PHYSICS

BOOKS - TARGET PHYSICS (MARATHI ENGLISH)

Motion in a plane

Exercise

1. When the force acting on the object and the velocity of the object both are along the same line, it is called _______

A. rectilinear motion

B. vibratory motion

C. rotational motion

D. oscillatory motion

Answer:

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2. The actual distance travelled by the particle during its motion is called _____

A. speed

B. displacement

C. path length

D. position

Answer:

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3. If distance covered by a particle is zero, what can you say about displacement?

A. It is positive

B. It is negative

C. It cannot be zero

D. It must be zero

Answer:

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4. Choose the CORRECT statement.

A. The magnitude of displacement is less than or equal to the path length

B. The magnitude of displacement is greater than the path length

C. The magnitude of displacement is infinite

D. The magnitude of displacement is twice the path length

Answer:

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5. The average speed is equal to the magnitude of average velocity, for the motion of the particle along a straight line and in the same direction. then

A. path length is less than the distance between them.

B. path length is less than the magnitude of velocity.

C. path length is greater than the magnitude of displacement.

D. path length is equal to the magnitude of displacement.

Answer:

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6. If the particle moves with a constant velocity its acceleration is ______

A. maximum

B. minimum

C. depends on frame of reference

D. zero

Answer:

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7. Choose the WRONG statement

A. Speed can never be negative.

B. When the particle returns to the starting point, its average velocity is zero but average speed is not zero.

C. Displacement does not tell the nature of the actual motion of a particle between the points

D. If the velocity of a particle is zero at an instant, its acceleration should also be zero at that instant

Answer:

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8. While plotting graph. independent variable (i.e., time) is plotted along __________

A. x-axis

B. y-axis

C. z-axis

D. negative z-axis

Answer:

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9. Displacement time graph cannot be

A. below the time axis

B. straight line perpendicular to time axis as well as normal above and below the time axis.

C. straight line parallel to time axis.

D. inclined to the time axis.

Answer:

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10. The slope of $x - t$ graph at any point gives

A. instantaneous velocity

B. instantaneous acceleration

C. force at that instant

D. momentum at that instant.

Answer:

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11. Ares under the curve of velocity-time graph of a particle moving with constant velocity is

A. acceleration of the particle.

B. distance travelled by the particle.

C. constant speed of the particle.

D. variable speed of the particle.

Answer:

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12. A body is projected vertically upwards from the ground. On reaching the greatest height

A. its velocity is zero and acceleration is not zero.

B. is acceleration is zero and velocity is not zero.

C. both velocity and acceleration are non zero.

D. both velocity and acceleration are zero.

Answer:

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13. When a car moves towards east 50 m then towards south 50 m, later on towards west 50 m, finally towards north 50 m, the displacement of the car in magnitude is

A. 200 m

B. 100 m

C. 50m

D. zero

Answer:

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14. A person travels along a straight road due east for the first half distance with speed v_1 and the second half distance with speed v_2, the average speed of the person is

A. $\dfrac{v_1 + v_2}{2}$

B. $\dfrac{v_1}{2} + \dfrac{v_2}{2}$

C. $\dfrac{v_1 + v_2}{2} v_1 v_2$

D. $2v_1 v_2 (v_1 + v_2)$

Answer:

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15. A bus travel its onward journey with a constant speed of $30 km / hr$ and its return journey with a constant speed of $60 km / hr$ .the average speed for its entire journey is

A. 90 k m / h r

B. 45 k m / h r

C. 40 k m / h r

D. 15 k m / h r

A. 90 km/hr

B. 45 km/hr

C. 40 km/hr

D. 15 km/hr

Answer:

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16. A body covers one-half of its journey at $40ms^{-1}$ and the next half at $50ms^{-1}$. Its average velocity is

A. $44.44ms^{-1}$

B. $50ms^{-1}$

C. $45ms^{-1}$

D. $40ms^{-1}$

Answer:

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17. A train covers the first half of the distance between two stations at the speed of

$40 km h^{-1}$ and the other half $60 km h^{-1}$. Its average speed is

A. $52 km h^{-1}$

B. $50 km h^{-1}$

C. $48 km h^{-1}$

D. $42 km h^{-1}$

Answer:

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18. The position of an object moving along x-axis is given by $x = a + bt^2$ where $a = 8.5m$ and $b = 2.5m$ and $t = 0$ is measured in second. If the object starts from $t = 0(thevelocityat$t=2s` is

A. 18.5 m/s

B. 10 m/s

C. 9.25 m/s

D. 1.5 m/s

Answer:

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19. An electron travelling with a speed of $5x10^3$ m/s passes through an electric field with an acceleration of $10^{12}\frac{m}{s^2}$. How long will it take for electron to double its speed?

A. $0.5 \times 10^{-9}s$

B. $0.5 \times 10^{-10}s$

C. $5 \times 10^{-9}s$

D. $5 \times 10^{-9}s$

Answer:

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20. An aeroplane takes off the ground after covering distance of 800 m of runway in 16 s. Its acceleration will be

A. $100\frac{m}{s^2}$

B. $50\frac{m}{s^2}$

C. $16.25\frac{m}{s^2}$

D. $6.25\frac{m}{s^2}$

Answer:

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21. A bullet strikes a plank of thickness 5 cm with a velocity of 1000 m/s and emerges out with a velocity of 400 m/s, the average retardation of the bullet is

A. $-8.4 \times 10^6 \frac{m}{s^2}$

B. $8.4 \times 10^6 \frac{m}{s^2}$

C. $-60 \times 10^5 \frac{m}{s^2}$

D. $60 \times 10^5 \frac{m}{s^2}$

Answer:

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22. A local train, travelling at 72 km/hr is brought to rest in 10 seconds by applying the brake. How much is the acceleration produced in this case? Also how much is distance (s) covered by the train before coming to rest?

A. $a = 2\frac{m}{s^2}, s = 300m$

B. $a = -2\frac{m}{s^2}, s = 300m$

C. $a = 2\frac{m}{s^2}, s = 100m$

D. $a = -2\frac{m}{s^2}, s = 100m$

Answer:

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23. The v-t graph of an athlete is shown below. The distance travelled by him between $t = 0$ and t=12` is

A. 36 m

B. 46 m

C. 66 m

D. 78 m

Answer:

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24. A body projected vertically upwards with a velocity of u returns to the starting point in 6 second, If $g = 9, 8ms^{-2}$ the value of 'u' is

A. 60 m/s

B. 30.4 m/s

C. 29.4 m/s

D. 15 m/s

Answer:

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25. A body released from rest to fall freely under gravity reaches the ground in 4 s. Then the height from which it is released is

A. 98 m

B. 78.4 m

C. 49 m

D. 24.5 m

Answer:

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26. A stone is thrown vertically upwards with initial velocity of $14ms^{-1}$. The maximum height it will reach is $[g = 9.8ms^{-2}]$

A. 16 m

B. 14 m

C. 10 m

D. 9.8 m

Answer:

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27. A man swims relative to water with a velocity greater than velocity of water. Then

A. man may cross the river along shortest path

B. man cannot cross the river.

C. man cannot cross the river without drifting

D. man may cross the river along longest path

Answer:

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28. Two trains A and B are moving on parallel tracks with velocities 60 km/h and 90 km/h respectively, in opposite directions. The relative velocity of train A with respect to train B is

A. 30 km/h

B. 60 km/h

C. 90 km/h

D. 150 km/h

Answer:

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29. If a car travelling at 58 km/h overtakes another car travelling at 40 km/h, the relative velocity of first car with respect to another car is

A. $-18k\frac{m}{h}$

B. 18 km/h

C. 98 km/h

D. 49 km/h

Answer:

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30. A thief is running away on a straight road in jeep moving with a speed of $9ms^{-1}$. A police man chases him on a motorcycle moving at a speed of $10ms^{-1}$. If the instantaneous separation of the jeep from the motorcycle is 100 m, how long will it take for the police to catch the thief?

A. 1 s

B. 19 s

C. 90 s

D. 100 s

Answer:

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31. If a car travelling at 58 km/h overtakes another car travelling at 40 km/h, the relative velocity of first car with respect to another car is

A. $-18k\frac{m}{h}$

B. 18 km/h

C. 98 km/h

D. 49 km/h

Answer:

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32. The two dimensional motion of a body in which a vertical motion with constant acceleration (g) and a horizontal motion with constant velocity acts, such a motion is ___________.

A. curved motion

B. circular motion

C. sinusoidal motion

D. projectile motion

Answer:

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33. Which of the following is NOT an example of a projectile?

A. Aeroplane in flight.

B. A bullet fired from the run.

C. A hammer thrown by an athlete

D. A stone thrown from the top of the building.

Answer:

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34. The path followed by projectile is called __________

A. ellipse

B. projection

C. trajectory

D. parabola

Answer:

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35. While studying projectile motion

A. air resistance is negligible with greater speed

B. air resistance affects 0.5% or its motion.

C. air resistance is negligible with very small speed.

D. air resistance affects 0.7% of its motion without change in its speed

Answer:

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36. The only force acting on the projectile is

A. gravitational force acting vertically downward

B. the effect of rotation of the earth.

C. the effect of moon on the earth.

D. attractive force between earth's magnetic field and the projectile

Answer:

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37. In projectile motion, a body is projected at an angle θ with velocity u then the horizontal component of velocity will be

A. u cos θ= constant

B. u sin θ= constant

C. u tan θ= constant

D. u cot θ= constant

Answer:

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38. The angle of projection for a projectile thrown parallel to horizontal is

A. 90°

B. 60°

C. 45°

D. 0°

Answer:

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39. A projectile is projected with velocity u making an angle θ with the horizontal, the equation of the path of the projectile is given by

A. $x=(\tan\theta)y-\left(\frac{g}{2u^2\cos^2\theta}y^2\right.$

B. $y=(\tan\theta)x-\left(\frac{g}{2u\cos\theta}x^2\right.$

C. $y=(\tan\theta)x-\left(\frac{g}{2u^2\cos\theta}x^2\right.$

D. $y=(\tan\theta)x-\left(\frac{g}{2u^2\cos^2\theta}x^2\right.$

Answer:

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40. Time taken by the projectile to cover entire trajectory is called as _______.

A. time of ascent

B. periodic time

C. time of descent

D. time of flight

Answer:

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41. The time (T) required by the projectile to retum to original plane of projection is given by

A. $T = \frac{u \sin \theta}{g}$

B. $T = \frac{u \cos \theta}{g}$

C. $T = \frac{2u \sin \theta}{g}$

D. $T = \frac{2u \cos \theta}{g}$

Answer:

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42. The relation between time of ascent t_a and time of descent t_d is

A. $t_a = t_d$

B. $t_a < t_d$

C. $t_a > t_d$

D. $t_a = 2t_d$

Answer:

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43. A shell is fired at an angle of 30° to the horizontal with velocity 196 m/s . The time of flight is

A. 6.5 s

B. 10 s

C. 16.5 s

D. 20 s

Answer:

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44. A body is thrown with velocity of 49 m s^{-1} at an angle of 30° with the horizontal, the time required to attained maximum height is ,

A. 5 s

B. 4 s

C. 3 s

D. 2 s

A. 5 s

B. 4 s

C. 3.5 s

D. 2.5 s

Answer:

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45. A projectile is launched at an angle of θ above the horizontal The elevation angle α of the highest point of the trajectory as seen from the launching position is given by

A. $\tan\alpha = \frac{1}{2}\tan\theta$

B. $\sin\alpha = \frac{1}{2}\sin\theta$

C. $\tan\alpha = \frac{\tan\theta}{2}$

D. $\sin\alpha = \frac{\sin\theta}{2}$

Answer:

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46. The horizontal distance between the point of projection and the point on the same horizontal plane, at which, the projectile returns after moving along its trajectory, is called _____ of the projectile.

A. maximum height

B. maximum velocity

C. horizontal range

D. vertical range

Answer:

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47. At the point of horizontal range (R), the coordinates are

A. $x = 0, y = R$

B. $x = 0, y = 0$

C. $x = R, y = 0$

D. $x = R, y = R$

Answer:

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48. A shell is fired from canon with a velocity of 200 m/s at an angle of 30° with the horizontal The horizontal range attained by it is $\left[g = 10 ms^{-2}\right]$

A. $2 \times 10^2 \sqrt{2} m$

B. $2 \times 10^2 \sqrt{3} m$

C. $4 \times 10^4 \sqrt{3} m$

D. $2 \times 10^3 \sqrt{3} m$

Answer:

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49. A gun throws shell with muzzle speed of $98ms^{-1}$. When the gun is elevated at 45°, the range is observed as 900 m. Due to air resistance is range is decreased by

A. 160 m

B. 120 m

C. 80 m

D. 40 m

Answer:

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50. The initial velocity of the projectile is u and its maximum range is $R_{\max}$ then u is given by

A. $u = R_{\max} \times g$

B. $u = \frac{R_{\max}}{g}$

C. $u = \sqrt{\frac{R_{\max}}{g}}$

D. $u = \sqrt{R_{\max} g}$

Answer:

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51. A shell fired from a canon can cover maximum horizontal distance of 10 km. Then velocity of projection is

A. $\sqrt{980}\frac{m}{s}$

B. $\sqrt{9800}\frac{m}{s}$

C. $\sqrt{98000}\frac{m}{s}$

D. $10^2\sqrt{98}\frac{m}{s}$

Answer:

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52. For the maximum height of a projectile

A. horizontal component of velocity is zero,

B. vertical component of velocity is zero.

C. vertical acceleration is zero.

D. initial velocity should be zero

Answer:

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53. The projectile attains maximum height when it is projected at an angle of

A. 35°

B. 45°

C. 90°

D. 120°

Answer:

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54. A man can jump on the moon _______times as high as on the earth.

A. two

B. three

C. four

D. six

Answer:

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55. A cricketer can throw a ball to a maximum horizontal distance of 100 m. How much high above the ground on the cricketer throw the same ball?

A. 100 m

B. 75 m

C. 50 m

D. 25 m

Answer:

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56. For a projectile motion, the horizontal range of projectile is same for any two angles which are

A. vertically opposite.

B. complementary angles.

C. supplementary angles

D. equal angles.

Answer:

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57. A stone is projected with velocity of 100 m/s at an angle of 60° with the horizontal, its maximum height is

A. 883.6 m

B. 683.8 m

C. 382.6 m

D. 196.3 m

Answer:

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58. The maximum horizontal range of projectile is 980 m. Its initial speed and maximum height is

A. $98ms^{-1}, 245m$

B. $245ms^{-1}, 98m$

C. $196ms^{-1}, 245m$

D. $98ms^{-1}, 490m$

Answer:

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59. The height y and the distance x along the horizontal, for a body projected in the vertical plane are given by $y = 8t - 5t^2$ and $x = 6t$, the initial velocity at $t = 0$ of the body is

A. 18 m/s

B. 10 m/s

C. 6 m/s

D. 4 m/s

Answer:

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60. A body is projected with a velocity of 30 m/s at an angle of 30° with the vertical the maximum height and horizontal range are respectively

A. 33.75 m, 45*sqrt3 m

B. 11.48 m, 79.53

C. 159.06 m, 11.48 m

D. 22.96 m. 79.53 m

Answer:

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61. When the particle is projected vertically upwards then θ, H and R of it respectively are

A. $0^{\circ}, \dfrac{u^2}{2}g, 0$

B. $90^{\circ}, 0, \dfrac{u^2}{g}$

C. $0^{\circ}, 0, \dfrac{u^2}{2}g$

D. $90^\circ, \frac{u^2}{2}g, 0$

Answer:

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62. In uniform circular motion,

A. both velocity and acceleration are constant

B. velocity changes and acceleration is constant

C. velocity is constant and acceleration changes

D. both velocity and acceleration change.

Answer:

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63. Select the WRONG statement

A. In U.C.M. linear speed is constant.

B. In U.CM. linear velocity is constant.

C. In U.C.M. magnitude of angular momentum is constant.

D. In U.CM. angular velocity is constant

Answer:

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64. IF a particle moves in a circle describing equal angles is equal intervals of time, the velocity vectore

A. remains constant

B. changes in magnitude only.

C. changes in direction only.

D. changes both in magnitude and direction.

Answer:

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65. A particle moves along a circle with a uniform speed v. After the position vector has made an angle of 30° with the reference position, its speed will be

A. $v\sqrt{2}$

B. $\frac{v}{\sqrt{2}}$

C. $\frac{v}{\sqrt{3}}$

D. v

Answer:

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66. A particle in U.C.M possesses linear accleration since

A. its linear speed changes continuously.

B. both magnitude and direction of linear velocily change continuously.

C. direction of linear velocity changes continuously.

D. its linear speed does not change continuously

Answer:

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67. The accelaration of a particle in U.C.M. directed towards centre and along the radius is called

A. centripetal acceleration

B. centrifugal acceleration

C. gravitational acceleration.

D. tangential acceleration

Answer:

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68. The angular velocity of a particle rotating in a circular orbit 100 times per minute is

A. 1.66 rad/s

B. 10.47 rad/s

C. 10.47 deg/s

D. 60 deg/s

Answer:

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69. A body mass 100 g is revolving in a horizontal circle. If its frequency of rotation is 3.5 r.p.s. and radius of circular path is 0.5 m, the angular speed of the body is

A. 18 rad/s

B. 20 rad/s

C. 22 rad/s

D. 24 rad/s

Answer:

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70. What is the angular velocity of the earth?

A. $2\frac{\pi}{86400}ra\frac{d}{s}$

B. $2\frac{\pi}{3600}ra\frac{d}{s}$

C. $2\frac{\pi}{24}ra\frac{d}{s}$

D. $2\frac{\pi}{6400}ra\frac{d}{s}$

Answer:

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71. An electric motor of 12 horse-power generates an angular velocity of 125rad/s. What will be the frequency of rotation?

A. 20 Hz

B. $\frac{20}{\pi} Hz$

C. $\frac{20}{2} \pi Hz$

D. 40 Hz

Answer:

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72. What is the angular speed of the seconds hand of a watch?

A. 60 rad/s

B. π rad/s

C. $\frac{\pi}{30}$ rad/s

D. 2 rad/s

Answer:

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73. The ratio of angular speeds of minute hand and hour hand of a watch is

A. $1:12$

B. $60:1$

C. $1:60$

D. $12:1$

Answer:

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74. If ω_E and ω_H are the angular velocities of the earth rotating about its own axis and the hour hand of the clock respectively, then

A. $\omega + E = \frac{1}{4}\omega_H$

B. $\omega + E = 2\omega_H$

C. $\omega + E = \omega_H$

D. $\omega + E = \frac{1}{2}\omega_H$

Answer:

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75. A fan is making 600 revolutions per minute . IF after some time it makes 1200 revolutions per minute, then increase in its angular velocity is

A. 10π rad/s

B. 20π rad/s

C. 40π rad/s

D. 60π rad/s

Answer:

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76. Angular velocity of hour arm of a clock, in rad/s, is

A. $\frac{\pi}{43200}$

B. $\frac{\pi}{21600}$

C. $\frac{\pi}{30}$

D. $\frac{\pi}{1800}$

Answer:

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77. Two particles of mass M and m are moving in a circle of radii R and r. If their time periods are same, what will be the ratio of their linear velocities?

A. MR:mr

B. M:m

C. R:r

D. 0.04236111111111

Answer:

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78. A wheel having a diameter of 3 m starts from rest and accelerates uniformly to an angular velocity of 210 r.p.m. in 5 seconds. Angular acceleration of the wheel is

A. 4.4 rad s^{-2}

B. 3.3 rad s^{-2}

C. 2.2 rad s^{-2}

D. 1.1 rad s^{-2}

Answer:

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79. A Wheel has circumference C. IF it makes f r.p.s, the linear speed of a point on the circumference is

A. $2\pi fC$

B. fC

C. $f\frac{C}{2}\pi$

D. $f\frac{C}{60}$

Answer:

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80. A body is whirled in a horizontal circle of radius 20 cm. It has angular velocity at any point on circular path?

A. 10m/s

B. 2 m/s

C. 20 m/s

D. $\sqrt{2}$m/s

Answer:

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81. A particle moves in a circular path, 0.4 m in radius, with constant speed. IF particle makes 5 revolution in each second of its motion, the speed of the particle is

A. 10.6 m/s

B. 11.2 m/s

C. 12.6 m/s

D. 13.6 m/s

Answer:

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82. An electric fan has blades of length 30cm as measured from the axis of rotation. If the fan is rotating at 1200 r.p.m, the acceleration of a point on the tip of the blade is about

A. $1600c\frac{m}{s^2}$

B. $4740c\frac{m}{s^2}$

C. $2370c\frac{m}{s^2}$

D. $5055c\frac{m}{s^2}$

Answer:

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83. The diameter of a flywheel is 1.2 m and it makes 900 revolutions per minute. Calculate the acceleration at a point on its rim

A. $540\pi^2\frac{m}{s^2}$

B. $270\frac{m}{s^2}$

C. $360\pi^2 \frac{m}{s^2}$

D. $540 \frac{m}{s^2}$

Answer:

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84. The angular speed (in $rev / \min$) needed for a centrifuge to produce an acceleration of 1000 g at a radius arm of 10cm is (Take g=10 m / s^2)

A. 1500 rev/min

B. 4000 rev/min

C. 2000 rev/min

D. 3000 rev/min

Answer:

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85. A racing car of mass 10^2 kg goes around a circular track (horizontal) of radius 10cm. The maximum thrust that track can withstand is

10^5N. The maximum speed with which car can go around is

A. 10 m/s

B. 100 m/s

C. 50 m/s

D. 20 m/s

Answer:

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86. Two particles of equal masses are revolving in circular paths of radii r_1 and r_2 respectively with the same speed . The ratio of their centripetal forces is

A. $\frac{r_2}{r_1}$

B. $\sqrt{\frac{r_2}{r_1}}$

C. $\left(\frac{r_1}{r_2}\right)^2$

D. $\left(\frac{r_2}{r_1}\right)^2$

Answer:

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87. A 10 kfg object attached to a nylon cord outside a space vehicle is rotating at a speed of $5m/s$. If the force acting on the cord is 125 N, its radius of path is

A. 2m

B. 4m

C. 6m

D. 1m

Answer:

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88. The breaking tension of a string if 50 N. A body of mass 1 kg is tied to one end of a 1m long string and whirled in a horizontal circle, The maximum speed of the body should be

A. $5\sqrt{2}$ m/s

B. 10m/s

C. 7.5 m/s

D. 5 m/s

Answer:

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89. A proton of mass 1.6×10^{-27}kg goes round in a circular orbit of radius 0.12 m under a certripetal force of $4 \times 10^{-13} N$. then the frequency of revolution of the proton is about

A. 1.25×10^{6} cycles per second

B. 2.50×10^6 cycles per second

C. 3.75×10^6 cycles per second

D. 5.00×10^6 cycles per second

Answer:

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90. When the bob of a conical pendulam is moving in a horizontal circle at constant speed, which quantity is fixed?

A. Velocity

B. Acceleration

C. Centripetal force

D. Kinetic energy

Answer:

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91. The period of a conical pendulam is

A. equal to that of a simple pendulum of same length l

B. more than that of a simple pendulum of same length l

C. less than that of a simple pendulum of same length l

D. independent of length of pendulum.

Answer:

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92. Consider a simple pendulam of length 1 m. Its bob performs a circular motion is horizontal plane with its string making an angle 60° with the vertical. The centripetal accleration experienced by the bob is

A. $17.3 \dfrac{m}{s^2}$

B. $5.8 \dfrac{m}{s^2}$

C. $10 \dfrac{m}{s^2}$

D. $5 \dfrac{m}{s^2}$

Answer:

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93. A particle of mass 1 kg is revolved in a horizontal circle of radius 1 m with the help of a string. IF the maximum tension the string can with stand is $16\pi^2$ N, then the maximum frequency with which the particle can revolve is

A. 3 Hz

B. 2 Hz

C. 4 Hz

D. 5 Hz

Answer:

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94. Which of the following changes, when a particle is moving with uniform velocity?

A. speed

B. velocity

C. acceleration

D. position vector

Answer:

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95. In an inertial frame of reference, a body performing uniform circular motion in clockwise direction has

A. constant velocity

B. zero angular acceleration

C. centripetal acceleration

D. tangential acceleration

Answer:

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96. The three initial and final position of a man on the x-axis are given (i) (-8 m, 7m) (ii) (7 m, -3 m) and (iii) (7 m, 3 m) Which pair gives the negative displacement?

A. (i)

B. (ii)

C. (iii)

D. (ii) and (iii)

Answer:

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97. Assertion: The equation of motion can be applied only if acceleration is along the direction of velocity and is constant. Reason: If the acceleration of a body is constant then its motion is known uniform motion

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True, Reason is True, Reason is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False.

Answer:

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98. Body can NOT have

A. constant speed and variable velocity.

B. acceleration and constant speed.

C. constant velocity and variable speed

D. non-zero speed and zero acceleration.

Answer:

Watch Video Solution

99. A particle oscillates along a straight line 1m long, if it completes one oscillation in 0.1s, then the distance covered by it and its average speed in one oscillation is,

A. 1m, 20 m / s

B. 2m, 20 m / s

C. 2m, 15 m / s

D. 1m, 15 m / s

A. 1 m 20 m/s

B. 2 m, 20 m/s

C. 2 m, 15 ms

D. 1 m, 15m/s

Answer:

Watch Video Solution

100. The ratio of the numerical values of the average velocity and average speed of a body is always

A. Unity

B. Unity or less

C. Unity or more

D. Less than unity

Answer:

Watch Video Solution

101. The speed v of particle moving along a straight line, when it is at a distance x from a fixed point on the line is given by $v^2 = 108x - 9x^2$. Then magnitude of its acceleration when it is a distance 3 metre from the fixed point is

A. $9\frac{m}{s^2}$

B. $18\frac{m}{s^2}$

C. $27\frac{m}{s^2}$

D. $36\frac{m}{s^2}$

Answer:

Watch Video Solution

102. A body starts from rest with uniform acceleration. If its velocity after n second is v, then its displacement in the last two seconds is

A. $2v\dfrac{n+1}{n}$

B. $v\dfrac{n+1}{n}$

C. $v\dfrac{n-1}{n}$

D. $2v\dfrac{n-1}{n}$

Answer:

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103. A particle starts from rest, accelerates at $2ms^{-2}$ for 10 s and then goes for constant speed for 30 s and then decelerates at $4ms^{-2}$ till it stops. The distance travelled is

A. 750 m

B. 800 m

C. 700 m

D. 850 m

Answer:

Watch Video Solution

104. A particle travels 10 m in first 5 s and 10 m next 3 s. Assuming constant acceleration what is the distance travelled in next 2 seconds?

A. 8.3 m

B. 9.3 m

C. 10.3 m

D. None of above

Answer:

Watch Video Solution

105. A body A moves with a uniform acceleration a and zero initial velocity. Another body B starts from the same point, moves in the same direction with a constant velocity v. The two bodies meet after a time t. The value of t is

A. $2\frac{v}{a}$

B. $\frac{v}{a}$

C. $\frac{v}{2}a$

D. $\sqrt{\frac{v}{2}a}$

Answer:

Watch Video Solution

106. "The velocity of a particle is $v = v_0 + (>) + ft^2$. If its position $x = 0$ at $t = 0$, then its displacement afler time $(t = 1)$ is

A. $v_0 + \frac{g}{2} + f$

B. $v_0 + 2g + 3f$

C. $v_0 + \frac{g}{2} + \frac{f}{3}$

D. $v_0 + g + f$

Answer:

Watch Video Solution

107. The acceleration a of a particle starting from rest varies with time, according to relation $a = \alpha t + \beta$. The velocity of the particle after a time t will be

A. $\alpha \frac{t^2}{2} + \beta$

B. $\alpha \frac{t^2}{2} + \beta t$

C. $\alpha t^2 + \frac{1}{2} \beta t$

D. $\frac{\alpha t^2 + \beta}{2}$

Answer:

Watch Video Solution

108. Acceleration of a body when displacement equation is $3s = 9t + 5t^2$ is

A. $\frac{5}{3}\frac{m}{s^2}$

B. $\frac{14}{3}\frac{m}{s^2}$

C. $\frac{10}{3}\frac{m}{s^2}$

D. $\frac{19}{3}\frac{m}{s^2}$

Answer:

Watch Video Solution

109. The relation between time and distance is $t = \alpha x^2 + \beta^x$, where α and $\beta$are constants. The retardation is

A. $2\alpha v^3$

B. $2\beta v^3$

C. $2\alpha\beta v^3$

D. $2\beta^2 v^3$

Answer:

Watch Video Solution

110. A body starting from rest, accelerates at a constant rate a $\frac{m}{s^2}$ for some time, after which it decelerates at constant rate $b\frac{m}{s^2}$ to come to rest finally. If the total time elapsed is ts the maximum velocity attained by the body is given

A. $a\frac{b}{a+b}t\frac{m}{s}$

B. $a\frac{b}{a-b}t\frac{m}{s}$

C. $2a\frac{b}{a+b}t\frac{m}{s}$

D. $2a\frac{b}{a-b}t\frac{m}{s}$

Answer:

Watch Video Solution

111. A lift is going up. The variation in the speed of the litt is as given in the graph. What is the height to which the lift takes the passengers?

A. 3.6m

B. 28.8m

C. 36.0m

D. Cannot be calculated from the above graph

Answer:

Watch Video Solution

112. A stone is shot straight upward with a speed of 20 m/s from a tower 200 m high. The speed with which it strikes the ground is $\left(g = 10\frac{m}{s^2}\right)$

A. 60 m/s

B. 65 m/s

C. 70 m/s

D. 75 m/s

Answer:

Watch Video Solution

113. A ball is dropped from a highly raised platform at $t = 0$ starting from rest. After 6 second another ball is thrown downwards from the same platform with a speed v. The two balls meet at $t = 18s$. What is the value of v? (Take $g = 10\frac{m}{s^2}$)

A. 75 m/s

B. 55 m/s

C. 40 m/s

D. 60 m/s

Answer:

Watch Video Solution

114. A balloon is rising vertically up with a velocity of 29 m s^{-1}. A stone is dropped from it and reaches ground in 10 s. The height of the balloon when the stone was dropped from it is

A. 400 m

B. 150 m

C. 100 m

D. 200 m

Answer:

Watch Video Solution

115. The relative velocity of two objects moving with same speed and in the same direction is

A. negative

B. zero

C. positive

D. infinite

Answer:

Watch Video Solution

116. Assertion: For a observer looking out through the window of a fast moving train, the nearby objects appear to move in the opposite direction to the trains, while the distant objects appear to be stationary

Reason: the observer and the object are moving at velocities v_1 and v_2 respectively with reference to a laboratory frame, the velocity of the object with respect to the observer is $\vec{v}_1 - \vec{v}_2$.

A. Assertion is True Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True Reason in True, Reason is no correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is False

Answer:

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117. A swimmer's speed in the direction of flow of river is 16 km/h. Against the direction of flow of river, the swimmer's speed is 8 km/h. The swimmer's speed in still water and the velocity of now of the river respectively are

A. 4 km/h , 12 km/h

B. 12 km/h 12 km/h

C. 4km/h, 4 km/h

D. 12 km/h, 4 km/h

Answer:

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118. A police jeep is chasing a thief with velocity of 45 km/h. The thief in another jeep is moving with velocity 153 km/h. Police fires a bullet with muzzle velocity of 180 m/s. The velocity with which it will strike the jeep of the thief is

A. 150 m/s

B. 27 m/s

C. 450 m/s

D. 250 m/s

Answer:

Watch Video Solution

119. A train A which is 120 m long is running with velocity 20 m/s while train B which is 130 m long is running in opposite direction with velocity 30 m/s. What is the time taken by train B to cross the train A?

A. 5s

B. 25s

C. 10s

D. 100 s

Answer:

Watch Video Solution

120. A 150 m long trains travelling from east to west at a speed of 20 m/s. A bird is flying from west lo cast at a speed of 5 m/s. How long will the bird take to cross the train?

A. 6s

B. 2s

C. 3s

D. 30 s

Answer:

Watch Video Solution

121. If v_x, and v_y, are the magnitudes of component of instantaneous velocity along X and Y axes, then

A. $\overrightarrow{v} = v_x \hat{i} + v_y \hat{j}$

B. $\overrightarrow{v} = v_x \hat{i} + v_y \hat{k}$

C. $\overrightarrow{v} = \sqrt{v_x^2 - v_y^2}$

D. $\overrightarrow{v} = \sqrt{v_y^2 + v_z^2}$

Answer:

Watch Video Solution

122. Position of a particle at any instant t is given by $\overrightarrow{r} = 3t\hat{i} + 2t^2 haij + 5\hat{k}$. Its velocity at same instant will be

A. $4thaiI + 5khaii$

B. $3haiI + 4\hat{j} + 5\hat{k}$

C. $3\hat{i} + 4t\hat{j}$

D. $3\hat{i} + 4t\hat{j}$

Answer:

Watch Video Solution

123. A particle starts from the origin with velocity $\overrightarrow{u} = \left(2\hat{i} - 4\hat{j}\right)\frac{m}{s}$ with constant acceleration $\left(3\hat{I}+5\hat{j}\right)\frac{m}{s^2}$. After travelling for 2 seconds, its distance from the origin is

A. 10 m

B. 10.2 m

C. 9.8 m

D. 11.7 m

Answer:

Watch Video Solution

124. A boat is moving with velocity of $3\hat{i} + 4\hat{j}$ in river and water is moving with a velocity of $3\hat{i} - 4\hat{j}$ith respect to ground. Relative velocity of boat with respect to water is

A. $-6\hat{I} - 8\hat{j}$

B. $-6\hat{i} + 8\hat{j}$

C. $8\hat{i}$

D. $6\hat{i}$

Answer:

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125. A train is moving towards cast and a car is moving along north, both with some speed. The observed direction of car to the passenger in the train is

A. East-north direction

B. West-north direction

C. South-east direction

D. East direction

Answer:

Watch Video Solution

126. The speed of boat is 5 km/hr in still water. It crosses a river of width 1 km along the shortest possible path in 15 minutes. The velocity of the river water is

A. 1 km/hr

B. 3 km/hr

C. 4 km/hr

D. 5km/hr

Answer:

Watch Video Solution

127. A particle is moving with velocity 5 m/s towards east and its velocity changes to 5 m/s north in 10 s. Find the acceleration.

A. $\sqrt{2}N - W$

B. $\frac{1}{\sqrt{2}}N - W$

C. $\frac{1}{\sqrt{2}}N - E$

D. $\sqrt{2}N - E$

Answer:

Watch Video Solution

128. A scooter going towards east at $10ms^{-1}$ turns right through an angle of 90°. If the speed of the scooter remains unchanged in taking tum, the change in the velocity of the scooter is

A. $20.0 ms^{-1}$ south eastern direction

B. Zero

C. $10.0 ms^{-1}$ in southern direction

D. $14.14 ms^{-1}$ in south-west direction

Answer:

Watch Video Solution

129. A river is flowing from west to eat at a speed of 4 m/min. In what direction should a man on the south bank of the river, capable of swimming at 8 m/min in still water, swim to cross the river in the shortest time?

A. North

B. West – North

C. South-West

D. North-West

Answer:

Watch Video Solution

130. A river is flowing from W to E with a speed of 5 m/min. A man can swim in still water with a velocity 10 m/min. In which direction should the man swim so as to take the shortest possible path to go to the south?

A. 30° with downstream

B. 60° with downstream

C. 120° with downstream

D. South

Answer:

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131. In a projectile motion, the velocity vector of the projectile is

A. always perpendicular to the acceleration.

B. never perpendicular to noceleration

C. perpendicular to acceleration two times during its flight,

D. perpendicular to acceleration only once during its flight.

Answer:

Watch Video Solution

132. Two bullets are fired simultaneously horizontally and with different speeds from the same place. Which bullet will hit the ground first?

A. The faster one.

B. The slower one.

C. Both will reach simultaneously

D. Depends on masses.

Answer:

Watch Video Solution

133. At the highest point of the path of a projectile,

A. kinetic energy is maximum

B. potential energy is minimum

C. kinetic energy is minimum.

D. total energy is maximum.

Answer:

Watch Video Solution

134. The velocity at the highest point of a projectile proiected 60° or with horizontal with velocity v is

A. zero

B. $\frac{v}{2}$

C. $\frac{v}{4}$

D. $\frac{v}{\sqrt{2}}$

Answer:

Watch Video Solution

135. A bomber plane moves horizontally with a speed of 500 m/s and a bomb released from it. strikes the ground in 10 s. Angle at which it strikes the ground will be $\left(g = 10\frac{m}{s^2}\right)$

A. $\tan^{-1}\left(\frac{1}{5}\right)$

B. $\tan\left(\frac{1}{5}\right)$

C. $\tan^{-1}(1)$

D. $\tan^{-1}(5)$

Answer:

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136. The equation of motion of a projectile are given by $x = 36t$ metre and $2y = 96t - 9.8t^2$ metre The angle of projection is

A. $\sin^{-1}\left(\frac{4}{5}\right)$

B. $\sin^{-1}\left(\frac{3}{5}\right)$

C. $\sin^{-1}\left(\frac{4}{3}\right)$

D. $\sin^{-1}\left(\frac{3}{4}\right)$

Answer:

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137. A body thrown with an initial speed of 96 ft/s reaches the ground after $\left(g = 32f\frac{t}{s^2}\right)$

A. 3 s

B. 6 s

C. 12 s

D. 8 s

Answer:

Watch Video Solution

138. A bomb is fired from a cannon with a velocity of 1000 m/s making an angle of 30°

with the horizontal. What is the time taken by the bomb to reach the highest point?

A. 11 s

B. 23 s

C. 38 s

D. 51 s

Answer:

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139. A projectile can have the same range R for two angles of projection. If t_1 and t_2 are the times of flight in the two cases, then the product of the two time of flight is proportional to

A. R^2

B. $\frac{1}{R^2}$

C. $\frac{1}{R}$

D. R

A. R^2

B. $\frac{1}{R^2}$

C. $\frac{1}{R}$

D. R

Answer:

Watch Video Solution

140. Neglecting the air resistance, the time of flight of a projectile is determined by

A. $u_{vertical}$

B. $u_{h \text{ or } izontal}$

C. $u = u^2_{vertical} + u^2_{h \text{ or } izontal}$

D. $u = u\left(u^2_{vertical} + u^2_{h \text{ or } izontal}\right)^{\frac{1}{2}}$

Answer:

Watch Video Solution

141. A stone thrown at an angle to θ with the horizontal reaches a maximum height H. Then the time of flight of stone will be

A. $\sqrt{2\frac{H}{g}}$

B. $2\sqrt{2\frac{H}{g}}$

C. $\left(2\frac{\sqrt{2H+theat}}{g}\right)$

D. $\left(\frac{\sqrt{2H\sin\theta}}{g}\right)$

Answer:

Watch Video Solution

142. If the range of a gun which fires a shell with muzzle speed v is R, then the angle of elevation of the gun is

A. $\cos^{-1}\left(\frac{v^2}{R}g\right)$

B. $\cos^{-1}\left(g\frac{R}{V^2}\right)$

C. $\frac{1}{2}\left(\frac{v^2}{R}g\right)$

D. $\frac{1}{2}\sin^{-1}\left(g\frac{R}{v^2}\right)$

Answer:

Watch Video Solution

143. A boy playing on the roof of 10 m high building throws a ball with a speed of $10ms^{-1}$ at an angle of 30° with the horizontal. How far from the throwing point will the ball be at the height of 10 m from the ground?

$$\left(g = 10ms^{-2}, \sin 30^\circ = \frac{1}{2}, \cos 30^\circ = \frac{\sqrt{3}}{2}\right)$$

A. 2.60 m

B. 4.33 m

C. 5.20 m

D. 8.66 m

Answer:

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144. A particle covers 50 m distance when projected with an initial speed. On the same surface it will cover a distance, when projected with double the initial speed

A. 100 m

B. 150 m

C. 200 m

D. 250 m

Answer:

Watch Video Solution

145. The acceleration due to grivity on the planet A is 9 times the acceleration due to gravity on planet B. A man jumps to a height of 2 m on the surface of A. What is the height of jump by the same person on the planet B?

A. 18 m

B. 6 m

C. $\frac{2}{3}m$

D. $\frac{2}{9}m$

Answer:

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146. In a projectile motion, velocity at maximum height is

A. $\frac{u\cos\theta}{2}$

B. $(u\cos\theta)$

C. $\frac{u\sin\theta}{2}$

D. none of these

Answer:

Watch Video Solution

147. A ball thrown by one player reaches the other in 2 s. The maximum height attained by the ball above the point of projection will be about

A. 10 m

B. 7.5 m

C. 5m

D. 2.5 m

Answer:

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148. An aeroplane is flying at a constant horizontal velocity of 600 km/hr at an elevation of 6 km towards a point directly above the target on the earth's surface. At an appropriate time, the pilot releases a ball so that it strikes the target at the carth. The ball will appear to be falling

A. on a parabolic path as seen by pilot in the plane

B. vertically along a straight path seen by an observer on the ground near the target.

C. on a parabolic path as een by an observer on the ground near the target.

D. on a zig-zag path as seen by pilot in the plane.

Answer:

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149. A body is projected horizontally from a point above the ground. The motion of the body is described by the equations $x = 2t$ and $y = 5t^2$, where x and y are the horizontal and vertical displacements (in m) respectively at time t. The trajectory of the body is

A. a straight line

B. circle

C. an ellipse

D. parabola

Answer:

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150. The trajectory of a projectile fired horizontally with velocity u is a parabola given by

A. $y = \frac{g}{2}u^2X^2$

B. $y = -\frac{g}{2u^2}X^2$

C. $y = \frac{g}{2}u^2Y^2$

D. $y = -\frac{g}{2u^2}Y^2$

Answer:

Watch Video Solution

151. If the equation of a projectile is $y = \sqrt{3}x - g\frac{x^2}{2}$, then the angle of projection is

A. 80°

B. 60°

C. 45°

D. 30°

Answer:

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152. A particle is projected obliquely into air with velocity of 20 m/s at an angle of elevation of 45°. Neglecting air resistance the equation of motion is

A. $y=\frac{x}{\sqrt{2}}-g\frac{x}{200}$

B. $y=x\left[\frac{1}{2}-g\frac{x}{400}\right]$

C. $y=x\left[1-\frac{g}{400}\right]$

D. $y=x-g\frac{x^2}{200}$

Answer:

Watch Video Solution

153. The trajectory of a particle is symmetrical about the perpendicular drawn from the highest point on x-axis, if the particle performs projectile motion in xy plane. This is due to

A. velocity of projection of projectile.

B. air resistance while performing projectile motion

C. gravitational acceleration which is same for upward and downward motion

D. angle of projection of projectile

Answer:

Watch Video Solution

154. The maximum height attained by projectile is increased by 10%, by changing the angle of projection, without changing the speed of projection. The percentage increase in the time of flight will be

A. 0.2

B. 0.15

C. 0.1

D. 0.05

Answer:

Watch Video Solution

155. The equation of motion of a projectile is $y = ax - bx^2$ where a and b are constants of motion. The horizontal range of the projectile is

A. $\dfrac{a}{b}$

B. $\dfrac{\sqrt{a}}{b}$

C. $\dfrac{a^2}{2}b$

D. $\dfrac{a^2}{4}b$

Answer:

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156. Four balls P, Q, R and S are thrown with equal velocities al angles of 10°, 30°, 45° and

60° respectively. Which ball will fall at the maximum distance?

A. P

B. Q

C. R

D. S

Answer:

Watch Video Solution

157. A projectile thrown with a speed v at an angle θ has a range R on the surface of earth. For same v and theta`, its range on the surface of moon will be

A. $\frac{R}{6}$

B. 6R

C. $\frac{R}{36}$

D. 36R

Answer:

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158. The initial speed of a shell is 140 m/s. At what angle must the gun be fined if the projectile is to strike a target at the same level as the gun? [The gun and the target are 1000 m apart]

A. 45°

B. 30°

C. 20°

D. 15°

Answer:

Watch Video Solution

159. The range of a projectile, when launched at an angle of 15° with the horizontalis 1.5 km. What is the range of the projectile, when launched at an angle of 45° with the horizontal?

A. 0.75 km

B. 1.5 km

C. 3.0 km

D. 6.0 km

Answer:

Watch Video Solution

160. A ball is kicked at an angle of 30° with the vertical. If the horizontal component of its velocity is $19.6 m s^{-1}$. The maximum height is

A. 135,8 m

B. 58.8 m

C. 39.2 m

D. 60 m

Answer:

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161. Two stones are projected with the same speed but making different angles with the horizontal. Their ranges are equal. If the angle of projection of one is $\frac{\pi^c}{3}$ and its maximum height is H, then the maximum height of the other is

A. $\frac{1}{3}H$

B. $\frac{2}{3}H$

C. $2H$

D. $3H$

Answer:

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162. When a body is projected vertically up from the ground, its velocity is reduced to `(1/3)^rd of its initial value at height y above the ground. The maximum height reached by the body is

A. $\frac{3}{4}y$

B. $8\frac{y}{9}$

C. $\frac{9y}{8}$

D. 9y

Answer:

Watch Video Solution

163. A body is projected at an angle of projection of 35° with horizontal. To get the same range with the same velocity of projection, the body should also be projected at an angle of

A. 55°

B. 65°

C. 70°

D. 80°

Answer:

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164. Which of the following statements is false for a particle moving in a circle with a constant angular speed?

A. The velocity vector is tangent to the circle.

B. The acceleration vector is tangent to the circle.

C. The acceleration vector points to the centre of the circle

D. The velocity and acceleration vectors are perpendicular to each other.

Answer:

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165. A particle covers equal distances around a circular path in equal intervals of time. Which of the following quantities connected with the motion of the particle remains constant with time?

A. Displacement

B. Velocity

C. Speed

D. Acceleration

Answer:

Watch Video Solution

166. A particle performing uniform circular motion has

A. radial velocity and radial acceleration

B. radial velocity and transverse acceleration

C. transverse velocity and radial acceleration

D. transverse velocity and transverse acceleration.

Answer:

Watch Video Solution

167. A particle is moving on a circular path with constant speed, then its acceleration will be

A. zero.

B. external radial acceleration

C. indemnal radial acceleration

D. constant acceleration.

Answer:

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168. A sphere of mass m is tied to end of a string of length l and rotated through the other end along a horizontal circular path with speed v. The work done in full horizontal circle is

A. 0

B. $\left(m\frac{v^2}{l}\right)2\pi r$

C. $mg(2\pi r)$

D. $\left(m\frac{v^2}{r}\right)(l)$

Answer:

Watch Video Solution

169. If a particle moves with inform speed then its tangential accleration will be

A. $\frac{v^2}{r}$

B. zero

C. $r\omega^2$

D. infinite

Answer:

Watch Video Solution

170. A body moves along a circular path with certain velocity. What will be the path of body in following figure?

A. Move radially out

B. Move horizontally out

C. Fall vertically down.

D. Move tangentially out.

Answer:

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171. IF the length of the second's hand in a stop clock is 3cm, the angular velocity and linear velocity of the tip is

A. 0.2047 rad/s, 0.0314 m/s

B. 0.2547 rad/s, 0.314 m/s

C. 0.1472 rad/s, 0.06314 m/s

D. 0.1047 rad/s, 0.00314 m/s

Answer:

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172. A wheel of diameter 20 cm is rotating at 600 rpm. The linear velocity of particle at its rim is

A. 6.28 cm/s

B. 62.8 cm/s

C. 0.628 cm/s

D. 628.4 cm/s

Answer:

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173. The angular velocity of a wheel is 70 rad/s. If the radius of the wheel is 0.5 m.,then linear velocity of the wheel is

A. 10 m/s

B. 20 m/s

C. 35 m/s

D. 70 m/s

Answer:

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174. A particle of mass 200 g completes one rotation of a circular track of radius 2 m in 20 second. Calculate angular speed.

A. 70 m

B. 140 m

C. 110 m

D. 220 m

Answer:

Watch Video Solution

175. The length of second's hand in a watch is 1 cm. The changle in velocity of its tip is 15 seconds is

A. zero

B. $\frac{\pi}{30}\sqrt{2}c\frac{m}{s}$

C. $\frac{\pi}{30}c\frac{m}{s}$

D. $\pi\frac{\sqrt{2}}{30}c\frac{m}{s}$

Answer:

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176. If a cycle wheel of raduius 0.4m completes one revolution in one second, then acceleration of the cycle is

A. $0.4\frac{\pi}{m}s^2$

B. $0.8\frac{\pi}{m}s^2$

C. $0.4\frac{\pi^2}{m}s^2$

D. $1.6\frac{\pi^2}{m}s^2$

Answer:

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177. Certain neutron stars are belived to be rotating at about $1 rev / s$. IF such a star has a radius of 20 km, the acceleration of an object on the equator of the star will be

A. $20 \times 10^8 \frac{m}{s^2}$

B. $8 \times 10^5 \frac{m}{s^2}$

C. $120 \times 10^5 \frac{m}{s^2}$

D. $4 \times 10^8 \frac{m}{s^2}$

Answer:

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178. IF a tension In a string is 6.4 N. A load at the lower end of a string is 0.1 kg, the length of string is 6 m then find its angular velocity(g=10m/s^2)

A. 3 rad/s

B. 4 rad/s

C. 2 rad/s

D. 1 rad/s

Answer:

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179. A string breaks if its tension exceeds 10 newton. A stone of mass 250 g tied to this string the length 10 cm is rotated in a horizontal circle. The maximum angular velocity of rotation can be

A. 20 rad/s

B. 40 rad/s

C. 100 rad/s

D. 200 rad/s

Answer:

Watch Video Solution

180. A proton of mass 1.6×10^{-27}kg goes round in a circular orbit of radius 0.12 m under a certripetal force of $4 \times 10^{-13} N$. then the frequency of revolution of the proton is about

A. 0.08×10^8 cycles per s

B. 4×10^8 cycles per s

C. 8×10^8 cycles per s

D. 12×10^8 cycles per s

Answer:

Watch Video Solution

181. IF the radius of curvature of the path of two particles of same masses are in the ratio

1:2, then in order to have constant centripetal force their, velocity, should be in the ratio of

A. 1:4

B. 4:1

C. $\sqrt{2}:1$

D. $1:\sqrt{2}$

Answer:

Watch Video Solution

182. A wheel rotates with a constant angular velocity of 300 r.p.m. The angle through which the wheel rotates in one second is

A. πrad

B. 5πrad

C. 10π rad

D. 20π rad

Answer:

Watch Video Solution

183. A wheel completes 2000 revolutions to cover the 9.5 km distance. Then the diameter of the wheel is

A. 1.5 m

B. 1.5 cm

C. 7.5 cm

D. 7.5 m

Answer:

Watch Video Solution

184. The ratio of angular speed of second hand to that of the minute hand of a clock is

A. 60:1

B. 1 : 60

C. 1:1

D. 1:6

Answer:

Watch Video Solution

185. What is the angular speed of the minute hand of the clock is degrees per second ?

A. 0.01

B. 0.1

C. 1.0

D. 0.001

Answer:

Watch Video Solution

186. A paricle is describing the circular path of radius 20 m in every 2 s. The average angular speed of the particle during 4 s is

A. $20\pi rads^{-1}$

B. $4\pi rads^{-1}$

C. $\pi rads^{-1}$

D. $2\pi rads^{-1}$

Answer:

Watch Video Solution

187. The linear velocity of a particle on the N-pole of the earth is

A. zero

B. 486 km/hr

C. infinite.

D. 125 m/s

Answer:

Watch Video Solution

188. A body revolves n times in a circle of radius π cm in one minute. Its linear veloity is

A. $\frac{60}{2}nc\frac{m}{s}$

B. $2\frac{n}{60}c\frac{m}{s}$

C. $2\pi^2\frac{n}{60}c\frac{m}{s}$

D. $2\pi^2\frac{n^2}{60}c\frac{m}{s}$

Answer:

Watch Video Solution

189. The second's hand of a watch has length of 6cm.Speed of end point and magnitude of difference of velocities at two perpendicular positions will be

A. 6.28 and 0 mm/s

B. 8.88 and 4.44 mm/s

C. 8.88 and 6.28 mm/s

D. 6.28 and 8.88 mm/s

Answer:

Watch Video Solution

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190. Two Cars C_1 and C_2 are going round in concentric circles of radii R_1 and R_2. They complete the circular paths in the same time

Then $\frac{Speed of C_1}{Speed of C_2}$ =

A. 1

B. $\frac{R_1}{R_2}$

C. $\frac{R_2}{R_1}$

D. cannot be determined as data is insufficient

Answer:

Watch Video Solution

191. A wheel is 0.25m in radius . When it makes 15 revolutions per minute, its linear speed at a point on circumference is

A. $\frac{\pi}{2}\frac{m}{s}$

B. $\frac{\pi}{8}\frac{m}{s}$

C. $\frac{\pi}{4}\frac{m}{s}$

D. $\pi\frac{m}{s}$

Answer:

Watch Video Solution

192. A stone tied to the end of a string of length 50 cm is whirled in a horizontal circle with a constant speed . IF the stone makes 40 revolutions in 20 s, then the speed of the stone along the circle is

A. $\frac{\pi}{s}\frac{m}{s^{-1}}$

B. $\pi\frac{m}{s^{-1}}$

C. $2\pi \frac{m}{s^{-1}}$

D. $\frac{\pi}{s} \frac{m}{s^{-1}}$

Answer:

Watch Video Solution

193. The radius of the earth is 6400 km. the linear velocity of a point on the equator is nearly

A. 1600 km/hr

B. 1675 km/hr

C. 1500 km/hr

D. 1800 km/hr

Answer:

Watch Video Solution

194. What is the value of linear velocity if $\omega = 3\hat{i} - 4\hat{j} + \hat{k}$and `r= 5 hat I - 6 hat j + 6 hat k'?

A. $6\hat{I} + 2\hat{j} - 3\hat{k}$

B. $-18\hat{i} - 13\hat{j} + 2\hat{k}$

C. $4\hat{i} + 13\hat{j} + 6\hat{k}$

D. $6\hat{I} - 2\hat{j} + 8\hat{k}$

Answer:

Watch Video Solution

195. IF the equation for the displancement of a particle moving on a circular path is given by $\theta = 2t^3 + 0.5$, where θ is in radius and t is in seconds, then the angular velocity of the particle at t=2 s is

A. 8 rad/s

B. 12 rad/s

C. 24 rad/s

D. 36 rad/s

Answer:

Watch Video Solution

196. An aircraft executes a horizontal loop of radius 1 km with a steady speed of 900$km\frac{/}{h}$. Ratio of its centripetal acceleration to acceleration due to gravity is

A. 9.2

B. 6.25

C. 5.0

D. 8.25

Answer:

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197. A turn table which is rotating uniformly has a particle placed on it. As seen from the ground, the particle goes in a circle with speed 20 cm/s and acceleration 20 cm/s^2. The particle is now shifted to a new position where radius is half of the original value . the new values of speed and acceleration will be

A. $10c\frac{m}{s}, 10c\frac{m}{s^2}$

B. $10c\frac{m}{s}, 80c\frac{m}{s^2}$

C. $40c\frac{m}{s}, 10c\frac{m}{s^2}$

D. $40c\frac{m}{s}, 40c\frac{m}{s^2}$

Answer:

Watch Video Solution

198. A particle goes round a circular path with uniform speed v. After describing half the circle, what is the change in its centripetal acceleration?

A. $\frac{v^2}{r}$

B. $2\frac{v^2}{r}$

C. $2\frac{v^2}{\pi}r$

D. $\frac{v^2}{\pi}r$

Answer:

Watch Video Solution

199. A body of mass 500 g is revolving in a horizontal circle of radius 0.49 m. The centripetal force acting on it (if its period is 11 s) will be

A. 0.008 N

B. 8.0 N

C. 0.8 N

D. 0.08 N

Answer:

Watch Video Solution

200. A mass of 2 kg describes a circle of radius 1.0m on a smooth horizontal table at a uniform speed. It is joined to the centre of the circle by a string, which can just withstand 32 N. the greatest number of revolutions per minute the mass can make is

A. 38

B. 4

C. 76

D. 16

Answer:

Watch Video Solution

201. A particle performs uniform circular motion iin a horizontal plane. The radius of the circle is 20 cm. The centripetal force acting on the particle is 10N. Its kinectic energy is

A. 0.1 J

B. 0.2 J

C. 2.0 J

D. 1.0 J

Answer:

Watch Video Solution

202. A string breaks under a load of 4 kg. A mass weighing 200 g is attached to the end of this string which is one metre long and rotation when the string breaks, Is nearly(g=10 m/s^2)

A. 16 rad/s

B. 14 rad/s

C. 12 rad/s

D. 20 rad/s

Answer:

Watch Video Solution

203. A car of mass 1000kg moves on a circular path with constant speed of $12m/s$. It turned through90° after travelling 471 m on the road . The centripetal force acting on the car is

A. 320N

B. 480 N

C. 640 N

D. 1280 N

Answer:

Watch Video Solution

204. A mass of 10kg is whirled in a horizontal circle by means of a string at an initial speed of 5 r.p.m. Keeping the radius constant , the tension in the string is quadrupled. The new speed is nearly

A. 14 r.p.m.

B. 10r.p.m.

C. 2.25 r.p.m.

D. 7 r.p.m.

Answer:

Watch Video Solution

205. Consider a simple pendulam of length 1 m. Its bob performs a circular motion is horizontal plane with its string making an angle 60° with the vertical. The centripetal accleration experienced by the bob is

A. 2 s

B. 1.4 s

C. 1.98 s

D. 2.4 s

Answer:

Watch Video Solution

206. The length of the string of a conical pendulam is 10 m and it has a bob of mass 50 g. The angle that the string makes with the vertical is 30°. If the bob covers one revolution is 3 s, then the corresponding centripetal force acting on the bob will be

A. 10 N

B. 1 N

C. 100 N

D. 5 N

Answer:

Watch Video Solution

207. In a conical pendulam, when the bob moves in a horizontal circle of radius r with uniform speed v, the string of length L describes a cone of semivertical angle θ. The tension in the string is given by

A. $T = mg\frac{L}{\sqrt{L^2 - r^2}}$

B. $T = \dfrac{\dfrac{\left(L^2 - r^2\right)^1}{2}}{m} gL$

C. $T = mg\dfrac{L}{L^2 - r^2}$

D. $T = mg\dfrac{L}{\left(L^2 - r^2\right)^2}$

Answer:

Watch Video Solution

208. An automobile travelling with a speed of $60 kmh^{-1}$ can apply brakes to stop after covering a distance of 20 m. If the car is going iwit as fast i.e., $120 kmh^{-1}$, the stopping distance will be

A. 20 m

B. 40 m

C. 60 m

D. 80 m

Answer:

Watch Video Solution

209. The unifom motion in the following acceleration time graph is

A. AB

B. BC

C. CD

D. DE

Answer:

Watch Video Solution

210. A particle starts from rest at $t = 0$ and undergoes an acceleration a in ms^{-2} with time t in seconds which is as shown in figure.

Which one of the following plot represents velocity v in ms^{-1} versus time t in seconds?

A.

B.

C.

D.

Answer:

Watch Video Solution

211. A ball is dropped vertically from a height d above the ground. It hits the ground and bounces up vertically to a height $\frac{d}{2}$.

Neglecting subsequent motion and irresistance, its velocity v varies with the height h above the ground as

A.

B.

C.

D.

Answer:

Watch Video Solution

212. Which of the following is CORRECT graph for variation of distance with time in free fall motion?

A.

B.

C.

D.

Answer:

Watch Video Solution

213. An athlete completes one round of a circular track of radius R in 40s. What will be his displacement at the end of 2 min 20 s?

A. zero

B. 2R

C. $2\pi R$

D. $7\pi R$

Answer:

Watch Video Solution

214. 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 The magnitude of the velocity of the projectile 1 second after it is fired is

A. $\left[\left(a^2 + (2b + c)^2\right]^{\frac{1}{2}}$

B. $\left[\left(2a^2 + (b + c)^2\right]^{\frac{1}{2}}$

C. $\left[\left(2a^2 + (2b + c)^2\right]^{\frac{1}{2}}$

D. $\left[\left(a^2 + (b + 2c)^2\right]^{\frac{1}{2}}$

Answer:

Watch Video Solution

215. A body is projected horizontally from a height with speed 20 metres/second. What will be its speed after 5 second? $\left[g = 10metr\frac{e}{\sec o}nd^2\right]$

A. 54 metres/ second

B. 20 metres/second

C. 50 metres /second

D. 700 metres/second

Answer:

Watch Video Solution

216. A ball is thrown from rear end of the compartment to the front end which is moving at constant horizontal velocity. An observer A sitting in the compartment and another observer B standing on the ground draw the trajectory. They will have

A. equal horizontal and equal vertical ranges.

B. equal vertical ranges but different horizontal ranges.

C. different vertical ranges but equal horizontal ranges

D. different vertical and different horizontal ranges.

Answer:

Watch Video Solution

217. Time taken by the projectile to reach from A to B in figure is t. Then the distance AB is equal to

A. $u\frac{t}{\sqrt{3}}$

B. $\frac{\sqrt{3}ut}{2}$

C. $\sqrt{3ut}$

D. 2ut

Answer:

Watch Video Solution

218. A stone is projected from the ground with velocity 50 m/s at an angle of 30°. It crosses a wall after 3 s. How far beyond the wall the stone will strike the ground? $\left[g=10\frac{m}{s^2}\right]$

A. 90.2 m

B. 89.6 m

C. 86.6 m

D. 70.2 m

Answer:

Watch Video Solution

219. A man standing on the roof of a house of height h throws one particle vertically downwards and another particle horizontally with the same velocity u. The ratio of their velocities when they reach the earth's surface will be

A. $\sqrt{2gh+u^2}:u$

B. $1:2$

C. $1:1$

D. $\sqrt{2gh + u^2} : \sqrt{2gh}$

Answer:

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220. A ball is rolled off the edge of a horizontal table at a speed of 4 m/second. It hits the ground after 0.4 second. Which statement given below is true?

A. It hits the ground at a horizontal distance 2.6 m from the edge of the table

B. The speed with which it hits the ground is 4.0 m/second

C. Height of the table is 0.8 m.

D. It hits the ground at an angle of 60° to the horizontal.

Answer:

Watch Video Solution

221. A particle comes round a circle of radius Im once. The time taken by it is 10s . The average velocity of motion is

A. $0.2\pi \frac{m}{s}$

B. $2\pi \frac{m}{s}$

C. $2 \frac{m}{s}$

D. zero

Answer:

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222. The tangential velocity of a particle making p rotations along a circle of radius π in t seconds is

A. $2\pi \frac{p}{t^2}$

B. $2\pi \frac{p^2}{t}$

C. $\pi \frac{p}{2} t$

D. $2\pi^2 \frac{p}{t}$

Answer:

Watch Video Solution

223. A cyclist turns around a curve at 15 $mi \leq s / hour$. IF he turns at double the speed, the tendency to overturn is

A. doubled.

B. quadrupled.

C. halved.

D. unchanged

Answer:

Watch Video Solution

224. A coin placed on a rotating turn-table slips when it is placed at a distance of 9cm from the centre. If the angular velocity of the turn-table is trippled, it will just slip if its distance from the centre is

A. 27 cm

B. 9 cm

C. 3 cm

D. 1 cm

Answer:

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225. A small coin is kept at the rim of a horizontal circular disc which is set into rotation about vertical axis passing through its centre. If radius of the disc is 5cm and $\mu_s = 0.25$, then the angular speed at which the coin will just slip is

A. 5 rad/s

B. 7 rad/s

C. 10 rad/s

D. 4.9 rad/s

Answer:

Watch Video Solution

226. A motor cycle driver doubles its velocity when he is having a turn. The force exerted outwardly will be

A. double

B. half

C. 4 times

D. $\frac{1}{4}$ times

Answer:

Watch Video Solution

227. A long horizontal rod has a bead which can slide along its length, and initially placed at a distance L from one end A of the rod. The rod is set in angular motion about A with constant angular accleration α. If the coefficient of friction between the rod and the bead is μ, and gravity is neglected , then the time after which the bead starts slipping is

A. $\sqrt{\frac{\mu}{\alpha}}$

B. $\left(\frac{\mu}{\alpha}\right)$

C. $\frac{1}{\sqrt{\mu\alpha}}$

D. infinitesimal

Answer:

Watch Video Solution

228. On the centre of a frictionless table, a small hole is made, through which a weightless string of lenth 2l is inserted. On the two ends of the strings, two balls of the same mass m are attached, Arrangement is made in such a way that half of the string is on the table top and half is hanging below. The ball on the table top is made to move in a circular path with a constant speed v, What is the centripetal acceleration of the moving ball?

A. mvl

B. g

C. Zero

D. 2mvl

Answer:

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229. The ratio of centripetal forces on two clectrons which are revolving around nucleus of hydrogen alom in $2^n d$ and $3^r d$ orbits respectively is

A. $27:8$

B. $81:16$

C. 8.27

D. $16:81$

Answer:

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230. Two particles A and B are located at distances $r_A$and r_B respectively from the centre of a rotating disc such that $r_A > r_B$. In this case , if angular velocity ω of rotation is constant then

A. both A and B do not have any acceleration.

B. both A nd B have same acceleration

C. A has greater acceleration than B

D. B has greater acceleration than A

Answer:

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231. IF p is the magnitude of linear momentum of a particle executing a uniform circular motion, then the ratio of centripetal force acting on the particle to its linear momentum is given by

A. $\frac{r}{v}$

B. $\frac{V^2}{m}r$

C. $\frac{v}{r}$

D. $v \cdot r$

Answer:

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232. Select the incorrect statements from the following SI: Average velocity is path length divided by time interval S2: In general, speed is greater than the magnitude of the velocily. S3: A particle moving in a given direction with a non-zero velocity can have zero speed. S4. The magnitude of average velocity is the average speed,

A. S2 and S3

B. S1 and S4

C. SI, S3 and S4

D. All four statements

Answer:

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233. Assertion: The average velocity of the object over an interval of time is either smaller than or equal to the average spood of the object over the same interval. Reason: Velocity is a vector quantity and speed is a scalar quantity.

A. Assertion is True, Reason is True, Reason is a correct explanation for Assertion

B. Assertion is True Reason is True, Reason is not a correct explanation for Assertion

C. Assertion is True, Reason is False

D. Assertion is False, Reason is True.

Answer:

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234. Two particles A and B having different masses are projected from a tower with same speed. A is projected vertically upward and B vertically downward. On reaching the ground

A. velocity of A is greater than that of B.

B. velocity of B is greater than that of A.

C. both A and B attain the same velocity

D. the particle with the larger mass attains higher velocity.

Answer:

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235. A person travelling in a straight line moves with a constant velocity v_1 for certain distance 'x' and with a constant velocity v_2 for next equal distance. The average velocity is given by the relation

A. $v = \sqrt{v_1 v_2}$

B. $\dfrac{1}{v} = \dfrac{1}{v_1} + \dfrac{1}{v_2}$

C. $\dfrac{2}{v} = \dfrac{1}{v_1} + \dfrac{1}{v_2}$

D. $\dfrac{v}{2} = \dfrac{v_1 + v_2}{2}$

Answer:

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236. A body travelling along a straight line path travels first half of the distance with a velocity $7 ms^{-1}$. During the travel time of the second half of the distance, first half time is travelled with a velocity $14 ms^{-1}$ and the second half time is travelled with a velocity $21 ms^{-1}$. Then the average velocity of the body during the journey is

A. $14 ms^{-1}$

B. $10 ms^{-1}$

C. $9 ms^{-1}$

D. $12ms^{-1}$

Answer:

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237. Preeti reached the metro station and found that the escalator was not working. She walked up the stationary escalator in time t_1. On other days. if she remains stationary on the moving escalater, then the escalator takes her up in time t_2. The time taken by her to walk up on the moving escalator will be:

A. $\frac{t_1 + t_2}{2}$

B. $\frac{t_1 t_2}{t_2 - t_1}$

C. $\frac{t_1 t_2}{t_2 + t_1}$

D. $(t_1 - t_2)$

Answer:

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238. A particle moves along x-axis obeying the equation `x=t(t-1)(t-2), where x (in metres) is the position of the particle at any time t (in seconds). The displacement when the velocity of the particle is zero, is

A. $-\left(\frac{2}{3}\sqrt{3}\right)m, \left(\frac{2}{3}\sqrt{3}\right)m$

B. $-\left(\frac{5}{3}\sqrt{3}\right)m, \left(\frac{5}{3}\sqrt{3}\right)m$

C. $-3m, 3m$

D. $-5m, 5m$

Answer:

Watch Video Solution

239. If the velocity of a particle is $v = At + Bt^2$. where A and B are constants, then the distance travelled by it between 1 s and 2 s is

A. $\frac{3}{2}A + \frac{7}{3}B$

B. $\frac{A}{2} + \frac{B}{3}$

C. $\frac{3}{2}A + 4B$

D. $3A + 7B$

Answer:

Watch Video Solution

240. The displacement of a body along x-axis depends on time as $x = \sqrt{t+1}$. Then the velocity of body

A. increases with time

B. decreases with time

C. independent of time

D. none of these

Answer:

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

A. $2\frac{C}{B}$

B. $2\frac{B}{C}$

C. 2C

D. $\frac{C}{2}B$

Answer:

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242. An object moving with a speed of 6.25 m/s, is decelerated at a rate given by $d\frac{v}{dt} = -2.5\sqrt{v}$ where v is the instantaneous speed. The time taken by the object, to come to rest, would be

A. 1 s

B. 2s

C. 4 s

D. 8s

Answer:

Watch Video Solution

243. A particle is moving with constant acceleration and v_1, v_2 and v_3 are the average velocities of the particle in three successive intervals t_1, t_2 and t_3. Which of the following relations will be correct?

A. $\dfrac{v_1 - V_3}{V_2 - V_3} = \dfrac{t_1 - t_2}{t_1 - t_3}$

B. $\dfrac{v_1 - V_2}{V_2 - V_3} = \dfrac{t_1 - t_2}{t_1 - t_3}$

C. $\dfrac{v_1 - V_2}{V_2 - V_3} = \dfrac{t_1 - t_2}{t_2 - t_3}$

D. $\dfrac{v_1 - V_2}{V_2 - V_3} = \dfrac{t_1 + t_2}{t_2 + t_3}$

Answer:

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244. Two cars P and Q start from a point at the same time in a straight line and their positions are represented by $X_p(t) = at + bt^2$ and $X_Q(t) = ft - t^2$. At what time do the cars have the same velocity?

A. $\dfrac{f-a}{2(1+b)}$

B. $a - \dfrac{f}{1} + b$

C. $a + \dfrac{f}{2(b-1)}$

D. $a+\dfrac{f}{2(1+b)}$

Answer:

Watch Video Solution

245. An object moving with a speed of 6.25 m/s, is decelerated at a rate given by $d\dfrac{v}{dt}=-2.5\sqrt{v}$ where v is the instantaneous speed. The time taken by the object, to come to rest, would be

A. 2 s

B. 3 s

C. 2.5 s

D. 4 s

Answer:

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246. A particle first accelerates from rest and then retards to rest during the time interval of 8 s. If the retardation is 3 times the acceleration, then the time for which it accelerated is

A. 2 s

B. 3 s

C. 4 s

D. 6 s

Answer:

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247. A car accelerate from rest with $2\frac{m}{s^2}$ on a straight line path and then comes to rest after applying brakes. Total distance travelled by the car is 100 m in 20 seconds. Then the maximum velocity attained by the car is

A. 10m/s

B. 20 m/s

C. 15 m/s

D. 4 m/s

Answer:

Watch Video Solution

248. The velocity of an object moving in straight line path is given as a function of time by $v = 6t - 3t^2$, where v is in ms^{-1}, t is in s. The average velocity of the object between $t = 0$ and $t = 2$ second is

A. 0

B. $3ms^{-1}$

C. $2ms^{-1}$

D. $4ms^{-1}$

Answer:

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249. Consider a car initially at rest, starts to move along a straight road first with acceleration 5 m/s^2, then with uniform velocity and finally decelerating at 5 m/s^2, before coming to stop. Total time taken from start to end is $t = 25s$. If the average velocity during that time is 72 km/hr, the car moved with uniform velocity for a time of

A. 15 s

B. 30 s

C. 155 s

D. 2 s

Answer:

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250. The velocity-time graph for two bodies A and Bare shown. Then the acceleration of A and B are in the ratio

A. $\sin 25^\circ$ to $\sin 50^\circ$

B. $\tan 25^\circ$ to $\tan 40^\circ$

C. $\cos 25^\circ$ to $\cos 50^\circ$

D. $\tan 25^\circ$ to $\tan 50^\circ$

Answer:

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251. A particle shows distance-time curve as shown in the figure. The maximum instantaneous velocity of the particle is around the point

A. P

B. S

C. R

D. Q

Answer:

Watch Video Solution

252. The nature of graph drawn for a freely falling body with time on the x-axis and speed on the y. axis is (Assuming initial speed to be zero)

A. A straight line with positive y-axis intercept

B. A straight line passing through origin

C. A parabola.

D. A straight line parallel to y-axis with positive x-axis intercept

Answer:

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253. A body is thrown vertically upwards. Which one of the following graphs correctly represent the velocity vs time?

A.

B.

C.

D.

Answer:

Watch Video Solution

254. All the graphs below are intended to represent the same motion. One of them does it incorrectly. Pick it up.

A.

B.

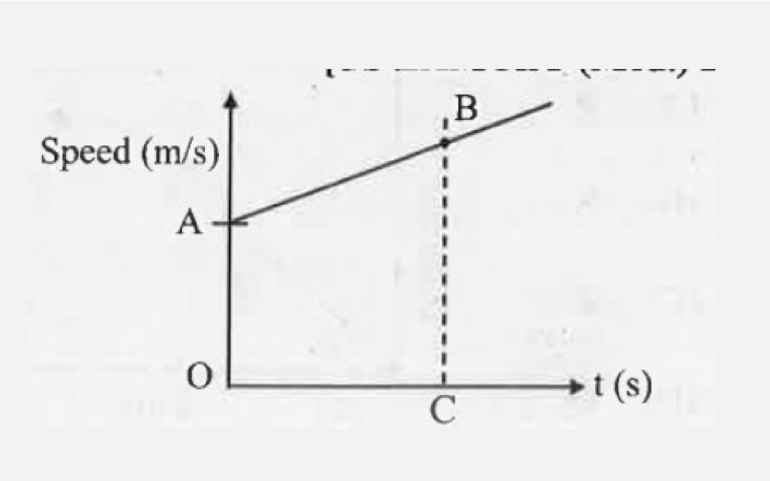
C.

D.

Answer:

Watch Video Solution

255. The speed versus time graph of a moving particle is shown in the following figure. If 'u' is the initial speed at $t = 0$, v is the speed at time t, a is the acceleration and $s' isthedis \tan cecovered \in timet$`, then total area OABC is best described using. (Assume O as origin)



A. $v = u + at$

B. $s = ut + \frac{1}{2}at^2$

C. $v^2 = u^2 + 2as$

D. $v = at$

Answer:

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256. A toy car with charge moves on a frictionless horizontal plane surface under the influence of a uniform electric field $\overrightarrow{E}$. Due to the force $q\overrightarrow{E}$ E. its velocity increases from 0 to 6 m/s in one second duration. At that instant the direction of the field is reversed. The car continues to move for two more seconds under the influence of this field. The average velocity and the average speed of the day car between 0 to 3 seconds are respectively

A. 2 m/s, 4 m/s

B. 1 m/s, 3 m/s

C. 1m/s, 3.5 m/s

D. 1.5 m/s, 3 m/s

Answer:

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257. Two trains, which are moving along different tracks in opposite direction, are put on the same track by mistake. On noticing the mistake, when the trains are 300 m apart the drivers start slowing down the trains. The graphs given below show decrease in their velocities as function of time. The separation between the trains when both have stopped is

A. 120m

B. 20m

C. 60m

D. 280m

Answer:

Watch Video Solution

258. A stone falls freely under gravity. It covers distances $h_1, h_2$and h_3 in the first 5 seconds, the next 5 seconds and the next 5 seconds respectively. The relation between h_1, h_2 and h_3 is

A. $h_1 = 2h_2 = 3h_3$

B. $h_1 = \frac{h_2}{3} = 3\frac{h_3}{5}$

C. $h_2 = 3h_1$ and $h_3 = 3h_2$

D. `h_1=h_2=h_3

Answer:

Watch Video Solution

259. 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 $\left(\frac{t_2}{t_1}\right)$ is

A. $\sqrt{2}+1$

B. $\sqrt{2}-1$

C. $2\sqrt{2}$

D. $\frac{1}{\sqrt{2}}+1$

Answer:

Watch Video Solution

260. A parachutist drops freely from an aeroplane for 10 s before the parachute opens out. Then he descends with a net retardation of 2.5 ms^-2. If he jumps out of the planem a height of 2495 m and $g = 10ms^{-2}$, then his velocity on reaching the ground will be

A. $2.5ms^{-1}$

B. $7.5ms^{-1}$

C. $5ms^{-1}$

D. $10ms^{-1}$

Answer:

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261. Two bodies of different masses m_a, and m_b are dropped from two different heights a and b. The ratio of the time taken by the two to cover these distances are

A. a:b

B. b:a

C. $\sqrt{a}:\sqrt{b}$

D. $a^2 : b^2$

Answer:

Watch Video Solution

262. A body falls freely for 10s. Its average velocity during this journey (take $g = 10ms^{-2}$)

A. $100ms^{-1}$

B. $10ms^{-1}$

C. $50ms^{-1}$

D. $5ms^{-1}$

Answer:

Watch Video Solution

263. An object is thrown vertically upward with a speed of 30 m/s. The velocity of the object half a second before it reaches the maximum height

A. 4.9 m/s

B. 9.8 m/s

C. 19.6 m/s

D. 25.1 m/s

Answer:

Watch Video Solution

264. Ball-1 is dropped from the top of a building from rest. At the same moment, ball-2 is thrown upward towards ball-1 with speed 14 m/s from a point 21 m below the top of building How far will the ball-1 have dropped when it passes ball-2. (Assume $g = 10\frac{m}{s^2}$)

A. $\frac{45}{4}m$

B. $\frac{52}{6}m$

C. $\frac{37}{2}m$

D. $\frac{25}{2}m$

Answer:

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265. From the top of a tower of height 'H', body is thrown vertically upwards with a speed 'u'. Time taken by the body to reach the ground is '3' times the time taken by it to reach the highest point in its path. Then, the speed u is

A. $\sqrt{gH}$

B. $\sqrt{g\frac{H}{2}}$

C. $\sqrt{2g\frac{H}{3}}$

D. $\sqrt{g\frac{H}{3}}$

Answer:

Watch Video Solution

266. Points P, Q and R are in a vertical line such that $PQ = QR$. A ball at P is allowed to fall freely with zero initial speed. The ratio of the times of descent through PQ and OR is

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

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

C. $1 : 2$

D. $1 : \sqrt{2}$

Answer:

Watch Video Solution

267. A person standing on the floor of an elevator drops a coin. The coin reaches the floor in time t_1 if the elevator is at rest and in time t_2 if the elevator is moving uniformly. Then

A. $t_1 = t_2$

B. $t_1 < t_2$ or $t_1 > t_2$ depending upon whether the lift is going up or down

C. $t_1 < t_2$

D. $t_1 > t_2$

Answer:

Watch Video Solution

268. The relative velocity of geostationary satellite with respect to the spinning motion of the earth is ______.

A. 0 m/s

B. 6 m/s

C. 12 m/s

D. 14m/s

Answer:

Watch Video Solution

269. A particle moves so that its position vector is given by $\overrightarrow{r} = \cos \omega t \widehat{x} = \sin \omega t \hat{y}$, where ω is a constant. Which of the following is true?

A. Velocity is perpendicular to $\vec{r}$ and acceleration is directed towards the origin.

B. Velocity is perpendicular to $\vec{r}$ and acceleration is directed away from the origin.

C. Velocity and acceleration both are perpendicular to $\vec{r}$.

D. Velocity and acceleration both are parallel to $\overrightarrow{r}$.

Answer:

Watch Video Solution

270. A particle has an initial velocity of $3\hat{i} + 4\hat{j}$ and an acceleration of $0.4\hat{i} + 0.3\hat{j}$. Its speed after 10 s is

A. 10 units

B. $7\sqrt{2}$ units

C. 7 units

D. 8.5 units

Answer:

Watch Video Solution

271. The position vector of a particle $\overrightarrow{R}$ as a functions of time is given by $\overrightarrow{R} = 4\sin(2\pi t)\hat{i} + 4\cos(2\pi t)\hat{j}$ where, R is in metres, t is in seconds and $\hat{i}$ and $\hat{j}$denote unit vectors along x and y-directions, respectively

Which one of the following statements is wrong for the motion of particle?

A. Path of the particle is a circle of radius 4 metre.

B. Acceleration vector is along $-\overrightarrow{R}$.

C. Magnitude of acceleration vector is $\frac{v^2}{R}$ where v is the velocity of particle.

D. Magnitude of the velocity of particle is 8 metre /second.

Answer:

Watch Video Solution

272. A particle is moving such that its position coordinates (x, y) are (2m, 3m) at time $t = 0$. (6m, 7m) at time $t = 2s$ and $(13m, 14m) at time$t=5 s` Average velocity vector from 0s to 5 s is

A. $\frac{1}{5}\left('13\hat{I} + 14\hat{j}'\right)$

B. $\frac{7}{3}\left(\hat{I} + \hat{j}\right)$

C. $2\left(\hat{I} + \hat{j}\right.$

D. $\frac{11}{5}\left(\hat{I} + \hat{j}\right)$

Answer:

Watch Video Solution

273. Particle A moves along X-axis with a uniform velocity of magnitude 10 m/s. Particle B moves with uniform velocity 20 m/s. along a direction making an angle of 60° with the positive direction of X-axis as shwon in the figure. The relative velocity of B with respect to that of A is

A. 10m/s along X-axis

B. $10\sqrt{3}$ m/s along Y-axis (perpendicular to X-axis)

C. $10\sqrt{5}$ along the bisection of the velocities of A and B

D. 30 m/s along negative X- axis.

Answer:

Watch Video Solution

274. A ship A is moving westwards with a speed of $10 km h^{-1}$ and a ship B 100 km south of A, is moving northwards with a speed of $10 km h^{-1}$ The time after which the distance between them becomes shortest, is

A. 0h

B. 5h

C. $5\sqrt{2}h$

D. $10\sqrt{2}h$

Answer:

Watch Video Solution

275. The speed of swimmer in still water is 20 m/s. The speed of river water is 10 m/s and is flowing due east. If he is standing on the south bank and wishes to cross the river along the shortest path, the angle at which he should make this strokes w.r.t.north is given by:

A. 60° west

B. 45° west

C. 30° west

D. 0°

Answer:

Watch Video Solution

276. The speed of a projectile at its maximum height is half of its initial speed. The angle of projection is

A. 60°

B. 15°

C. 30°

D. 45°

Answer:

Watch Video Solution

277. Two bodies are thrown with the same velocily al an angle of 30° and 60° to the horizontal. The ratio of maximum heights reached is

A. $\sqrt{3}$

B. 3

C. $\frac{1}{3}$

D. $\frac{1}{\sqrt{3}}$

Answer:

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278. A body projected from the ground reaches a point 'X' in its path after 3 seconds and from there it reaches the ground after further 6 seconds. The vertical distance of the point 'X' from the ground is (acceleration due to gravity = $10ms^{-2}$)

A. 30 m

B. 60 m

C. 80 m

D. 90 m

Answer:

Watch Video Solution

279. Three projectiles A, B and Care projected at an angle of $30^\circ, 45^\circ, 60^\circ$ respectively. If $R_A, R_B$and R_C are ranges of A, B and C respectively, then (velocity of projection is same for A, B and C

A. $R_A = R_B = R_C$

B. $R_A = R_C > R_B$

C. $R_A < R_B < R_C$

D. $R_A = R_C < R_B$

Answer:

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280. Two particles are simultaneously projected in the horizontal direction from a point P at a certain height. The initial velocities of the particles are oppositely directed to each other and have magnitude v each. The separation between the particles at a time when their position vectors (drawn from the point P are mutually perpendicular, is

A. $\frac{v^2}{2}g$

B. $\frac{v^2}{g}$

C. $4\frac{v^2}{g}$

D. $2\frac{v^2}{g}$

Answer:

Watch Video Solution

281. The trajectory of a projectile projected from origin is given by the equation $y = x - \left(\frac{2x^2}{5}\right)$. The initial velocity of the projectile is

A. $25ms^{-1}$

B. $\frac{2}{5}ms^{-1}$

C. $\frac{5}{2}ms^{-1}$

D. $5ms^{-1}$

Answer:

Watch Video Solution

282. A particle is projected with velocity $2\sqrt{gh}$ and at an angle 60° to the horizontal so that it just clears two walls of equal height 'h' which are at a distance 2h from each other. The time taken by the particle to travel between these two walls

A. $s\sqrt{2\frac{h}{g}}$

B. $\sqrt{\frac{h}{2}g}$

C. $2\sqrt{\frac{h}{g}}$

D. $\sqrt{\frac{h}{g}}$

Answer:

Watch Video Solution

283. A body projected from the ground reaches a point 'X' in its path after 3 seconds and from there it reaches the ground after further 6 seconds. The vertical distance of the point 'X' from the ground is (acceleration due to gravity = $10ms^{-2}$)

A. 30 m

B. 60 m

C. 80 m

D. 90 m

Answer:

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284. The velocity of a projectile at the initial point A is $\left(2\hat{i}+3\hat{j}\right)$ m/s. Its velocity (in m/s) at point B is

A. $-2\hat{I} - 3\hat{j}$

B. $-2\hat{i} + 3\hat{j}$

C. $2\hat{I} - 3\hat{j}$

D. $2\hat{I} + 3\hat{j}$

Answer:

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285. A projectile is given an initial velocity of $\hat{i}+2\hat{j}$. The Cartesian equation of its path is $\left(g=10\frac{m}{s^2}\right.$

A. $y=2x-5x^2$

B. $y=x-5x^2$

C. $4y=2x-5x^2$

D. $y=2x-25x^2$

Answer:

Watch Video Solution

286. A body is projected vertically upwards with a velocity of $10 ms^{-1}$ and another body is projected simultaneously from the same point with a velocity of $20 ms^{-1}$ at an angle of $\frac{\pi}{6}$ with the horizontal. The distance between the two bodies after one second from the time of projection is (Acceleration due to gravity is 10 ms^-2`)

A. 10m

B. $10\sqrt{3}$ m

C. 20m

D. $20\sqrt{3}$ m

Answer:

Watch Video Solution

287. The maximum height attained by projectile is increased by 10%, by changing the angle of projection, without changing the speed of projection. The percentage increase in the time of flight will be

A. 0.05

B. 0.1

C. 0.15

D. 0.2

Answer:

Watch Video Solution

288. A particle is projected with a velocity v so that its horizontal range twice the greatest height attained. The horizontal range is

A. $4\frac{v^2}{5g}$

B. $\frac{v^2}{g}$

C. $\frac{v^2}{2g}$

D. $2\frac{v^2}{3}g$

Answer:

Watch Video Solution

289. A particle moves so that its position vector is given by $\overrightarrow{r} = \cos\omega t\widehat{x} = \sin\omega t\hat{y}$, where ω is a constant. Which of the following is true?

A. Velocity is perpendicular to $\vec{r}$ and acceleration is directed towards the origin.

B. Velocity is perpendicular to $\vec{r}$ and acceleration is directed away from the origin.

C. Velocity and acceleration both are perpendicular to $\vec{r}$.

D. Velocity and acceleration both are parallel to $\vec{r}$.

Answer:

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290. The angle between velocity and acceleration of a particle describing uniform circular motion is

A. 180°

B. 90°

C. 45°

D. 60°

Answer:

Watch Video Solution

291. Angular speed of hour hand of a clock in degree per second is

A. $\frac{1}{30}$

B. $\frac{1}{60}$

C. $\frac{1}{120}$

D. $\frac{1}{720}$

Answer:

Watch Video Solution

292. The ratio of angular speed of a second-hand to the hour-hand of a watch is

A. $3600 : 1$

B. $720:1$

C. $72:1$

D. $60:1$

Answer:

Watch Video Solution

293. The difference between angular speed of minute hand and second hand of a clock is

A. $59\frac{\pi}{900}$ rad/s

B. $59\frac{\pi}{1800}$ rad/s

C. $59\frac{\pi}{2400}$ rad/s

D. $59\frac{\pi}{3600}$ rad/s

Answer:

Watch Video Solution

294. For a particle in uniform circular motion, the accleration $\overrightarrow{a}$ at a point P(R,θ) on the circle of radius R is (Here $\theta$is measured from the X-axis)

A. $\frac{v^2}{R}\hat{i} + \frac{v^2}{R}\hat{J}$

B. $-\left(\frac{v^2}{R}\right)\cos\theta\hat{i} + \frac{v^2}{R}\sin\theta\hat{J}$

C. $-\left(\frac{v^2}{R}\right)\sin\theta\hat{i} + \frac{v^2}{R}\cos\theta\hat{J}$

D. $-\left(\frac{v^2}{R}\right)\cos\theta\hat{i} + \frac{v^2}{R}\sin\theta\hat{J}$

Answer:

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295. Two cars of masses m_1 and m_2 are moving in circles of radii r_1 and r_2 respectively. Their speeds are such that they make complete circle in the same time t The ratio of their centripetal acceleration is .

A. $m_1 r_1 : m_2 r_2$

B. $m_1 : m_2$

C. $r_1 : r_2$

D. $1 : 1$

Answer:

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296. A particle moves in a circle of radius 5 cm with constant speed and time period 0.2 $\pi . s$. The acceleration of the particle is

A. $5\frac{m}{s^2}$

B. $15\frac{m}{s^2}$

C. $25\frac{m}{s^2}$

D. $36\frac{m}{s^2}$

Answer:

Watch Video Solution

297. A particle moves in a circle of radius 25 cm at two revolutions per second. The acceleration of the particle is m/s^2 is

A. π^2

B. $8\pi^2$

C. $4\pi^2$

D. $2\pi^2$

Answer:

Watch Video Solution

298. The angular separation between the minute hand and the hour hand of a clock at 12:20 pm is

A. 120°

B. 90°

C. 110°

D. 100°

Answer:

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299. Two particles A and B are moving in uniform circular motion in concentric circles of radii r_A and r_B with speed V_A and V_B respectively. Their time period of rotation is the same. The ratio of angular speed of A to that of B will be:

A. $r_B : r_A$

B. $1 : 1$

C. $r_A : r_B$

D. $V_B : V_A$

Answer:

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300. A particle is moving with a uniform speed in a circular orbit of radius R in the centripetal force inversely proportional to the n^{th} power of R. If the period of rotation of the particle is T, then:

A. $T \propto \frac{R^{n+1}}{2}$

B. $T \propto \frac{R^{n}}{2}$

C. $T \propto \frac{R^3}{2}$ for any n

D. $T \propto R^{\frac{n}{2}} + 1$

Answer:

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301. One end of string of length l is connected to a particle of mass 'm' and the other end is connected to a small peg on a smooth horizontal table. IF the particle moves in circle with speed'v', the net force on the particle (directed towards centre) will be (T represents the tension in the string)

A. T

B. $T + \frac{mv^2}{l}$

C. $T - \frac{mv^2}{l}$

D. Zero

Answer:

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302. A particle of mass m is executing uniform circular motion on a path of radius r. IF p is the magnitude of its linear momentum, the radial force acting on the particle is

A. pmr

B. $r\frac{m}{p}$

C. $\frac{mp^2}{r}$

D. $\frac{p^2}{r}m$

Answer:

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303. A toy cart is tied to the end of an unstretched string of length 'l'. When revolved, the toy cart moves in horizontal circle with radius $2l$ and time period T. If it is speeded until it moves in horizontal circle of radius '3l' with period T_1, relation between T and $T_1$is (Hooke's law is obeyed)

A. $T_1 = \frac{2}{\sqrt{3}}T$

B. $t_1 = \frac{\sqrt{3}}{2}T$

C. $T_1 = \sqrt{3}T$

D. $t_1 = \sqrt{\frac{3}{2}}T$

Answer:

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304. A body at rest starts sliding from top of a smooth inclined plane and requires 4 second to reach bottom. How much time does it take, starting from rest at top, to cover one-fourth of a distance ?

A. 1 second

B. 2 second

C. 3 second

D. 4 second

Answer:

Watch Video Solution

305. A wheel of circumference C is at rest on the ground. When the wheel rolls forward through half a revolution, then the displacement of initial point of contact will be

A. $C\sqrt{\frac{1}{\pi^2}+\frac{1}{4}}$

B. $\frac{C}{2}$

C. $\pi\sqrt{C^2+4}$

D. $C\sqrt{\frac{1}{\pi}+\frac{1}{2}}$

Answer:

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306. Two stones are thrown up simultaneously from the edge of a clir 240 m high with initial speed of 10 m/s and 40 m/s respectively. Which of the following graphs best represents the time variation of relative position of the second stone with respect to the first? (Assume stones do not rebound after hitting the ground and neglect air resistance, take $g = 10\frac{m}{s^2}$) (The figures are schematic and not drawn to scale).

A.

B.

C.

D.

Answer:

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307. A body starting from rest at $t = 0$ moves along a straight line with a constant acceleration. At $t = 2s$, the body reverses its direction keeping the acceleration same. The body returns to the initial position at $t = t_0$, then t_0 is

A. 4 s

B. $\left(4 + 2\sqrt{2}\right) s$

C. $\left(2 + 2\sqrt{2}\right) s$

D. $\left(4+4\sqrt{2}\right)s$

Answer:

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308. Two particles are simultaneously projected in the horizontal direction from a point P at a certain height. The initial velocities of the particles are oppositely directed to each other and have magnitude v each. The separation between the particles at a time when their position vectors (drawn from the point P are mutually perpendicular, is

A. $\frac{v^2}{2}g$

B. $\frac{v^2}{g}$

C. $4\frac{v^2}{g}$

D. $2\frac{v^2}{g}$

Answer:

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309. A stone is dropped from the top of a tower of height 45 m. One second later another stone is thrown down from the town of the same tower. Both stones reach the ground at the same time. If `(g= 10 m/s^2), magnitude of the initial velocity of the sound stone is

A. 16 m/s

B. 25 m/s

C. 12.5 m/s

D. 8 m/s

Answer:

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310. A particle of unit mass undergoes one-dimensional motion such that its velocity varies according to $v(x) = \beta x^{-2n}$ where β and n are constants and x is the position of the particle. The acceleration of the particle as a function of x, is given by

A. $-2n\beta^2 x^{-(2n-1)}$

B. $-2n\beta^2 x^{-(4n-1)}$

C. $-2n\beta^2 x^{-(2n+1)}$

D. $-2n\beta^2 e^{-(4n+1)}$

Answer:

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311. Two balls are thrown horizontally in opposite directions from the same point from a heighth with velocities 4 m/s and 3 m/s. The separation between the two balls when their velocities are perpendicular will be

A. 65 m

B. 5.25 m

C. 2.45 m

D. None of these

Answer:

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312. A projectile has some range R when the maximum height attained by it is either h_1 or h_2, Then R, h_1, and h_2 will be related as

A. $R = \sqrt{h_1 h_2}$

B. $R = 2\sqrt{h_1 h_2}$

C. $R = 3\sqrt{h_1 h_2}$

D. $R = 4\sqrt{h_1 h_2}$

Answer:

Watch Video Solution

313. A large number of bullets are fired in all directions with same speed v. What is the maximum area on the ground on which these bullets will spread

A. $\pi \frac{v^2}{g}$

B. $\pi \frac{v^4}{g^2}$

C. $\pi^2 \frac{v^4}{g^2}$

D. $\pi^2 \frac{v^2}{g^2}$

Answer:

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314. The ceiling of a tunnel is 5 m high. What is the maximum horizontal distance that a ball thrown with a speed of 20 m/s, can go without hitting the ceiling of the tunnel? ($g = 10\frac{m}{s^2}$)

A. $10\sqrt{3}$ m

B. $20\sqrt{3}$ m

C. $30\sqrt{3}$m

D. 40m

Answer:

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315. A small particle of mass mis projected at an angle θ with the x-axis with an initial velocity in the x-y plane as shown in the figure. At a time `t<(v_0 sin theta)/g, the angular momentum of the particle is

where $haii$, $\hat{j}$ and $\hat{k}$ are unit vectors along x,y, and z -axis respectively.

A. $\frac{1}{2}mgv_0t^2\cos\theta haii$

B. $mgv_0t^2\cos\theta\hat{j}$

C. $mgv_0t\cos\theta\hat{k}$

D. $\frac{1}{2}mgv_0t^2\cos\theta haik$

Answer:

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316. A projectile is fired from the surface of the earth with a velocity of $7ms^{-1}$ and angle θ with the horizontal. Another projectile fired from another planet with a velocity of $2.5ms^{-1}$ at the same angle follows a trajectory which is identical with the trajectory of the projectile fired from the earth. The value of the acceleration due to gravity on the planet is (in ms^{-1} (given $= 9, 8ms^{-2}$)

A. 9.8

B. 0.98

C. 16.3

D. 1.25

Answer:

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317. From a tower of height H, a particle is thrown vertically upwards with a speed u. The time taken by the particle, to hit the ground, is n times that taken by it to reach the highest point of its path. The relation between H, u and n is:

A. $2gH = n^2u^2$

B. $gH = (n-2)^2u^2$

C. $2gH = n(u^2)(n-2)$

D. $gH = (n - 2)u^2$

Answer:

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318. The relation between linear speed v, angular speed ω and angular acceleration α in circular motion is

A. $\alpha = a\frac{\omega}{v}$

B. $\alpha = a\frac{v}{\omega}$

C. $\alpha = v\frac{\omega}{a}$

D. $\alpha = \frac{\omega}{a}v$

Answer:

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319. If K.E of the particle of mass m performing U.C.M in a circle of radius r is R. the acceleration of the particle is

A. $2\frac{E}{m}r$

B. $\left(2\frac{E}{m}r\right)^2$

C. $2Emr$

D. $4\frac{E}{m}r$

Answer:

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320. A particle at rest is moved along a straight line by a machine giving constant power. The distance moved by the particle in time 't' is proportional to

A. $t^{\frac{1}{2}}$

B. $t^{\frac{2}{3}}$

C. t

D. $t^{\frac{3}{2}}$

Answer:

Watch Video Solution

321. A coin is placed on a rotating tur table rolated with angular speed ω. The coin just slips if it is placed at 4 cm from the center of the table. If angular velocity is doubled, at what distance will coin starts to slip.

A. 1 cm

B. 4 cm

C. 9 cm

D. 16 cm

Answer:

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322. A particle has initial velocity $4\hat{i} + 3\hat{j}$ and an accelaration $3\hat{I} + 4\hat{j}$. The rate of change of its speed is

A. 5 units

B. $\frac{24}{5}$ units

C. $\frac{18}{5}$ units

D. 7 units

Answer:

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323. A boat crosses a lake and returns in time T_0, at a speed V. On a rough day, there is uniform current al speedy to help the onward journey and impede the return journey. If the time taken to go across and retum on the same day be T. then $\frac{T}{T_0}$ is

A. $\frac{1-v^2}{V^2}$

B. $\frac{1}{1-\left(\frac{v^2}{V^2}\right)}$

C. $\frac{1+v^2}{V^2}$

D. $\frac{1}{1+\left(\frac{v^2}{V^2}\right)}$

Answer:

Watch Video Solution

324. A bullet is fired from surface of earth with a velocity of u m/s at an angleθ with the x-axis. Simultaneously a similar bullet is fired from a certain plant with velocity u' m/s at the same angle with the direction of x-axis. The trajectories in the two cases are identical. If g and g' are accelerations due to gravity on the curth's surface and planet's surface respectively, then

A. $\frac{u}{u'} = \frac{g}{g'}$

B. $\frac{u}{u'} = \frac{g^2}{g'2}$

C. $\frac{u^2}{u'^2} = \frac{g'}{g}$

D. $\frac{u^2}{u'^2} = \frac{g}{g'}$

Answer:

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325. A man throws balls with same speed vertically upwards one after the other at an interval of 3s. What should be the speed of throw so that more than two balls are in the sky at any time?

A. Only with speed 29.4 m/s

B. More than 29.4 m/s

C. At least 9.8 m/s

D. Any speed less than 29.4 m/s

Answer:

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326. A body is projected with velocity v_1 from the point P as shown in the figure. At the same time, another body is projected vertically upwards from Q with velocity v_2 . The point Q lies vertically below the highest point. For both the bodies to collide, $\frac{v^2}{v_1}$ should be

A. $\frac{\sqrt{3}}{2}$

B. $\frac{1}{\sqrt{2}}$

C. $\frac{\sqrt{5}}{3}$

D. $\frac{7}{2}$

Answer:

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327. A particle of mass 8 kg is initially at rest. A force acts on it whose magnitude changes with time. The force-time graph is shown in the figure.

The velocity of the particle after 10 s is

A. $20ms^{-1}$

B. $50ms^{-1}$

C. $12.5ms^{-1}$

D. $26ms^{-1}$

Answer:

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328. Two trains 120 m and 100 m in length are running in opposite directions with velocities

$43kmh^{-1}$ and $29kmh^{-1}$. In what time they will completely cross each other?

A. 9s

B. 11 s

C. 13 s

D. 15 s

Answer:

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329. A body starting from rest is accelerated uniformly for 15 s. If x_1, x_2, x_3 are the distance travelled in 5s, 10 s and 15 s respectively, then $x_1 : x_2 : x_3 =$

A. $1 : 2 : 3$

B. $1 : 1 : 1$

C. $1 : 3 : 5$

D. $1 : 3 : 9$

Answer:

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330. Two particles are projected from the same point with the same speed, at different angles θ_1 andθ_2 to the horizontal. Their times of flight are t_1 and $t_2$respectively and they have the same horizontal range. Then the incorrect relation is

A. $\frac{t_1}{t_2} = \tan\theta_1$

B. $\theta_1 + \theta = 90^\circ$

C. $\frac{t_1}{\sin\theta_1 = } \frac{t_2}{\sin\theta_2}$

D. $\dfrac{t_1}{t_2} = \tan\theta_2$

Answer:

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331. A body of mass m starts moving from a position of rest with a constant acceleration a. After covering a distance, it has acquired velocity v. What will be the magnitude of its velocity after it has covered a distance 2s?

A. $\dfrac{v}{2}$

B. v

C. $\sqrt{2}v$

D. 2v

Answer:

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332. A child travelling in a minibus accidentally drops a bottle out of the window. If the bus is moving in forward direction and bottle at the moment of falling is directed vertically downward, then the correct path that the bottle takes in falling to ground is

A. Straight line

B. slant line

C. parabola

D. semicircle

Answer:

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333. A particle is projected at $\frac{\pi}{4}$ to the horizontal with a kinetic energy K. The kinetic energy at the highest point is

A. K

B. zero

C. $\frac{K}{4}$

D. $\frac{K}{2}$

Answer:

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334. A cyclist starts from the centre O of a circular park of radius two kilometre, reaches the edge P of the park, then cycles along the circumference and return to the centre along QO as shown in the figure. If the round trip takes 10 minutes, the net displacement and average speed of the cyclist (in metre and kilometre per hour) is

A. $0, \dfrac{\pi + 4}{2}$

B. $\dfrac{\pi + 4}{2}, 0$

C. $42.9, \frac{\pi+4}{2}$

D. 0,42.9

Answer:

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335. A projectile has initially the same horizontal velocity as it would acquire if it had moved from rest with uniform acceleration of $4ms^{-1}$ for half a minute. Ir the maximum height reached by it is 180 m, then the angle of projection is (Take $g = 10 m s^{-2}$)

A. $\tan^{-1}\left(\frac{1}{3}\right)$

B. $\tan^{-1}(0.5)$

C. $\tan^{-1}(0.8)$

D. $\sin^{-1}\left(\frac{4}{9}\right)$

Answer:

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336. In a car race, car A takes a time of t s less than car B at the finish and passes the finishing point with a velocity v m/s more than the car B. Assuming that the cars start from rest and travel with constant acceleration a_1 and a_2 respectively, velocity v is given by

A. $\sqrt{a_1 a_2} t$

B. $\sqrt{2}\left(a_1 a_2 t^2\right)^{\frac{1}{2}}$

C. `sqrt(a_1a_2)t

D. $a_1 \sqrt{a_2 + t^2}$

Answer:

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337. A body starting from rest, accelerates at a constant rate a $\frac{m}{s^2}$ for some time, after which it decelerates at constant rate $b\frac{m}{s^2}$ to come to rest finally. If the total time elapsed is ts the maximum velocity attained by the body is given

A. $a\frac{b}{a+b}t\frac{m}{s}$

B. $a\frac{b}{a-b}t\frac{m}{s}$

C. $2a\frac{b}{a+b}t\frac{m}{s}$

D. $2a\frac{b}{a-b}t\frac{m}{s}$

Answer:

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338. The speed of a projectile when it is at its greatest height is $\sqrt{\frac{2}{5}}$ times its speed at half the maximum height. What is its angle of projection?

A. 30°

B. 60°

C. 45°

D. 15°

Answer:

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339. A particle of mass 2 kg is revolved in a horizontal circle of radius l m with the help of a string. If the maximum tension the string can withstand is $32\pi^2 N$, then the maximum frequency with which the particle can revolve is

A. 3 Hz

B. 2 Hz

C. 4 Hz

D. 5 Hz

Answer:

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340. A car of mass 840 kg moves on a circular path with constant speed of 10m/s. It is turned through 90° after travelling 660 m on the road. The centripetal force acting on the car is

A. 324 N

B. 2640 N

C. 284 N

D. 200 N

Answer:

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