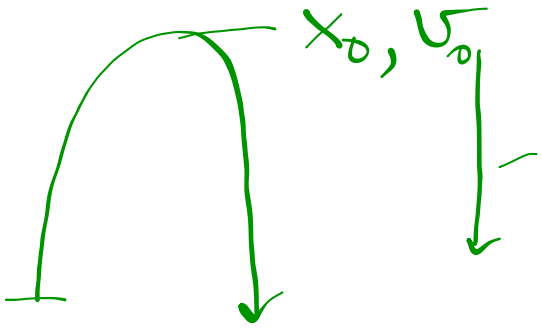
Lofty Heights Lab:

$x_0 \rightarrow v_0 \rightarrow t_0(0)$

$x \rightarrow v \rightarrow t$



$x_0 =$

$x = 0$

$v_0 = 0$

$v =$

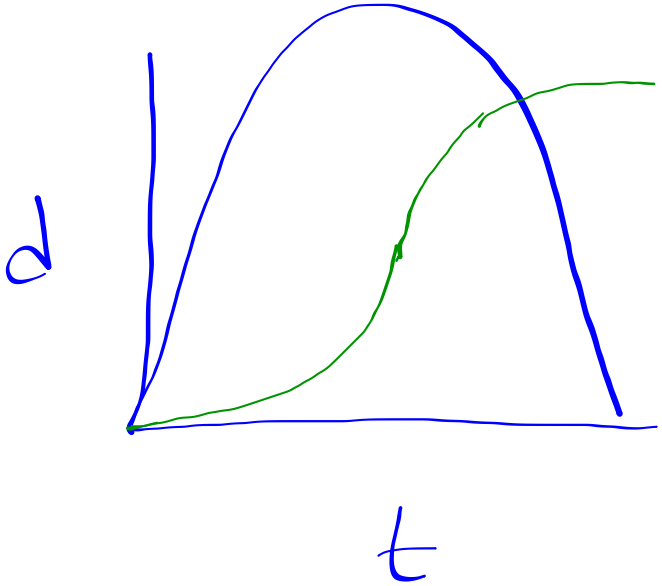
$a = -9.8\ m/s^2$

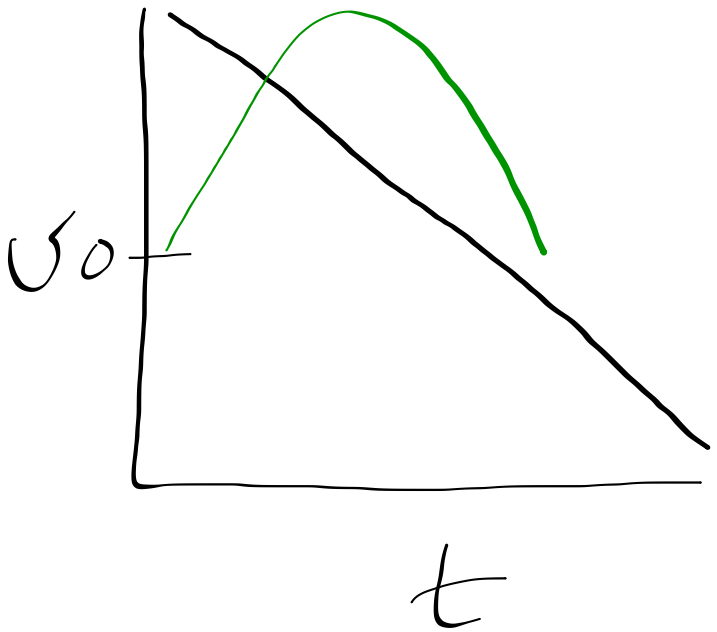
$t = 2.2\ s$

$x = x_0 + v_0 t + \frac{1}{2} a t^2$

$t = \Delta t = t - t_0 = t$

$t_0 = 0$

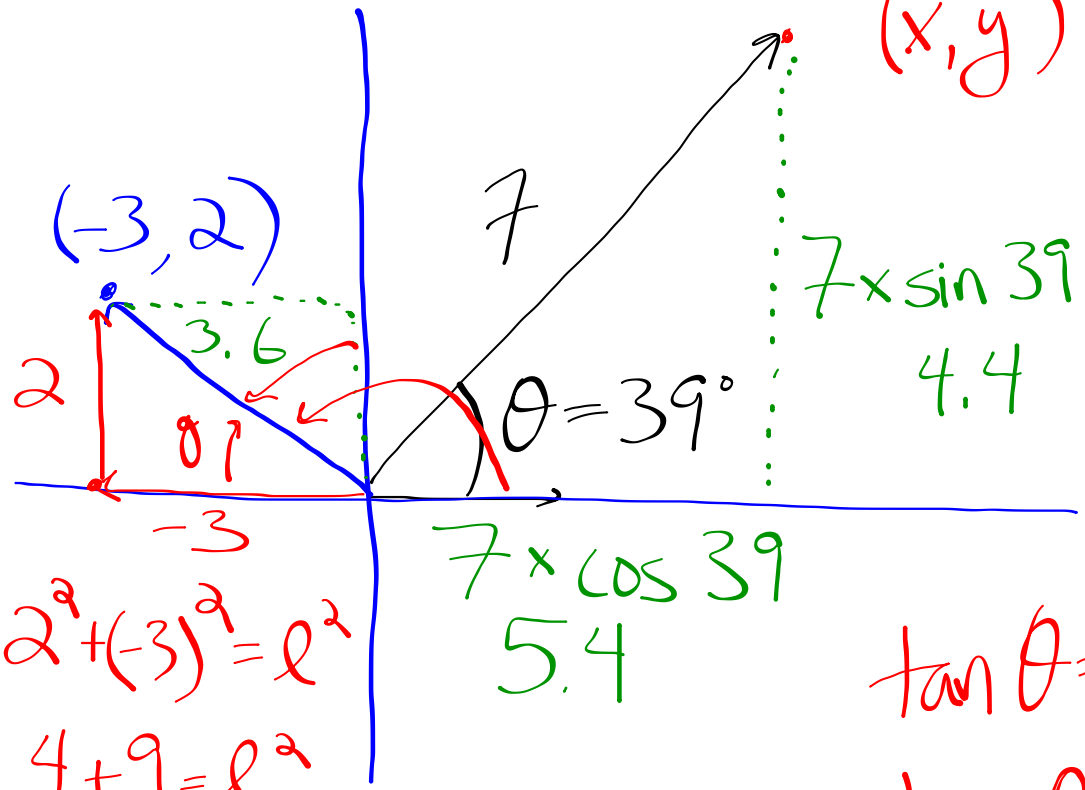

d
t


v0
t

EXAMPLE 1: A bionic bunny bounces along a trail and travels 56 meters 18° west of due north. It spies a hawk, gets scared, and bolts in a direction that is 39° west of due south. Unfortunately, after going 35 meters he encounters a burly bear. For the bionic bouncing bunny to avoid the burly bear, the bouncing bunny darts away in a direction of 27° north of due east and runs for 98 meters. Where does the bunny end up relative to its starting point?

to combine multiple vectors:

1. Draw a picture
2. Break all vectors into (x,y) components
3. Combine all x,y coordinates
4. Convert to r,θ (if necessary)



$(x, y) ? = (5.4, 4.4)$

$\sin\theta = \frac{o}{h}$

$\cos\theta = \frac{a}{h}$

$2^2 + (-3)^2 = \ell^2$

$4 + 9 = \ell^2$

$\ell = \sqrt{13} \cong 3.6$

$\tan\theta = \frac{o}{a}$

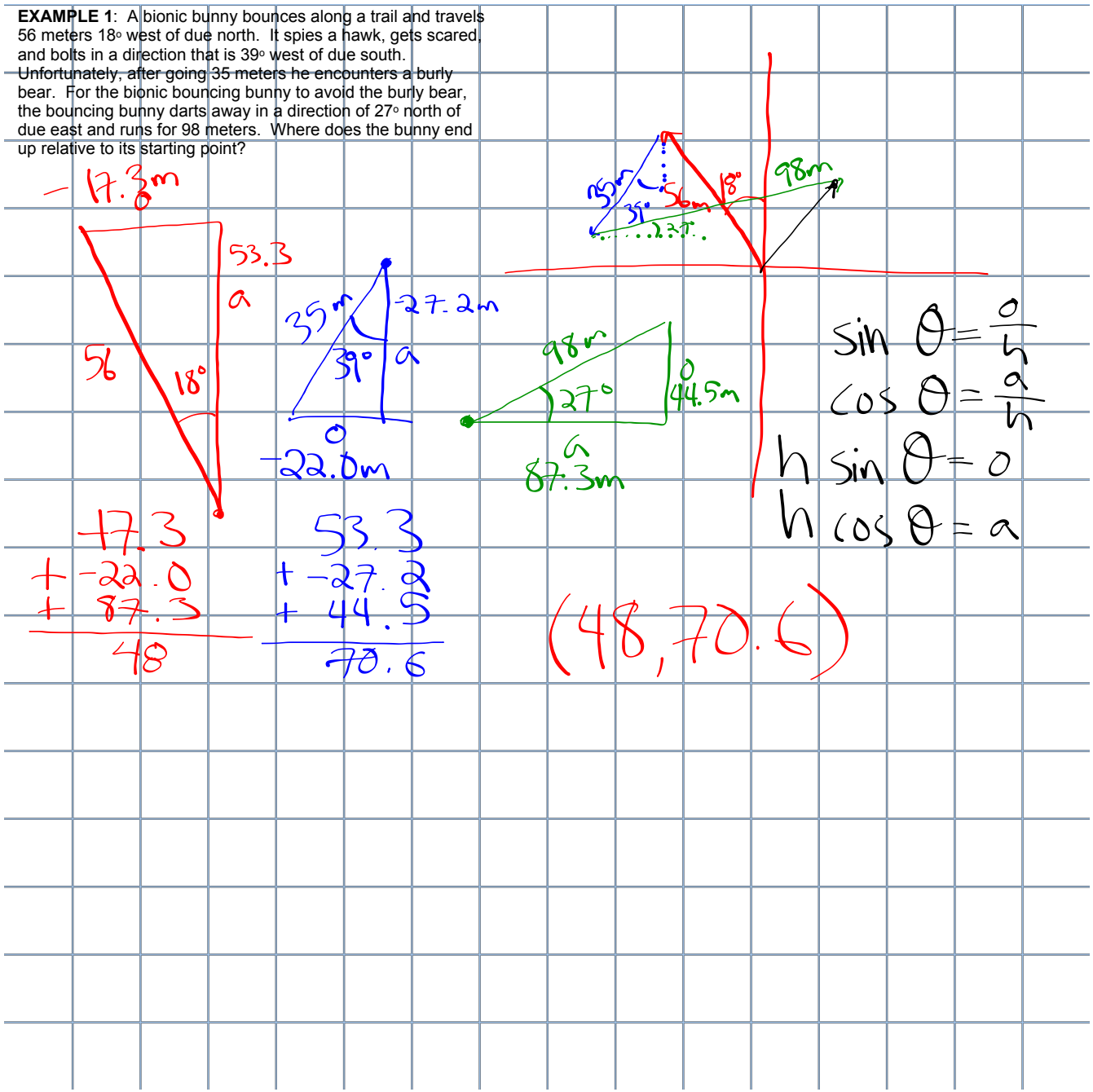
$\theta = \tan^{-1}\frac{2}{-3}$

$\tan\theta = \frac{2}{-3}$

$\theta = 33.7°$

up from x axis in - direction

EXAMPLE 1: A bionic bunny bounces along a trail and travels 56 meters 18° west of due north. It spies a hawk, gets scared, and bolts in a direction that is 39° west of due south. Unfortunately, after going 35 meters he encounters a burly bear. For the bionic bouncing bunny to avoid the burly bear, the bouncing bunny darts away in a direction of 27° north of due east and runs for 98 meters. Where does the bunny end up relative to its starting point?



EXAMPLE 2: A micro meteor experiences the simultaneous accelerations of three different stars as shown. What is the meteor's net acceleration?