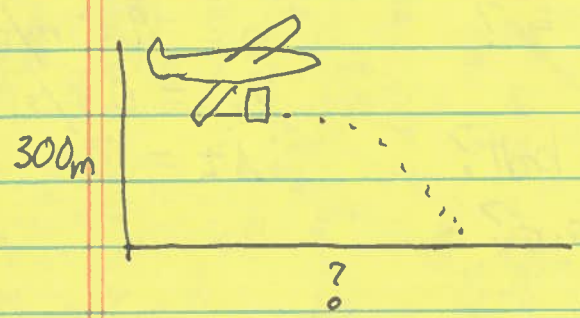
# 2D More Practice Problems Worksheet

1. 


| X info | Y info |
|---|---|
| $V_x = 60\ m/s$ | $Y_i = 300m$ |
| $X_F = ?$ | $Y_F = 0m$ |
| $X_i = 0m$ | $a = -9.8\ m/s^2$ |
| | $V_{yi} = 0\ m/s$ |

1.1 We need to use $X_F = V\Delta t + X_i$ to find $X_F$ but first have to find $\Delta t$

So use y information to ge $\Delta t$

1.2 $Y_F = \frac{1}{2} a \Delta t^2 + V_{iy} \Delta t + Y_i$

$0m = \frac{1}{2}(-9.82\ m/s^2)\Delta t^2 + 0\ m/s\ \Delta t + 300m$

$-300m = -4.9\ m/s^2\ \Delta t^2$

$61.22 s^2 = \Delta t^2$

$7.8s = \Delta t$

Use positive because it is time

Now plug this into equation 1.1

$X_F = V\Delta t + X_i$

$X_F = 60\ m/s\ (7.8s) + 0m$

$\boxed{X_F = 468m}$

2.


X info

$V_x = 18\ m/s$

$X_i = 0m$

$X_F = ?$

Y info

$Y_i = 1m$

$Y_F = 0m$

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

$V_{yi} = 0\ m/s$

$\Delta t = ?$

2 Questions
- First ~~what~~ is $X_F$ for ball?
- 2nd what is $X_F$ for car?

## First Question

$X_F = V_x \Delta t + X_i$ but you need $\Delta t$ so use y info

$Y_F = \frac{1}{2} a \Delta t^2 + V_{yi} \Delta t + Y_i$

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

$-1m = -4.9\ m/s^2\, \Delta t^2$

$0.204 s^2 = \Delta t^2$

$0.45 s = \Delta t$

$X_F = V_x \Delta t + X_i$

$X_F = 18 m/s\,(0.45 s) + 0m$

$\boxed{X_F = 8.1\ m}$ where ball hits ground

## 2nd Question

$X_F$ for Car

$X_F = V_x \Delta t + X_i$

Same $\Delta t$ as ball, same $V_x$ as ball, same $X_i$ as ball

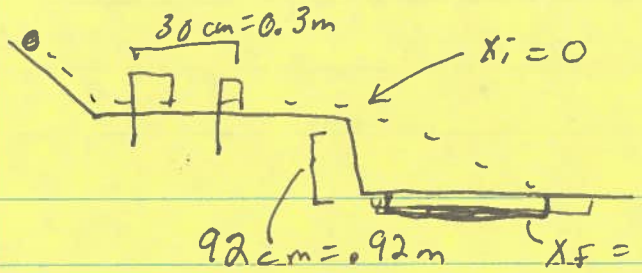
$X_F = 18 m/s\,(0.45 s) + 0m$

$\boxed{X_F = 8.1\ m}$

They will be in same place because their x properties are the same!

Weird but True!!!

(3)




a) $V_x = ?$

$x_F = V_x \Delta t + x_i$

You need $\Delta t$

use y info to get $\Delta t$

$Y_F = \frac{1}{2} a \Delta t^2 + V_{yi} \Delta t + Y_i$

$0m = \frac{1}{2}(-9.8 m/s^2)\Delta t + 0 m/s\, \Delta t + 0.92m$

$-.92m = -4.9 m/s^2 \Delta t$

$0.188 s^2 = \Delta t^2$

$\boxed{0.43s = \Delta t}$ → plug in $x_F = V_x \Delta t + x_i$

$0.25m = V_x(0.43s) + 0m$

$\boxed{0.58 m/s = V_x}$

| X info | Y info |
|---|---|
| $x_i = 0m$ | $Y_i = .92m$ |
| $x_F = .25m$ | $Y_F = 0m$ |
| $V_x = ?$ | $a = -9.8 m/s^2$ |
| | $\Delta t = ?$ |
| | $V_{iy} = 0 m/s$ |

(b) Different X info now

$x_F = V_x \Delta t + x_i$

$0.3m = 0.58 m/s\, \Delta t + 0m$

$\boxed{0.517s = \Delta t}$

$x_i = 0m$

$x_F = 30cm = 0.3m$

$V_x = 0.58 m/s$

$\Delta t = ?$

**WARNING**

In problem description it says it took the ball 0.2s to go through the photogate. That is a mistake. We don't know how long it took. That number should NOT have been there.