Prayas JEE (2025)

Physics

Ray Optics

DPP: 3

Q1 A luminous point object is moving along the principal axis of a concave mirror of focal length $12\ \text{cm}$ towards it. When its distance from the mirror is $20\ \text{cm}$ its velocity is $4\ \text{cm/s}$.

The velocity of the image in cm/s at that instant is

(A) 6 , towards the mirror
(B) 6 , away from the mirror
(C) 9 , away from the mirror
(D) 9 , towards the mirror.

Q2 A particle is moving towards a fixed spherical mirror. The image:

(A) must move away from the mirror
(B) must move towards the mirror
(C) may move towards the mirror
(D) will move towards the mirror, only if the mirror is convex.

Q3 A point object on the principal axis at a distance 15 cm in front of a concave mirror of radius of curvature $20\ \text{cm}$ has velocity $2\ \text{mm/s}$ perpendicular to the principal axis. The magnitude of velocity of image at that instant will be:

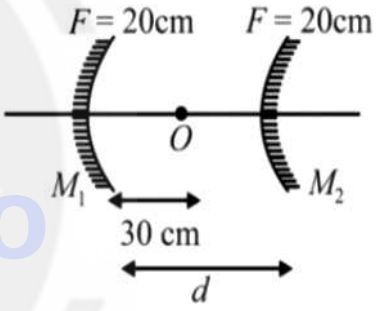
(A) $2\ \text{mm/s}$
(B) $4\ \text{mm/s}$
(C) $8\ \text{mm/s}$
(D) $16\ \text{mm/s}$

Q4 Which of the following statements is correct?

i. A convex mirror can form a real image
ii. A convex mirror can form a virtual image
iii. A concave mirror can form a real image
iv. A concave mirror can form a virtual image

(A) i, ii, iii, iv
(B) ii, iii, iv
(C) ii, iii
(D) only iv

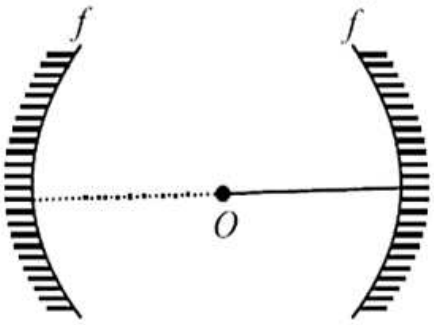
Q5 In the figure shown, O is the object at a distance of $30\ \text{cm}$ from M_1. If the image coincides with the object after two reflections, one from each mirror, find the distance between the two mirrors.



(A) $40\ \text{cm}$
(B) $60\ \text{cm}$
(C) $100\ \text{cm}$
(D) $50\ \text{cm}$

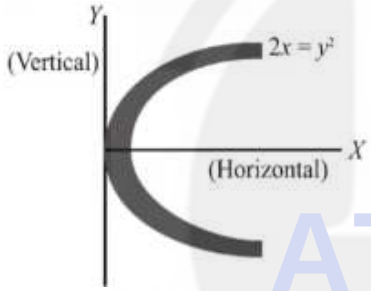
Q6 A point source S is placed midway between two concave mirrors having equal focal lengths f each as shown. The values of d for which the source and its image coincide are:

i. f ii. $2f$
iii. $3f$ iv. $4f$



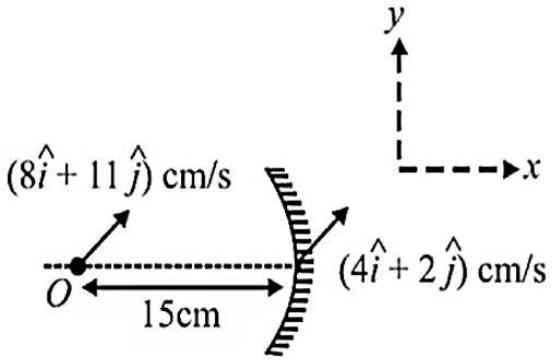
(A) i, ii (B) ii, iii
(C) ii, iv (D) i, iv

Q7 The reflecting surface is represented by the equation $2x = y^2$ as shown in fig. A ray travelling horizontal becomes vertical after reflection. The co-ordinates of the point of incidence are :



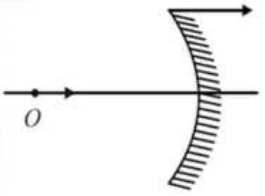
(A) $(1/2, 1)$
(B) $(1, 1/2)$
(C) $(1/2, 1/2)$
(D) $(3/2, 2)$

Q8 A point object is located at a distance $15\ \text{cm}$. from the pole of a concave mirror of focal length $10\ \text{cm}$ on its principal axis is moving with a velocity $(8\hat{i} + 11\hat{j})\text{cm/s}$ and velocity of mirror is $(4\hat{i} + 2\hat{j})\ \text{cm/s}$ as shown. If $\vec{v}$ is the velocity of image. Then find the value of $|\vec{v}|$ in (cm/s).



(A) 24 (B) 30
(C) 10 (D) 40

Q9 An object kept on the principle axis is moving in the same directions as that of mirror as shown in figure.Speed of object and mirror is $10\ \text{m/s}$ and $\frac{40}{13}\ \text{m/s}$.Radius of the curvature of the mirror is $20\ \text{cm}$. What should be the distance of object from the mirror at this instant so that the image is stationary?



(A) $25\ \text{cm}$
(B) $45\ \text{cm}$
(C) $37.5\ \text{cm}$
(D) $15\ \text{cm}$

Answer Key

Q1	C
Q2	C, D
Q3	B
Q4	A
Q5	D
Q6	C
Q7	A
Q8	A
Q9	A

Android App | iOS App | PW Website