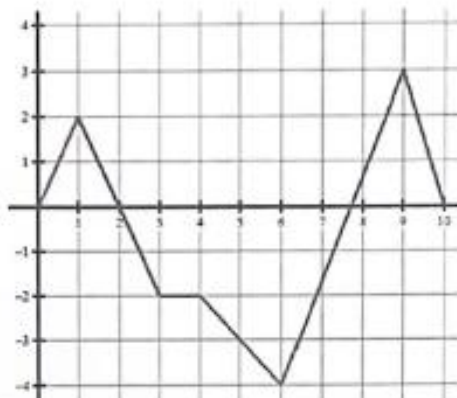


## Interpreting the Graph of Velocity

Jane walks in front of a motion detector that records her velocity at 1-minute intervals for 10 minutes. She stores the data and uses it to generate the time-velocity graph shown in the figure below. Describe her motion as a function of time by reading the velocity graph,  $v(t)$ .



<p>1) When does Jane move forward? Explain. Jane moves forward on <math>(0, 2) \cup (7.75, 10)</math> b/c <math>v(t) &gt; 0</math></p> <p>2) When does Jane move backward? Explain Jane moves backward on <math>(2, 7.75)</math> b/c <math>v(t) &lt; 0</math>.</p>	<p>3) At what time(s) does Jane change direction? Explain Jane changes direction at <math>t = 2</math> &amp; <math>t = 7.75</math> b/c <math>v(t)</math> changes signs.</p>
<p>4) When is Jane's acceleration positive? Explain Jane's acceleration is positive on <math>(0, 1) \cup (6, 9)</math> b/c <math>v(t)</math> is increasing.</p> <p>5) When is Jane's acceleration negative? Explain Jane's acceleration is negative on <math>(1, 3), (4, 6), (9, 10)</math> b/c <math>v(t)</math> is decreasing.</p> <p>6) When is Jane's acceleration zero? Explain. Jane's acceleration is zero on <math>(3, 4)</math> b/c <math>v(t)</math> is constant.</p>	<p>7) On which interval(s) is Jane's speed increasing? Explain Jane's speed is increasing on <math>(0, 1), (2, 3), (4, 6)</math>, &amp; <math>(7.75, 9)</math> b/c <math>v(t)</math> &amp; <math>a(t)</math> have the same signs.</p> <p>8) On which interval(s) is Jane's speed decreasing? Explain Jane's speed is decreasing on <math>(1, 2)</math> &amp; <math>(6, 7.75)</math> b/c <math>v(t)</math> &amp; <math>a(t)</math> have opposite signs.</p>
<p>9) If Jane's initial position is <math>x(0) = 14</math> feet, determine her position when <math>t = 6</math> minutes.</p> $x(6) = 14 + \int_0^6 v(t) dt$ $= 14 + [2 - 9] = 7$ $x(6) = 7$	<p>10) Determine Jane's total distance traveled for the entire 10-minute interval.</p> $\int_0^{10}  v(t)  dt = 2 + 9 + \frac{1}{2}(1.75)(4) + \frac{1}{2}(2.25)(3)$ $= 2 + 9 + \frac{1}{2}(7) + \frac{1}{2}\left(\frac{9}{4}\right)(3)$