PHYSICS

DPP No. : 09

SCQ (Single Correct Type) :

1. A particle is projected at angle 60° with speed $10\sqrt{3}$, from the point ' A ' as shown in the fig. At the same time the wedge is made to move with speed $10\sqrt{3}$ towards right as shown in the figure. Then the time after which particle will strike with wedge is (g = 10 m/sec²) :
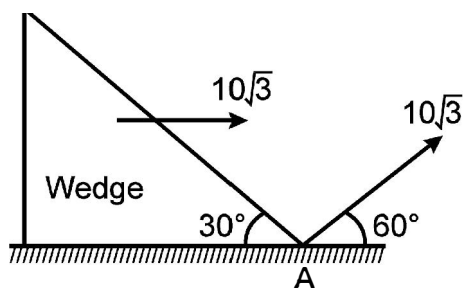

    (A) 2 sec   (B) $2\sqrt{3}$ sec   (C) $\dfrac{4}{\sqrt{3}}$ sec   (D) none of these

2. Two plane mirrors are inclined at 70°. 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) 50°   (B) 45°   (C) 30°   (D) 55°

3. An object moves in front of a fixed plane mirror. The velocity of the image of the object is
    (A) Equal in the magnitude and in the direction to that of the object.
    (B) Equal in the magnitude and opposite in direction to that of the object.
    (C) Equal in the magnitude and the direction will be either same or opposite to that of the object.
    (D) Equal in magnitude and makes any angle with that of the object depending on direction of motion of the object.

4. 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.

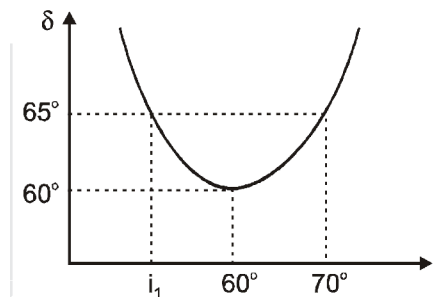   (A) one time   (B) two times   (C) three times   (D) Data insufficient

5. Angle of incidence of the incident ray for which reflected ray intersect perpendicularly the principal axis.
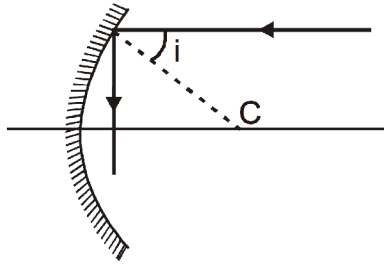
(A) $0°$ (B) $30°$ (C) $45°$ (D) $60°$

MCQ (One or more than one correct) :

6. The angle of deviation (δ) vs angle of incidence (i) is plotted for a prism. Pick up the correct statements.

(A) The angle of prism is $60°$

(B) The refractive index of the prism is $n = \sqrt{3}$

(C) For deviation to be $65°$ the angle of incidence $i_1 = 55°$

(D) The curve of 'δ' vs 'i' is parabolic

COMPREHENSION

An extended object of size 2 cm is placed at a distance of d (cm) in medium (refractive index n = 3) from pole, on the principal axis of a spherical curved surface. The medium on the other side of refracting surface is air (refractive index n = 1).
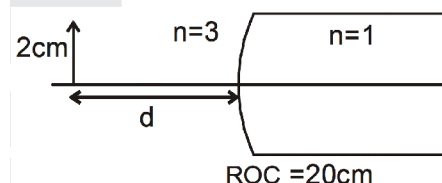
7. For d = 20 cm, the distance of the image from the pole is
(A) 2 cm   (B) 3 cm   (C) 4 cm   (D) 5 cm

8. For d = 20 cm, The size of image is

(A) $\dfrac{1}{6}$ cm   (B) $\dfrac{2}{15}$ cm   (C) $\dfrac{6}{5}$ cm   (D) $\dfrac{3}{2}$ cm

Numerical based Questions :

9. A bullet is fired with speed 50 m/s at 45° angle find the height of the bullet when its direction of motion makes angle 30° with the horizontal.

10. A point source S is centered in front of a 70 cm wide plane circular mirror. A man starts walking from the source along a line parallel to the mirror in a single direction. Maximum distance that can be walked by man without losing sight of the image of the source is _____ cm.

Match The Column :

11. Four particles are moving with different velocities in front of stationary plane mirror (lying in y-z plane). At t = 0, velocity of A is $\vec{v}_A = \hat{i}$, velocity of B is $\vec{v}_B = -\hat{i} + 3\hat{j}$, velocity of C is $\vec{v}_C = 5\hat{i} + 6\hat{j}$, velocity of D is $\vec{v}_D = 3\hat{i} - \hat{j}$. Acceleration of particle A is $\vec{a}_A = 2\hat{i} + \hat{j}$ and acceleration of particle C is a $\vec{a}_C = 2t\hat{j}$. The particle B and D move with uniform velocity (Assume no collision to take place till t = 2 seconds). All quantities are in S.I. Units. Relative velocity of image of object A with respect to object A is denoted by $\vec{V}_{A',A}$. Velocity of images relative to corresponding objects are given in column I and their values are given in column II at t = 2 second. Match column I with corresponding values in column II.

Column I	Column II
(A) $\vec{V}_{A',A}$	(p) $2\hat{i}$
(B) $\vec{V}_{B',B}$	(q) $-6\hat{i}$
(C) $\vec{V}_{C',C}$	(r) $-12\hat{i} + 4\hat{j}$
(D) $\vec{V}_{D',D}$	(s) $-10\hat{i}$

ANSWER KEY OF DPP NO. : 09

1.	(A)	2.	(A)	3.	(D)	4.	(C)	5.	(C)	6.	(ABC)	7.	(C)

8. (C) 9. $h = \dfrac{125}{3}$ m above point of projection   10. (70 cm)

11. (A) s, (B) p, (C) s, (D) q