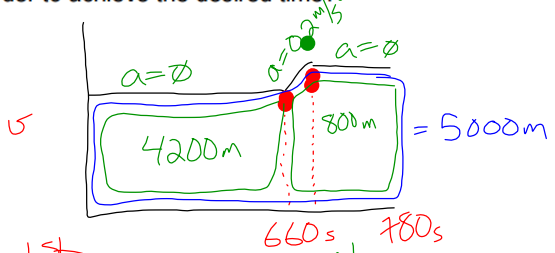
Announcement:

- Work you turn in should represent your thinking, writing, and problem solving
- Lab scores talk to me!
- But brief but thorough

30. A runner hopes to complete the 5000-m run in less than 13.0 min. After exactly 11.0 min, there are still 800 m to go. The runner must accelerate at 0.20 m/s^2 for how many seconds in order to achieve the desired time?



$X = 0$ where she starts

+ is the direction she runs

$t_2 + t_3 = 120$

1st

$X_0 = 0$

$X = 4200$

$v_0 = 6.36$ m/s

$v = 6.36$ m/s

$a = 0$

$\Delta t = 660$ s

2nd

$X_0 = 4200$m

$X = 4200 + 6.36t_2 + 0.1t_2^2$

$v_0 = 6.36$ m/s

$v = 6.36 + 0.2t_2$

$a = 0.2$ m/s^2

$\Delta t = t_2$

3rd

$X_0 = 4200 + 6.36t_2 + 0.1t_2^2$

$X = 5000$m

$v_0 = 6.36 + 0.2t_2$

$v = 6.36 + 0.2t_2$

$a = 0$

$t = t_3 = 120 - t_2$

$X = X_0 + v_0 t + \frac{1}{2}at^2$

$X = 4200 + 6.36t_2 + (0.1)t_2^2$

$v = v_0 + at$

$v = 6.36 + 0.2t_2$

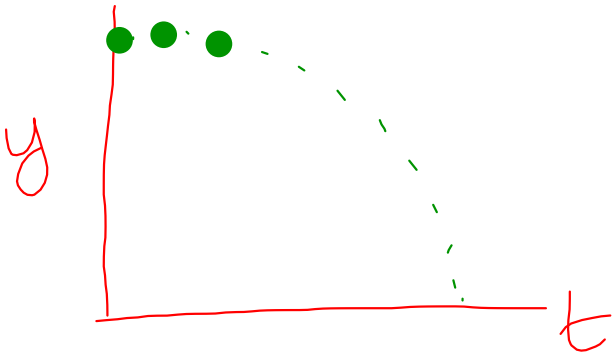
$X = X_0 + v_0 t + \frac{1}{2}at^2$

$5000 = (4200 + 6.36t_2 + 0.1t_2^2) + (6.36 + 0.2t_2)(120 - t_2)$

$5000 = 4200 + 6.36t_2 + 0.1t_2^2 + 763.2 - 6.36t_2 + 24t_2 - 0.2t_2^2$

$-0.1t_2^2 + 24t_2 - 36.8 = 0$

$t = 1.54$ s



$$Ax^2 + Bx + C = y$$

$$At^2 + Bt + C = y$$

$$\frac{1}{2}a_y t^2 + v_{oy} t + y_0 = y$$

$$A = \frac{1}{2}a_y$$

$$B = v_{oy}$$

$$C = y_0$$

$$y = mx + b$$

$$v_y = mt + b$$

$$v_y = at + v_{oy}$$

$$m = a$$

$$b = v_{oy}$$

Preliminary / Final Projectile motion lab: