**Physics math.** Remember pictures are worth marks!!!

**1)** A woman starts running due west. If she covers 5 km in 1.7 hr, what is her velocity?

let "+" be east

$\vec{d}_f = 5\,km$, $t_f = 1.7\,hr$ ← $\vec{d}_i = 0\,km$, $t_i = 0\,s$

$$V_{av} = \frac{\Delta d}{\Delta t}$$

$$= \frac{-5\,km - 0\,km}{1.7\,hr - 0\,s}$$

$$= -2.94\ \frac{km}{hr}$$

**2)** A dog runs at a constant velocity of $4.1\ \frac{m}{s}$ [N] for 7 s. What is its position at the end of its run?

let "North" be "+"

$\vec{d}_f = ?$, $t_f = 7\,s$

$V_{av} = 4.1\ \frac{m}{s}$ [N]

$\vec{d}_i = 0\,m$, $t_i = 0\,s$

$$\Delta d = V_{av}\,\Delta t$$

$$\vec{d}_f - \vec{d}_i = V_{av} \times (t_f - t_i)$$

$$\vec{d}_f - 0 = 4.1\ \frac{m}{s} \times (7\,s - 0\,s)$$

$$d_f = 28.7\,m$$

**3)** A ball travels 16.2 meters to the west at a constant velocity of $5\ \frac{m}{s}$ [W]. How long did this journey take?

let east be "+"

$-5\ \frac{m}{s}$ ←

$\vec{d}_f = 16.2\,m$, $t_f = ?$

$\vec{d}_i = 0$, $t_i = 0$

$$\Delta t = \frac{\Delta d}{V_{av}}$$

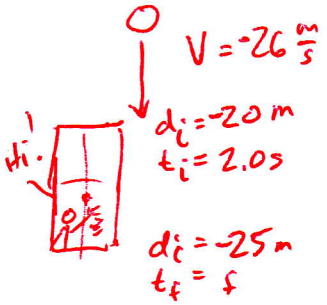
$$t_f - t_i = \frac{\vec{d}_f - \vec{d}_i}{V_{av}}$$

$$t_f - 0\,s = \frac{16.2\,m - 0\,m}{-5\ \frac{m}{s}}$$

$$= 3.24\,s$$

let up be "+"

4) A tennis ball is falling at a constant velocity of 26 m/s. It passes the top of a window frame 20 m beneath the roof at t=2.0 s. If the bottom of the window is 25m beneath the roof, how long did it take for the ball to pass the window?




$$\Delta t = \frac{\Delta d}{v_{av}}$$

$$t_f - t_i = \frac{d_f - d_i}{v_{av}}$$

$$t_f - 2s = \frac{-25m - (-20m)}{-26m}$$

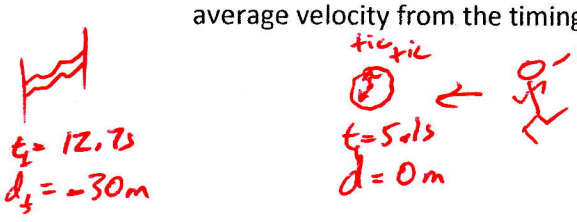
$$t_f - 2s = \frac{-5m}{-26m}$$

$$t_f - 2s = 0.19231s$$

$$t_f = 2.19231s$$

5) A runner is travelling west towards a finish line. The runner passes a timing station at t=5.1 s and the finish line at 12.7 s. If the timing station is 30 m from the finish line, what is the runner's average velocity from the timing station to the finish line?

let east be "+"




$$v_{av} = \frac{\Delta d}{\Delta t}$$

$$v_{av} = \frac{d_f - d_i}{t_f - t_i}$$

$$v_{av} = \frac{-30m - 0m}{12.7s - 5.1s}$$

$$= \frac{-30m}{7.6s}$$

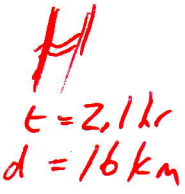
$$= -3.94734 \frac{m}{s}$$

6) A car begins travelling at a constant velocity of 25 $\frac{km}{hr}$ [E] at t=0 hr. After a certain amount of time, the car passes a toll booth 4 km [E] of the starting point and continues on to pass the finish line 16 km [E] of the starting point at t= 2.1 hr. At what time did the car pass the toll booth?

sweet ride mugrove.

let east be "+"






$$\Delta t = \frac{\Delta d}{v_{av}}$$

$$t_f - t_i = \frac{d_f - d_i}{v_{av}}$$

$$2.1hr - t_i = \frac{16km - 4km}{25\ \frac{km}{hr}}$$

$$2.1hr - t_i = \frac{12km}{25\ \frac{km}{hr}}$$

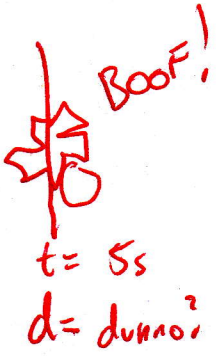
$$2.1hr - t_i = 0.48hr$$

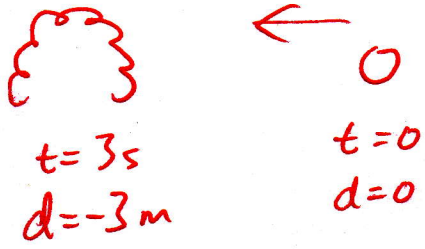
$$-t_i = -1.62hr$$

$$t_i = 1.62hr$$

7) A ball is rolling at a constant velocity of $5\frac{m}{s}$ in the negative direction. It passes a shrub -3 m from the starting point at t=3 s and continues rolling till it hits a wall. If it hits the wall at t= 5 s, how far is the wall from the shrub?

let "-" be negative :)




Do lab 8-2C on p 370

$$\vec{\Delta d} = V \Delta t$$

$$d_f - (-3m) = -5\frac{m}{s} \times (5s - 3s)$$

$$d_f + 3m = -10\,m$$

$$d_f = -13\,m$$