

### Physics 151 Worksheet #3: 2-D Kinematics

Name: \_\_\_\_\_

Partner(s): \_\_\_\_\_

**Directions :** Complete the following questions based on the computer simulation. Please show all of your work and explain all of your reasoning. Place a box around your final answer.

#### **Simulation #1: Horizontal Motion with Constant Velocity**

Can you mathematically express the relationship between position and time?

#### **Simulation #2: Freefall**

Can you mathematically express the relationship between position and time?

#### **Simulation #3: The Superposition of Horizontal and Vertical Motion**

- For an initial horizontal velocity of 5 m/s -- how far has the red ball moved in 3.5 seconds? How far has the green ball fallen in 3.5 seconds? Use the simulation to check your answers.
- How long does it take the green ball to fall 60 m? For an initial horizontal velocity of 12 m/s, how far does the red ball move during this time?

#### **Simulation #4: Projectile Motion with Initial Horizontal Velocity**

- Determine the platform height.
- Determine the horizontal velocity of the ball.
- Determine the position where the ball hits the ground (off of the screen).
- Determine the velocity of the ball when it hits the ground.

#### **Simulation #5: Minimum Velocity of Projectile Motion**

- Calculate the minimum velocity of the following particle during its trajectory. (Fully explain your method)