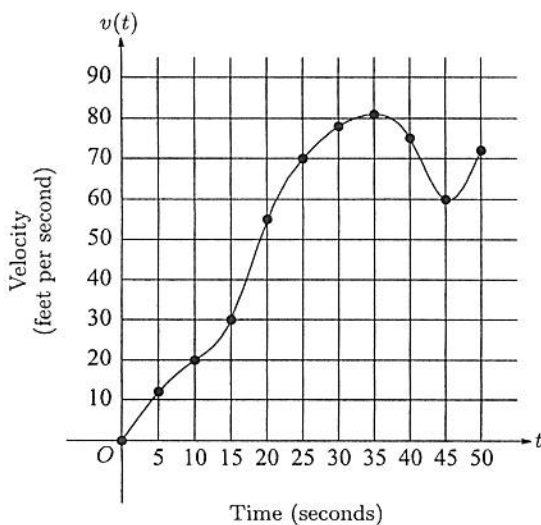


## 1998 AP Calculus AB Free-Response Questions



$t$ (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

3. The graph of the velocity  $v(t)$ , in ft/sec, of a car traveling on a straight road, for  $0 \leq t \leq 50$ , is shown above. A table of values for  $v(t)$ , at 5 second intervals of time  $t$ , is shown to the right of the graph.
- During what intervals of time is the acceleration of the car positive? Give a reason for your answer.
  - Find the average acceleration of the car, in  $\text{ft}/\text{sec}^2$ , over the interval  $0 \leq t \leq 50$ .
  - Find one approximation for the acceleration of the car, in  $\text{ft}/\text{sec}^2$ , at  $t = 40$ . Show the computations you used to arrive at your answer.

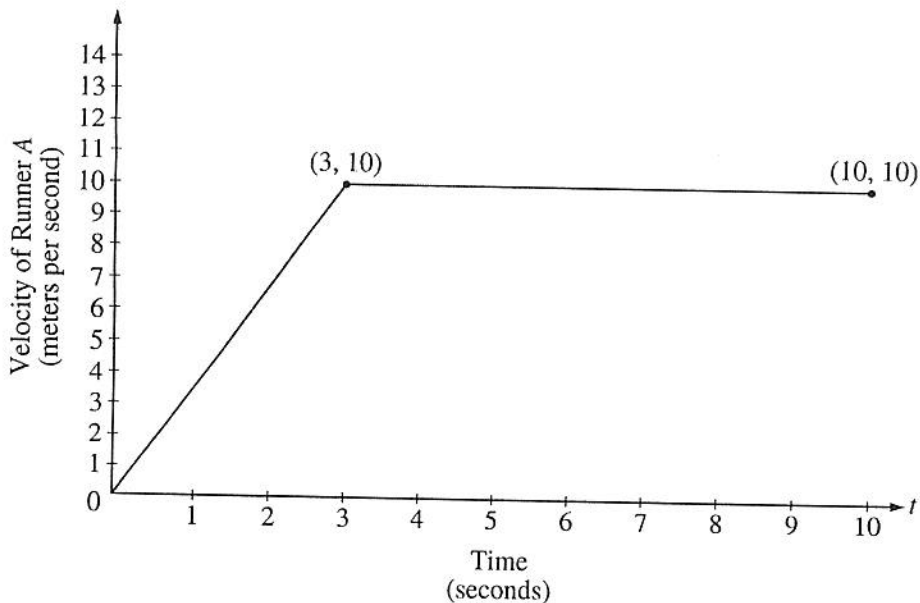
## 1999

1. A particle moves along the  $y$ -axis with velocity given by  $v(t) = t \sin(t^2)$  for  $t \geq 0$ .

- In which direction (up or down) is the particle moving at time  $t = 1.5$ ? Why?
- Find the acceleration of the particle at time  $t = 1.5$ . Is the velocity of the particle increasing at  $t = 1.5$ ? Why or why not?



## 2000 AP® CALCULUS AB FREE-RESPONSE QUESTIONS



2. Two runners,  $A$  and  $B$ , run on a straight racetrack for  $0 \leq t \leq 10$  seconds. The graph above, which consists of two line segments, shows the velocity, in meters per second, of Runner  $A$ . The velocity, in meters per second, of Runner  $B$  is given by the function  $v$  defined by  $v(t) = \frac{24t}{2t + 3}$ .
- (a) Find the velocity of Runner  $A$  and the velocity of Runner  $B$  at time  $t = 2$  seconds. Indicate units of measure.
- (b) Find the acceleration of Runner  $A$  and the acceleration of Runner  $B$  at time  $t = 2$  seconds. Indicate units of measure.