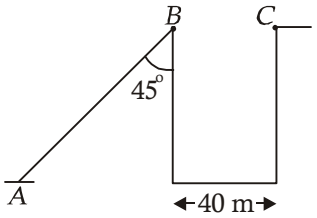
1. Which of the following is largest, when the height attained by the projectile is a maximum ?

(A) Range (B) Time of flight

(C) Angle of projectile with the vertical (D) None of these

2. A body is projected up a smooth inclined plane with velocity V from the point A as shown in the figure. The angle of inclination is 45° and the top is connected to a well of diameter 40 m. If the body just manages to cross the well, what is the value of V ? Length of inclined plane is $20\sqrt{2}$m.



(A) 40 ms^{-1} (B) $40\sqrt{2}$ ms^{-1} (C) 20 ms^{-1} (D) $20\sqrt{2}$ ms^{-1}

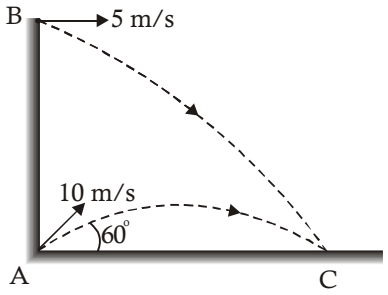
3. A particle has an initial velocity of $\left(3\hat{i}+4\hat{j}\right)$m/s and a constant acceleration of $\left(4\hat{i}-3\hat{j}\right)$m/s^2. Its speed after one second will be equal to

(A) 0 (B) 10 m/sec (C) $5\sqrt{2}$ m/sec (D) 25 m/sec

4. A ball rolls off the top of a staircase with a horizontal velocity u ms^{-1}. If the steps are h m high and w m wide the ball will hit the edge of the n^{th} step if

(A) $n=\frac{gw^2}{2hu^2}$ (B) $n=\frac{2hu^2}{gw^2}$ (C) $n=\frac{2u^2}{gw^2h}$ (D) $n=\frac{2hw^2u^2}{g}$

5. A particle A is projected from the ground with an initial velocity of 10 m/s at an angle of 60° with horizontal. From what height h should an another particle B be projected horizontally with velocity 5 m/s so that both the particles collide on the ground at the point C, assuming that both are projected simultaneously (g = 10 m/s^2)



(A) 10 m (B) 30 m (C) 15 m (D) 25 m

6. Select the correct alternative(s)

(A) In a projectile motion, H/R ratio is equal to (1/4) tanθ

(B) For angles of projection, which exceed or fall short of 45° by equal amounts, the ranges are equal.

(C) In projectile motion, velocity at initial and final points are same.

(D) None of these

7. **Assertion** : When a body is projected at an angle α with vertical and then for the same angle with horizontal, the range is same

Reason : For oblique projection range, $R = \frac{u^2 \sin^2 \alpha}{2g}$ with usual notations.

(A) If both assertion and reason are true and reason is a correct explanation of the assertion.

(B) If both assertion and reason are true but the reason is not a correct explanation of assertion.

(C) If assertion is true but reason is false.

(D) Both assertion and reason are false.

8. **Assertion** : A massy particle is under oblique projection the slope of the path adopted is a straight line having +ve, 0 and –ve values.

Reason : Equation of motion is $y = x\tan\theta - \frac{gx^2}{2u^2\cos^2\theta}$ with notations having usual meaning

(A) If both assertion and reason are true and reason is a correct explanation of the assertion.

(B) If both assertion and reason are true but the reason is not a correct explanation of assertion.

(C) If assertion is true but reason is false.

(D) Both assertion and reason are false.

9. A ball is thrown with a velocity of $7\sqrt{2}$ m/s at an angle to $45°$ with the horizontal. It just clears two vertical poles of height 90 cm each. Find the separation between the poles (g = 9.8 m/s).

10. At what angle should a body be projected with a velocity 24 m/s just to pass over an obstacle 16m high at a horizontal distance of 32 m ? (Assume g = 10m/s^2)

11. A food packet is dropped from the plane moving horizontally with velocity 50 ms^{-1} and at a height of 500 m. Find the angle with horizontal which the velocity vector makes at the time when it reaches the ground. Neglect air resistance

(A) $\tan^{-1}(-2)$ (B) $\tan^{-1}(1/2)$ (C) $-45°$ (D) $53°$

12. Figure shows a still photograph from a war movie. Bombs have been dropped from the plane B-52 at regular intervals. Air plane moves with constant speed in horizontal direction. Which figure may be true still photograph. [Assume that there is no wind] :-

(A)  (B)  (C)  (D) 

13. A particle is projected with a velocity u, at an angle α, with the horizontal. At what time its vertical component of velocity becomes half of its net speed at the highest point ?

(A) $\frac{u}{2g}$ (B) $\frac{u}{2g}(\sin\alpha - \cos\alpha)$

(C) $\frac{u}{2g}(2\cos\alpha - \sin\alpha)$ (D) $\frac{u}{2g}(2\sin\alpha - \cos\alpha)$

14. A body is thrown with velocity 20 m/s at an angle of 60° with the horizontal. Find the time gap between the two positions of body where velocity of body makes an angle of 30° with horizontal

(A) 1.15 sec (B) 0.95 sec (C) 1 sec. (D) 1.5 sec.

Answers

RACE # 12

1. (B) **2.** (D) **3.** (C) **4.** (B) **5.** (C) **6.** (AB) **7.** (C) **8.** (A) **9.** 8 m

10. $\tan^{-1}(3)$ & $\tan^{-1}\frac{3}{5}$ **11.** (A) **12.** (C) **13.** (D) **14.** (A)