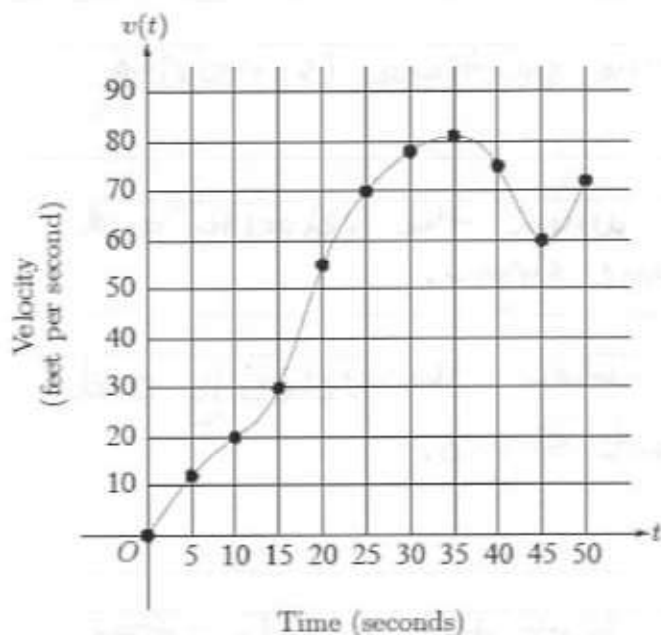


1998 AP Calculus AB #3 (Modified)

The graph of the velocity  $v(t)$ , in feet per second, of a car traveling on a straight road, for  $0 \leq t \leq 50$  is shown below. A table of values for  $v(t)$ , at 5 second intervals of time, is also shown to the right of the graph.



$t$ (seconds)	$v(t)$ (feet per second)
0	0
5	12
10	20
15	30
20	55
25	70
30	78
35	81
40	75
45	60
50	72

- a. During what interval(s) of time is the acceleration of the car positive? Give a reason for your answer.

Since  $v(t)$  is increasing on  $(0, 35) \cup (45, 50)$ , then  $a(t) > 0$ .

- b. Find the average acceleration of the car over the interval  $0 \leq t \leq 50$ . Indicate units of measure.

$$\begin{aligned} \text{Avg Acceleration} &= \frac{v(0) - v(50)}{0 - 50} \\ &= \frac{0 - 72}{-50} = \boxed{\frac{36}{25} \text{ feet/sec}^2} \end{aligned}$$

- c. Find one approximation for the acceleration of the car at  $t = 40$ . Show the computations you used to arrive at your answer. Indicate units of measure.

$$a(40) \approx \frac{v(35) - v(45)}{35 - 45} \approx \frac{81 - 60}{-10} = \boxed{-\frac{21}{10} \text{ feet/sec}^2}$$

- d. Is the speed of the car increasing or decreasing at  $t = 40$ ? Give a reason for your answer.

$v(40) = 75 > 0$   
 $a(40) \approx -\frac{21}{10} < 0$   
 Since  $v(40)$  and  $a(40)$  have different signs, the speed is decreasing at  $t = 40$ .