AP Calculus
Vel/Acc/Distance
Graph Analysis

Name _____

The graphs (a) through (e) in Figure N6–18 show the velocities of five cars moving along an east-west road (the x-axis) at time t, where $0 \leq t \leq 6$. In each graph the scales on the two axes are the same.

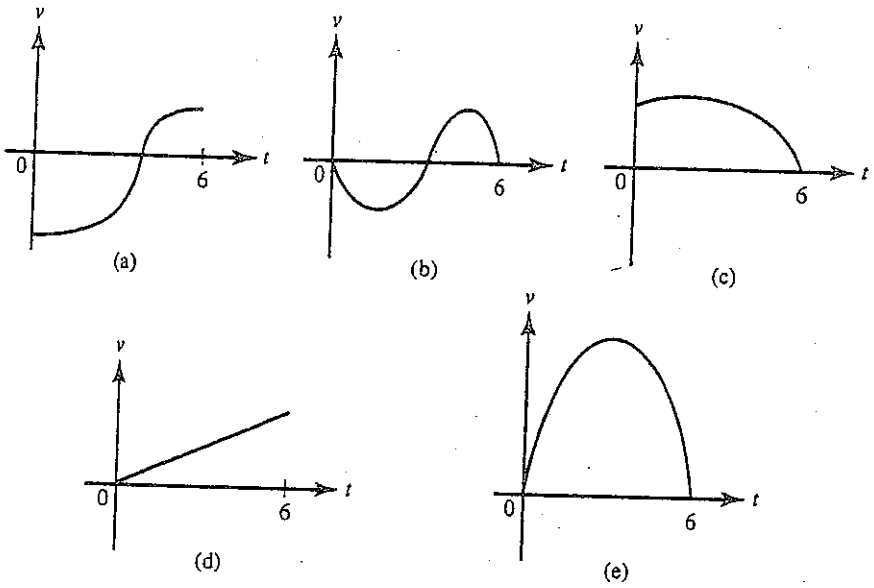


FIGURE N6–18

Which graph shows the car

(1) with constant acceleration?
(2) with the greatest initial acceleration?
(3) back at its starting point when $t = 6$?
(4) that is furthest from its starting point at $t = 6$?
(5) with the greatest average velocity?
(6) with the least average velocity?
(7) farthest to the left of its starting point when $t = 6$?

The graph in Figure N6–20 shows the speed $v(t)$ of a car in mph at 10- hour intervals during a one-hour period.

(a) Give an estimate of the total distance traveled.
(b) When does the acceleration appear greatest?
(c) Estimate the acceleration when $t = 20$.
(d) Estimate the average speed of the car during the interval $30 \leq t \leq 50$.

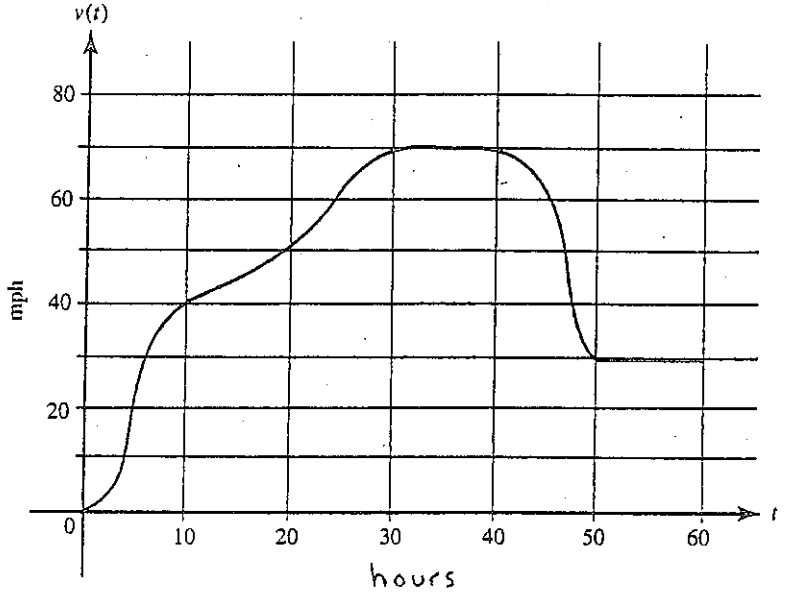
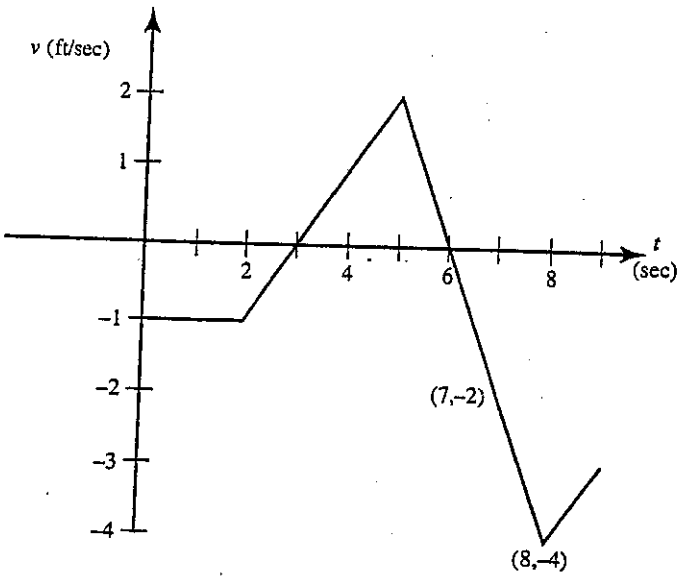


FIGURE N6–20



The graph shown is for Questions 5 and 6. It shows the velocity of an object during the interval $0 \leq t \leq 9$.

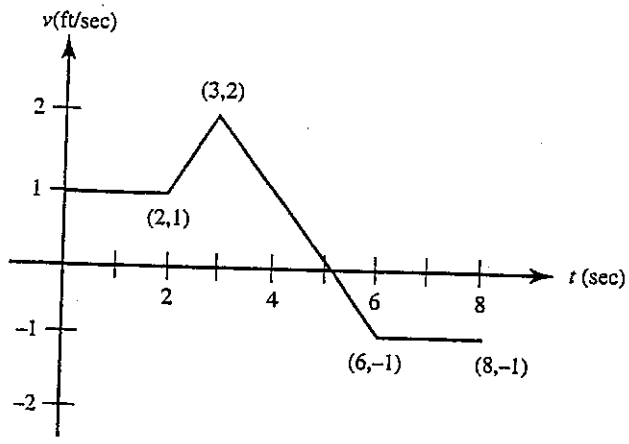
5. The object attains its greatest speed at $t =$

(A) 2 (B) 3 (C) 5 (D) 6 (E) 8

6. The object was at the origin at $t = 3$. It returned to the origin

(A) at $t = 5$ (B) at $t = 6$ (C) during $6 < t < 7$
(D) at $t = 7$ (E) during $7 < t < 8$

The graph is for Questions 65 through 67. It shows the velocity, in ft/sec, for of an object moving along a straight line, $0 < t < 8$



65. The object's average speed (in ft/sec) for this eight-second interval was

(A) 0 (B) $\frac{3}{8}$ (C) 1 (D) $\frac{8}{3}$ (E) 8

66. When did the object return to the position it occupied at $t = 2$?

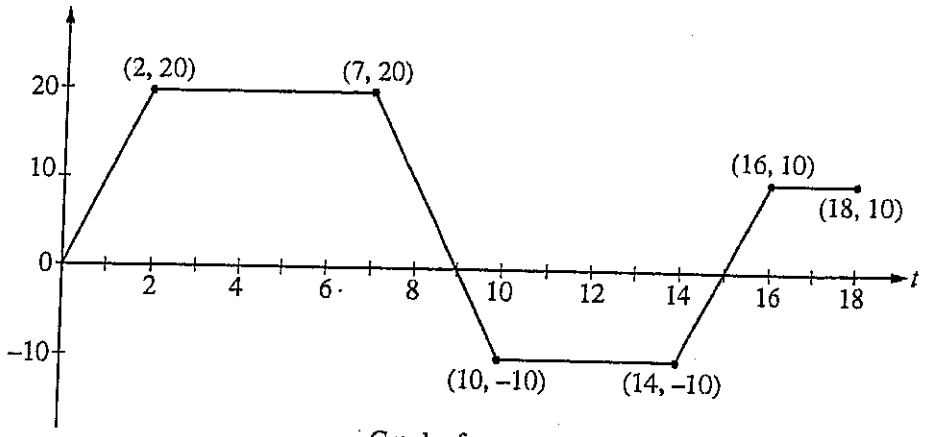
(A) $t = 4$ (B) $t = 5$ (C) $t = 6$ (D) $t = 8$ (E) never

67. The object's average acceleration (in ft/sec^2) for this 8-second interval was

(A) -2 (B) $-\frac{1}{4}$ (C) 0 (D) $\frac{1}{4}$ (E) 1

MOTION
AP – HW

No calculator is allowed for these problems.



Graph of v

4. A squirrel starts at building A at time $t = 0$ and travels along a straight, horizontal wire connected to building B. For $0 \le t \le 18$, the squirrel's velocity is modeled by the piecewise-linear function defined by the graph above.

   (a) At what times in the interval $0 < t < 18$, if any, does the squirrel change direction? Give a reason for your answer.

   (b) At what time in the interval $0 \le t \le 18$ is the squirrel farthest from building A ? How far from building A is the squirrel at that time?

   (c) Find the total distance the squirrel travels during the time interval $0 \le t \le 18$.

   (d) Write expressions for the squirrel's acceleration $a(t)$, velocity $v(t)$, and distance $x(t)$ from building A that are valid for the time interval $7 < t < 10$.