

## DPP – 3 (Geometrical Optics)

Video Solution on Website:-

<https://physicsaholics.com/home/courseDetails/67>

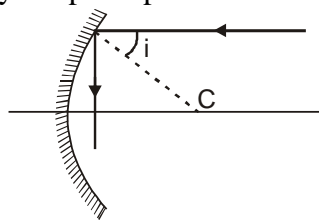
Video Solution on YouTube:-

[https://youtu.be/\\_dCTkwtZAVc](https://youtu.be/_dCTkwtZAVc)

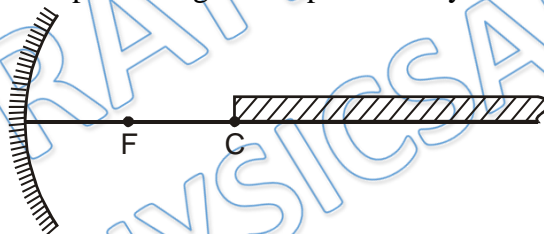
Written Solution on Website:-

<https://physicsaholics.com/note/notesDetails/68>

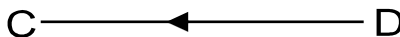
- Q 1. Angle of incidence of the incident ray for which reflected ray intersect perpendicularly the principal axis. Incident ray is parallel to principal axis.



- (a)  $0^\circ$  (b)  $30^\circ$   
(c)  $45^\circ$  (d)  $60^\circ$
- Q 2. An infinitely long rectangular strip is placed on principal axis of a concave mirror as shown in figure. One end of the strip coincides with centre of curvature as shown. The height of rectangular strip is very small in comparison to focal length of the mirror. Then the shape of image of strip formed by concave mirror is



- (a) Rectangle (b) Trapezium  
(c) Triangle (d) Square
- Q 3. A convex mirror cannot form (for real or virtual object):  
(a) real, diminished image (b) virtual, diminished image  
(c) real, enlarged image (d) virtual, enlarged image
- Q 4. AB is an incident beam of light and CD is a reflected beam (the number of reflections for this may be 1 or more than 1) of light. AB & CD are separated by some distance (may be large). It is possible by placing what type of mirror on the right side.



- (a) one plane mirror  
(b) one concave mirror  
(c) one convex mirror

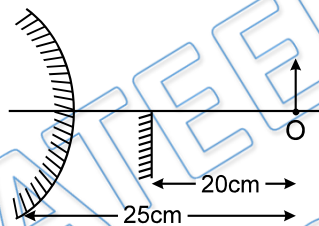
(d) none of these

- Q 5. A point object is moving along principal axis of a concave mirror with uniform velocity towards pole. Initially the object is at infinite distance from pole on right side of the mirror as shown. Before the object collides with mirror, the number of times at which the distance between object and its image is 40 cm are.



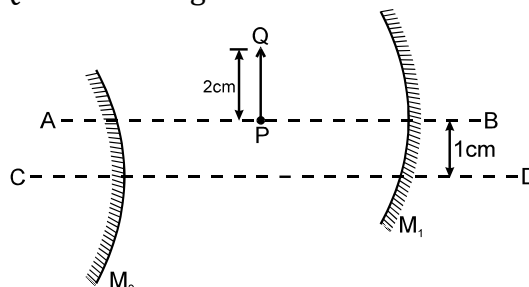
- (a) one time  
 (b) two times  
 (c) three times  
 (d) Data insufficient

- Q 6. In the figure, an object is placed at distance 25 cm from the surface of a convex mirror, and a plane mirror is set so that the image formed by the two mirrors lie adjacent to each other in the same plane. The plane mirror is placed at 20 cm from the object. What is the radius of curvature of the convex mirror?



- (a) 50 cm  
 (b) 36 cm  
 (c) 75 cm  
 (d) 90 cm

- Q 7. In the figure shown  $M_1$  and  $M_2$  are two spherical mirrors of focal length 20 cm each. AB and CD are their principal axes respectively which are separated by 1 cm. PQ is an object of height 2 cm and kept at distance 30 cm from  $M_1$ . The separation between the mirrors is 50 cm. Consider two successive reflections first on  $M_1$  then on  $M_2$ . Find the size of the 2nd image. Also find distances of end points  $P''$  and  $Q''$  of that image from the line AB

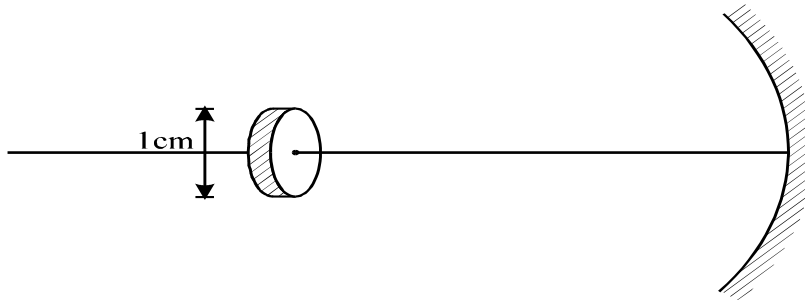


### Comprehension (Q8 to Q11)

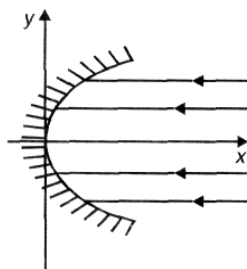
A concave mirror of radius of curvature 20 cm is shown in the figure. A circular disc of diameter 1 cm is placed on the principal axis of mirror with its plane perpendicular to the principal axis at a distance 15 cm from the pole of the mirror. The radius of disc



starts increasing according to the law  $r = (0.5 + 0.1 t)$  cm/sec where  $t$  is time in second.



- Q 8. The image formed by the mirror will be in the shape of a :
- circular disc
  - elliptical disc with major axis horizontal
  - elliptical disc with major axis vertical
  - distorted disc
- Q 9. In the above question, the area of image of the disc at  $t = 1$  second is :
- $1.2 \pi \text{ cm}^2$
  - $1.44 \pi \text{ cm}^2$
  - $1.52 \pi \text{ cm}^2$
  - none of these
- Q 10. What will be the rate at which the radius of image will be changing?
- 0.2 cm/sec increasing
  - 0.2 cm/sec decreasing
  - 0.4 cm/sec increasing
  - 0.4 cm/sec decreasing
- Q 11. The minimum distance of the real image of a real object, formed by a concave mirror of focal length ' $f$ ' from the mirror is:
- 0
  - $f$
  - $2f$
  - $4f$
- Q 12. When an object is at distance  $x_1$  and  $x_2$  from the poles of a concave mirror, images of same magnification are formed. The focal length of the mirror is
- $\frac{x_1 + x_2}{2}$
  - $\frac{x_1 - x_2}{2}$
  - $|x_1 - x_2|$
  - $|x_1 + x_2|$
- Q 13. An object is placed in front of a concave mirror of focal length  $f$ . A virtual image is formed with a magnification of 2. To obtain a real image of same magnification, the object has to move by a distance:
- $f$
  - $\frac{f}{2}$
  - $\frac{3f}{2}$
  - $\frac{2f}{3}$
- Q 14. A mirror of parabolical shape is shown. The equation of mirror surface is  $y^2 = 8x$ , rays parallel to principal axis are focussed at





(a) (2,0)

(b) (0,2)

(c) (4,0)

(d) (6,0)

Q 15. A point object lies at the center of curvature of a concave mirror. The mirror starts moving with velocity  $\vec{v}$ , then the instantaneous velocity of the image is:

(a)  $\vec{v}$

(b)  $2\vec{v}$

(c)  $-\vec{v}$

(d)  $-2\vec{v}$

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## Answer Key

Q.1 c	Q.2 c	Q.3 a	Q.4 b	Q.5 c
Q.6 c		Q.8 a	Q.9 b	Q.10 a
Q.11 b	Q.12 a	Q.13 a	Q.14 a	Q.15 b

**Q.7 Size of final image is = 8 cm, distance of  $P''$  from AB = 1 cm, distance of  $Q''$  from AB = 7 cm**