MOTION PRACTICE #1 ANSWER KEY

For the following problems, let's designate the Skyline Flagpole of Physics as the "origin." Let's also designate **north** to be the positive direction and **south** as the negative direction.

1. If you start 3m north of the flagpole and ride your bike at a constant velocity of 4 $^{m}/_{s}$ for 12 seconds:
   a. Use the equation $d_2 = v \cdot t + d_1$ to calculate your final displacement

$d_1 = 3m$

$v = 4\ ^{m}/_{s}$

$t = 12s$

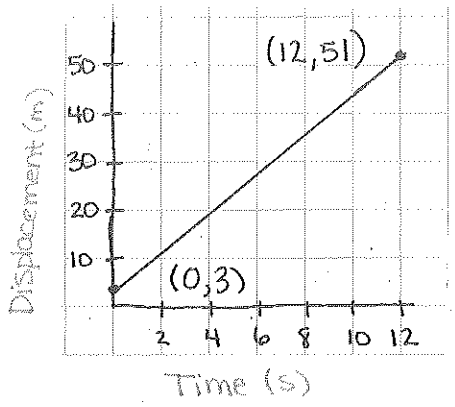
$d_2 = ?$

$d_2 = vt + d_1$

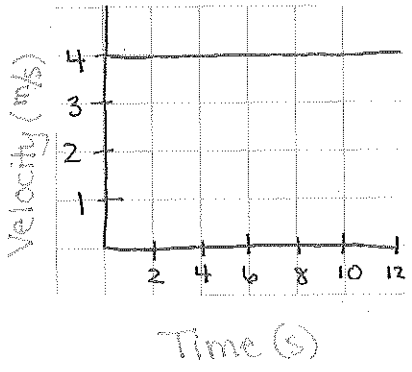
$= (4\ ^{m}/_{s})(12s) + (3m)$

$\boxed{d_2 = 51m \text{ North}}$

   b. Sketch a quantitative *d-t* graph of your motion



   c. Sketch a quantitative *v-t* graph of your motion



2. If you start 7m south of the flagpole and ride your bike at a constant velocity of 5.75 $^{m}/_{s}$ for 15 seconds:
   a. Calculate your final displacement

South → $d_1 = -7m$

North → $v = +5.75\ ^{m}/_{s}$

$t = 15s$

$d = ?$

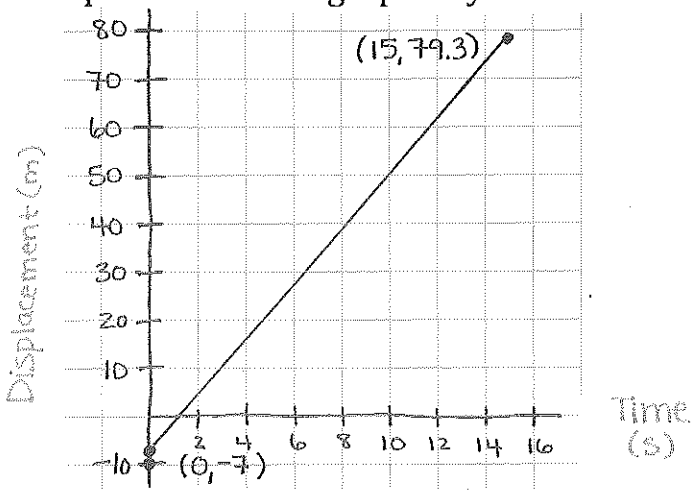
$d = v \cdot t + d_1$

$= (5.75\ ^{m}/_{s})(15s) + (-7m)$

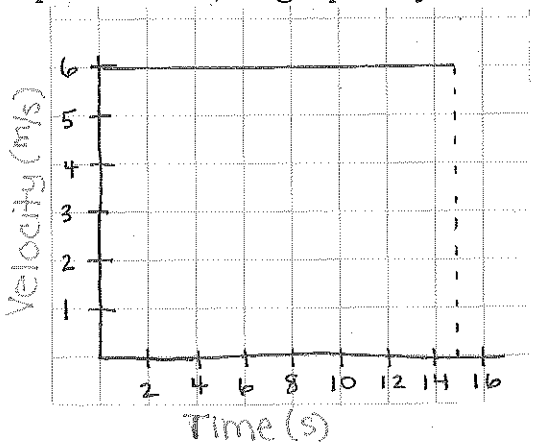
$\boxed{d = +79\ m}$

↑ North of the pole

   b. Sketch a quantitative *d-t* graph of your motion



   c. Sketch a quantitative *v-t* graph of your motion



3. If you start 12m north of the flagpole and ride your bike at a constant velocity of -8.5 $^{m}/_{s}$ for 4.5 seconds:
   a. Calculate your final displacement

$d_1 = 12m$

$v = -8.5\ ^{m}/_{s}$

$t = 4.5s$

$d = ?$

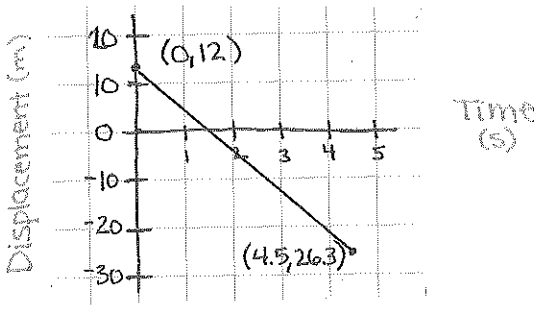
$d = v \cdot t + d_1$

$= (-8.5\ ^{m}/_{s})(4.5s) + (12m)$

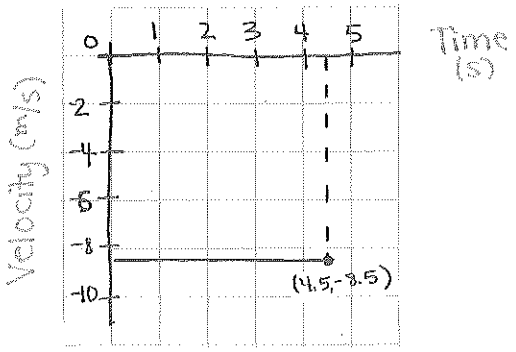
$\boxed{d = -26\ m}$

↑ South of pole!

b. Sketch a quantitative *d-t* graph of your motion



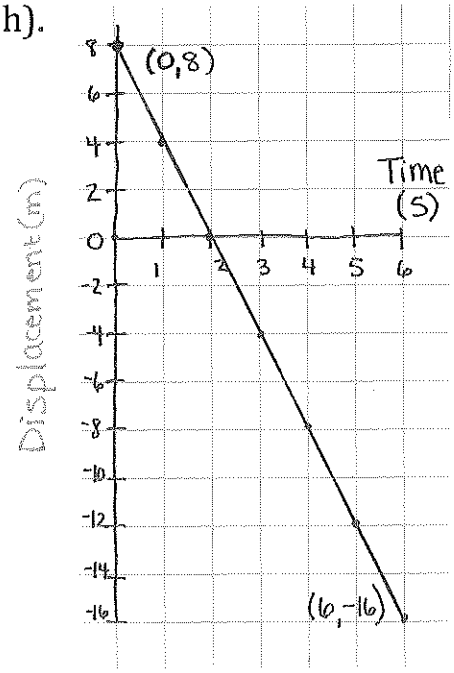
c. Sketch a quantitative *v-t* graph of your motion



4. Sketch a quantitative *d-t* graph for the following motion:

Starting at 8m north of the flagpole, you ride towards the pole (eventually passing it) covering 4 meters every second for a total of 6 seconds.

Write a linear equation describing this motion in the form $y = mx + b$ (but replace y and x with the appropriate variables for our graph).



$m = \text{Slope} = \frac{d_2 - d_1}{t_2 - t_1} = \frac{(-16-8)m}{(6-0)s} = -4\,m/s$

$y = mx + b$

$d = -4t + 8$

$d = (-4\,m/s)t + (8m)$