QB365 Question Bank Software Study Materials

Light Important 2,3 & 5 Marks Questions With Answers (Book Back and Creative)

9th Standard

Science

Total Marks : 75

2 Marks

10 x 2 = 20

1) According to cartesion sign convention, which mirror and which lens has negative focal length?

Answer : Concave mirror and concave lens.

2) Name the mirror(s) that can give (i) an erect and enlarged image, (ii) same sized, inverted image

Answer : 1. Concave mirror

2. Concave mirror.

3) If an object is placed at the focus of a concave mirror, where is the image formed?

Answer : At infinity.

4) Why does a ray of light bend when it travels from one medium to another?

Answer : Deviation in the path of light is due to change of velocity of light in the different medium

5) What is speed of light in vacuum?

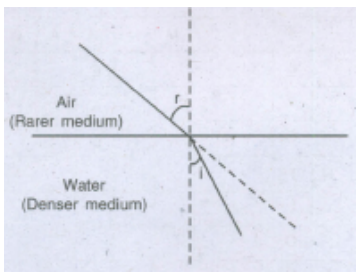
Answer : Speed of light in vacuum is exactly 300,00 km / s

6) Concave mirrors are used by dentists to examine teeth. Why?

Answer : A parallel beam of light is made to fall on the concave mirror. This mirror focuses the light beam on a small area of the body like teeth, throat etc. So concave mirrors are used by dentists.

7) Light ray emerges from water into air. Draw a ray diagram indicating the change in its path in water.

Answer :



8) Why are convex mirrors preferred to use rear view mirrors in vehicles?

Answer : Convex mirrors are preferred because they always give an erect image. They have a wider field view as they are curved outwards.

9) What is real image?

Answer : If the light rays coming from an object actually meet, after reflection, the image formed will be a real image and it is inverted. The real image can be produced on a screen.

10) Give the two properties of light.

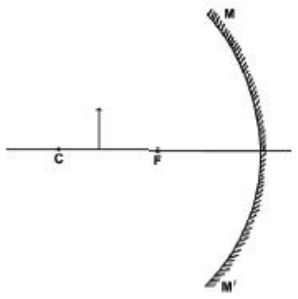
Answer : Reflection, refraction.

3 Marks

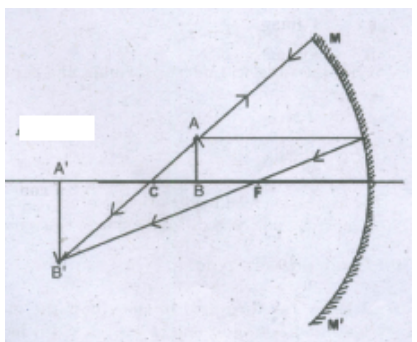
10 x 3 = 30

11) a) Complete the diagram to show how a concave mirror forms the image of the object.

b) What is the nature of the image?



Answer : (a)



b) Nature of the image is Real, inverted, magnified.

12) Pick out the concave and convex mirrors from the following and tabulate them Rear-view mirror, Dentist's mirror, Torch-light mirror, Mirrors in shopping malls, Make-up mirror.

Answer :

Concave mirror	**Convex mirror**
1. Dentist's mirror	Rear view mirror
2. Torch light mirror, Make up mirror	Mirrors in shopping malls

13) State the direction of incident ray which after reflection from a spherical mirror retraces its path. Give reason for your answer.

Answer : A ray of light going towards the centre of curvature is reflected back along the same path. It is a rule for construction of image formed by spherical mirrors.

14) What is meant by magnification? Write its expression. What is its sign for the image and virtual image?

Answer : Magnification is defined as the ratio of the height of the image (h_i) to the height of object (h_0)

Magnification $= \frac{h_i}{h_0}$

1. Real image is negative sign.
2. Virtual image is positive sign

15) Write the spherical mirror formula and explain the meaning of each symbol used in it.

Answer : The spherical mirror equation is $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

u = distance of object.

v = distance of image.

f = focal length of spherical mirror.

16) What are the uses of optical fibres?

Answer : (i) Optical fibres are extensively used for transmitting audio and video signals through long distances.

(ii) Moreover, due to their flexible nature, optical fibers enable physicians to look and work inside the body through tiny incisions without having to perform surgery.

17) Give the laws of reflection.

Answer : (i) The incident ray, the reflected ray and the normal at the point of incidence all lie in the same plane.

(ii) The angle of incidence is equal to angle of reflection.

18) Define centre of curvature and pole of the mirror.

Answer : **Centre of curvature:** The centre of a hollow sphere of which the spherical mirror forms apart called centre of curvature.

Pole: The geometrical centre of the spherical mirror is called pole of the mirror.

19) Define - focal length (F).

Answer : The distance between the pole and the principal focus is called focal length (f).

20) What are the conditions to achieve total internal reflection?

Answer : (i) Light must travel from denser medium to rarer medium. Example (water to air).

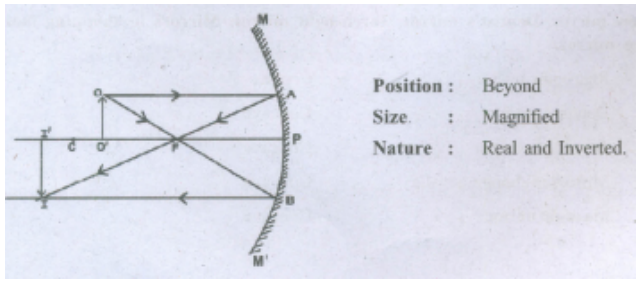
(ii) The angle of incidence inside the denser medium must be greater than that of the critical angle.

5 Marks 5 x 5 = 25

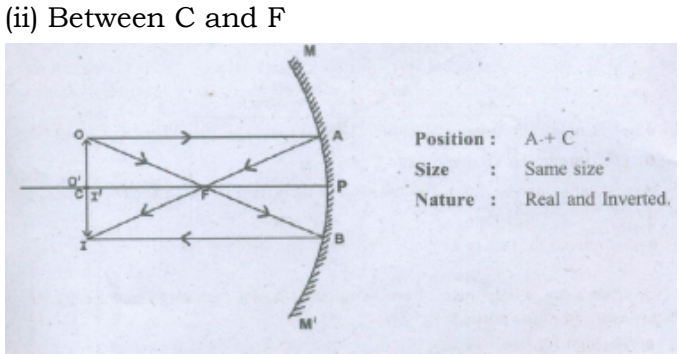
21) a) Draw ray diagrams to show how the image is formed using a concave mirror, when the position of object is i) at C ii) between C and F iii) between F and P of the mirror.

b) Mention in the diagram the position and nature of image in each case.

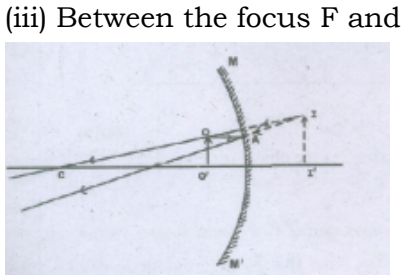
Answer : (a) (i) At the centre of Curvature C



(ii) Between C and F



(iii) Between the focus F and the pole P of the mirror.



b)

Position of object	Position of image	Name of image
At C	At 'C'	Real and inverted
Between C and F	Beyond C	Real and inverted
Between F and P	Behind the mirror	Virtual and erect

22) Explain with diagrams how refraction of incident light takes place from

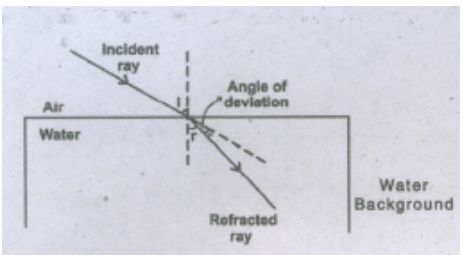
a) rarer to denser medium

b) denser to rarer medium

c) normal to the surface separating the two media.

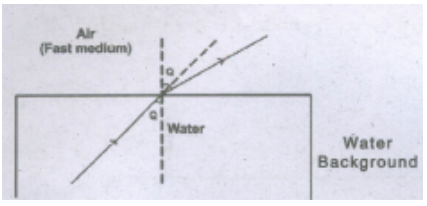
Answer : **a) Rarer to denser medium:**

When a ray of light travels from optically rarer medium to optically denser medium, it bends towards the normal.



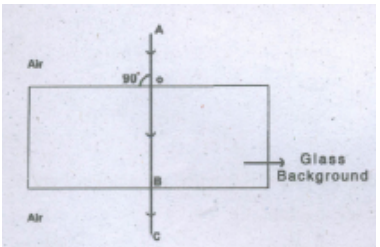
b) Denser medium to rarer medium:

When a ray of light travels from an optically denser medium to an optically rarer medium it bends away from the normal.



c) Normal to the surface separating the two media:

A ray of light incident normally on a denser medium goes without any deviation.



23) Find the size, nature and position of image formed when an object of size 1 cm is placed at a distance of 15 cm from a concave mirror of focal length 10 cm.

Answer : Position of image

Object distance u = − 15 cm (to the left of mirror)

Image distance v = ?

Focal length f = − 10 cm (concave mirror) Using mirror formula.

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

$\frac{1}{v}+\frac{1}{-15}=\frac{1}{-10}$

$\frac{1}{v}-\frac{1}{15}=\frac{-1}{10}$

$\frac{1}{v}=\frac{-1}{10}+\frac{1}{15}$

$\frac{1}{v}=\frac{-1}{30}$

∴ Image distance v = -30cm (negative sign indicates that the image is on the left side of the mirror)

∴ Position of image is 30 cm in front of the mirror

2.Nature of image: Since the image is in front of the mirror it is real and inverted.

3.Size of image: To find the size of the image, we have to calculate the magnification

$m=\frac{-v}{u}$

Object distance u = − 15cm

Image distance v = − 30 cm

$m=\frac{-(-30)}{(-15)}$

m = − 2

We know that,$m=\frac{h_2}{h_1}$

Here, height of the object h_1 = 1 cm

-2 =$\frac{h_2}{1}$

h_2 = -2× 1

= -2 cm

The height of image is 2 cm (negative sign shows that the image is formed below the principal axis).

24) An object is placed at a distance of 15 cm from a concave mirror of focal length 30 cm. Find the position and nature of the image.

Answer : u =-15 cm ; f= 30 cm

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

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

$\frac{1}{v}=\frac{1}{30}+\frac{1}{15}=\frac{1+2}{30}=\frac{1}{10}$

$v=30cm$

The image formed is virtual

25) The ray of light enters from air to Kerosene? Refractive index of Kerosene is 1.41. Calculate the velocity of light in Kerosene.

Answer :

$$Refractive\ index\ of\ kerosene = \frac{Velocity\ of\ light\ in\ air}{Velocity\ of\ light\ in\ kerosene}$$

$$\mu = \frac{C_{air}}{C_{kerosene}} = \frac{C_4}{C_k}$$

$$1.41 = \frac{3\times10^8}{C_k}$$

$$C_k = \frac{3\times10^8}{1.41} = 2.1 \times 10^8 m/s$$

$$Velocity\ of\ light\ in\ kerosene = 2.1 \times 10^8\ m/s$$