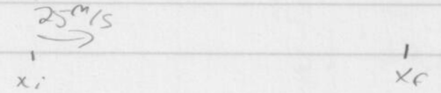
The original review did not provide the initial velocity for problem 3. So you'll notice in the solution the arguments for using the 25 m/s in x and 14.7 m/s in y. If you use the daredevil's calculated speed you get 29 m/s cos 30^o = 25 m/s in the x and 29 m/s sin 30^o = 14.5 m/s in the y. Since we only have 2 sig figs, this is really the same number as 14.7 m/s used in problem 2. Which means you have already calculated most of what you need for problem 3 when doing problems 1 and 2!

Rev

1.

a. 

c. I will use the kenimatics equation that determines x_f

b. $x_i = 0$

$x_f = ?$

$V_{xi} = 25\,m/s$

$V_{xf} =$

$a_x = 0\,m/s^2$

$\Delta t = 3.0\,s$

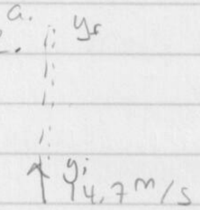
d. $x_f = x_i + V_{xi}\Delta t + \frac{1}{2} a_x \Delta t^2$

$x_f = 0m + 25\,m/s\ 3.0s + 0$

$x_f = \boxed{75m}$

$\boxed{V_f = 25\,m/s}$ because $a = 0\,m/s^2$ no change

e. If a car travels 25 meters in 1s then 75m in 3 seconds is reasonable.

2. a. 

b. $y_i = 0m$

$y_f = 0m$

$V_{yi} = 14.7\,m/s$

$V_{yf} =$

$a_y = -9.8\,m/s^2$

$\Delta t =$

c. This is a free fall problem so I'll look only at information in the y direction - vertically. We need time in the air and velocity just before landing

d) $y_f = y_i + V_{yi}\Delta t + \frac{1}{2} a_y \Delta t^2$

$\frac{0}{\Delta t} = 0 + \frac{14.7\,m/s\,\Delta t}{\Delta t} + \frac{1}{2}\ \frac{-9.8\,m/s^2\,\Delta t^2}{\Delta t}$

$0 = 14.7\,m/s + -4.9\,m/s^2\,\Delta t$

$-14.7\,m/s = -4.9\,m/s^2\,\Delta t$

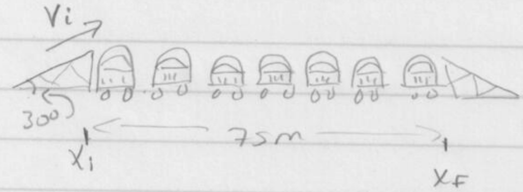
$-14.7 / -4.9 = \Delta t$

$\boxed{3.0s = \Delta t}$

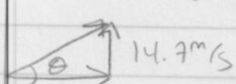
$V_{yf} = V_{yi} + a_y \Delta t$ $\quad V_{yf} = 14.7\,m/s + -9.8\,m/s^2\ 3.0s = \boxed{-14.7\,m/s}$

e) The ball travels from the hand, up in the air until it's stopped, turns around and falls back in the boys hand. Since it's undergoing the same acceleration (change in velocity/speed) the entire time, it's reasonable that it has the same speed when it gets back - it's just in the opposite direction.

3.



b. Well, in problem 1 the car traveled 75m horizontally in a time of 3.0s which happens to be the distance the daredevil needs to go horizontally. And notice both problems 1 & 2 had a time of 3.0s. So just as a check I'll look at 25 m/s & 14.7 m/s. If 25 m/s is my V_x & 14.7 m/s is my V_y let's see what angle they make



$\tan\theta = 14.7/25 \Rightarrow \theta = \tan^{-1} 14.7/25 = 30°$

How convenient, that's the angle of the daredevil's ramp! So with $V_y = 14.7$ & $V_x = 25$ m/s I am traveling at an initial angle of 30° and I travel 75m while being in the air for 3.0s. Perfect!

The initial speed (speed is magnitude of velocity) is $\sqrt{(25\,m/s)^2 + (14.7\,m/s)^2} = \boxed{29\,m/s}$

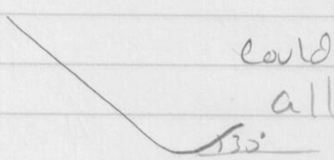
c. $x_i = 0m$ | $y_i = 0m$
$x_f = 75m$ | $y_f = 0m$
$V_{xi} = 25 m/s$ | $V_{yi} = 14.7 m/s$
$V_{xf} = 25 m/s$ | $V_{yf} = -14.7 m/s$
$a_x = 0 m/s^2$ | $a_y = -9.8 m/s^2$
$\Delta t =$ | $\Delta t =$

Part c says to check to see if the initial velocity I determined in b fits.
Yes because 29 m/s @ 30° has a
$V_{xi} = 29 m/s \cos 30° = 25 m/s$ and
$V_{yi} = 29 m/s \sin 30° = 14.5 m/s$
↑ rounding - we only have 2 sig figs here.

So use #s from problems 1 & 2 to see that
25 m/s in the x for 3.0 s travels 75 m
14.5 m/s in the y is in the air for 3.0 s. ✓

d. $29 m/s \left(\frac{1 mile}{1609 m}\right)\left(\frac{3600 s}{1 hr}\right) = 65 mi/hr$
No, not on flat ground!

e. Lots of reasonable answers here



could have a huge ramp that allows her to gain the necessary speed before hitting the ramp.

Roughly 43 meter or higher ramp.

She could switch to a dirt bike
She could strap rockets to her bike.