CLASS X – SCIENCE – CHAPTER 10

LIGHT – REFLECTION AND REFRACTION

Name: Date:

CHOOSE THE CORRECT OPTION FROM QUES 1 TO 09

Q01. An object is kept at a distance more than twice the focal length (F) from a concave mirror. The distance the image formed will be

(a) less then F (b) equal to F (c) between F and 2 F (d) More than 2 F

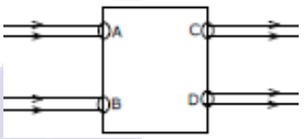
Q02. The speed of light, in a given medium is **(**2/3)rd of its speed in vacuum. The absolute refractive index of the medium equals to

(a) $\frac{9}{4}$ (b) $\frac{4}{9}$ (c) $\frac{3}{2}$ (d) $\frac{2}{3}$

Q03. A ray passing through the center of curvature of a concave mirror is inclined at an angle a to its principal axis. The angle of reflection for this ray equals

(a) 0° (b) (α/2)° (c) α° (d) 90°

Q04. Beams of light are incident though the holes C and D respectively as shown in the figure. Which of the following could be inside the box?



(a) A rectangular glass slab (b) Convex lens

(c) Concave lens (d) Prism

Q05. The power of a lens is (– 4.0) D. what is the nature of the lens?

(a) Plane (b) Concave

(c) Convex (d) Plano convex

Q06. Where should an object be placed in front of a convex lens to get real image of the size of the object?

(a) At focus (b) At 2F

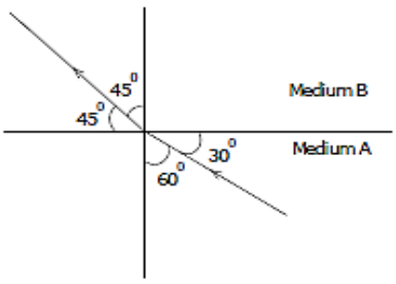
(c) At Infinity (d) Between optical center and focus.

Q07. In torches, search lights and head lights of vehicles the bulb is placed

(a) Between pole and focus (b) Very near to the focus

(c) Between focus and center of curvature (d) At center of curvature

Q08. Figure shows a ray of light as it travels from medium A to B. Refractive index of medium B with respect to A is



(a) $\frac{\sqrt{3}}{\sqrt{2}}$ (b) $\frac{1}{\sqrt{2}}$

(c) $\frac{\sqrt{2}}{\sqrt{3}}$ (d) $\frac{\sqrt{2}}{1}$

Q09. When a ray of light goes from one medium to another, these is

(a) Always a change in its speed as well as direction

(b) No change in speed and direction

(c) A change in speed but no change in direction

(d) A change in direction but constant speed.

Q01. What are the values of
(i) Angle of incidence (ii) Angle of reflection for normal incidence on a plane surface?

Q02. A beam of rays, parallel to the principal axis, is incident on a convex mirror. Show, on a diagram, the path of these rays after reflection from the mirror.

Q03. Find the power of a concave lens of focal length 2m?

Q04. With respect to air the refractive index of ice is 1.31 and that of rock salt is 1.54**.** Calculate the refractive index of rock salt with respect to ice?

Q05. A object is placed at a distance of 12cm in front of a concave mirror. It forms a real image four times larger than the object. Calculate the distance of the image from the mirror

Q06. Draw a ray diagram to represent the nature, position and size of the image formed by a convex lens for the object placed at
(a) infinity (b) Between F1 and optical centre (O)

Q07. An convex mirror used on a bus has a focal length of 200cm. it a scooter is located at 100cm from this mirror find the position, nature and magnification of the image formed in the mirror.

Q08. A convex lens has a focal length of 10cm. At what distance from the lens should the object be placed so that it forms a real and inverted image 20cm away from the lens? What would be the size of the image formed if the object is 2cm high? With the help of a ray diagram show the formation of the image by the lens in this case.

Q09. A concave mirror produces three times magnified (enlarged) real image of an object 10cm in front of it. Where is the image located?

Q10. Three mirrors, one plane, one concave and one convex are lying on the table. How can a person identify them without touching them or using any other apparatus or device?

Q11. Obtain the formula for the focal length of a lens in terms of object distance (u) and magnification (m)

Q12. In what S.I unit is the power of lenses stated? A convex lens has a focal length of 50 cm. calculate its power?

Q13. A concave lens has focal length of 20cm. At what distance from the lens a 5cm tall object be placed so that it forms an image at 15cm from the lens? Also calculate the size of the image formed?

Q14. An object is kept at a distance of 15cm from a
(a) convex mirror (b) concave lens (c) Plane mirror.
The focal length of the convex mirror and the concave lens are 10 cm each. Draw the appropriate ray diagrams, showing the formation of image, is each of the three cases.

Q15. State the mirror formula for determining the focal length of spherical mirrors write the meaning of the symbols used an object is placed at a distance of 25cm from a concave mirror of focal length 15 cm calculate the distance of the image from the mirror.

Q16. Draw a ray diagram to show the use of a convex lens for the formation of images having the following characteristics.

(a) Real & inverted and diminished (b) Virtual, erect & magnified.

Q17. Name the mirror that can give an erect and enlarged image of an object?

Q18. The rays, parallel to the principal axis, of a spherical mirror, actually meet at a point 20cm distant from

its pole. Identify the mirror and give its focal length.

Q19. Name the kind of surfaces that

(i) Reflect (ii) Refract most of the light falling on them.

Q20. Which type of mirror is usually used as a rear-view mirror in motor cars?

Q21. Define one dioptre of power of a lens?

Q22. Light enters from air into diamond which has a refractive index of 2.42**.**

Calculate the speed of light in diamond. The speed of light in air is 3.0×10^8 m/s.

Q23. Light is incident at an angle of (i) 30^o (ii) 45^o,

on the same face of a given rectangular slab. If the angles of refraction, at this face are r_1 and r_2 in the two cases. Obtain the relation between these two angles.

Q24. Why do we prefer a convex mirror as a rear view mirror is vehicles?

Q25. A doctor has prescribed a corrective lens of power 1.5D. Find the focal length of this lens. Is the prescribed lens diverging or converging.

Q26. Find the position, nature and size of the image formed by a convex lens of focal length 12cm of an object 5cm high placed at a distance 20 cm from it.

Q27. An object is kept at a distance of (i) $\frac{a}{2}$ (ii) $\frac{3a}{2}$

from a convex lens having focal length of magnitude .Draw ray diagrams showing the formation of images formed in the two cases.

Q28. A concave mirror is used to from an erect and enlarged image of a given object. Where is the image located with respect to the mirror? Draw the corresponding ray diagram.

Q29. How can you show that if a ray enters a rectangular glass slab obliquely and emerges from the opposite face, the emergent ray is parallel to the incident ray?

LIGHT – NUMERICALS

Q01. Light enters from air into glass plate which has a refractive index of 1.5. Calculate the speed of light in glass. (Given, speed of light in vacuum is 3 x 10^8ms)

Q02. The speed of light in a transparent medium is 0.6 times that of its speed in vacuum. What is the refractive index of the medium?

Q03. An object of size 7.0 cm is placed at 27 cm in front of a concave mirror of focal length 18 cm. At what distance from the mirror should a screen be placed, so that a sharp focused image can he obtained? Find the size and the nature of the image.

Q04. An object of size 2.0 cm is placed at 30 cm in front of a concave mirror of focal length 15 cm. At what distance from the mirror should a screen be placed, so that a sharp focused image can he obtained? Find the size and the nature of the image.

Q05. An object 5.0 cm in length is placed at a distance of 20 cm in front of a convex mirror of radius of curvature 30 cm. Find the position of the image , its nature and size.

Q06. A 4.5 cm needle is placed 12cm away from a convex mirror of focal length 15 cm. Give the location of the image and magnification. Describe what happens as the needle is moved farther from the mirror?

Q07. An object 50 cm tall is placed on the principal axis of a convex lens. Its 20cm tall image is formed on the screen placed at a distance of 10 cm from the lens. Calculate the focal length of the lens.

Q08. An object 3 cm high is placed at a distance of 20 cm in front of a convex lens of focal length 12 cm. Find the position, nature and size of the image formed.

Q09. A convex lens has a focal length of 30 cm. Calculate at what distance should the object be placed from the lens so that it forms an image at 60 cm on the other side of the lens. Find the magnification produced by the lens in this case.

Q10. A convex lens has a focal length of 40 cm. Calculate its power.

Q11. An object 4 cm high is placed 15cm from a convex lens of focal length 5 cm. Draw a ray diagram on graph paper (paste in the space provided) and find the position, nature and size of the image.

Q12. A 6cm object is placed perpendicular to the principal axis of a convex lens of focal length 15cm. The distance of the object from the lens is 10cm. Find the position, size and nature of the image formed, using the lens formula.

Q13. An object is placed at a distance of 10cm from a convex lens of focal length 15 cm. Find the position size and nature of image formed.

Q14. A concave lens has focal length 20cm. At what distance from the lens a 5 cm tall object be placed so that it forms an image at 15 cm from the lens? Also calculate the size of the image formed.

Q15. Find the power of a concave lens of focal length 2 m.

Q16. Two thin lenses of power +3.5 D and -2.5 D are placed in contact. Find the power and focal length of the lens combination.