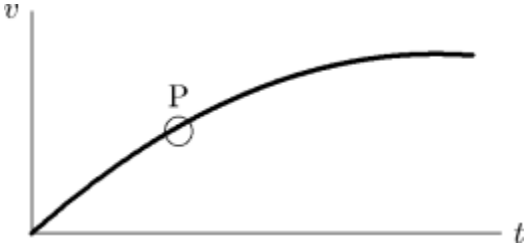
Name: _____ Date: _____

1. A car moving with an initial velocity of 25 m/s north has a constant acceleration of 3 m/s^2 south. After 6 seconds its velocity will be:
   A) 7 m/s north
   B) 7 m/s south
   C) 43 m/s north
   D) 20 m/s north
   E) 20 m/s south

2. A car starts from rest and goes down a slope with a constant acceleration of magnitude 5 m/s^2. After 5 s its speed, in meters per second, is:
   A) 1
   B) 12.5
   C) 25
   D) 50
   E) 160

3. The velocity of an object is given as a function of time by $\vec{v} = (4t - 3t^2)\hat{\imath}$, where $\vec{v}$ is in m/s and t is in seconds. Its average velocity over the interval from t = 0 to t = 2 s:
   A) is 0
   B) is (–2 m/s) $\hat{\imath}$
   C) is (2 m/s) $\hat{\imath}$
   D) is (–4 m/s) $\hat{\imath}$
   E) cannot be calculated unless the initial position is given

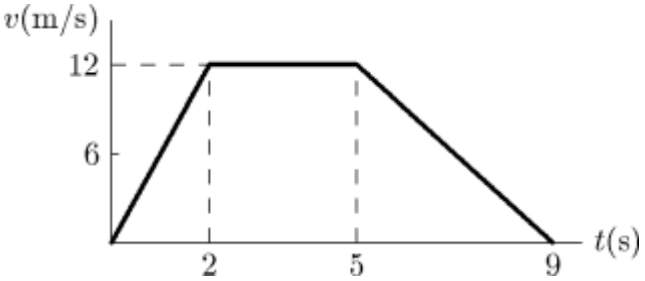
4. The diagram shows a velocity-time graph for a car moving in a straight line. At point P the car must be:



   A) moving with zero acceleration
   B) climbing the hill
   C) accelerating
   D) stationary
   E) moving at about 45° with respect to the x axis

5. A car travels 40 kilometers at an average speed of 80 km/h and then travels 40 kilometers at an average speed of 40 km/h. The average speed of the car for this 80-km trip is:
   A) 40 km/h
   B) 45 km/h
   C) 48 km/h
   D) 53 km/h
   E) 80 km/h

6. The diagram represents the straight line motion of a car. Which of the following statements is true?



   A) The car accelerates, stops, and reverses
   B) The car accelerates at 6 m/s^2 for the first 2 s
   C) The car is moving for a total time of 12 s
   D) The car decelerates at 12 m/s^2 for the last 4 s
   E) The car returns to its starting point when t = 9 s

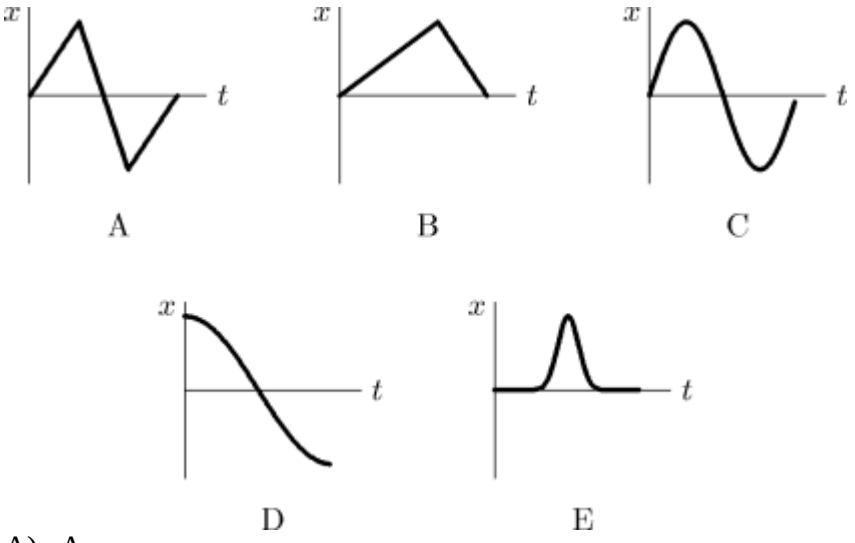
7. A racing car traveling with constant acceleration increases its speed from 10 m/s to 50 m/s over a distance of 60 m. How long does this take?
   A) 2.0 s
   B) 4.0 s
   C) 5.0 s
   D) 8.0 s
   E) The time cannot be calculated since the speed is not constant

8. The coordinate-time graph of an object is a straight line with a positive slope. The object has:
   A) constant displacement
   B) steadily increasing acceleration
   C) steadily decreasing acceleration
   D) constant velocity
   E) steadily increasing velocity

9. A particle moves along the x axis from x_1 to x_2. Of the following values of the initial and final coordinates, which results in the displacement with the largest magnitude?
   A) $x_1 = 4$ m, $x_2 = 6$ m
   B) $x_1 = -4$ m, $x_2 = -8$ m
   C) $x_1 = -4$ m, $x_2 = 2$ m
   D) $x_1 = 4$ m, $x_2 = -2$ m
   E) $x_1 = -4$ m, $x_2 = 4$ m

10. A particle moves along the x axis from x_1 to x_2. Of the following values of the initial and final coordinates, which results in a displacement that is in the negative x direction?
   A) $x_1 = 4$ m, $x_2 = 6$ m
   B) $x_1 = -4$ m, $x_2 = -8$ m
   C) $x_1 = -4$ m, $x_2 = 2$ m
   D) $x_1 = -4$ m, $x_2 = -2$ m
   E) $x_1 = -4$ m, $x_2 = 4$ m

11. A car accelerates from rest on a straight road. A short time later, the car decelerates to a stop and then returns to its original position in a similar manner, by first speeding up and then slowing to a stop. Which of the following five coordinate versus time graphs best describes the motion?



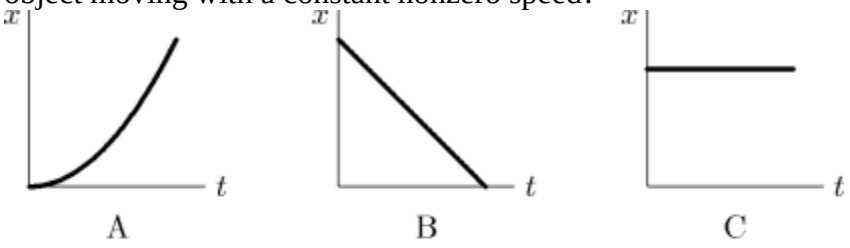
   A) A
   B) B
   C) C
   D) D
   E) E

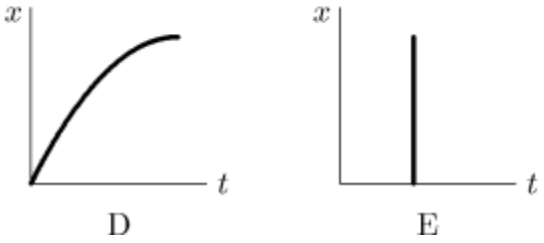
12. Throughout a time interval, while the speed of a particle increases as it moves along the *x* axis, its velocity and acceleration:
    A) might be in the positive and negative *x* directions, respectively
    B) might be in the negative and positive *x* directions, respectively
    C) might both be in the negative *x* direction
    D) might be in the negative *x* direction and zero, respectively
    E) might be in the positive *x* direction and zero, respectively

13. At time $t = 0$ a car has a velocity of (16 m/s) î. It slows down with an acceleration given by $(-0.50\ \text{m/s}^3)t$ î. By the time it stops it has traveled:
    A) 15 m
    B) 31 m
    C) 62 m
    D) 85 m
    E) 100 m

14. A car starts from Hither, goes 50 km in a straight line to Yon, immediately turns around, and returns to Hither. The time for this round trip is 2 hours. The average speed of the car for this round trip is:
    A) 0
    B) 50 km/h
    C) 100 km/h
    D) 200 km/h
    E) cannot be calculated without knowing the acceleration

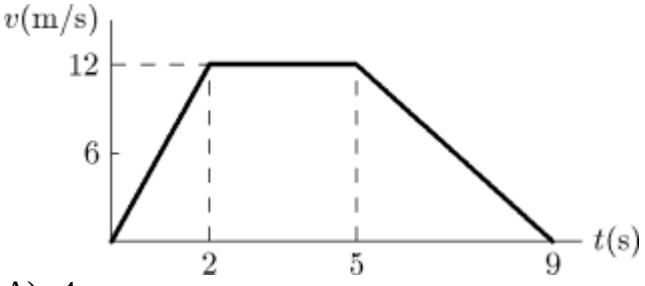
15. Which of the following five coordinate versus time graphs represents the motion of an object moving with a constant nonzero speed?





A) A
B) B
C) C
D) D
E) E

16. The graph represents the straight line motion of a car. How far does the car travel between $t = 2$ s and $t = 5$ s?



A) 4 m
B) 12 m
C) 24 m
D) 36 m
E) 60 m

17. Over a short interval, starting at time $t = 0$, the coordinate of an automobile in meters is given by $x(t) = 27t - 4.0t^3$, where t is in seconds. The magnitudes of the initial (at $t = 0$) velocity and acceleration of the auto respectively are:
    A) 0; (12 m/s^2) î
    B) 0; (24 m/s^2) î
    C) (27 m/s) î; 0
    D) (27 m/s) î; (12 m/s^2) î
    E) (27 m/s) î; (24 m/s^2) î

18. A particle moves along the x axis according to the equation $x = 6t^2$, where x is in meters and t is in seconds. Therefore:
    A) the acceleration of the particle is (6 m/s^2) î
    B) t cannot be negative
    C) the particle follows a parabolic path
    D) each second the speed of the particle changes by 9.8 m/s
    E) none of the above

19. Two automobiles are 150 kilometers apart and traveling toward each other on a straight road. One automobile is moving at 60 km/h and the other is moving at 40 km/h mph. In how many hours will they meet?
    A) 2.5
    B) 2.0
    C) 1.75
    D) 1.5
    E) 1.25

20. Over a short interval near time $t = 0$ the coordinate of an automobile in meters is given by $x(t) = 27t - 4.0t^3$, where t is in seconds. At the end of 1.0 s the acceleration of the auto is:
    A) (27 m/s^2) î
    B) (4.0 m/s^2) î
    C) (–4.0 m/s^2) î
    D) (–12 m/s^2) î
    E) (–24 m/s^2) î

Answer Key

1. A
2. C
3. A
4. C
5. D
6. B
7. B
8. D
9. E
10. B
11. E
12. C
13. D
14. B
15. B
16. D
17. C
18. E
19. D
20. E