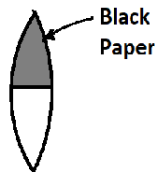
(a) The size of the image is reduced to one-half
(b) The upper half of the image will be absent
(c) The brightness of the image is reduced
(d) There will be no effect

Ans . (c) The brightness of the image is reduced

5. A mirror can produce a magnified virtual image. The nature of the mirror is
(a) Convex
(b) Concave
(c) Plane
(d) None of these

Ans. (b) concave

6. In a museum a child walks towards large concave mirror . He will see that

(a) His real , erect image goes on decreasing in size
(b) His virtual , erect image goes on increasing in size
(c) His real , inverted image goes on increasing in size and suddenly it becomes virtual , erect and magnified .
(d) His real, erect image goes on diminishing in size and suddenly it becomes virtual , erect and magnified .

Ans. (c) His real , inverted image goes on increasing in size and suddenly it becomes virtual , erect and magnified .

7. Rays from Sun converges at a point 15 cm in front of a concave mirror. Where should an object be placed so that size of its image is equal to the size of the object ?

(a) 15cm in front of the mirror
(b) 30cm in front of the mirror
(c) Between 15cm and 30cm in front of the mirror
(d) More than 30cm in front of the mirror

Ans. (b) 30cm in front of the mirror

8. When light travels from a rarer to a denser medium it will have
(a) Increased velocity

(b) Decreased velocity

(c) Decreased wavelength

(d) Both (b) and (c)

Ans. (d) both (b) and (c)

This questions given below consists of an assertion and the reason. Use the following key to choose the appropriate answer.

(a) **Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion**

(b) **Both the Assertion and the Reason are correct but the Reason is not the correct explanation of the Assertion**

(c) **Assertion is true but Reason is false**

(d) **Both Assertion and Reason are false**

9. Assertion: Convex mirror used in street light.
   Reason: Convex mirror diverges light over a small area than the plane mirror.

Ans. (c) Assertion is true but Reason is false

10. Assertion : Red light travels faster in glass than the green light
    Reason : Red light has a wavelength larger than green.

Ans. (a) Both the Assertion and the Reason are correct and the Reason is the correct explanation of the Assertion

SECTION B   **[2 × 2 = 4]**

11. Refractive index of diamond with respect to glass is 1.6 and absolute refractive index of glass is 1.5. Find out the absolute refractive index of diamond.

Ans. Refractive index of diamond with respect to glass $_g n^D = n_D / n_g$

So, the refractive index of diamond $n_D = \,_g n^D \times n_g$

$n_D = 1.6 \times 1.5 = 2.4$

12. A diverging mirror of focal length 20cm forms an image of 12cm from the mirror. Find where the object is placed.

Ans. Focal length of converging mirror f = - 20cm

$$\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$$

$$\frac{1}{u} = \frac{1}{20} - \frac{1}{12}$$

u = - 30cm

Object is placed at a distance 30 cm in front of the mirror.

SECTION C [3 × 2 = 6]

13. (a) " A convex lens of focal length 'f' can form a magnified erect as well as inverted image ." Justify this statement stating the position of the object with respect to the thin lens in each case for obtaining these images.

(b) A convex lens of focal length 25cm and a concave lens of focal length 10cm are placed in close contact with each other.Calculate the lens power of this combination.

Ans. (a) A convex lens of focal length f can form :

    i)   **A magnified and erect image only, when the object is placed between the focus and the optical centre of the lens**

    ii)   **The inverted image , when the object is placed beyond the focus of the lens.**

  (b) f= 25 cm , f_2 = -10 cm

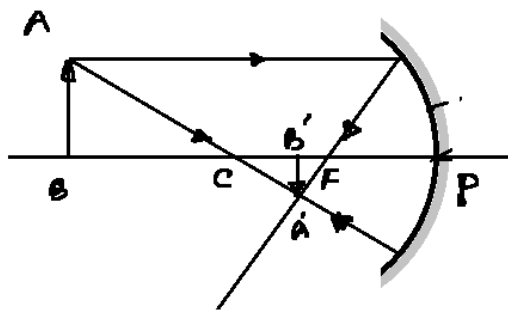**power of the combination =**

$$\frac{100}{25} + \frac{100}{-10}$$

= - 6D

14.The linear magnification produced by a spherical mirror is - 1/5 .Analysing this value state the (i) type of spherical mirror and the position

of the object with respect to pole of the mirror. Draw ray diagram to justify your answer.

Ans. (i) Concave mirror
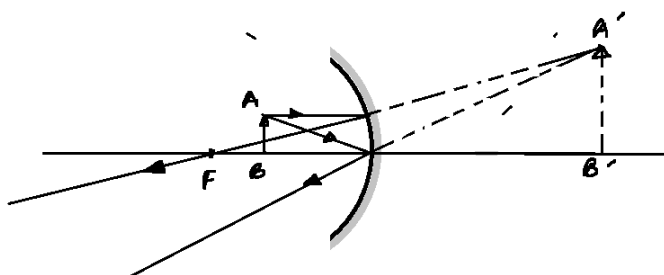
(ii) Object is placed beyond C

SECTION D [5 × 1 =5]

15. (a) Which mirror can be conveniently used as a make-up mirror? Draw a ray diagram to illustrate this function?

(b) If the image formed by a lens for all positions of an object placed in front of it is always erect and diminished , what is the nature of this lens. Draw a ray diagram to justify your answer.

Ans. (a) Concave mirror can be used an a make-up mirror.When the object is placed between the focus and pole of the concave mirror a virtual, erect and enlarged image will be formed.

(b) It is a diverging lens