Hello

- Solutions for the homework are on either side of the room.
- Check your answers and write down a number that you would like me to go over.

Today

- Continue 2-D kinematics with horizontal trajectories.
- Solve for other aspects of measurement.
- *Sp*eed of landing, angle of landing, "applied variables."

Tonight

- Projectile motion WS 1
- Problems 1-5

Vector Algebra

- When an object with a horizontal trajectory finally hits the ground, it's velocity is in neither the x or y direction.
- We can use trig and pythagorean theorem to solve for this.
- We will need the final velocities for both the x and y direction.

Example

- $V_{f,x}=V_{i,x}=15 m/s$
- $V_{f,y}=-23 m/s$

- Solve for the speed that the object hits the ground.
- Solve for the angle that the object hits the ground.

- $V_{f,x} = V_{i,x} = 15 m/s$
- $V_{f,y} = -23 m/s$

- Final Speed:
- Angle of at impact. Does this answer make sense?

Katniss Everdeen shoots an arrow with a horizontal velocity of 23m/s from the top of a 10m tower. What is the final speed of the arrow when it hits the ground. At what angle does it hit?

Variables

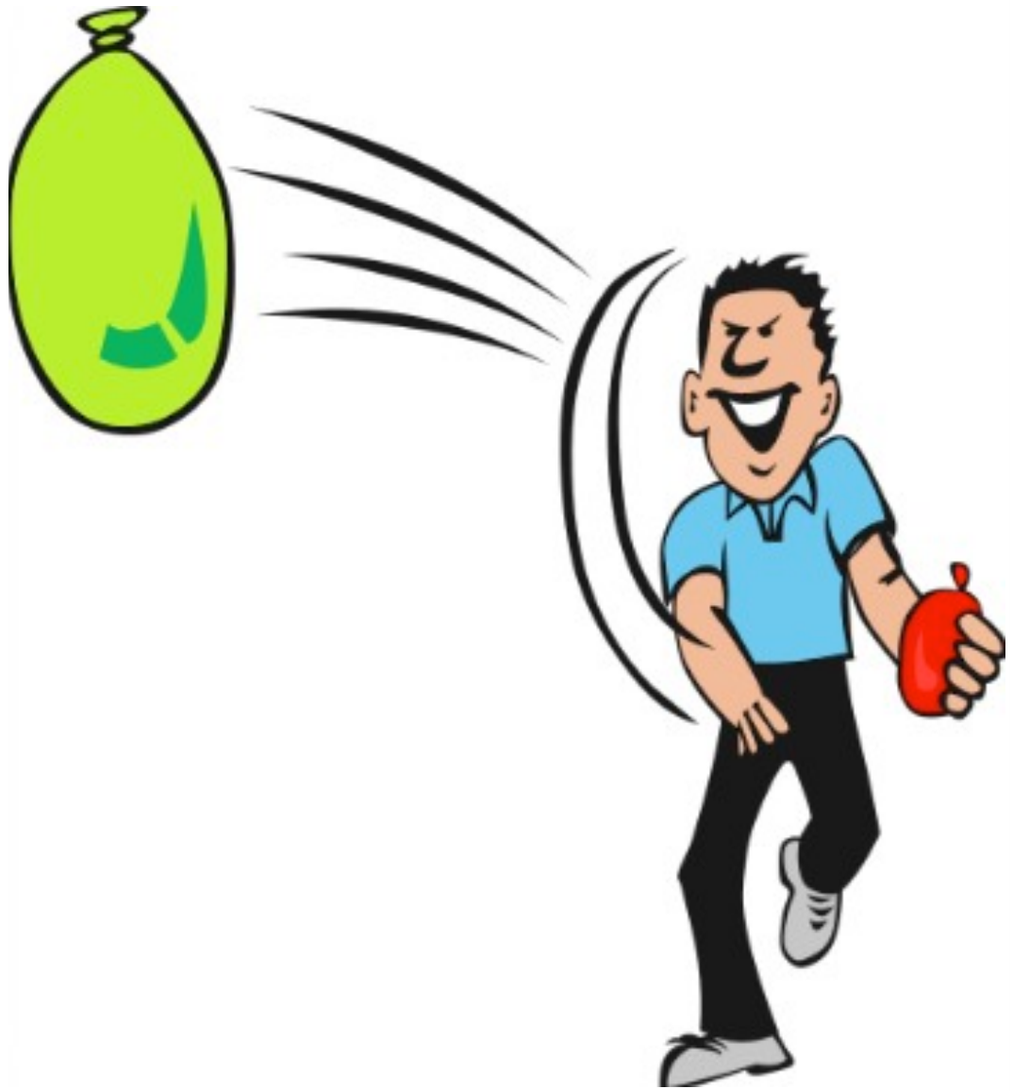
- x direction
- Δx
- Vi,x
- Vf,x
- ax
- t (x and y)
- y direction
- Δy
- Vi,y
- Vf,y
- ay

Katniss Everdeen shoots an arrow with a horizontal velocity of 23m/s from the top of a 10m tower. What is the final speed of the arrow when it hits the ground. At what angle does it hit?

- θf=

- Sf=

A water balloon is thrown from a 5m high window. It his someone's feet, 17m from the base of the house. How fast is the balloon going at impact?



Variables

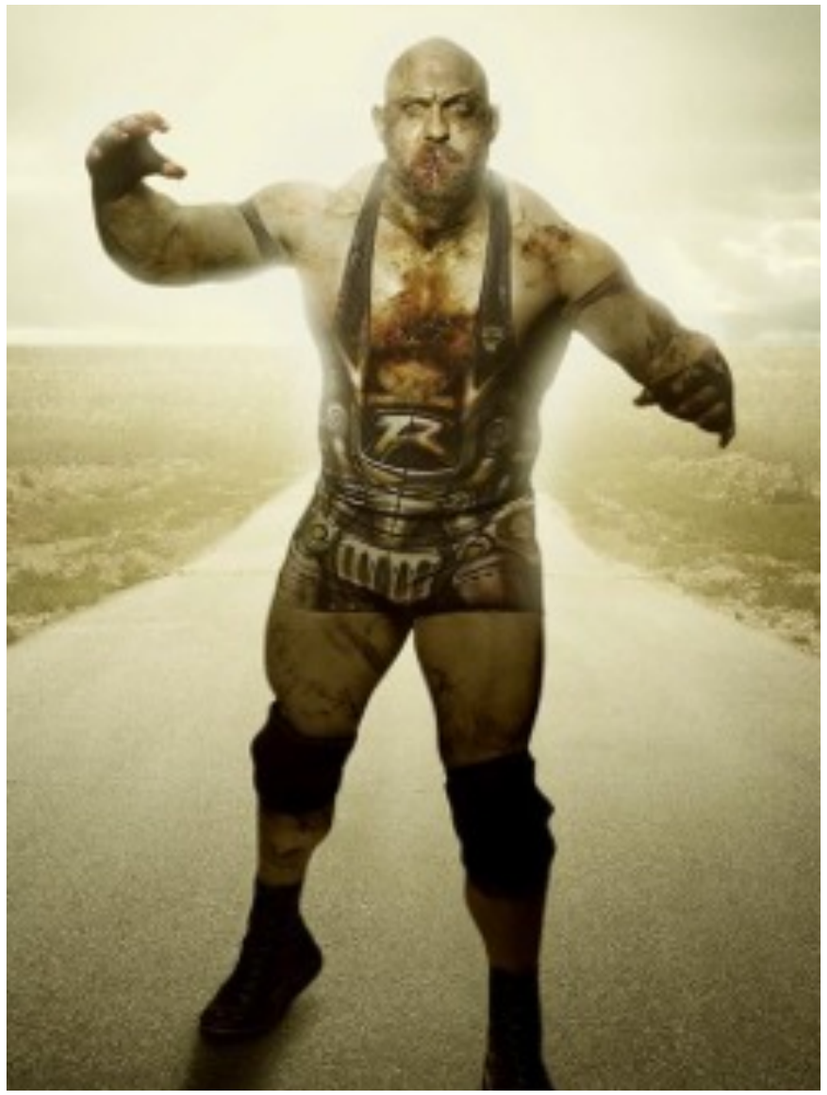
- x direction
- Δx
- Vi,x
- Vf,x
- ax
- t (x and y)
- y direction
- Δy
- Vi,y
- Vf,y
- ay
- Sfinal

A black hawk helicopter is trying to stop the zombie apocalypse. The helicopter is stationary 30m off the ground. The gun turret is horizontal. A bullet hits a 2m tall zombie in the head. How fast was the bullet going when it left the helicopter?

Variables

- x direction
- Δx
- Vi,x
- Vf,x
- ax
- t (x and y)
- y direction
- Δy
- Vi,y
- Vf,y
- ay
- Sfinal

How high would the helicopter have to be from the ground to hit a zombie 1 km away? Assume it hits the zombie 2m off of the ground.



A ball rolls off of a 0.9m table and lands 7m from the base of it. If the ball rolls off of a 2m tall bookcase at the same velocity, where does the ball land from the base of the book case?

Variables

- x direction
- Δx
- Vi,x
- Vf,x
- ax
- t (x and y)
- y direction
- Δy
- Vi,y
- Vf,y
- ay
- Sfinal