Suggested problems
Chapter 02

The quiz questions will be same or very similar to the following text-book problems.
Refer to the course website for the latest version of this document.
You are encouraged to seek the help of your instructor during his office hours.

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5. The position of an object moving along an x axis is given by $x = 3t - 4t^2 + t^3$, where x is in meters and t in seconds. Find the position of the object at the following values of t: (a) 1 s, (b) 2 s, (c) 3 s, and (d) 4 s. (e) What is the object's displacement between t = 0 and t = 4 s? (f) What is its average velocity for the time interval from t = 2 s to t = 4 s? (g) Graph x versus t for $0 \le t \le 4$ s and indicate how the answer for (f) can be found on the graph.

    Answer: (a); 0 (b) − 2 m ; (c) 0; (d) 12 m (e) + 12 m (f) + 7 m

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15. (a) If a particle's position is given by $x = 4 - 12t + 3t^2$ (where t is in seconds and x is in meters), what is its velocity at t = 1 s? (b) Is it moving in the positive or negative direction of x just then? (c) What is its speed just then? (d) Is the speed increasing or decreasing just then? (Try answering the next two questions without further calculation.) (e) Is there ever an instant when the velocity is zero? If so, give the time t; if not, answer no. (f) Is there a time after t = 3 s when the particle is moving in the negative direction of x? If so, give the time t; if not, answer no.

    Answer: (a) −6 m/s; (b) −x direction ; (c) 6 m/s; (d) decreasing; (e) 2 s; (f) no

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18. The position of a particle moving along an x axis is given by $x = 12t^2 - 2t^3$, where x is in meters and t is in seconds. Determine (a) the position, (b) the velocity, and (c) the acceleration of the particle at t = 3.0 s. (d) What is the maximum positive coordinate reached by the particle and (e) at what time is it reached? (f) What is the maximum positive velocity reached by the particle and (g) at what time is it reached? (h) What is the acceleration of the particle at the instant the particle is not moving (other than at t = 0)? (i) Determine the average velocity of the particle between t = 0 and t = 3 s.

    Answer: (a) + 61 m; (b) +11 m/s ; (c) −18 m/s^2; (d) +64 m; (e) 4.0 s; (f) +24 m/s; (g) 2.0 s; (h) −24 m/s^2; (i) + 18 m/s

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25. An electric vehicle starts from rest and accelerates at a rate of 2.0 m/s^2 in a straight line until it reaches a speed of 20 m/s. The vehicle then slows at a constant rate of 1.0 m/s^2 until it stops. (a) How much time elapses from start to stop? (b) How far does the vehicle travel from start to stop?

    Answer: (a) 30 s; (b) 300 m

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45. (a) With what speed must a ball be thrown vertically from ground level to rise to a maximum height of 50 m? (b) How long will it be in the air? (c) Sketch graphs of y, v, and a versus t for the ball. On the first two graphs, indicate the time at which 50 m is reached.

    Answer: (a) 31 m/s; (b) 6.4 s