INDUS RANGERS INSTITUTE PVT. LTD.

Projectile Motion

1.A man standing at the top of a tower has two spheres A and B .He drops sphere A down wards and throws sphere B horizontally at the same time. Which of the following is correct?
(a)Both the sphere will reach the ground simultaneously
(b) A will reach the ground first
(c)B will reach the ground first
(d)The question is incomplete because the masses of the sphere are not given

2.If the horizontal range of a projectile is four times its maximum height, the angle of projection is
(a)30 (b)45 (c)$sin^{-1}\left(\frac{1}{4}\right)$ (d)$tan^{-1}\left(\frac{1}{4}\right)$

3.The height y and the horizontal distance x of a projectile on a certain planet are given by y= 8t-5t^2 and x=6t meters where t is in seconds .The velocity of projection is
(a)6m/s (b)8m/s (c)10m/s (d)not obtainable from the data

4.In previous Q, the angle of projection is
(a)$tan^{-1}\left(\frac{3}{4}\right)$ (b)$tan^{-1}\left(\frac{4}{3}\right)$ (c)$sin^{-1}\left(\frac{3}{4}\right)$
(d)Not obtainable from the data

5.In Q.3, the acceleration due to gravity of the planet is
(a)2.5m/s^2 (b)5m/s^2
(c)10m/s^2 (d)20m/s^2

6.The speed of a projectile at the maximum height is half of its initial speed u. Its horizontal range is
(a) $\frac{u^2}{\sqrt{3g}}$ (b)$\frac{2u^2}{\sqrt{3g}}$ (c)$\frac{\sqrt{3u^2}}{2g}$ (d)$\frac{\sqrt{3u^2}}{g}$

7.The maximum range of a gun on a horizontal terrain is 16km.The muzzle velocity of the shell is (g=10m/s^2)
(a)200m/s (b)256m/s (c)400m/s (d)800 m/s

8.The range of a projectile when launched at an angle of 15° with the horizontal is 1.5 km. Its range ,when launched at 45°,with the same speed , is
(a)0.75km (b)1.5km (c)3.0 km (d)6.0km

9.It is possible to project a particle with a given speed in two possible ways so that it has the same horizontal range. R. The product of the time taken by it in two possible ways is
(a)R/g (b)2R/g (c)3R/g (d)4R/g

10.An object is thrown along a direction inclined at an angle of 45° with the horizontal. The horizontal range of the object is equal to
(a)vertical height (b) twice the vertical height
(c)Thrice the vertical height (d)four times the vertical height

11.The coordination of a moving particle at any time t are given by x=ct^2 and y=bt^2.The speed of the particle is given by
(a)2r(c+b) (b)2t$\sqrt{c^2-b^2}$
(c)t$\sqrt{c^2+b^2}$ (d)2t$\sqrt{c^{2+}b^2}$

12.A particle is moving in the xy plane according to the equation (in SI units) x=4t² +5t+ 16 and y= 5t.The acceleration of the particle is
(a)8m/s² (b)13m/s² (c)14m/s²
(d)32m/s²

13.An aeroplane is flying at a constant horizontal velocity of 600 km/h at an elevation of 6 m towards a point directly the target lying on the earth's surface .At an appropriate time ,the pilot release a ball so that it strikes the target on the earth .The ball will appear to be falling
(a)on a parabolic path as seen by the pilot in the aeroplane
(b)vertically along a straight path as seen by an observer on the ground near the target
(c)On a parabolic path as seen by an observer on the ground near the target
(d)On a zigzag path as seen by the pilot in the aeroplane .

14.Two projectiles are fired from the same point with the same speed at angles of projection 60°

and 30° respectively. Which one of the following is true?

(a)Their maximum height will be same

(b)Their range will be same

(c)Their landing velocity will be same

(d)Their time of flight will be same

15.Four bodies P,Q,R and S are projected with equal velocities having angles of projection 15°,30°,45° and 60° with horizontal respectively .The body having shortest range is

(a)P (b)Q (c)R (d)S

16.For a projectile ,the ratio of maximum height reached to the square of fifth time is (g=10ms^{-2})

(a)5:4 (b)5:2 (c)5:1 (d)10:1

17.A stone projected with a velocity *u* at an angle θ with the horizontal reaches maximum height H_1When it is projected with velocity *u* at an angle $\left(\frac{\pi}{2}-\theta\right)$with the horizontal, it reaches maximum height H_2.The relation between the horizontal range R of the projectile ,H_1 and H_2 is

(a)R=4$\sqrt{H_1H_2}$ (b)R=4(H_1-H_2)

(c)R=4(H_1+H_2) (d)R=$\frac{H_1^2}{H_2}$

18.An object is projected with a velocity of 20m/s making an angle of 45° with horizontal .The equation of the trajectory is h=Ax-Bx² where h is height ,x is horizontal distance ,A and B are constant .The ratio A:B is(g=10m/s²)

(a)1:5 (b)5:1 (c)1:40 (d)40:1

19.Assume that the acceleration due to gravity on the surface of the moon is 0.2 times the acceleration due to gravity on the surface of the earth .If R ,is the maximum range on the surface of the moon for the same velocity of projection?

(a)0.2R_c (b)2R_c (c)0.5R_c (d)-5 R_c

20.A ball of mass *m* is thrown vertically up. Another ball of mass *2m* is thrown at an angle θ .If their times of ascent are equal ,then the heights attained by them are in the ratio

(a)1:1 (b)2:1 (c)1:cos θ (d)1:sec θ

21.Four projections are fired with the same speed at angles 20,35,60 and 70 to the horizontal .The range is maximum for the one fired at

(a)20° (b)35° (c)60° (d)70°