PHYSICS

TARGET : JEE-2024 **Maximum Time : 50 Min.**

DPP No. : 08

1. A particle is projected up the incline such that its component of velocity along the incline is 10 m/s. Time of flight is 2 sec and maximum height above the incline is 5 m. Then velocity of projection will be:

(A) 10 m/s (B) $10\sqrt{2}\,m/s$ (C) $5\sqrt{5}\,m/s$ (D) None

2. A pebble is thrown horizontally from the top of a 20 m high tower with an initial velocity of 10 m/s. The air drag is negligible. The speed of the pebble when it is at the same distance from top as well as base of the tower ($g = 10\ m/s^2$)

(A) $10\sqrt{2}\,m/s$ (B) $10\sqrt{3}\,m/s$ (C) 20 m/s (D) 25 m/s

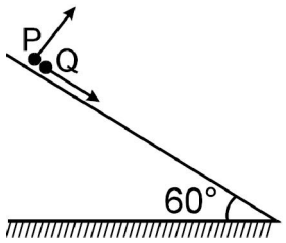
3. A ball is projected with velocity u at right angle to the slope which is inclined at an angle α with the horizontal. The distance 'x' along the inclined plane that it will travel before striking the slope is -

(A) $\frac{2u^2}{g}\cos\alpha$ (B) $\frac{2u^2}{g}\tan\alpha$ (C) $\frac{2u^2}{g}\frac{\tan\alpha}{\cos\alpha}$ (D) $\frac{2u^2}{g}\frac{\tan\alpha}{\sin\alpha}$

4. A stone projected at angle 'θ' with horizontal from the roof of a tall building falls on the ground after three second. Two second after the projection it was again at the level of projection. Then the height of the building, is ($g = 10m/s^2$)–

(A) 5 m (B) 25 m (C) 20 m (D) 15 m

5. A particle P is projected from a point on the surface of long smooth inclined plane (see figure). Simultaneously another particle Q is released on the smooth inclined plane from the same position. P and Q collide after t = 4 second. The speed of projection of P is



(A) 5 m/s (B) 10 m/s (C) 15 m/s (D) 20 m/s

6. A ball is thrown from bottom of an incline plane at an angle α from the inclined surface up the plane. Another ball is thrown from a point on the inclined plane with same speed and at same angle α from the inclined surface down the plane. If in the two cases, maximum height attained by the balls with respect to the inclined surface during projectile motion are h_1 and h_2 then :

(A) $h_1 > h_2$ (B) $h_1 < h_2$
(C) $h_1 = h_2$ (D) All the three can be possible

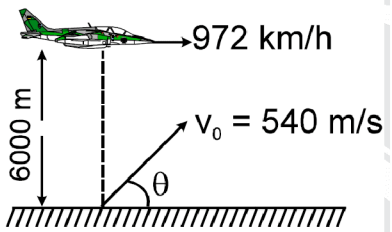
7. Three particles, A, B and C are projected from ground from the same point with same initial speeds making angles 30°, 45° and 60° respectively with the horizontal. Which of the following statement is correct-
(A) A, B and C have unequal ranges
(B) Ranges of A and C are equal and less than that of B
(C) Ranges of A and C are equal and greater than that of B
(D) A, B and C have equal ranges

8. A particle is projected from a point on ground with initial speed of 10 m/sec at an angle of 37° with the horizontal. At the same instant a fly starts flying on the same path of particle with constant speed of 10 m/s Then :
(A) time taken by fly to complete whole path is less then time taken by particle
(B) acceleration of fly is zero
(C) average velocity of both are same for whole journey
(D) None of these

9. A ball is thrown upward at an angle 30° to the horizontal and lands on the top edge of a building that is 20 m away and 5m high. How fast was the ball thrown ($g = 10 m/s^2$).
(A) 10 m/s (B) 20 m/s (C) 40 m/s (D) 80 m/s

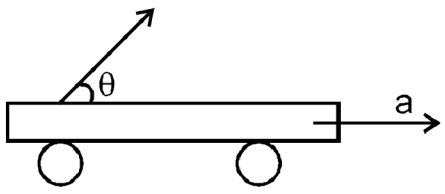
10. A particle starts from the origin at t = 0 and moves in the x-y plane with constant acceleration a in the y direction. Its equation of motion is $y = bx^2$. The x component of its velocity is :
(A) variable (B) $\sqrt{\frac{2a}{b}}$ (C) $\frac{a}{2b}$ (D) $\sqrt{\frac{a}{2b}}$

11. An aircraft moving with a speed of 972 km/h is at a height of 6000 m, just overhead of an anti-aircraft gun. If the muzzle velocity of the gun is 540 m/s, the firing angle θ for the bullet to hit the aircraft should be



(A) 73° (B) 30° (C) 60° (D) 45°

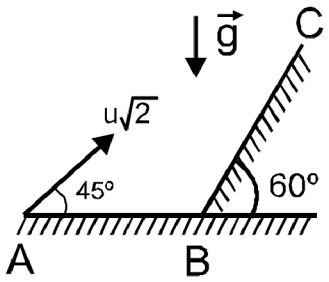
12. A platform is pulled with a constant acceleration a. A particle is projected from the platform at angle θ with the horizontal with respect to the platform as shown in the figure. The value of $\tan\theta$ such that particle again come to the starting point on the platform is ($a = 5 m/s^2$): use $g = 10 m/s^2$



(A) 4 (B) 6 (C) 2 (D) 3

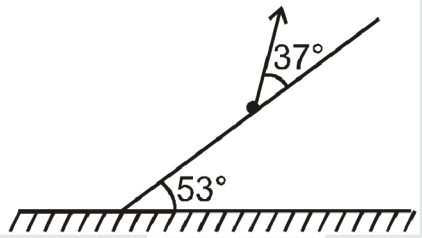
13. The vertical height of the projectile at time t is given by $y = 4t - 5t^2$ and the horizontal distance covered is given by $x = 3t$. What is the angle of projection with the horizontal?
(A) $\tan^{-1} 3/5$ (B) $\tan^{-1} 4/5$ (C) $\tan^{-1} 4/3$ (D) $\tan^{-1} 3/4$

14. A particle is projected from point 'A' with velocity $u\sqrt{2}$ at an angle of 45° with the horizontal as shown in the figure. It strikes the inclined plane BC at right angle. The velocity of the particle just before the collision with the inclined is :



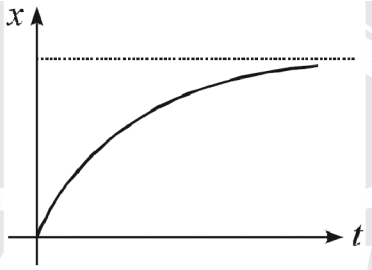
(A) $\frac{\sqrt{3}u}{2}$ (B) $\frac{u}{2}$ (C) $\frac{2u}{\sqrt{3}}$ (D) u

15. A particle is projected from the inclined plane at angle 37° with the inclined plane in upward direction with speed 10 m/s. The angle of inclined plane with horizontal is 53°. Then the maximum height attained by the particle from the incline plane will be-



(A) 3m (B) 4 m (C) 5 m (D) zero

16. Variation of displacement x of a particle moving on a straight line with time t is shown in following figure. **The figure indicates :**

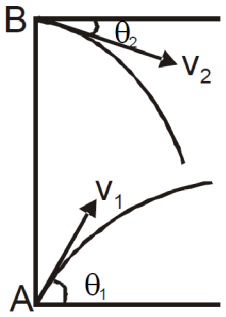


(A) the particle starts with a certain speed but the motion is retarded
(B) the velocity of particle is constant throughout motion
(C) the acceleration of the particle is constant throughout motion
(D) the particle starts with certain speed and moves with increasing speed .

17. A body dropped from the top of a tower covers 7/16 of the total height in the last second of its fall. The time of fall is

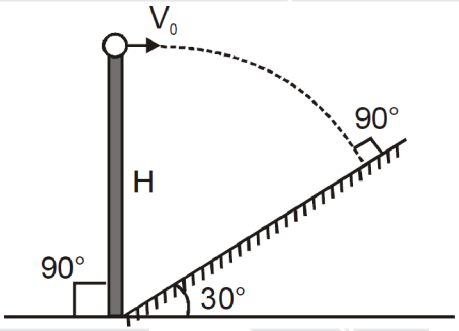
(A) 2 sec (B) 4 sec (C) 1 sec (D) $\left(\frac{50}{7}\right)$sec

18. Two balls are projected from points A and B in vertical plane as shown in Fig. AB is a straight vertical line. The balls can collide in mid air if v_1/v_2 is equal to :



(A) $\frac{\sin\theta_1}{\sin\theta_2}$ (B) $\frac{\sin\theta_2}{\sin\theta_1}$ (C) $\frac{\cos\theta_1}{\cos\theta_2}$ (D) $\frac{\cos\theta_2}{\cos\theta_1}$

19. In fig. the angle of inclination of the inclined plane is 30°. Find the horizontal velocity V_0 so that the particle hits the inclined plane perpendicularly.



(A) $V_0 = \sqrt{\frac{2gH}{5}}$ (B) $V_0 = \sqrt{\frac{2gH}{7}}$ (C) $V_0 = \sqrt{\frac{gH}{5}}$ (D) $V_0 = \sqrt{\frac{gH}{7}}$

20. A train is standing on a platform, a man inside a compartment of a train drops a stone . At the same instant train starts to move with constant acceleration. The path of the particle as seen by the person who drops the stone is :

(A) parabola
(B) straight line for sometime & parabola for the remaining time
(C) straight line
(D) variable path that cannot be defined

ANSWER KEY OF DPP NO. : 08

1.	(D)	**2.**	(B)	**3.**	(C)	**4.**	(D)	**5.**	(B)	**6.**	(C)	**7.**	(B)
8.	(A)	**9.**	(B)	**10.**	(D)	**11.**	(C)	**12.**	(C)	**13.**	(C)	**14.**	(C)
15.	(A)	**16.**	(A)	**17.**	(B)	**18.**	(D)	**19.**	(A)	**20.**	(C)		