1.What is a prism?

Ans: Prism is a transparent optical element which refracts light.

2. Define reflection.

Ans: Reflection of light is the phenomenon of bouncing back of light in the same medium on striking the surface of any object.

3. What is the radius of curvature of a plane mirror?

Ans: Radius of curvature of a plane mirror is infinite. The plane mirror is a part of sphere with infinite radius

4. What type of image is formed by a plane mirror?

Ans: Real and virtual.

5. What does negative magnification means?

Ans: If the size of image is less than object then it can also be referred as negative magnification

6. A plane as well as convex mirror produces real image, if the object is virtual. How?

Ans: Plane and convex mirror can only produce virtual images. Only a concave mirror produces real and inverted image. The plane mirror can't produce real images because of the fact that the plane mirror reverses everything. To see a real image with the plane mirror you would need to stand behind the mirror which is not the reflective surface. In case of convex mirror, the location of the object does not effect the characteristics of the image. so the convex mirror would always produces virtual image whatever may be the position of the object.

7. Show that the mirror formula for spherical mirror also holds good for a plane mirror too.

Solution: Using mirror formula

$1/v + 1/u = 1/f$

For plane mirror f = infinity

Hence,

1/v + 1/u = 0

So,

v = -u

It means that image is at equal distance and in opposite side of the object. This is the true condition in image formation through plane mirror. Hence spherical mirror formula holds equally to a plane mirror.

8. Define linear magnification produced by a spherical mirror. Also give its relation.

Ans: The linear magnification or magnification of a spherical mirror may be defined asthe ratio of the size (height) of the image to the size (height) of the object. Themagnification of a mirror is represented by the letter m. ... But h2can be positive or negative depending on whether the image formed is virtual or real.

m=-u/v

9. Give different cases of image formation by a convex lens. Give ray diagrams in each case.

Ans: See in book

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

Ans:-

Here,

object size , h1 = 4.5 cm

object distance, u = –12 cm

focal length, f = + 15 cm

image distance , v = ?

magnification, m = ?

As. 1/u + 1/v = 1/f

$1/v = 1/f - 1/u$

Now,

putting u = −12 cm and f = +15cm , we get

$1/v = 1/15 - 1/-12 = 4+5/60 = 9/60$

v = 60/9 = 6.7 cm

image is formed 6.7 CM behind the convex mirror. it must be virtual and erect.

if h2 is size of image , then m = h2/h1 = -v/u

or,

m = h2/h1 = −(6.7)/−12 = 0.558

h2 = 0.558

h1 = 0.558 * 4.5 = 2.5 cm

As the needle is moved further from the mirror, image moves away from the mirror till it is at focus F of the mirror the size of the image goes on decreasing.

11. How will you decide whether a given piece of glass is a convex lens, concave lens or a plane glass plate?

Ans: Hold the given piece of glass over some printed matter.

(i) If the letters appear magnified,the given piece is a convex lens.

(ii) If the letters appear diminished,the given piece is a concave lens.

(iii) If the letters appear to be of the same size,then it is a plane glass piece.

12. Explain with reference to spherical lens:

(a) Optical centre:

(b) Centre of curvature

(c) Principal axis

(d) Aperture

(e) Principal focus

Ans:

(a) Centre of curvature (C): The centre of the sphere, of which the spherical lens forms a part is called as the centre of curvature. It is represented by the alphabet C. Since a lens has two surfaces, so it has two centres of curvature (C1,C2).

(b) Radius of curvature (R): The radius of the sphere of which the lens forms a part is known as the radius of curvature. Is symbolised as R.

(c) Principal Axis: The line passing through the centre of curvature of the lens is the principal axis.

(d) Principal focus (F): A narrow bean of light which is incident parallel to the principal axis either converges to a point or appears. diverge from a point on the principal axis after refraction-through the lens. This point is called principal focus.

(e) Optical centre (O): A point satiated within the lens through which a ray of light passes

(f) Focal length (f): Distance between the principal focus and the optical centre of the lens.

(g) Aperture: The diameter of the circular boundary of the lens is called the aperture of the lens.