7. A student drives the $1\bar{0}0$ mile trip back to campus after spring break and travels with an average speed of 55 mi/hr for 1 hour and $3\bar{0}$ minutes?
   a. What distance was traveled during this time?

$$V = \frac{d}{t}$$
$$d = V\ x\ t$$
$$d = 55\frac{mi}{hr}\ x\ 1.5\ hours$$
$$d = 82\ mi$$

   b. Traffic gets heaver, and the last part of the trip takes another half-hour. What was the average speed during this leg of the trip?

$$V = \frac{d}{t}$$
$$V = \frac{(1\bar{0}0 - 82)mi}{0.50\ hr}$$
$$V = 36\ \frac{mi}{hr}$$

   c. Find the average speed for the total trip.

$$V = \frac{d}{t}$$
$$V = \frac{1\bar{0}0\ mi}{2.0\ hr}$$
$$V = 5\bar{0}\ \frac{mi}{hr}$$

9. An airplane flying directly eastward at a constant rate travels 300 km in 2.0 h.
   a. What is the average velocity of the plane?

$$V = \frac{d}{t}$$
$$V = \frac{3\bar{0}0\ km}{2.0\ hr}$$
$$V = 150\ \frac{km}{hr}$$

   b. What is its instantaneous velocity?

$$V = 150\ \frac{km}{hr}$$

It is the same because the plane did not change directions.

11. A sprinter starting from rest on a straight and level track is able to achieve a speed of 12 m/s in a time of 4.0 s. What is the sprinter's average acceleration?

$$a = \frac{V}{t}$$
$$a = \frac{12\ m/s}{4.0s}$$
$$a = 3.0\ {}^{m}/_{s^2}$$

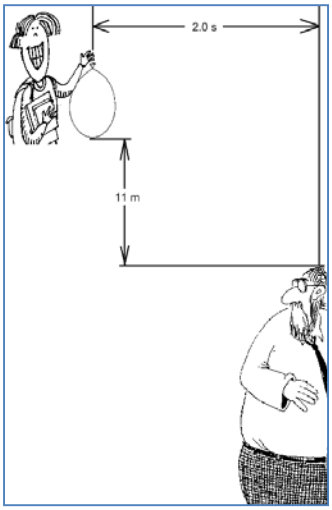
13. A motorboat starting from rest travels in a straight line on a lake.
    a. If the boat achieves a speed of 12 m/s in $1\bar{0}$ s, what is the boat's average acceleration?

$$a = \frac{V}{t}$$
$$a = \frac{12\ m/s}{1\bar{0}\ s}$$
$$a = 1.2\ {}^{m}/_{s^2}$$

    b. Then, in 5.0 more seconds, the boat's speed is 18 m/s. What is the boat's average acceleration for the total time?

$$a = \frac{V}{t}$$
$$a = \frac{18\ m/s}{15\ s}$$
$$a = 1.2\ {}^{m}/_{s^2}$$

18. A student sees her physical science professor approaching on the sidewalk that runs by her dorm. She gets a water balloon and waits. When the professor is 2.0 s from being directly under her window 11 m above the sidewalk, she drops the balloon. You finish the story.



a. Determine how long it will take for the balloon to drop 11 m.

$$d = \frac{1}{2}gt^2$$

$$g = 9.80\,\frac{m}{s^2}$$

$$11\,m = \frac{1}{2}\left(9.80\,\frac{m}{s^2}\right)t^2$$

$$2.2\,s^2 = t^2$$

$$1.5\,s = t$$

b. See if this is the time that the professor is under the window.
It is a sad day. The balloon hit the ground before the professor was under the window.