Your Thoughts?

This Week

- Monday: Intro to 2-D kinematics.

- Tuesday: Horizontal 2-D kinematics.

- Wednesday: Potato Cannon Lab.

- Thursday: Candy Count and Projectile Motion Core.

- Friday: Candy Awards and non-horizontal projectile motion intro.

Homework

- There are 2 worksheets on School Wire.

- Tonight: do the first four problems from WS 1.

Projectile Motion

- Objects moving through the air in 2 dimensions.

- We ignore air resistance.

- These are essentially free fall problems with a horizontal component.

Equations

- $V_f = V_i + at$

- $V_f{}^2 = V_i{}^2 + 2a\Delta x$

- $\Delta x = V_i t = 1/2a(t^2)$

Subscripts

- We will break motion into either the x or y directions.

- All of the variables will have to have either an x or y subscript.

Variables

- x direction
- Δx
- $V_{i,x}$
- $V_{f,x}$
- a_x

- y direction
- Δy
- $V_{i,y}$
- $V_{f,y}$
- a_y

What's Missing?

Time

- The variable that is **independent** of the direction of motion.

- This will allow us to connect information from the x and y directions of motion.

Assumptions?

- Draw the FBD for projectile in the air.

- Based on this, what can I assume is true for **all** projectile motion problems.

Horizontal velocity remains constant

$$Vi,x = Vf,x$$

Step by Step

- Draw a picture that represents the problem.

- Divide your work space into two columns: x direction and y direction.

- Write down all of you knowns and unknowns.

A stunt driver wants to ride a motorcycle off of a 30m high cliff. He is going 15m/s and rides horizontally off of the cliff. How far away from the base of the cliff does he land?

- Write down your knowns.

- Draw a picture.

Variables

- x direction
- Δx
- $V_{i,x}$
- $V_{f,x}$
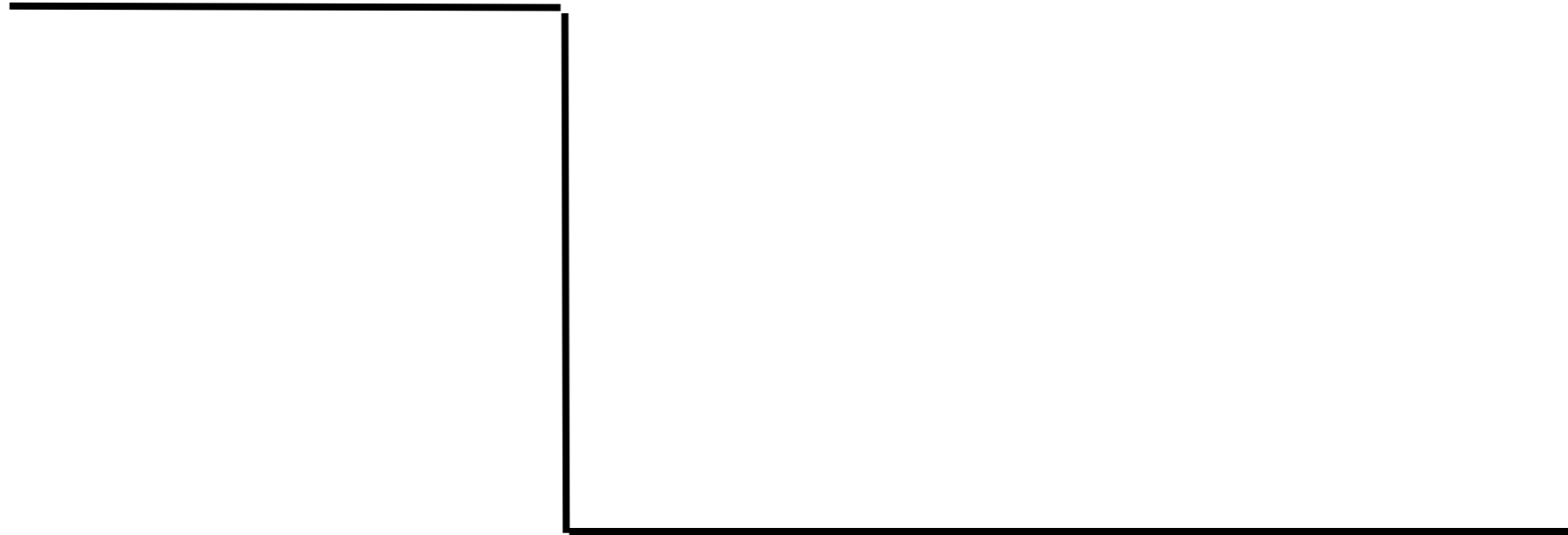- a_x
- t

- y direction
- Δy
- $V_{i,y}$
- $V_{f,y}$
- a_y
- t

Picture

Next Steps

- Figure out what you variables you can solve for.

- As you solve for one, write it in your knowns and see what else you can solve for.

- Keep going until you solve for the desired unknown that the question asks for.

A stunt driver wants to ride a motorcycle off of a 30m high cliff. He is going 15m/s and rides horizontally off of the cliff. How far away from the base of the cliff does he land?

A plane is flying at 50m/s at a constant altitude of 300m above the ground. The pilot wants to drop a box of food to people on the ground. How far away from the target does the pilot need to let the package go?
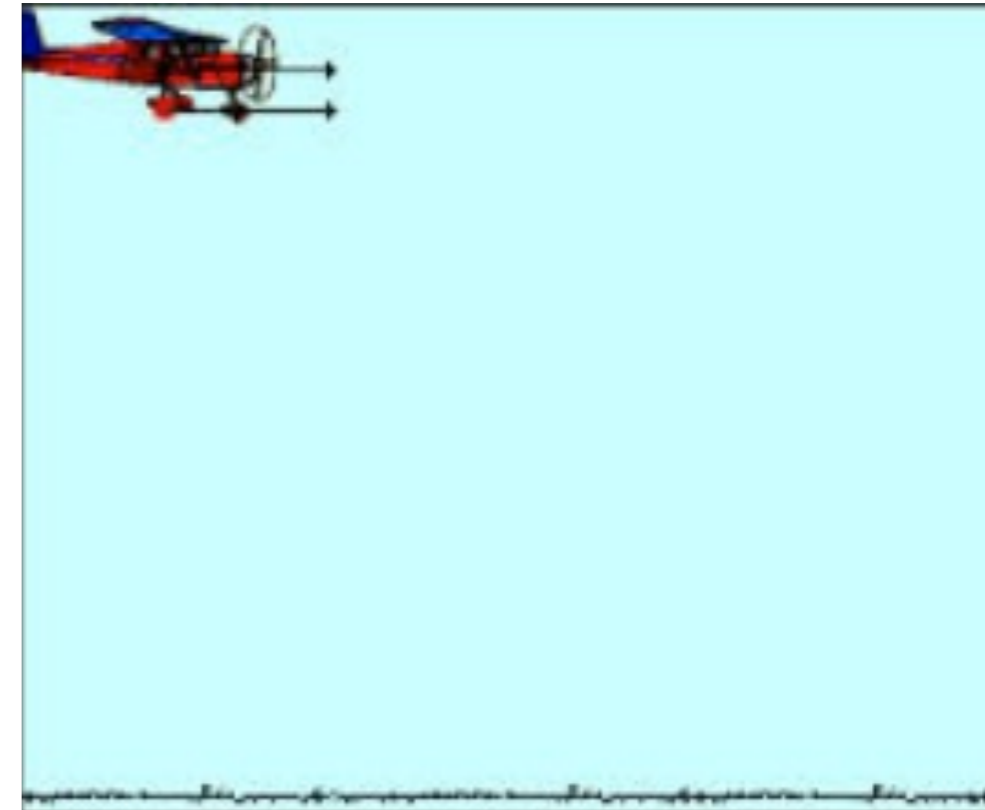
A cat is chasing a mouse across a 0.7m table with a speed of 2.5m/s. The cat slides off of the edge of the table. How tar from the base of the table does the cat land?