

Class – XI

Chapter – Vector

Date - 29.06.20

Topic – Projectile motion

Choose the correct option for the following questions.

 $1 \times 15 = 15$ 

- 1. The quantity that remains constant throughout the projectile motion of a particle is
  - a. The velocity of the particle
  - b. The kinetic energy of the particle
  - c. The vertical component of velocity of the particle
  - d. The horizontal component of velocity of the particle Ans: d. The horizontal component of velocity of the particle
- 2. A ball is projected with a velocity of 20m/s making an angle with the horizontal direction to have the maximum range. Its velocity at the highest point must be
  - a. 10m/s
  - b. 14m/s
  - c. 18m/s
  - d. 16m/s
    - Ans: b. 14m/s
- 3. Two bodies are thrown with same initial velocity at angles  $\theta$  and  $(90 \theta)$  respectively with the horizontal. their maximum heights are in the ratio
  - a. 1:1
  - b.  $sin\theta : cos\theta$
  - c.  $\sin^2 \theta : \cos^2 \theta$
  - d.  $cos\theta$ :  $sin\theta$ Ans: c.  $sin^2\theta$  :  $cos^2\theta$
- 4. A gun is firing bullets with velocity  $v_0$  by rotating through 360° in horizontal plane. The maximum area covered by the bullets is
  - a.  $\frac{\pi v_0^2}{g}$ b.  $\frac{\pi^2 v_0^2}{g}$ c.  $\frac{\pi v_0^4}{g^2}$ d.  $\frac{\pi^2 v_0^4}{g}$ Ans: c.  $\frac{\pi^2 v_0^4}{g}$
- 5. A body is projected at an angle  $60^{\circ}$  with the horizontal with kinetic energy K. When the velocity vector makes an angle  $30^{\circ}$  with the horizontal, the kinetic energy of the body will be
  - a. K/2
  - b. K/3
  - c. 2K/3
  - d. 3K/4

Ans: b. K/3

- 6. The range of a projectile at an angle  $\theta$  is equal to half of the maximum range if thrown with same initial velocity. The angle of projection  $\theta$  is –
  - a. 15°
  - b. 30°
  - c. 60°
  - d. None of these

Ans: a. 15°

- 7. If  $T_1$  and  $T_2$  are the times of flight for two complementary angles, then the range of the projectile R is
  - a.  $4gT_1T_2$
  - b.  $2gT_1T_2$
  - c.  $\frac{1}{4} gT_1T_2$
  - d.  $\frac{1}{2}gT_1T_2$

Ans: d.  $\frac{1}{2} gT_1T_2$ 

- 8. A grass hopper can jump maximum distance of 1.6m. It spends negligible time on ground. How far can it go in  $10\sqrt{2}$  sec?
  - a. 45m
  - b. 30m
  - c. 20m
  - d. 40m
    - Ans: d. 40m
- 9. A train is moving on a track at 30m/s. A ball thrown from it perpendicular to the direction of motion at 30m/s at 45° with horizontal. Find the distance of the ball from the point of projection on train to the point where it strikes the ground.
  - a. 90m
  - b.  $90\sqrt{3}m$
  - c. 60m
  - d.  $60\sqrt{3}m$

<mark>Ans: a. 90 m</mark>

- 10. Two bodies are projected from the same point with same initial speed at angles  $(45^\circ \theta)$  and  $(45^\circ + \theta)$  respectively. The ratio of their ranges will be
  - a. 2:1
  - b. 1:1
  - c. 2:3
  - d. 1:2

Ans: b. 1:1

- 11. For a projectile, the range R and the maximum height H are related by the relation  $R^2 = 48H^2$ . What is the angle of projection for this motion?
  - a. 15°
  - b. 30°
  - c. 60°
  - d. None of these

<mark>Ans: b. 30°</mark>

- 12. The range of a projectile when fired at 75° to the horizontal is 0.5 km. what will be its range when fired at 45° with horizontal at same initial speed?
  - a. 0.5km
  - b. 1km
  - c. 1.5km
  - d. 2km

Ans: b. 1km

- 13. A particle is projected making an angle  $\theta$  with the horizontal with an initial speed u. At any instant, its velocity  $\vec{v}$  is at right angle to its initial velocity. Then magnitude of  $\vec{v}$  is
  - а. *и соѕθ*
  - b.  $u tan \theta$
  - с. *u cotθ*
  - d. *u secθ* 
    - <mark>Ans: a. *u cosθ*</mark>
- 14. The speed of a projectile at its maximum height is  $\frac{\sqrt{3}}{2}$  times the initial speed u. The range of the projectile is
  - a.  $\frac{\sqrt{3}u^2}{2g}$ <br/>b.  $\frac{u^2}{2g}$ <br/>c.  $\frac{3u^2}{2g}$ <br/>d.  $\frac{3u^2}{g}$ <br/>Ans: a.  $\frac{\sqrt{3}u^2}{2g}$
- 15. A ball is thrown at an angle  $\theta$  with the horizontal and the range becomes maximum. Then the value of  $tan\theta$  is
  - a. 1
  - b.  $\sqrt{3}$
  - c.  $\frac{1}{\sqrt{3}}$
  - d.  $2^{\sqrt{3}}$

Ans: a. 1

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