TENDER HEART HIGH SCHOOL, SEC-33B, CHD

Teacher Name :- Charanjeet Kaur

Laws of Reflection and formation of Image by a plane mirror (Ch-7(A) Reflection of Light

DATE 28/10/24

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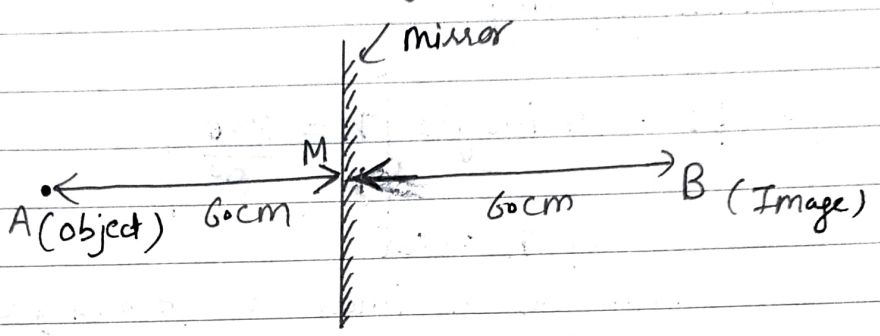
Subject PHYSICS

CLASS- VIII

QNO-18 An object is kept at 60cm in front of a plane mirror. If the mirror is now moved 25 cm away from the object, How does the image shift from its previous position?

Ans:→



Initially Object position AM = 60cm

So Image will form at B position (behind the mirror)

$\therefore$ BM = 60cm

So distance b/w Object and its image is 60cm + 60cm = 120cm

Now after moving the mirror 25cm away from object; let the Mirror shifts to position M' So,

Object distance becomes AM' = 60cm + 25cm = 85cm

Also, Image distance becomes B'M' = 85cm

(Now Image is formed at B' (behind the mirror)

So New distance becomes; 85cm + 85cm = 170 cm (distance between Object and Image)

$\therefore$ Distance between two positions of image = New distance between Object and Image − Previous distance between them

= 170cm − 120cm

= 50cm

Ans 50cm

Ch-7(b) [Images formed in a pair of mirrors]

Q1 When two plane mirrors are inclined to each other or are placed such that making an angle θ° in between them. If an object is placed between the two mirrors. Write an expression for number of images formed. State the condition, if any.

Ans **Case 1:—** $\therefore \boxed{n = \frac{360^\circ}{\theta^\circ}}$

If n = odd

then (a) n - images are formed, when the object is placed asymmetrically between the mirrors.

(b) $(n-1)$ images are formed, when the object is placed symmetrically between the mirrors.

Case 2:→ $\boxed{n = \frac{360^\circ}{\theta^\circ}}$

If n = even

then number of images will be $(n-1)$ for all positions of object in between the mirrors.

Q2:→ State the number of images of an object placed between the two plane mirrors, formed in each case when the mirrors are inclined to each other at (a) 90° (b) 60°

Ans (a) $\theta = 90^\circ$ So, $n = \frac{360^\circ}{\theta^\circ} = \frac{360^\circ}{90^\circ} = 4$

$n = 4$ (Even)

$\therefore (n-1) = (4-1) = 3$ images are formed

(b) $\theta = 60°$, $n = \frac{360°}{\theta°} = \frac{360°}{60°} = 6$

So $n = 6$ (even)

$\therefore (n-1) = (6-1) = 5$ images are formed

Q3:→ An object is placed (i) asymmetrically (ii) symmetrically, between the two plane mirrors inclined at angle of 50°. find the number of images formed.

Ans

$$n = \frac{360°}{\theta°}$$

(i) When the object is placed asymmetrically between the plane mirrors then;

n- 9mages are formed

So $n = \frac{360°}{\theta°} = \frac{360°}{50°} = 7.2 \doteq 7$

$\boxed{n = 7}$ Ans

(ii) When the object is placed symmetrically between the plane mirrors then,

$(n-1)$ images are formed

So $n = 7$

Ans $\therefore (7-1) = 6$ images are formed

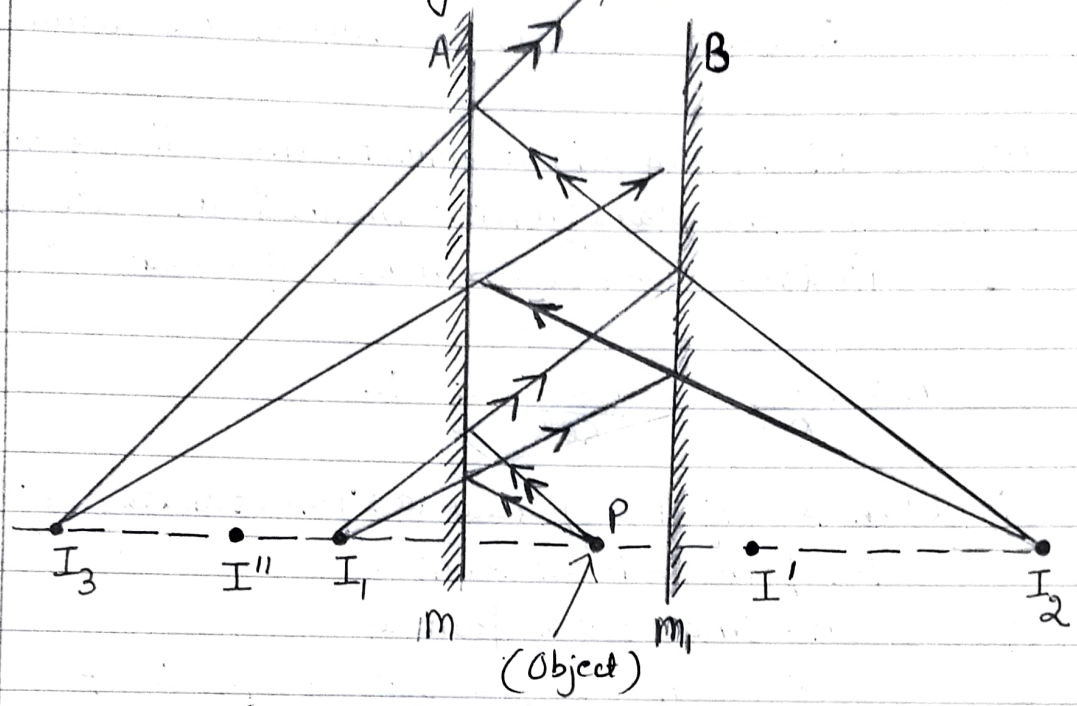
Q4 When two plane mirrors are placed parallel to each other then state how many images are formed and show the formation of images with the help of a ray diagram

Ans When two plane mirrors are placed parallel to each other, then angle between them is 0°

then $n = \frac{360^\circ}{\theta^\circ} = \frac{360^\circ}{0^\circ}$ $(\because \theta = 0^\circ)$

$\boxed{n = \infty}$ (Infinite)

So Infinite images are formed.



(Image formed in two parallel mirrors)

Q5:→ State the number of images formed by two plane mirrors placed perpendicular to each other.

Ans:→

When two plane mirrors are placed perpendicular to each other then angle between them is 90° or $\theta = 90^\circ$

So

$$n = \frac{360^\circ}{\theta^\circ} = \frac{360^\circ}{90^\circ} = 4$$

n = even so $(n-1) = (4-1) = 3$ images are formed

Q6:→ State three uses of a plane mirror?

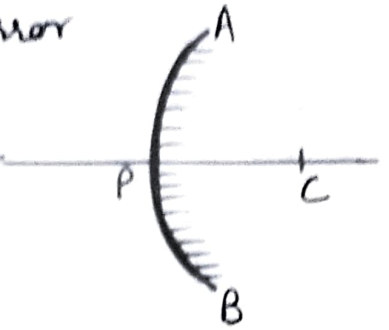
Ans (1) As a looking glass (2) [In solar heating devices such as [Solar Cooker, Solar water heater etc.]

(3) In barber's shop for seeing the hair at the back of head.

(d) **Aperture** :→

The plane surface area of the mirror through which light rays enters and fall on the mirror is called its aperture.

for Convex mirror shown below, AB is diameter of Aperture



(e) **Principal Axis** :→ It is the straight line joining the pole of the mirror to its centre of curvature.

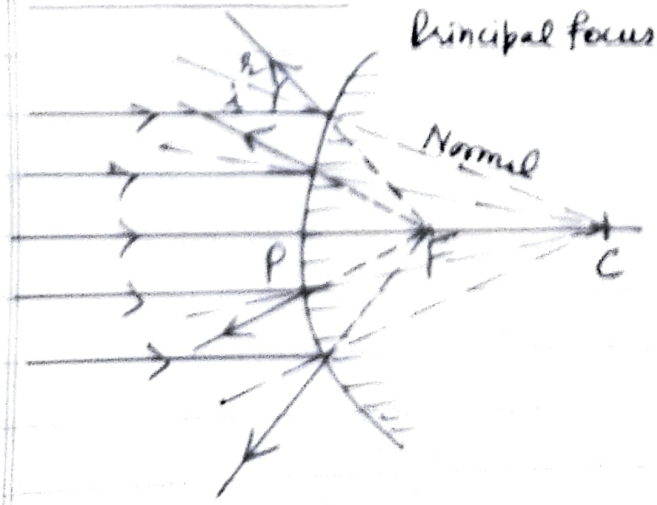
In the above figure PC represents principal axis

(f) **Principal focus** :→ It is the point on the principal axis through which the light rays incident parallel to the principal axis appear to come from or pass after reflection from the mirror.

* for Convex mirror :→ reflected rays do not meet at a point i.e at focus but appear to come from focus
* for Concave mirror :→ Reflected rays actually meet at focus.

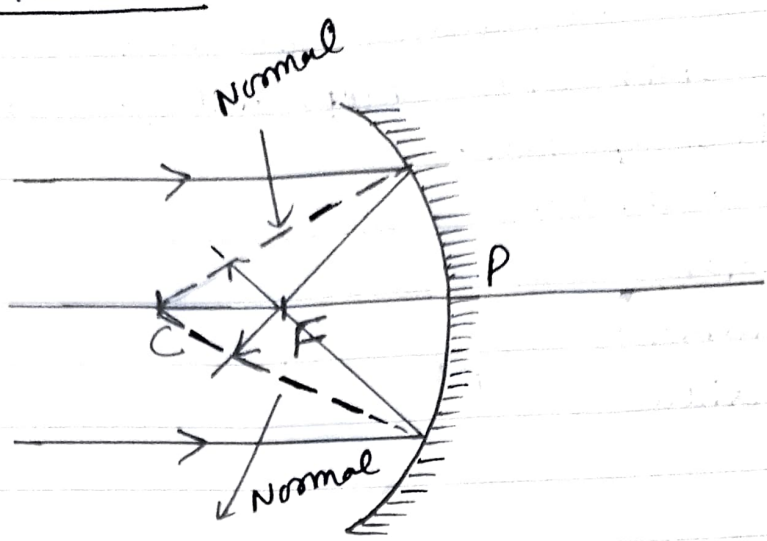
⇒ Focus is denoted by point F.

for Convex mirror :—



1(a)

For concave mirror :→



F is principal focus

fig. (1)(b)

(g) Focal length :→ The distance of focus F from pole 'P' of the mirror is called its focal length. i.e focal length = PF

In fig 1(b);

PF = f (focal length)

* Convex mirror is also called as diverging mirror. (Virtual Imag

* Concave mirror is also called as Converging mirror (Real Image

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