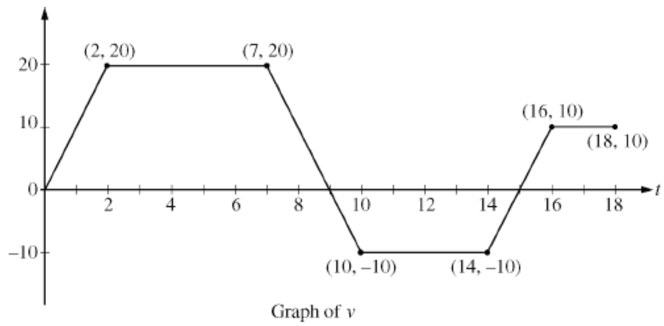
AB/BC 4



Graph of v

(a) The squirrel changes direction at $\boxed{t = 9 \text{ and at } t = 15}$, because its velocity changes sign at each of these points in time.

(b) The squirrel is farthest from building A at the absolute maximum of $x(t)$ on $0 \le t \le 18$. This will occur at $t = 0$, $t = 18$, or at a critical point of $x(t)$ or where $x'(t)$ or $v(t) = 0$. From (a), $v(9) = v(15) = 0$. $x(0) = 0$

$x(9) = x(0) + \int_0^9 v\,dt = 0 +$ the area of the trapezoid extending from $t = 0$ to $t = 9$. The area is $\frac{1}{2}(20)(9+5) = 140$, so the squirrel moves 140 units towards B during that time.

So, $x(9) = x(0) + \int_0^9 v\,dt = 0 + 140 = 140$

The area of the trapezoid from $t = 9$ to $t = 15$ is $\frac{1}{2}(10)(6+4) = 50$, so the squirrel moves back 50 units towards A during that time. The area of the trapezoid from $t = 15$ to $t = 18$ is $\frac{1}{2}(10)(3+2) = 25$, so the squirrel moves 25 units towards B during that time.

So, $x(15) = x(9) + \int_9^{15} v\,dt = 140 - 50 = 90$ And $x(18) = x(15) + \int_{15}^{18} v\,dt = 90 + 25 = 115$

Hence, the squirrel is farthest from building A at $\boxed{t = 9 \text{ when it is 140 units away}}$.

(c) Based on the calculations in Part (b), the total distance traveled by the squirrel is $\boxed{140 + 50 + 25 = 215}$.

(d)

$$a(t) = v'(t) = \frac{v(10) - v(7)}{10 - 7} = \frac{-10 - 20}{10 - 7} = -10 \Rightarrow \boxed{a(t) = -10}$$

$$v(t) - 0 = v'(9)(t - 9) \Rightarrow \boxed{v(t) = -10(t - 9)} = -10t + 90$$

$x(t) = \int v(t)\,dt = -5t^2 + 90t + C$ From Part (b), x(9) = 140

$$\Rightarrow -5 \cdot 9^2 + 90 \cdot 9 + C = 140 \Rightarrow C = -265 \Rightarrow \boxed{x(t) = -5t^2 + 90t - 265}$$