Physicsaholics

Q 1. Two plane mirrors are inclined at 70º. A ray incident on one mirror at angle θ after reflection falls on the second mirror and is reflected from there parallel to the first mirror θ is:
(a) 50º (b) 45º (c) 30º (d) 55º

Q 2. Choose the correct mirror-image of figure given below.

(a) (b) (c) (d)
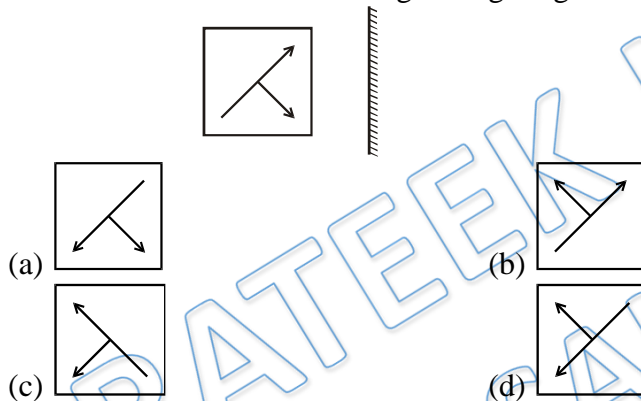
Q 3. Two plane mirrors are inclined to each other at 90º. A ray of light is incident on one mirror and the reflected light goes to the other mirror. The ray will undergo a total deviation of:
(a) 180º
(b) 90º
(c) 45º
(d) cannot be found because angle of incidence is not given.
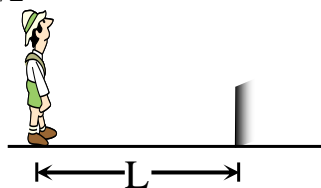
Q 4. Two plane mirrors are inclined at an acute angle such that a ray incident on a mirror undergoes a total deviation of 210° after two reflections
(a) The angle between mirrors is 60°
(b) The number of images formed by this system will be 5
(c) All images and object will lie on a circle
(d) All images and object will lie on an ellipse

Q 5. Two plane mirrors are arranged at right angles to each other as shown in figure. A ray of light is incident on the horizontal mirror at an angle θ. For what value of θ the ray emerges parallel to the incoming ray after reflection from the vertical mirror?
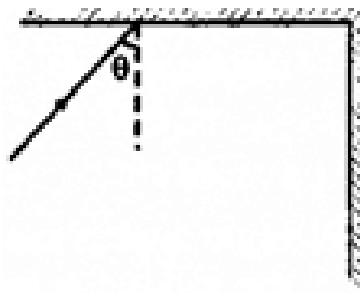
(a) 60° (b) 30° (c) 45° (d) all of these

Q 6. A boy of height H is standing in front of mirror, which has been fixed on the ground as shown in figure. What length of his body can the man see in the mirror? The length of the mirror is H/2 –

(a) H (b) $H^2/(H^2 + L^2)^{1/2}$
(c) Zero (d) $2H^2/L$

Q 7. AB and AC are two plane mirrors inclined at an angle of 15º and P is a point on AB. At what angle must a ray of light from P be incident upon AC in order that after three successive reflection it may be parallel to AB ?
(a) 45^0
(b) 30^0
(c) 60^0
(d) None of these

Q 8. Two plane mirrors are parallel to each other and spaced 20 cm apart. An object is kept in between them at 15 cm from A. Out of the following at which point (s) image (s) is/are not formed in mirror A (distance measured from mirror A) –
(a) 15 cm (b) 25 cm (c) 45 cm (d) 55 cm

Q 9. A person's eye level is 1.5 m. He stands in front of 0.3 m long plane mirror which is 0.8m above the ground. The length of the image he sees of himself is –
(a) 1.5 m (b) 1.0 m (c) 0.8 m (d) 0.6 m

Q 10. Two mirrors inclined to each other produce five images of an object placed between them irrespective of position of object. If the angle between them is reduced by 30º, then number of images seen in the two mirrors will be -
(a) 15 (b) 13 (c) 12 (d) 11

Q 11. Two plane mirrors M_1 and M_2 have a length of 20 m each and are 10 cm apart. A ray of light is incident on one end of mirror M_2 at an angle of 53^0 . The number of reflections light undergoes before reaching the other end is:
(a) 170 (b) 100 (c) 150 (d) 200

Answer Key

Q.1 a	Q.2 c	Q.3 a	Q.4 c	Q.5 d
Q.6 c	Q.7 a	Q.8 c	Q.9 d	Q.10 d
Q.11 c				

PHYSICSLIVE

| PLUS | ICONIC |

- ✓ India's Best Educators
- ✓ Interactive Live Classes
- ✓ Structured Courses & PDFs
- ✓ Live Tests & Quizzes
- ✗ Personal Coach
- ✗ Study Planner

24 months	₹2,333/mo
No cost EMI	₹56,000

18 months	₹2,625/mo
No cost EMI	₹47,250

12 months	₹3,208/mo
No cost EMI	₹38,500

6 months	₹4,667/mo
No cost EMI	₹28,000

To be paid as a one-time payment

View all plans

🎁 Add a referral code   APPLY

Use code PHYSICSLIVE to get 10% OFF on Unacademy PLUS.

| PLUS | ICONIC |

- ✓ India's Best Educators
- ✓ Interactive Live Classes
- ✓ Structured Courses & PDFs
- ✓ Live Tests & Quizzes
- ✗ Personal Coach
- ✗ Study Planner

24 months	₹2,100/mo
No cost EMI	+10% OFF ₹50,400

18 months	₹2,363/mo
No cost EMI	+10% OFF ₹42,525

12 months	₹2,888/mo
No cost EMI	+10% OFF ₹34,650

6 months	₹4,200/mo
No cost EMI	+10% OFF ₹25,200

To be paid as a one-time payment

View all plans

🎁 Awesome! PHYSICSLIVE code applied   ✗

Written Solution

DPP 2- Geometrical Optics: Multiple Reflections, Number of images
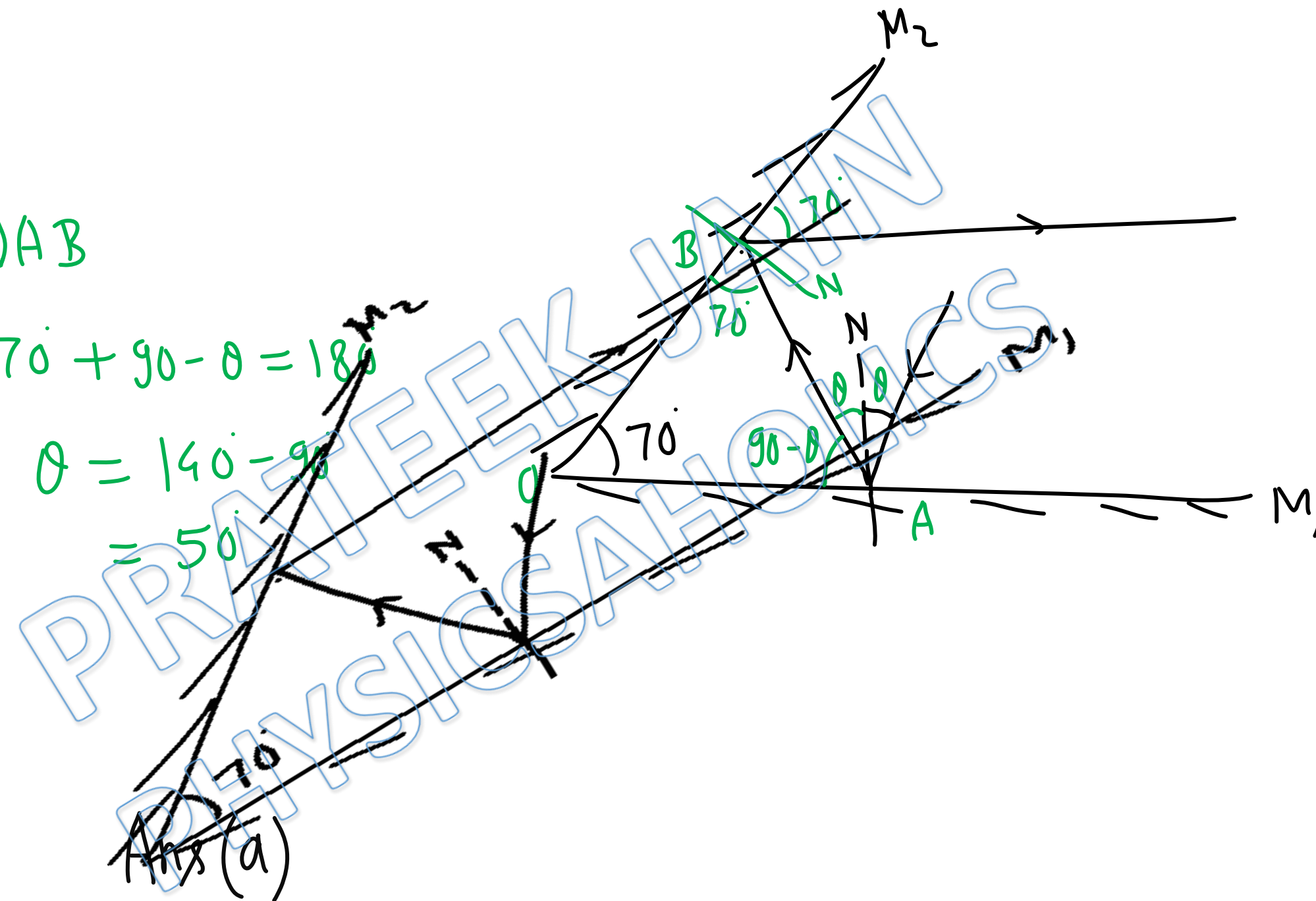
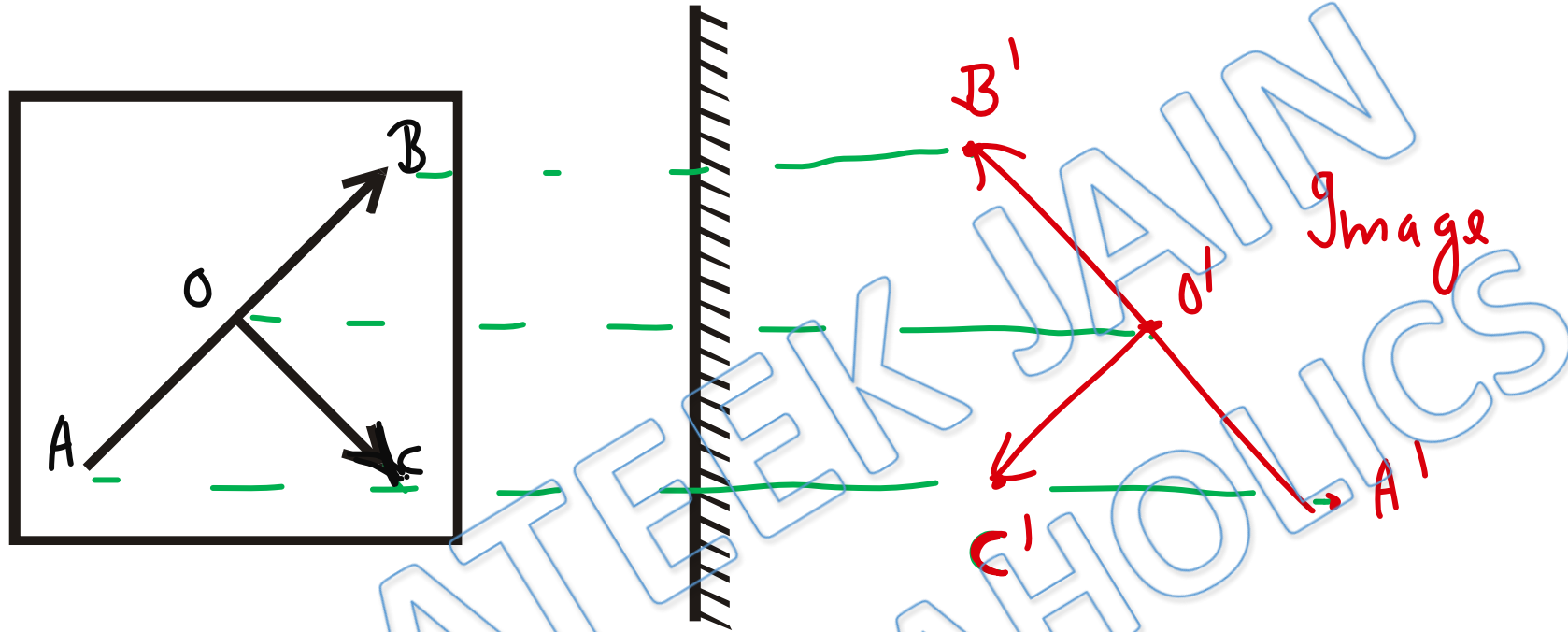**By Physicsaholics Team**

Solution: 1

In $\triangle OAB$

$70° + 70° + 90 - \theta = 180$

$\Rightarrow \quad \theta = 140° - 90$

$\quad = 50°$

Ans (a)

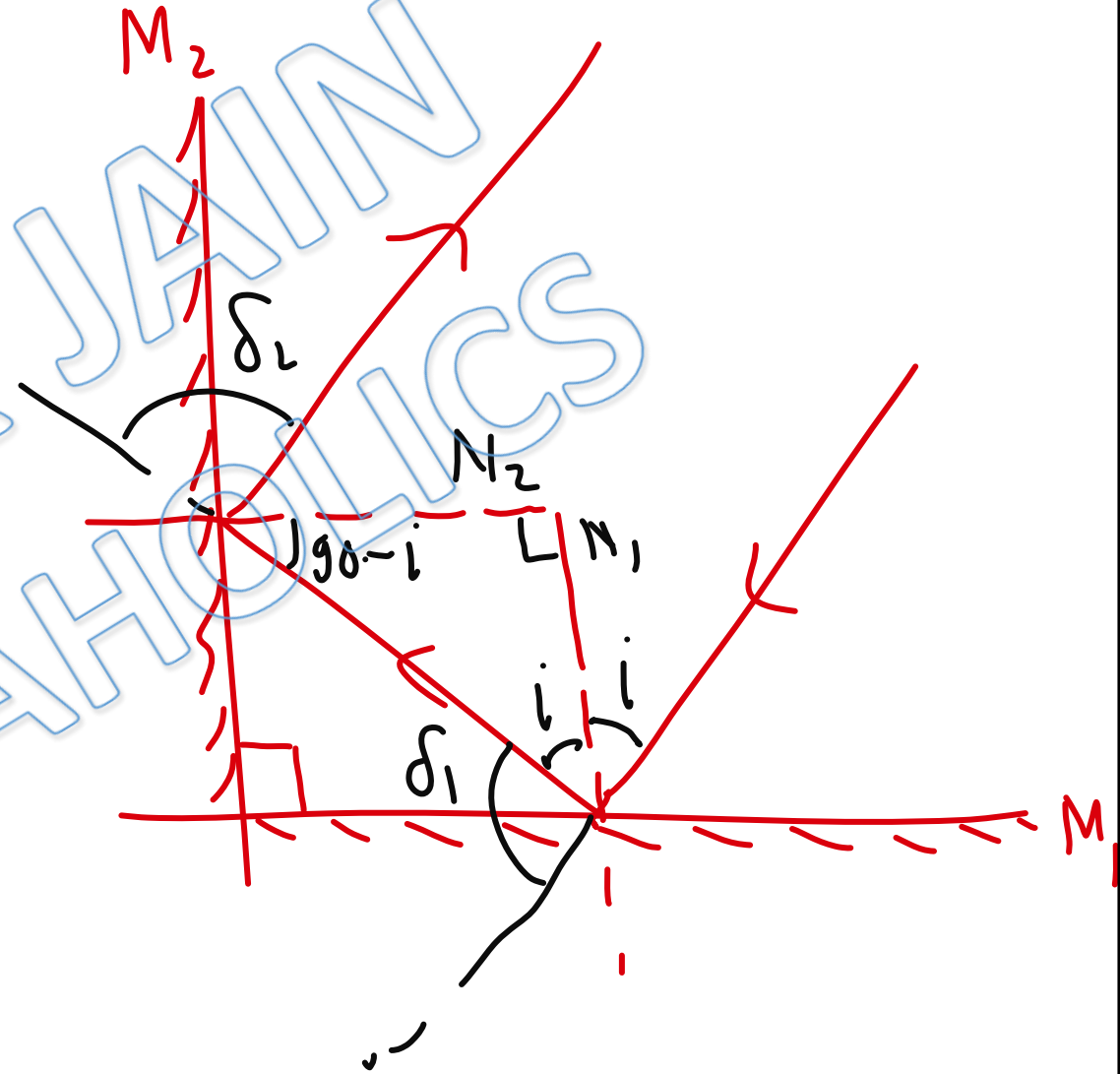Solution: 2

Image

Ans (c)

Total angle of deviation

$$\delta = \delta_1 + \delta_2$$

$$= (\pi - 2i) + \pi - 2(90-i)$$

$$= 2\pi - 2i - 180 + 2i$$

$$= \pi$$

Ans (a)

Solution: 4

first deviation

Second deviation

$$\delta = \delta_1 + \delta_2$$

$$210° = \pi - 2i_1 + \pi - 2i_2$$

$$\Rightarrow 2i_1 + 2i_2 = 150°$$

$$\Rightarrow i_1 + i_2 = 75° \quad ---(1)$$

In $\triangle OAB$

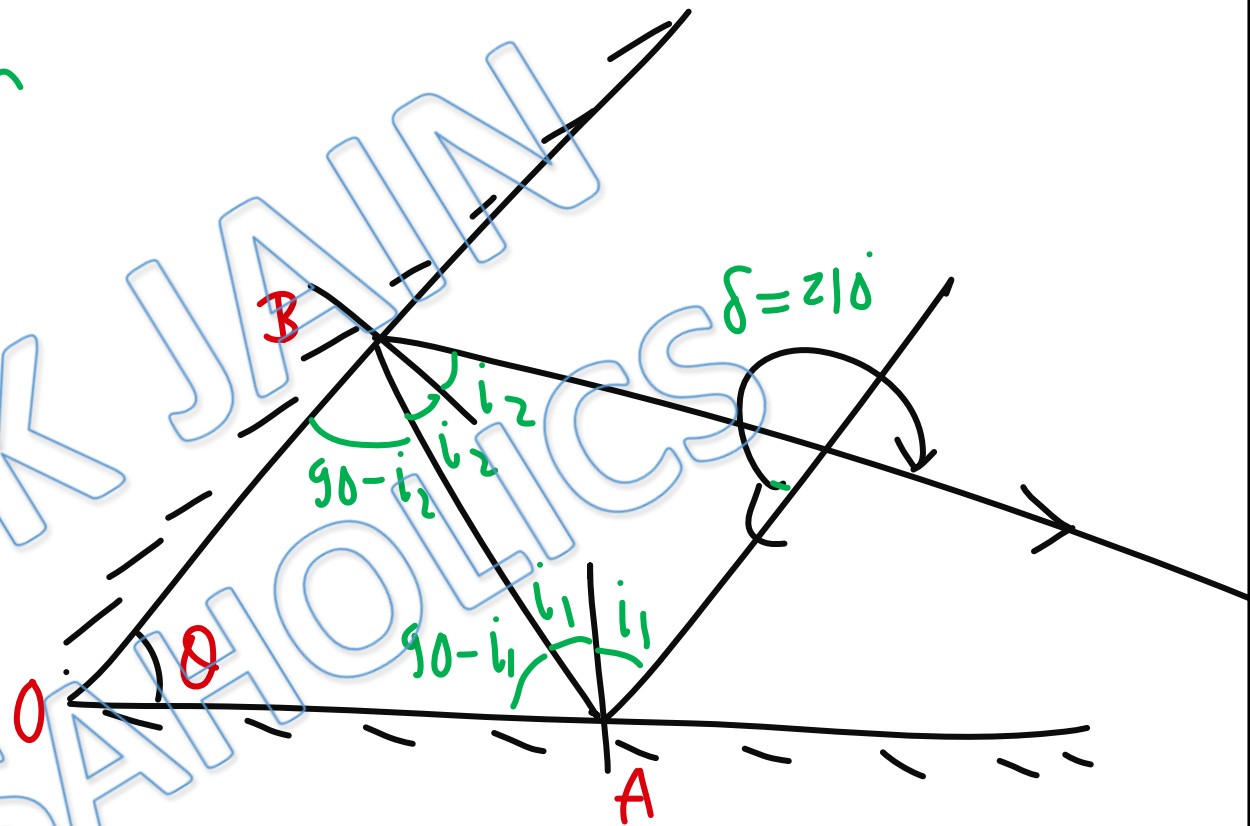$$\theta + 90 - i_1 + 90 - i_2 = 180°$$
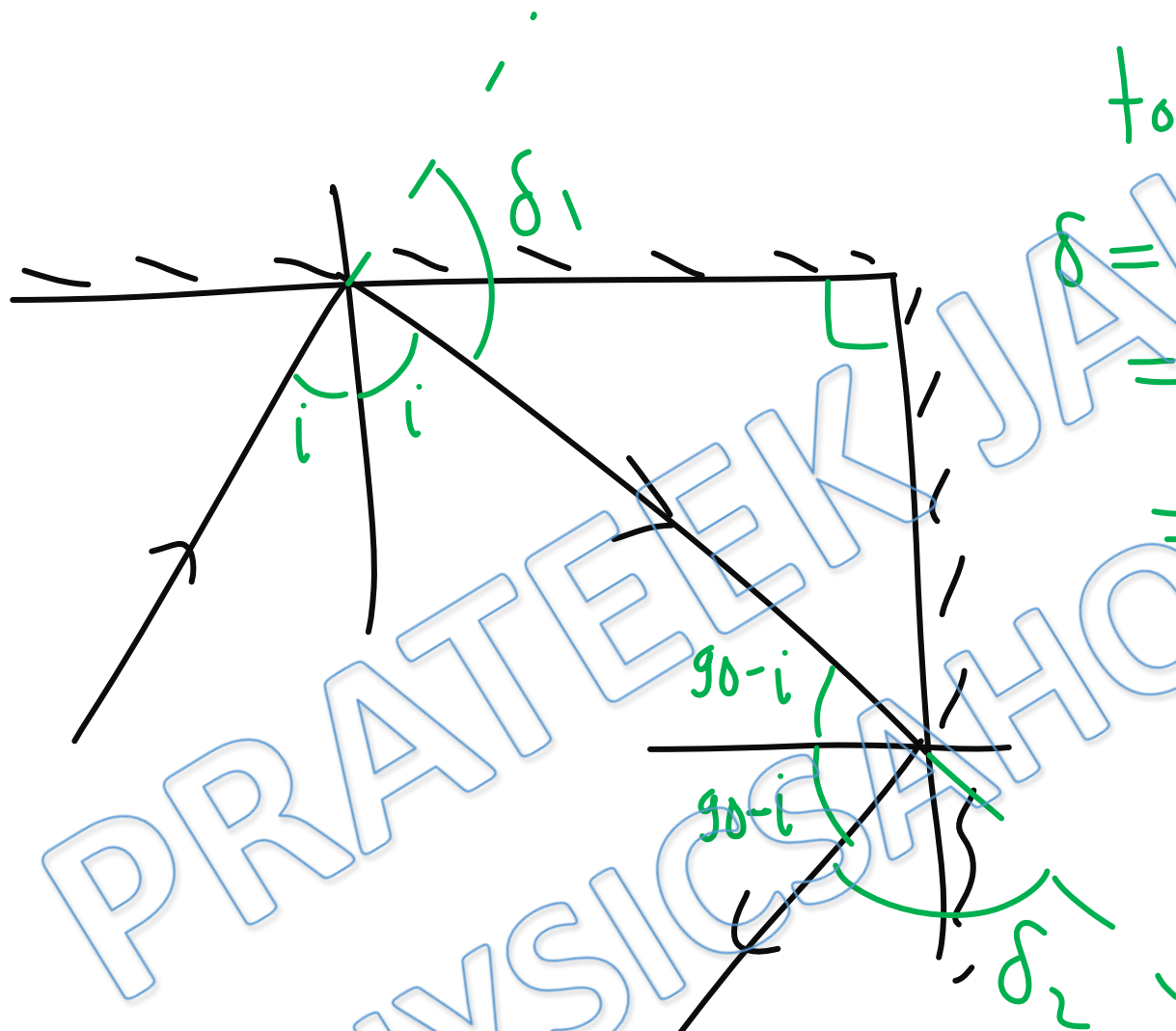
$$\Rightarrow \theta = i_1 + i_2 = 75°$$

Since $\frac{360°}{\theta} \neq$ Integer $\Rightarrow$ no. of images depends on position of object.

All Images formed by Combination of two mirrors lie on a Circle.   Ans (c)

Solution: 5

i

δ_1

i i

$90-i$

$90-i$

δ_2

total deviation

$\delta = \delta_1 + \delta_2$

$= (\pi - 2i) + \pi - 2\left(\frac{\pi}{2} - i\right)$
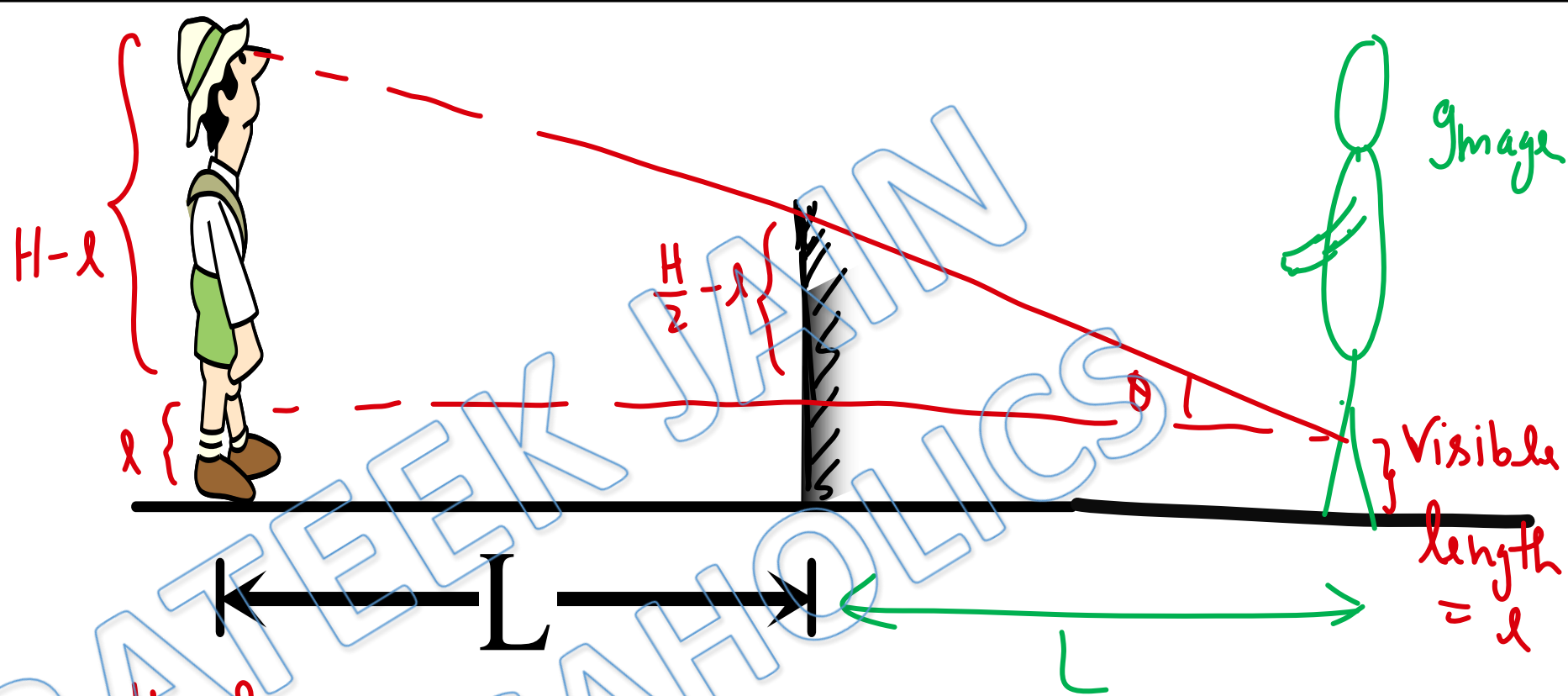
$= \pi - 2i + \pi - \pi + 2i$

$= \pi$

for all values of i; Reflected ray will be parallel to incident ray.

Ans(d)

Solution: 6

$$\tan\theta = \frac{H-\ell}{2L} = \frac{\frac{H}{2}-\ell}{L} \Rightarrow H-\ell = H-2\ell \Rightarrow 3\ell = 0 \Rightarrow \ell = 0$$
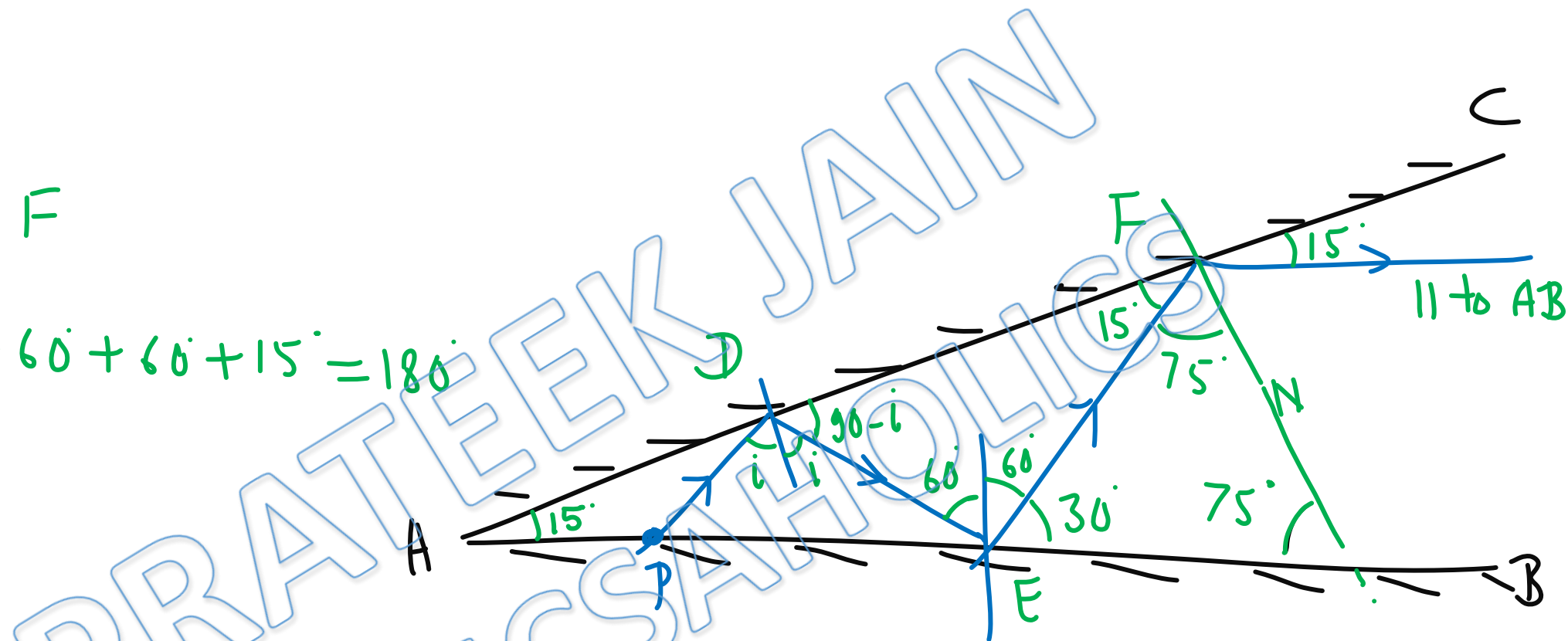
Ans (c)

Solution: 7

In $\triangle DEF$
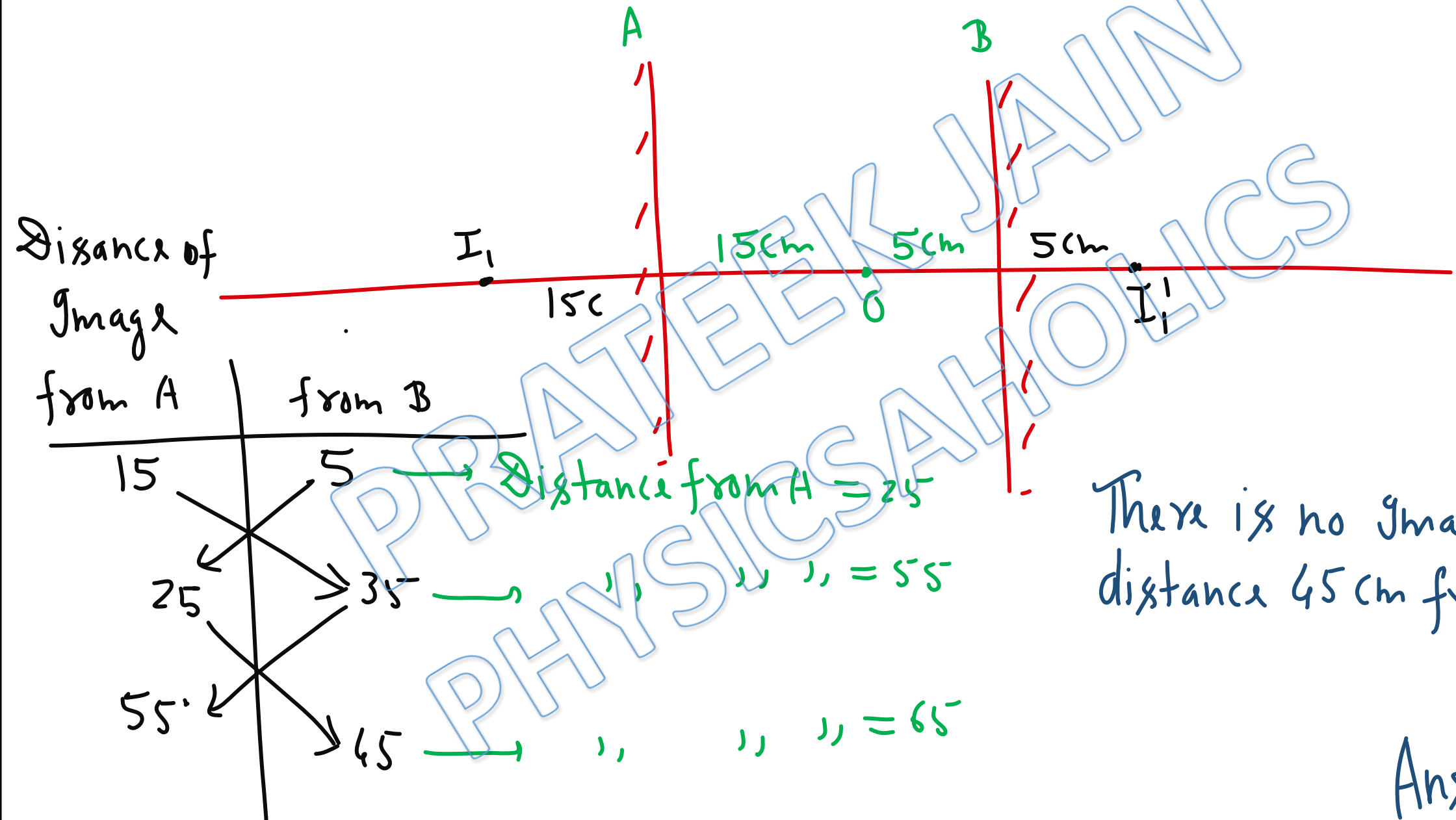
$90 - i + 60 + 60 + 15° = 180°$

$\Rightarrow i = 45°$

Ans (a)

Solution: 8

A   B

Disance of I_1 •   15cm   5cm   5cm
Image   15c   O I_1^1

from A   from B

from A	from B
15	5
25	35
55	45

→ Distance from A = 25

35 ——→ ,, ,, ,, = 55

45 ——→ ,, ,, ,, = 65

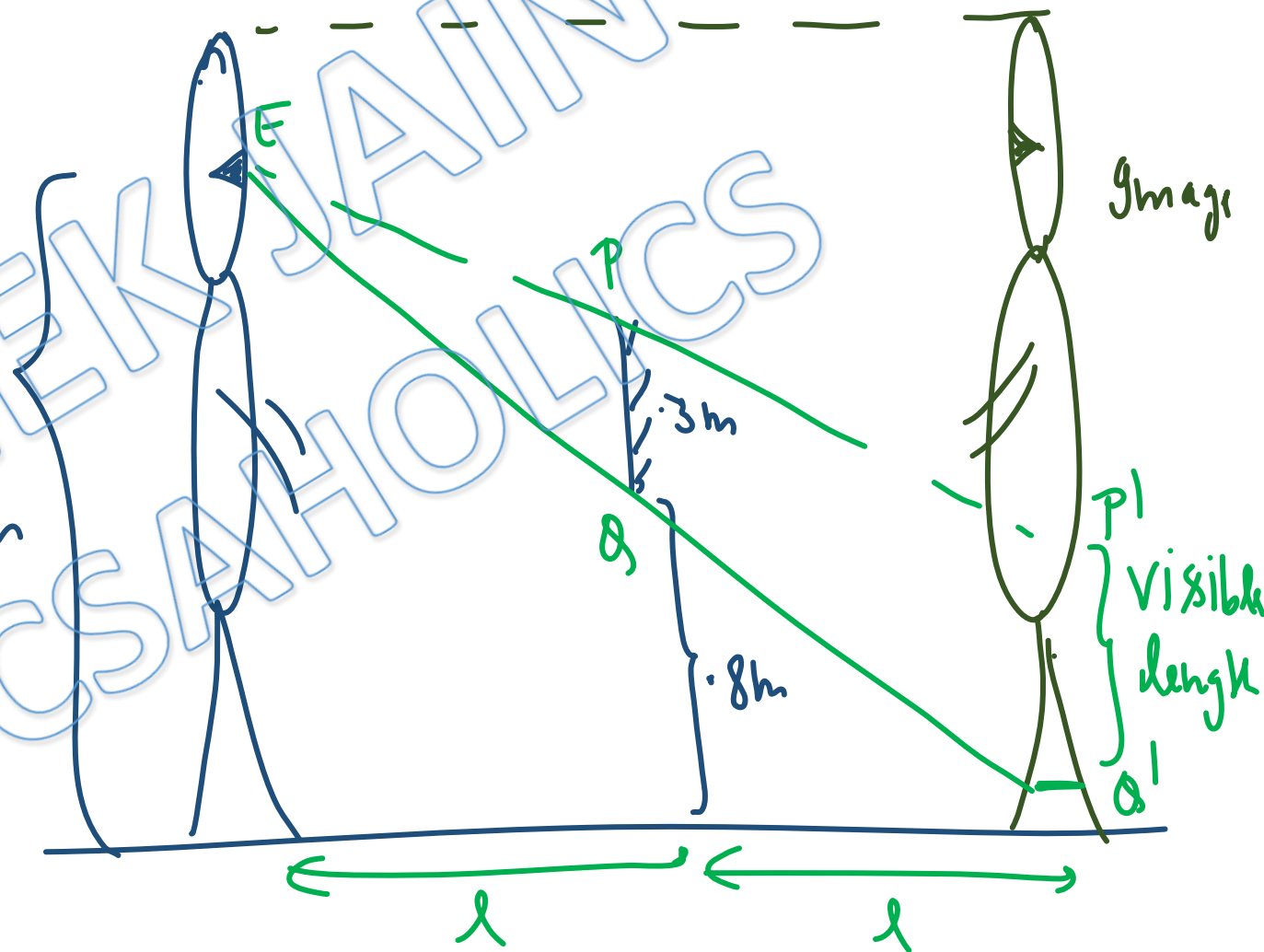There is no Image at distance 45 cm from A.

Ans (c)

Solution: 9

$\triangle EPQ$ & $\triangle EP'Q'$
are similar

$$\frac{\text{Visible length}}{.3} = \frac{2\ell}{\ell}$$

$\Rightarrow$ Visible length $= .6\,m$

Ans (d)

Solution: 10

$$\text{no of Images} = \frac{360^\circ}{\theta} - 1 = 5$$

$$\Rightarrow \theta = 60^\circ$$

$\Rightarrow$ angle between mirrors at reducing it by 30°
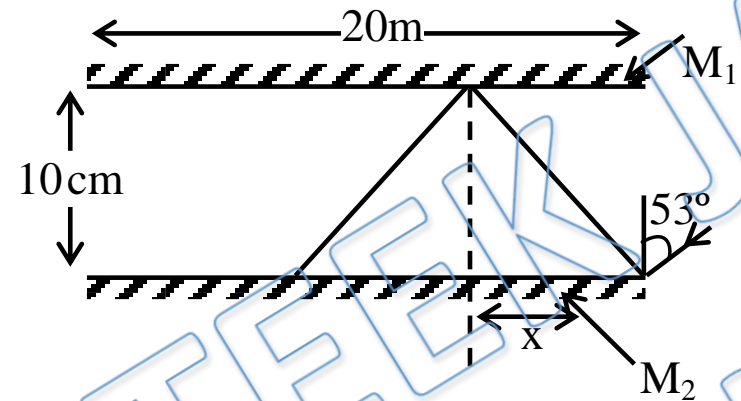
$$= 60^\circ - 30^\circ = 30^\circ$$

$\Rightarrow$ final no of images $= \frac{360^\circ}{\theta} - 1 = 12 - 1 = 1$

Ans. d

Solution: 11

After each reflection it covers a distance x along the mirror

$$\frac{x}{d} = \tan 53°$$

$$\Rightarrow \quad x = d \tan 53°$$

$$= 10 \times \frac{4}{3} \text{ cm}$$

Total no. of reflections

$$= \frac{20}{10 \times 4/3} \times 100$$

$$= 150$$

$$\therefore [C]$$

Ans. c

For Video Solution of this DPP, Click on below link

Video Solution on Website:- https://physicsaholics.com/home/courseDetails/67

Video Solution on YouTube:- https://youtu.be/C7IiT8iU2Mc

Written Solution on Website:- https://physicsaholics.com/note/notesDetalis/68

SUBSCRIBE

@Physicsaholics

@Physicsaholics_prateek

@NEET_Physics
@IITJEE_Physics

physicsaholics.com

Unacademy

CLICK

Chalo Niklo