

Session-5- Optics - Reflection @ plane Mirror

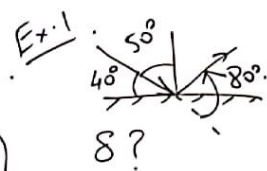
- ① Angle of deviation (δ) ② Motion of obj & Image ③ Extended obj ④ Pair of Plane Mirrors

RECAP

$$\delta = \pi - 2i$$

$$V_I = 2V_M - V_O$$

δ of incident ray
-||- Mirror



δ ?

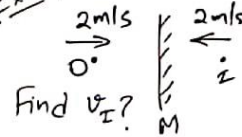
$$\delta = \pi - 2i$$

$$i = 50^\circ$$

$$\delta = 180^\circ - 2 \times 50^\circ$$

$$= 180^\circ$$

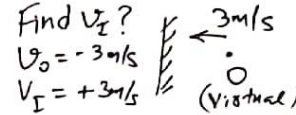
Ex. 2.



Find V_I ?

$$V_I = -2 \text{ m/s}$$

Ex. 3.



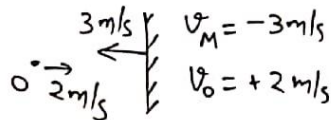
Find V_I ?

$$V_O = -3 \text{ m/s}$$

$$V_I = +3 \text{ m/s}$$

(Virtual)

Ex. 4.



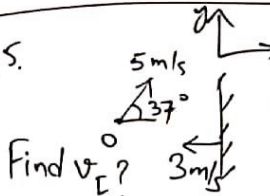
Find V_I ?

$$V_I = 2V_M - V_O$$

$$= 2 \times (-3) - 2$$

$$= -8 \text{ m/s}$$

Ex. 5.



Find V_I ?

$$V_{Ix} = 2V_M - V_{Ox}$$

$$= 2(-3) - 4$$

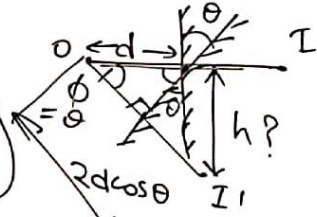
$$= -10 \text{ m/s}$$

$$V_{Iy} = V_{Oy} = 3 \text{ m/s}$$

$$V_M = -3 \text{ m/s}$$

$$V_{Ox} = 5 \cos 37^\circ$$

$$V_{Oy} = 5 \sin 37^\circ$$



$$h = 2d \cos \theta \sin \theta$$

$$h = d \sin 2\theta$$

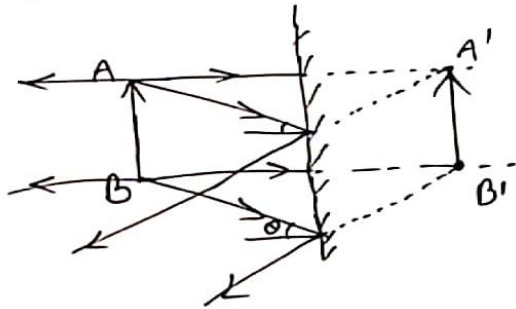
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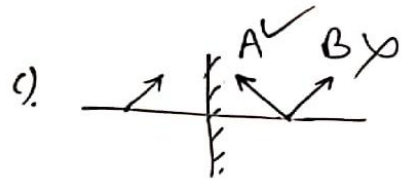
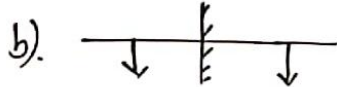
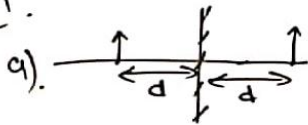
RECAP

Extended obj.

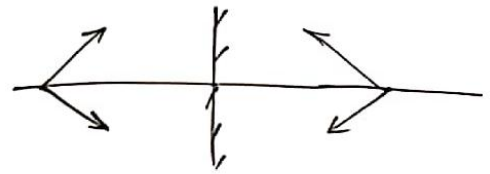
Image can be drawn by considering two or more points of the extended obj.



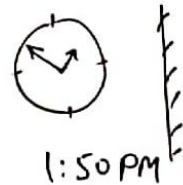
Ex 1.



Ex 2.



Ex 3.



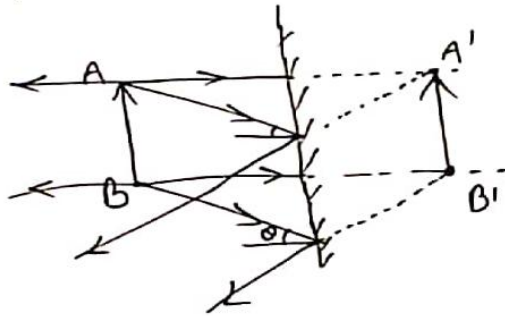
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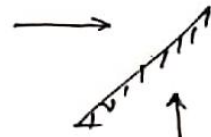
RECAP

Extended obj.

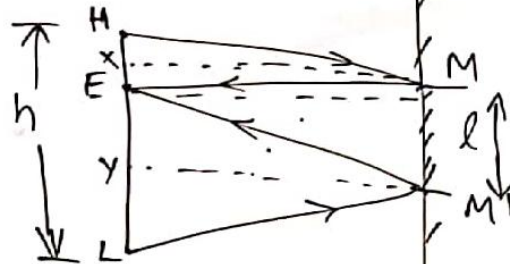
Image can be drawn by considering two or more points of the extended obj.



Ex-4.



Ex-5. Minimum Size of Mirror?



$$l = h/2$$

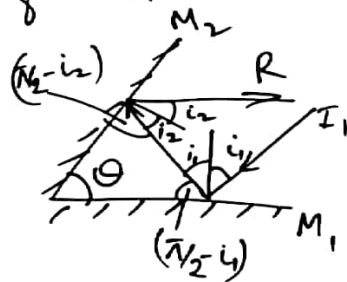
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④ Pair of Plane mirrors

a). Angle of deviation

$(\delta = \pi - 2i)$



$\delta_{M_1} = \pi - 2i_1$

$\delta_{M_2} = \pi - 2i_2$

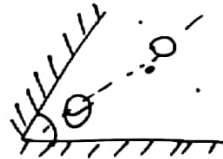
$\delta_{total} = \delta_{M_1} + \delta_{M_2}$
 $= (\pi - 2i_1) + (\pi - 2i_2)$
 $= 2\pi - 2i_1 - 2i_2$

$\theta + (\pi/2 - i_1) + (\pi/2 - i_2) = \pi$

$\theta = i_1 + i_2$

$\Rightarrow \delta_{total} = 2\pi - 2(i_1 + i_2)$
 $\delta = 2\pi - 2\theta$ (indep. of angle of incidence)

b). No. of images.



Q. How many images are formed?

Ans. → Depends upon two factors → ① θ

② position of obj.

$m = \frac{360^\circ}{\theta}$

- odd
- even
- fraction

position of obj. → Symmetrical position

odd position

No. of images = $(m - 1)$

= m if there are two odds

= nearest even integer if $m \rightarrow$ fraction & Symm position of obj.

Ex.

$\theta = 180^\circ \rightarrow$ One image.

Ex. $\theta = 90^\circ$
 $m = 4$
 no. of images = 3.

$\theta = 0^\circ \rightarrow$ infinite images