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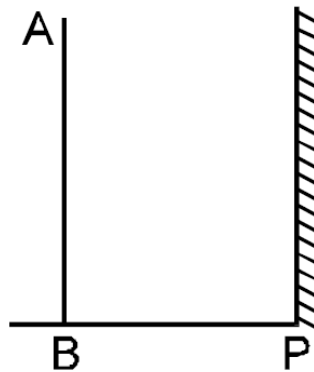
Video Solution on YouTube:-

<https://youtu.be/OkVw91Uu6gc>

Written Solution on YouTube:-

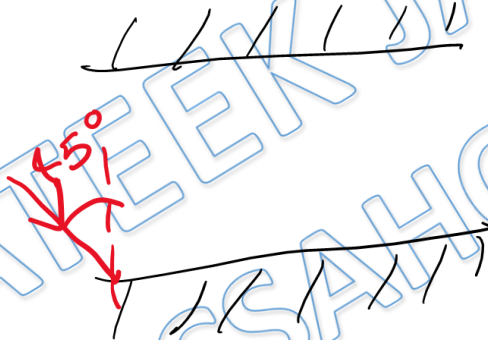
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- Q 1. A person AB of height 170 cm is standing in front of a plane mirror. His eyes are at height 164 cm. At what height from P should a hole be made in the mirror so that he cannot see the top of his head.



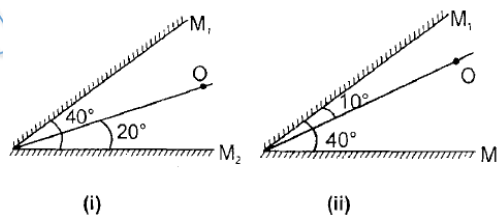
- (a) 167 cm (b) 161 cm
(c) 163 cm (d) none of these
- Q 2. Two plane mirrors are inclined to each other at 90° . A ray of light is incident on one mirror and the reflected light goes to the other mirror. The ray will undergo a total deviation of :
- (a) 180°
(b) 90°
(c) 45°
(d) cannot be found because angle of incidence is not given.
- Q 3. Find the number of images formed by two mutually perpendicular mirrors –
- (a) 3 (b) 4 (c) 1 (d) 2
- Q 4. The θ is the angle between two plane mirrors, in which of the following options always 5 images will be formed?
- (a) $30^\circ \leq \theta \leq 72^\circ$ (b) $45^\circ \leq \theta \leq 72^\circ$
(c) $60^\circ \leq \theta \leq 72^\circ$ (d) $15^\circ \leq \theta \leq 72^\circ$
- Q 5. Two mirrors are inclined at an angle of 60° . Then what is the number of images formed for an object placed in between the mirrors ?
- (a) 3 (b) 5 (c) 1 (d) 7

- Q 6. Two plane mirrors are inclined at an angle θ . A ray of light incident on one mirror at an angle of incidence i . The ray is reflected from this mirror, falls on the second mirror from where it is reflected parallel to the first mirror. What is the value of i , the angle of incidence in terms θ ?
- (a) $2\theta - 90^\circ$ (b) $4\theta - 90^\circ$
 (c) $\theta - 90^\circ$ (d) $3\theta - 90^\circ$
- Q 7. Two plane mirrors are inclined to each other at some angle. A ray of light incident at 30° (from normal) on one, after reflection from the other it retraces its path. The angle between the mirrors is
- (a) 30° (b) 45° (c) 60° (d) 90°
- Q 8. A boy of length 10 m, to see his own complete image, requires a mirror of length (in meter) at least equal to:
- (a) $10/4$ (b) $10/3$ (c) $10/2$ (d) 4
- Q 9. Two plane mirrors M_1 and M_2 each have length 1 m are separated by 1 cm. A ray of light is incident on one end of mirror M_1 at angle 45° . How many reflections the ray will have before going out from the other end?



- (a) 50 (b) 51
 (c) 100 (d) 101

- Q 10. Find number of images formed according to given case



- (a) 8, 9 (b) 9, 8
 (c) 9, 9 (d) 8, 8



Answer Key

Q.1 a	Q.2 a	Q.3 a	Q.4 c	Q.5 b
Q.6 a	Q.7 a	Q.8 c	Q.9 d	Q.10 a

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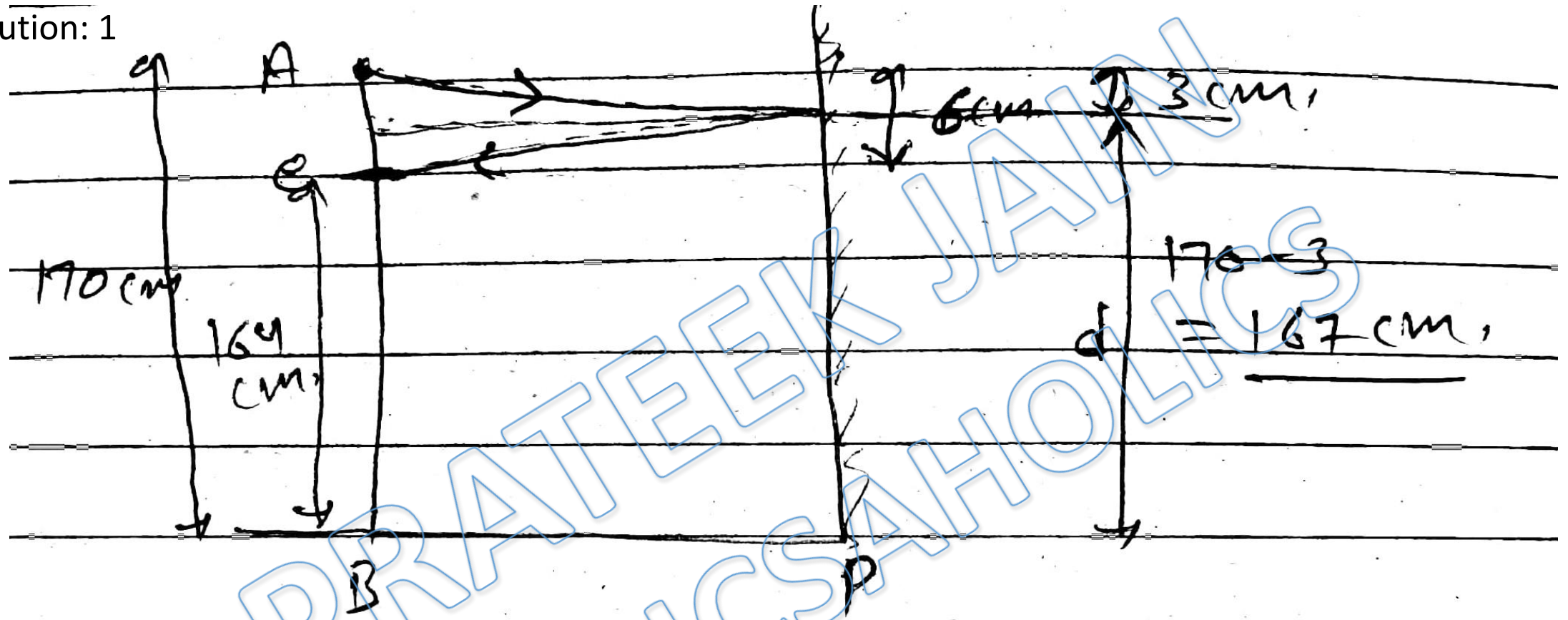


Written Solution

DPP-2 Plane Mirror (Extended Image, Multiple Reflections & Number of images

By Physicsaholics Team

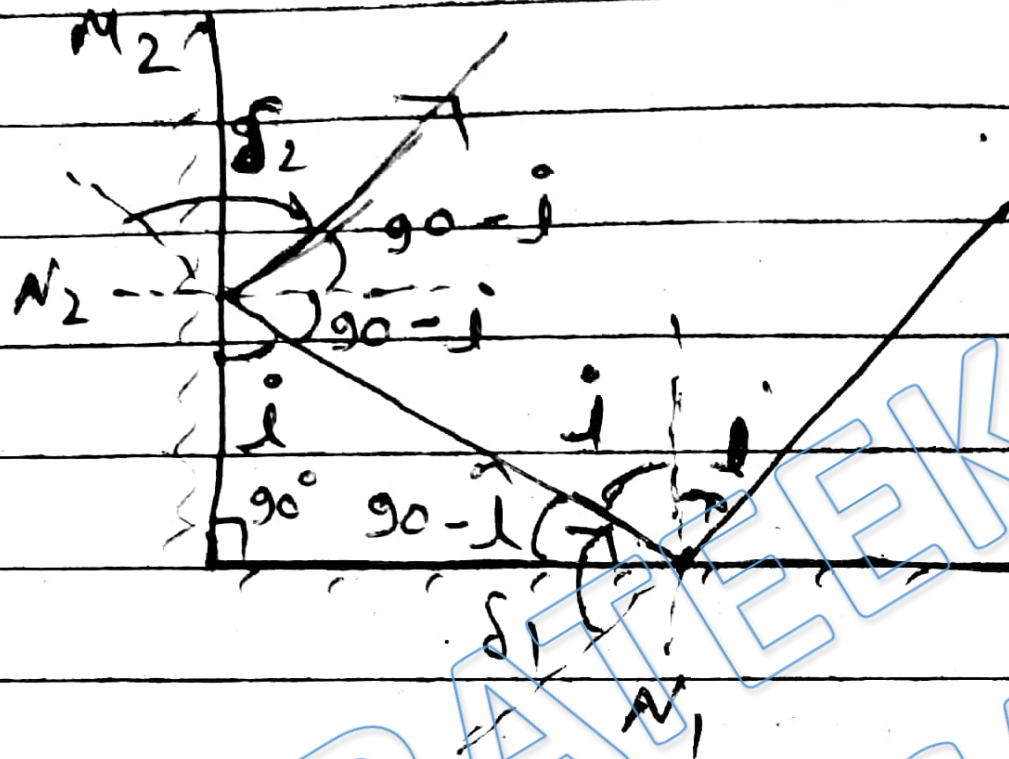
Solution: 1



If light coming from head does not reach to eye, then head will not be visible.

Ans. a

Solution: 2



Total deviation,

$$= \delta_1 + \delta_2$$

$$\delta_1 = 180^\circ - 2i$$

$$\delta_2 = 180^\circ - 2(90^\circ - i)$$

$$\delta = \delta_1 + \delta_2 = 180^\circ - 2i + 180^\circ - 2(90^\circ - i)$$

$$= 180^\circ - 2i + 180^\circ - 180^\circ + 2i$$

$$= 180^\circ$$

Ans. a

Solution: 3

$$n = \frac{360^\circ}{90^\circ} = 4 \in \text{even.}$$

$$\text{number of images} = 4 - 1$$

$$= 3 \text{ Images.}$$

Ans. a

Solution: 4

$$\text{number of images} = 5$$

$$\text{Let angle} = \theta$$

$$\text{then; } n = \frac{360^\circ}{\theta} \Rightarrow$$

$$\text{for } n = \text{even, } \theta = \frac{360^\circ}{n}$$

$$\text{number of images} = n - 1$$

If n is odd

$$\text{images} = n - 1$$

$$\text{images} = n$$

(object on
Angle

(not on Angle

bisector)

bisector)

$$\text{no. of images} = n$$

$$\text{no. of images} = n - 1$$

$$\text{for numb. images; } = n$$

$$n = 5$$

$$\theta = \frac{360^\circ}{5} = 72^\circ$$

$$\text{for numb. images; } = n - 1$$

$$n - 1 = 5 \Rightarrow n = 6$$

$$\theta = \frac{360^\circ}{6} = 60^\circ$$

$\therefore \theta$ is between 60° to 72°

$$60^\circ \leq \theta \leq 72^\circ$$

Ans. c

Solution: 5

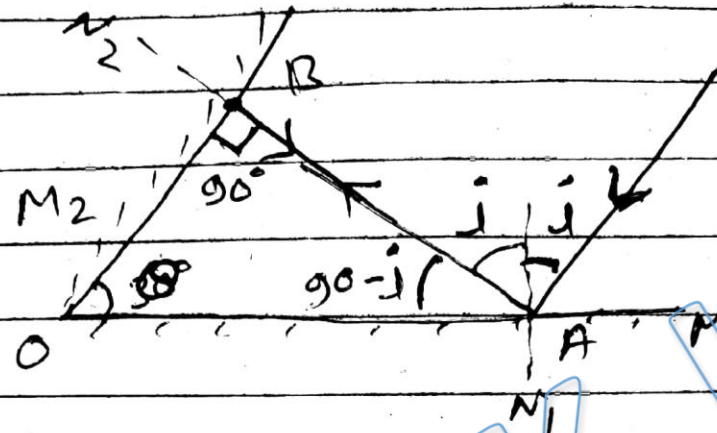
$$n = \frac{360^\circ}{\theta}$$

$$n = \frac{360^\circ}{60^\circ} = 6 \text{ (even)}$$

$$\text{number of images} = 6 - 1 = 5$$

Ans. b

Solution:7



to retrace it's path after reflection from M_2 , it should incident \perp to M_2

$$\therefore \angle OBA = 90^\circ$$

in $\triangle OBA$

$$90^\circ + 90^\circ + 90 - i = 180^\circ$$

$$i = 30^\circ$$

$$\therefore i = 30^\circ$$

$$\therefore \theta = 30^\circ$$

Ans. a

Solution:8

$$H = 10 \text{ m.}$$

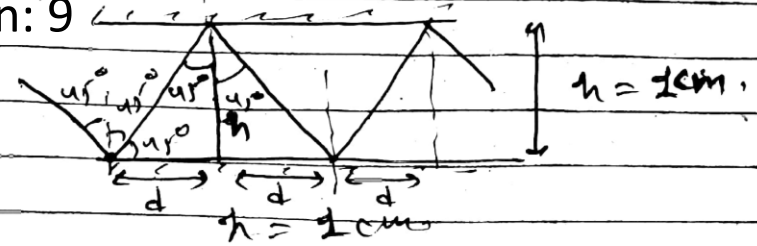
To see full image on mirror,
required size of mirror!

$$\therefore h = \frac{H}{2}$$

$$h = \frac{10}{2} = 5 \text{ m.}$$

Ans. c

Solution: 9



$d = h$ [∵ all angles = 45°]
 $d = 1 \text{ cm}$

after each reflection light travels 1 cm ,

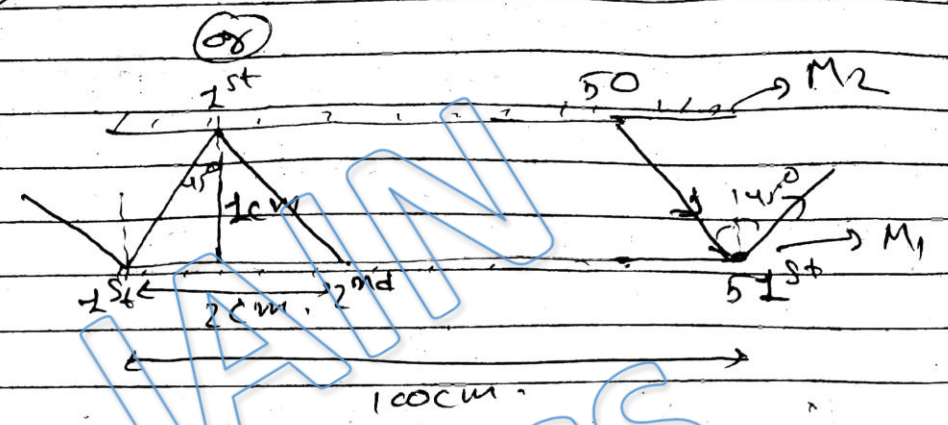
so, to go out from the mirrors let n reflections required.

$l = (n-1) d$

[∵ after n^{th} reflection it will go out from the mirrors, so will not cover distance between mirrors]

$\therefore l = (n-1) d$
 $1 \text{ m} = (n-1) 1 \text{ cm} = (n-1) \times 10^{-2}$

$n-1 = 100$
 $n = 101$



on mirror M_1 ,
 when 2nd reflection,
 distance covered = 2 cm
 when 3rd reflection,
 distance covered = 4 cm
 will be

so, for
 distance = 100 cm .
 reflection should be 51st

if reflection of mirror M_1 are 51 then reflection on mirror M_2 will be 50

\therefore Total reflection = $50 + 51$
 $= 101 \text{ cm}$.

Ans. d

Solution: 10

$$(i) n = \frac{360^\circ}{40^\circ} = 9$$

$$n = \text{odd}$$

∴ object is symmetric line
on

or on angle bisector

$$\therefore \text{Images} = n - 1 \\ = 9 - 1 = 8$$

$$(ii) n = \frac{360^\circ}{40} = 9$$

$$n = \text{odd}$$

∴ object is not on ~~forward~~
angle bisector

$$\therefore \text{Images} = n \\ = 9$$

Ans. a

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