Solutions to HW3, Chapter 2

NOTE! The problems in masteringphysics.com had their numbers altered slightly for each individual student. The solutions below use the same numbers as those used in the book for that problem!

2.4. Model: The jogger is a particle.
Solve: The slope of the position-versus-time graph at every point gives the velocity at that point. The slope at $t = 10$ s is

$$v = \frac{\Delta s}{\Delta t} = \frac{50\text{ m} - 25\text{ m}}{20\text{ s}} = 1.25\text{ m/s}$$

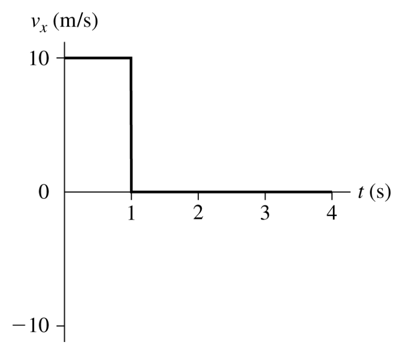
The slope at $t = 25$ s is

$$v = \frac{50\text{ m} - 50\text{ m}}{10\text{ s}} = 0.0\text{ m/s}$$

The slope at $t = 35$ s is

$$v = \frac{0\text{ m} - 50\text{ m}}{10\text{ s}} = -5.0\text{ m/s}$$

2.5. Solve: (a) We can obtain the values for the velocity-versus-time graph from the equation $v = \Delta s/\Delta t$.



(b) There are no turning points since the slope doesn't change from positive to negative (or vice versa) at any points.

2.10. Visualize: The graph is a graph of velocity vs. time, so the acceleration is the slope of the graph.
Solve: When the blood is speeding up the acceleration is

$$a_y = \frac{\Delta v_y}{\Delta t} = \frac{0.80\text{ m/s}}{0.05\text{ s}} = 16\text{ m/s}^2$$

When the blood is slowing down the acceleration is

$$a_y = \frac{\Delta v_y}{\Delta t} = \frac{-0.80\text{ m/s}}{0.15\text{ s}} = -5.3\text{ m/s}^2$$

Assess: 16 m/s^2 is an impressive but reasonable acceleration.

2.33. Solve: ERROR! OBJECTS CANNOT BE CREATED FROM EDITING FIELD CODES.
(a) The position $t = 2$ s is $x_{2\text{s}} = [2(2)^3 + 2(2) + 1]\text{ m} = 21\text{ m}$
(b) The velocity is the derivative $v = dx/dt$ and the velocity at $t = 2$ s is calculated as follows:

$$v = (6t^2 + 2)\text{ m/s} \Rightarrow v_{2\text{s}} = [6(2^2) + 2]\text{ m/s} = 26\text{ m/s}$$

(c) The acceleration is the derivative $a = dv/dt$ and the acceleration at $t = 2$ s is calculated as follows:

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