PHYSICS

BOOKS - SAI PHYSICS (TELUGU ENGLISH)

MOTION IN A STRAIGHT LINE AND A PLANE

Mcq

1. A particle aimed at a target, projected with an angle 15^0 with the horizontal is short of the target by 10 m. If projected with an angle of 45° is away from the target by 15 m, then the angle of projection to hit the target is

A. (a) $\frac{1}{2}\frac{\sin^{-1}1}{10}$

B. (b) $\frac{1}{2}\frac{\sin^{-1}3}{10}$

C. (c) $\frac{1}{2}\frac{\sin^{-1}9}{10}$

D. (d) $\frac{1}{2}\frac{\sin^{-1}7}{10}$

Answer: (d)

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2. A force $\left(2\hat{I}+\hat{j}-\hat{k}\right)N$ acts on a body which is initially at rest. At the end of 20 sec the velocity of the body is $\left(4\hat{i}+2\hat{j}-2\hat{k}\right)ms^{-1}$,then mass of the body is

A. (a) 8 kg

B. (b)10 kg

C. (c)5 kg

D. (d) 4.5 kg

Answer: (b)

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3. The displacement of a particle moving in a straight line Is given by the expression $x = At^3 + Bt^2 + Ct + D$meters, where t is in seconds and A, B, C and D are constants. The ratio between the initial acceleration and initial velocity is

A. (a) $2\frac{C}{B}$

B. (b) $2\frac{B}{C}$

C. (c) $2C$

D. (d) $\frac{C}{2B}$

Answer: (b)

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4. A, B, C are points in a vertical line such that AB = BC. If a body falls freely from rest at A and t_1 and t_2 are times taken to travel distances AB and BC, then ratio (t_2 / t_1) is

A. (a) $\sqrt{2}+1$

B. (b) $\sqrt{2}-1$

C. (c) $2\sqrt{2}$

D. (d) $\frac{1}{\sqrt{2}+1}$

Answer: (d)

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5. The path of a projectile is given by the equation $y = ax - bx^2$, where a and b are constants and x and y are respectively

horizontal and vertical distances of projectile from the point of projection. The maximum height attained by the projectile and the angle of projection are respectively.

A. (a) $2\frac{a^2}{b}, \tan^{-1}(a)$

B. (b) $\frac{b^2}{2a}, \tan^{-1}(b)$

C. (c) $\frac{a^2}{b}, \tan^{-1}(2b)$

D. (d) $\frac{a^2}{4b}, \tan^{-1}(a)$

Answer: (d)

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6. Velocity (v) versus displacement (x) plot of a body moving along a straight line is as shown in the graph. The corresponding plot of acceleration (a) as a function of displacement (x) is

A. 

B. 

C. 

D. 

Answer: (c)

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7. A particle is projected from the ground with an initial speed of V at an angle of projection θ . The average velocity of the particle between its time of projection and time it reaches highest point of trajectory is

A. (a) $\frac{V}{2}\sqrt{1+2\cos^2\theta}$

B. (b) $\frac{V}{2}\sqrt{1+2\sin^2\theta}$

C. (c) $\frac{V}{2}\sqrt{1+3\cos^2\theta}$

D. (d) $V\cos\theta$

Answer: (c)

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8. It is possible to project a particle with a given velocityin two possible ways so as to make them pess through a point P at a horizontal distance r from the point of projection. If t_1 and t_2 are times taken to reach

this point in two possible ways, then the product $t_1 t_2$ is proportional to

A. (a) $\frac{1}{r}$

B. (b) r

C. (c) r^2

D. (d) $\frac{1}{r^2}$

Answer: (b)

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9. Sum of magnitudes of two forces acting at a point is 16 N. If their resultant is normal to smaller force and has a magnitude 8 N, then forces are

A. (a) 6N, 10N

B. (b) 8N , 8N

C. (c) 4N, 12N

D. (d) 2N, 14N

Answer: (a)

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10. A certain vector in the xy-plane has an x-component of 4 m and a y-component of 10 m. It is then rotated in the xy-plane so that its x-component is doubled. Then its new y-component is (approximately)

A. (a) 20 m

B. (b) 7.2 m

C. (c) 5.0 m

D. (d) 4.5 m

Answer: (b)

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11. A particle is falling freely from a height. When it reaches 10m height from the ground its velocity is v_0.It colloids with the ground and loses 50% of its energy and rises back to height of 10 m. The velocity v_0 is

A. (a) $7m/s$

B. (b) $10m/s$

C. (c) $14m/s$

D. (d) $16m/s$

Answer: (c)

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12. Two persons A and B are located in X-Y plane at the points (0,0) and (0,10) respectively, The distances are measured in MKS unit. At a time t = 0, they start moving simultaneously with velocities $\overrightarrow{v}_A = 2\hat{j}ms^{-1}$

and $\overrightarrow{v}_B = 2\hat{i}ms^{-1}$ respectively. The time after which A and B are at their closest distance is

A. (a) 2.5 s

B. (b) 4 s

C. (c) 1 s

D. (d) $\frac{10}{\sqrt{2}}s$

Answer: (a)

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