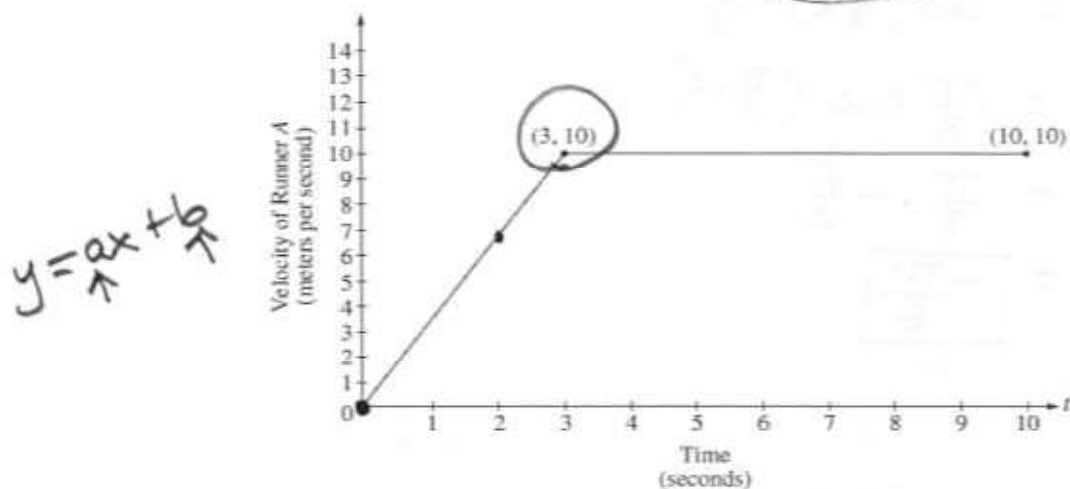Two runners, $A$ and $B$, run on a straight racetrack for $0 \le t \le 10$ seconds. The graph below, which consists of two line segments, shows the velocity, in meters per second, of Runner $A$. The velocity, in meters per second, of Runner $B$ is given by the function $v$ defined by $v(t) = \frac{24t}{2t+3}$.

$y = ax + b$



a. Find the velocity of Runner $A$ and the velocity of Runner $B$ at $t = 2$ seconds. Indicate units of measure.

**Runner A**

$$v(t) = \tfrac{10}{3}t + 0$$

$$v(2) = \tfrac{10}{3}(2)$$

$$= \boxed{\tfrac{20}{3} \text{ meters per second}}$$

**Runner B**

$$v(2) = \frac{24(2)}{2(2)+3}$$

$$= \boxed{\frac{48}{7} \text{ meters per second}}$$

b. Find the acceleration of Runner $A$ and the acceleration of Runner $B$ at time $t = 2$ seconds. Indicate units of measure.

**Runner A**

$$a(t) = v'(t) = \frac{10}{3}$$

$$a(2) = \boxed{\tfrac{10}{3} \text{ meters}/\text{sec}^2}$$

**Runner B**

$$v'(t) = \frac{(2t+3)(24) - (24t)(2)}{(2t+3)^2}$$

$$v'(2) = \frac{7(24) - 48(2)}{49}$$

$$= \boxed{\tfrac{72}{49} \text{ meters}/\text{sec}^2}$$

$$\begin{array}{r} 168 \\ -\ 96 \\ \hline 72 \end{array}$$