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1. The horizontal distance x and the vertical height y of a projectile at a time t are given by x = at and y = bt^2 + ct
where a, b and c are constants. What is the magnitude of the velocity of the projectile 1 second after it is fired?

(A) $\left[a^2+(2b+c)^2\right]^{1/2}$ **(B)** $\left[2a^2+(b+c)^2\right]^{1/2}$

(C) $\left[2a^2+(2b+c)^2\right]^{1/2}$ **(D)** $\left[a^2+(b+2c)^2\right]^{1/2}$

2. In previous Question, the angle (θ) with the horizontal at which the projectile is projected is given by

(A) $\theta=\tan^{-1}\left(\frac{a}{b}\right)$ **(B)** $\theta=\tan^{-1}\left(\frac{b}{a}\right)$

(C) $\theta=\tan^{-1}\left(\frac{a}{c}\right)$ **(D)** $\theta=\tan^{-1}\left(\frac{c}{a}\right)$

3. In Q. 1, the acceleration due to gravity is given by
(A) –2a **(B)** –2b **(C)** –2c **(D)** –ac + b

4. Four projectiles are projected with the same speed at angles 20°, 35°, 60° and 75° with the horizontal. The range will be the longest for the projectile whose angle of projection is
(A) 20° **(B)** 35° **(C)** 60° **(D)** 75°

5. A player throws a ball which reaches the other player in 4 seconds. If the height of each player is 1.8 m, what is the maximum height attained by the ball above the ground?
(A) 19.4 m **(B)** 20.4 m **(C)** 21.4 m **(D)** 22.4 m

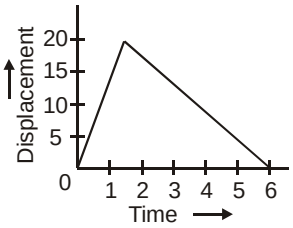
6. A projectile thrown at an angle of 30° with the horizontal has a range R_1 and attains a maximum height h_1. Another projectile thrown, with the vertical, has a range R_2 and attains a maximum height h_2. The relation between R_1 and R_2 is

(A) $R_1=\frac{R_2}{2}$ **(B)** $R_1=R_2$

(C) $R_1=2R_2$ **(D)** $R_1=4R_2$

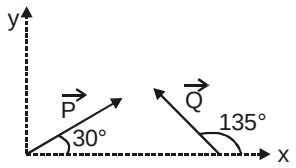
7. A body is projected at time t = 0 from a certain point on a planet's surface with a certain velocity at a certain angle with the planet's surface (assumed horizontal). The horizontal and vertical displacements x and y (im meters) respectively vary with time t (in seconds) as: $x=10\sqrt{3}\,t$ $y=10t-t^2$
What is the magnitude and direction of the velocity with which the body is projected?
(A) 20 ms^{-1} at an angle of 30° with the horizontal
(B) 20 ms^{-1} at an angle of 60° with the horizontal
(C) 10 ms^{-1} at an angle of 30° with the horizontal
(D) 10 ms^{-1} at an angle of 60° with the horizontal

8. For the displacement-time graph shown in figure, the ratio of the magnitudes of the (constant) speeds during the first two seconds and the next four second is



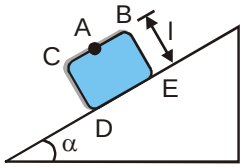
(A) 1 : 1 **(B)** 2 : 1 **(C)** 1 : 2 **(D)** 3 : 2

9. Two vectors $\vec{P}$ and $\vec{Q}$ have equal magnitude of 10 unit. They are oriented as shown in figure. The resultant of these vector is:



(A) 10 unit **(B)** $10\sqrt{2}$ unit
(C) 12 unit **(D)** none of the above

10. A rectangular box is sliding on a smooth inclined plane of inclination θ. At t = 0,
the box starts to move on the inclined plane. A bolt starts to fall from point A. Find
the time after which bolt strikes the bottom surface of the box:



(A) $\sqrt{\left(\frac{2l}{g\cos\theta}\right)}$ **(B)** $\sqrt{\left(\frac{2l}{g\sin\theta}\right)}$

(C) $\sqrt{\left(\frac{2l}{g}\right)}$ **(D)** $\sqrt{\left(\frac{l}{g}\right)}$