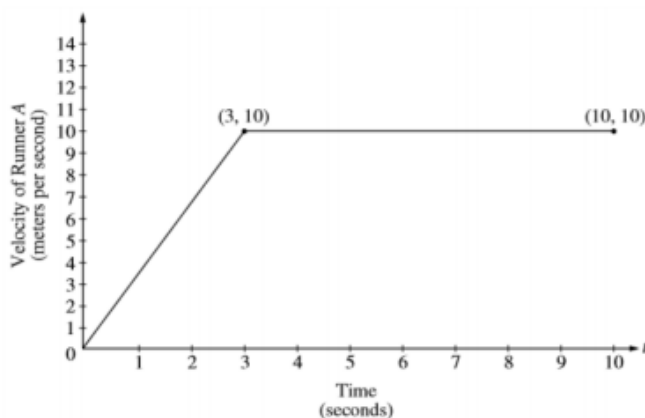


Ch 5 AP FRQs

2000 AP Calculus AB-2/BC-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.
- (c) Find the total distance run by Runner A and the total distance run by Runner B over the time interval $0 \leq t \leq 10$ seconds. Indicate units of measure.

(a) Runner A : velocity $= \frac{10}{3} \cdot 2 = \frac{20}{3}$
 $= 6.666$ or 6.667 meters/sec

Runner B : $v(2) = \frac{48}{7} = 6.857$ meters/sec

(b) Runner A : acceleration $= \frac{10}{3} = 3.333$ meters/sec²

Runner B : $a(2) = v'(2) = \frac{72}{(2t + 3)^2} \Big|_{t=2}$
 $= \frac{72}{49} = 1.469$ meters/sec²

(c) Runner A : distance $= \frac{1}{2}(3)(10) + 7(10) = 85$ meters

Runner B : distance $= \int_0^{10} \frac{24t}{2t + 3} dt = 83.336$ meters

2 { 1 : velocity for Runner A
1 : velocity for Runner B

2 { 1 : acceleration for Runner A
1 : acceleration for Runner B

4 { 2 : distance for Runner A
1 : method
1 : answer
2 : distance for Runner B
1 : integral
1 : answer

(units) meters/sec in part (a), meters/sec² in part (b), and meters in part (c), or equivalent.

1: units