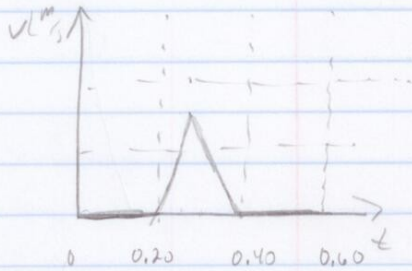
Chapter 2
Long hand problems

18a.) The area under the curve of a velocity vs. time graph gives the change in position



Area of a triangle $A = \frac{1}{2}bh$ b: base h: height

$A = \frac{1}{2}\ 0.20 \cdot 0.75 = 0.075\ m$

Question asks for centimeters $0.075m\left(\frac{100cm}{m}\right) = \boxed{7.5cm}$

b. I used a ruler and estimated 30 cm from my heart to my brain.

In a we found that blood travels 7.5cm in one beat. So $\frac{30cm}{7.5cm} = \boxed{4\ beats}$

27. Pike accelerates from rest to $4.0\ m/s$ in $0.11\ s$.

a. Given

$x_i = 0$
$x_f = ?$
$v_i = 0\ m/s$
$v_f = 4.0\ m/s$
$a = ?$
$\Delta t = 0.11\ s$

$v_f = v_i + at$

$v_f/t = a$

$\frac{4.0\ m/s}{0.11\ s} = \boxed{a = 36\ m/s^2}$

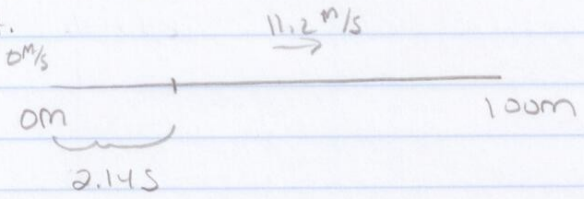
27 b. find distance moved during the strike same givens used in a.

$$X_F = X_i + V_i \Delta t + \tfrac{1}{2} a \Delta t^2$$

$$X_F = 0 + 0\Delta t + \tfrac{1}{2}\, 36.36\ m/s^2\, (0.11\,s)^2$$

$$\boxed{X_F = 0.22\ m}$$

37.



This is a two part motion. In the first part there is an acceleration. During the second part, the acceleration is zero. This means you have two sets of givens

Givens (1st motion)

$X_i = 0$

$X_F = ?$

$V_i = 0\ m/s$

$V_F = 11.2\ m/s$

$a = ?$

$\Delta t = 2.14\,s$

Givens (2nd motion)

$X_i = ?$

$X_F = 100m$

$V_i = 11.2\ m/s$

$V_F = 11.2\ m/s$

$a = 0\ m/s^2$

$\Delta t = ?$

Find the distance traveled in the 1st part of the motion. Then you know the distance covered in the 2nd part of the motion.

Find a then can find x

$$a = \frac{V_F - V_i}{\Delta t} = \frac{11.2\ m/s}{2.14\,s} = 5.23\ m/s^2$$

$$X_F = X_i + V_i \Delta t + \tfrac{1}{2} a \Delta t^2$$

$$X_F = \tfrac{1}{2}\, 5.23\ m/s^2\, (2.14\,s)^2 = 12\ m$$

2nd part find Δt using $X_i = 12m$

$$X_F = X_i + V_i \Delta t + \tfrac{1}{2} a \Delta t^2$$

$$100m = 12m + 11.2\ m/s\, \Delta t$$

$$\frac{88m}{11.2\ m/s} = \Delta t = 7.86\,s$$

Now you have the time for the 2nd part and the first part was given as 2.14s

$$2.14s + 7.86s = \boxed{10.0s}$$

57. Blink takes 0.024s

a. Estimate the distance your lid moves during a blink. I looked in the mirror with a ruler and guessed about $\boxed{1\,cm.}$

b. Given

$x_i = 0m$

$x_f = 0.01m$

$v_i = 0\,m/s$

$v_f = ?$

$a = ?$

$\Delta t = 0.024s$

$$x_f = x_i + v_i\Delta t + \tfrac{1}{2}a\Delta t^2$$

$$0.01m = 0m + 0 + \tfrac{1}{2}a(0.024s)^2$$

$$\frac{2 \cdot 0.01m}{(0.024s)^2} = a = 34.7\,m/s^2$$

$$= \boxed{35\,m/s^2}$$

c. $v_f = v_i + a\Delta t$

$v_f = 0\,m/s + 34.7\,m/s^2\ 0.024s$

$= \boxed{0.83\,m/s}$