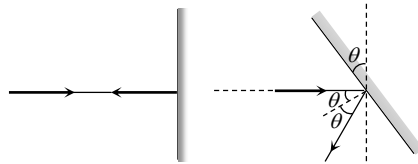
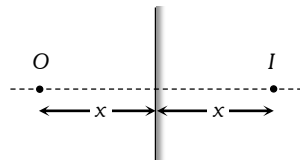


- (d) $\delta = (360 - 2\theta) = (360 - 2 \times 60) = 240^\circ$
- (c, d) By keeping the incident ray is fixed, if plane mirror rotates through an angle θ reflected ray rotates through an angle 2θ .

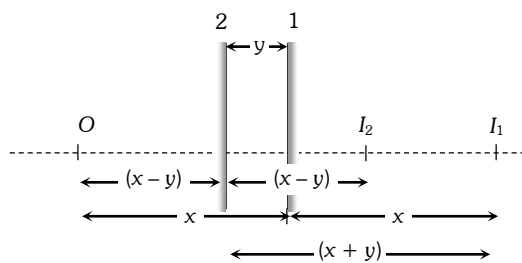


- (c) Suppose at any instant, plane mirror lies at a distance x from object. Image will be formed behind the mirror at the same distance x .

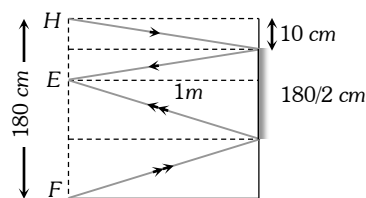


When the mirror shifts towards the object by distance 'y' the image shifts
 $= x + y - (x - y) = 2y$

So speed of image = $2 \times$ speed of mirror



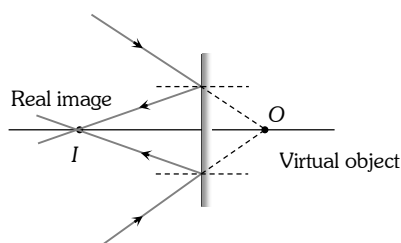
- (b) According to the following ray diagram length of mirror = $\frac{1}{2}(10 + 170) = 90\text{ cm}$



- (c) The walls will act as two mirrors inclined to each other at 90° and so will form $\left(\frac{360}{90} - 1\right) = 4 - 1$ i.e. 3 images of the person. Now these images with person will act as objects for the ceiling mirror and so ceiling mirror will form 4 images further. Therefore total number of images formed = $3 + 3 + 1 = 7$

Note : He can see. 6 images of himself.

- (b)



7. (b) $f = \frac{R}{2}$, and $R = \infty$ for plane mirror.

8. (a) $m = +\frac{1}{n} = -\frac{v}{u} \Rightarrow v = -\frac{u}{n}$

By using mirror formula $\frac{1}{f} = \frac{1}{-\frac{u}{n}} + \frac{1}{u} \Rightarrow u = -(n-1)f$

9. (c)

10. (d)

11. (b) Given $u = (f + x_1)$ and $v = (f + x_2)$

The focal length $f = \frac{uv}{u+v} = \frac{(f+x_1)(f+x_2)}{(f+x_1)+(f+x_2)}$

On solving, we get $f^2 = x_1x_2$ or $f = \sqrt{x_1x_2}$

12. (c) Plane mirror and convex mirror always forms erect images. Image formed by concave mirror may be erect or inverted depending on position of object.

13. (b) $\because m = -\frac{v}{u}$ also $\frac{1}{f} = \frac{1}{v} + \frac{1}{u} \Rightarrow \frac{u}{f} = \frac{u}{v} + 1$

$\Rightarrow -\frac{u}{v} = 1 - \frac{u}{f} \Rightarrow \frac{-v}{u} = \frac{f}{f-u}$ so $m = \frac{f}{f-u}$.

14. (b, c) Convex mirror and concave lens form virtual image for all positions of object.

15. (b) Erect and enlarged image can produced by concave mirror.

$\frac{I}{O} = \frac{f}{f-u} \Rightarrow \frac{+3}{+1} = \frac{f}{f-(-4)} \Rightarrow f = -6 \text{ cm}$

$\Rightarrow R = 2f = -12 \text{ cm}$

16. (a)

17. (c) $u = -20 \text{ cm}$, $f = +10 \text{ cm}$ also $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$

$\Rightarrow \frac{1}{+10} = \frac{1}{v} + \frac{1}{(-20)} \Rightarrow v = \frac{20}{3} \text{ cm}$; virtual image.

18. (a) Mirror formula

$\frac{1}{f} = \frac{1}{v} + \frac{1}{u} \Rightarrow \frac{1}{f} = \frac{1}{-20} + \frac{1}{(-10)} \Rightarrow f = \frac{20}{3} \text{ cm}$. If object moves towards the mirror by 0.1 cm then.

$u = (10 - 0.1) = 9.9 \text{ cm}$. Hence again from mirror formula $\frac{1}{-20/3} = \frac{1}{v'} + \frac{1}{-9.9} \Rightarrow v' = 20.4 \text{ cm}$ i.e.

image shifts away from the mirror by 0.4 cm .

19. (d) Image formed by convex mirror is always. Erect diminished and virtual.