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PHYSICS

BOOKS - R G PUBLICATION

MOTION IN A STRAIGHT LINE

Exercise

1. What is the difference between average velocity and instantaneous velocity?

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2. Write donw the equations of motion in circular path.

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3. A ball is projected vertically upward with a speed of 50 m/s. Find the maximum height.

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4. A ball is projected vertically upward with a speed of 50 m/s. Find the time to reach the maximum height,

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5. A ball is projected vertically upward with a speed of $50m/s$. Find (a) the maximum height, (b) the time to reach the maximum height, (c) the speed at half the maximum height. Take $g = 10ms^2$.

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6. During n^{th} second of its motion a body covers a distance S_n with uniform acceleration 'a' and initial velocity 'u'. Show that $\left(a = \frac{2S_n - 2u}{2n - 1}\right)$

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7. Explain the difference between distance and displacement with an example.

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8. Derive acceleration from velocity-time graph.

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9. A stone falls from the top of a building and travels 53.9 m in the last second before it reaches the ground. Find the height of the building.

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10. Explain the difference between distance and displacement with an example.

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11. Derive acceleration from velocity-time graph.

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12. The motion of particle of mass m is given by $y = ut + \frac{1}{2}gt^2$. The force acting on the particle is

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13. Deduce the equations of motion for constant acceleration using method of calculus.

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14. A particle is moving in a straight line. Its displacement at any instant t is given by $x = 10t + 15t^3$, where x is in meters and t is in seconds. Find

(i) the average acceleration in the intervasl t = 0 to t = 2s and

(ii) instantaneous acceleration at t = 2 s.

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15. Can a body have a constant speed and still have a varying velocity?

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16. What will be the nature of velocity time graph for a uniform motion?

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17. Under what conditions is the average velocity equal to instantaneous velocity.

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18. Can displacement be grater than distance travelled by an object?

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19. Draw the position-time graph of a stationary object.

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20. Under which condtion the distance travelled by a body is equal to the displacement of the body?

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21. Two straight line draw on the same displacement-time graph make angle 30° & 60° with time axis. Which line represent greater velocity.

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22. A person travelling on a straight line moves with a uniform velocity v_1 for some time and with uniform velocity v_2 for the next equal time. The average velocity v is given by

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23. The position of a moving particle is given by $x = 6 + 18t + 9t^2$ where x is the distance and t is the time. What is the velocity at t = 2sec.

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24. The displacement x of the body in a motion is given by x = Asin $(wt + \theta)$. Determine at which instant displacement maximum.

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25. A particle is moving in a circular path of radius r. What will be the displacement and distance traversed after half a circle ?

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26. Two train 100 m and 89 m in length are running in opposite directions with a velocity 40 km/hr and 30 km/hr. At what time they will completely cross each other.

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27. The distance x of a particle moving in one dimension, under the action of constant force is related to time t by equation. t = $\sqrt{x} + 3$

where x in metre and t in second. Find the displacement of the particle when its velicity is zero.

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28. A train 100 m long is moving with a velocity of 60 km/hr. Find the time it takes to cross the bridge 1km long.

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29. A ball thrown vertically upward with a speed of $19.6ms^{-1}$ from the top of a tower returns to earth in 6 sec. Find the height of tower.

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30. Derive $S = ut + \frac{1}{2}at^2$ by graphical method.

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31. Displacement is given by $x = 1 + 2t + 3t^2$ Calculate the value of instantaneous acceleration.

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32. Prove that $S_{uh} = u + \frac{a}{2}(2n - 1)$

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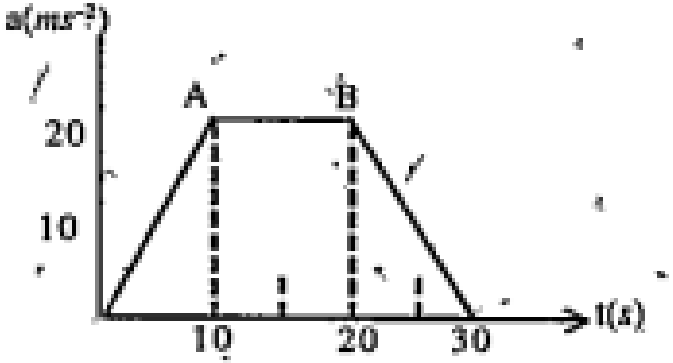
33. From the graph calculate the average acceleration in first twenty sec.



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

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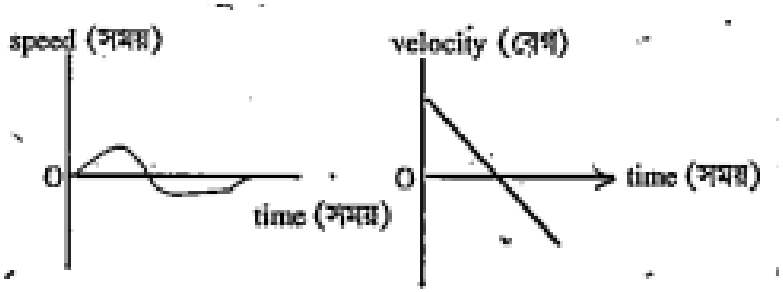
35. What is the wrong with the speed time graph from



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36. A ball is dropped from the top of a tower of height (h). It covers a distance of $h/2$ in the last second of its motion. How long does the ball remain in air?

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37. For a particle in one dimensional motion, the instantaneous speed is always equal to the magnitude of instantaneous velocity. Why?

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38. A particle experiences constant acceleration for 20 sec after starting from rest. If it travels a distance S_1 in first 10 sec. and distance S_2 in next 10 sec find the relation between S_1 and S_2.

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39. Prove that $V - u$ = 2as from velocity time graph.

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