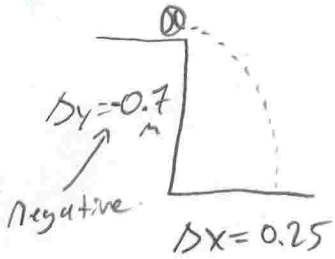
Horizontal Projection Solutions

#1.



X	Y
$\Delta x = 0.25m$	$\Delta y = -0.7m$
$a =$ do not need	$a = -9.81 m/s^2$
$V_i =$? (find)	$V_i = 0 m/s$
$V_f =$ do not need	$V_f =$ do not need
$\Delta t =$ ___	$\Delta t =$ ___

Tips Δt is the same for both X + Y axis

- Acceleration in Y is always $-9.81 m/s^2$.
- V_i in the y axis is $0 m/s$.
- Use time in X to solve for Y axis or Vice Versa.

USE Previous kinematic equations.

$\Delta x = \frac{1}{2}(V_i + V_f)\Delta t$

$V_f = V_i + a(\Delta t)$

$\Delta x = V_i(\Delta t) + \frac{1}{2}a(\Delta t)^2$

$V_f^2 = V_i^2 + 2a\Delta x$

New= $\Delta x = V_{i,x} \cdot \Delta t$

Solve for Δt in Y axis.

Pick a formula...

Ignore formulas with V_f...

$\Delta y = V_i(\Delta t) + \frac{1}{2}a(\Delta t)^2$

$-0.7m = 0 + \frac{1}{2}(-9.81 m/s^2)\cdot(\Delta t)^2$

$-0.7m = -4.91 m/s^2 \cdot (\Delta t)^2$

$\frac{-0.7m}{-4.91 m/s^2} = (\Delta t)^2$

$\sqrt{0.143 s^2} = \sqrt{\Delta t^2}$

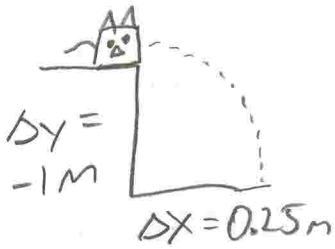
$\Delta t = 0.38s$ plug this into new formula

$\Delta x = V_{i,x} \cdot \Delta t$

$0.25m = V_{i,x} \cdot (0.38s)$

$\boxed{V_{i,x} = 0.66 m/s}$

2.



X	Y
$\Delta x = 2.2\ m$	$\Delta y = -1m$
~~x =~~	$a = -9.81 m/s^2$
$V_i =$	$V_i =$ assume $0 m/s$
~~$V_f =$~~	~~$V_f =$~~
$\Delta t =$	$\Delta t =$

solve for time in the Y axis. Pick formula that does not have V_f in it

$$\Delta y = V_i \Delta t + \frac{1}{2} a (\Delta t)^2$$

$$-1m = 0 + \frac{1}{2} -9.81 m/s^2 \cdot (\Delta t)^2$$

$$-1m = 0 + -4.91 m/s^2 \cdot (\Delta t)^2$$

$$\sqrt{0.204 s^2} = \sqrt{\Delta t^2}$$

$$\Delta t = 0.451 s$$

Use new formula

$$\Delta x = V_{f,x} \cdot \Delta t$$

$$2.2m = V_{f,x} \cdot 0.451 s$$

$$\boxed{V_{f,x} = 4.88 m/s}$$