

# Shell Tutorial Center

## Projectile Motion

### Step 1

\*Note:

$$v_{ox} = v \cos\theta = \underline{\hspace{2cm}}$$

$$v_{oy} = v \sin\theta = \underline{\hspace{2cm}}$$

Fill in all known information.

#### x-components

$$\Delta x = x_f - x_o = \underline{\hspace{2cm}}$$

$$v_{ox} = v_{fx} = \underline{\hspace{2cm}}$$

$$t_x = \Delta x / v_{ox} = \underline{\hspace{2cm}}$$

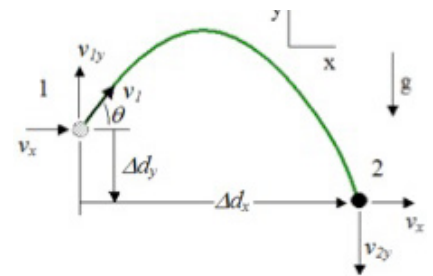
\*Note:  $a_x = 0$  and  $\mathbf{a_y = 9.8 \text{ m/s}^2}$

#### y-components

$$\Delta y = y_f - y_o = \underline{\hspace{2cm}}$$

$$v_{oy} = \underline{\hspace{2cm}}, v_{fy} = \underline{\hspace{2cm}}$$

$$t_y = t_x = \underline{\hspace{2cm}}$$



### Step 2

Using the following equations you should be able to solve for all other unknowns.

$$\Delta y = v_{oy}t + \frac{1}{2}a_y t^2$$

$$v_f = v_o + at$$

$$v_f^2 = v_o^2 + 2a_y \Delta y$$

$$v = \sqrt{v_x^2 + v_y^2}$$

### Important Information

If the projectile is pointed upwards, the acceleration is  $-9.8 \text{ m/s}^2$  and  $v_{oy}$  is positive; else, acceleration is  $+9.8 \text{ m/s}^2$  and  $v_{oy}$  is negative.

If the final displacement is below the starting point,  $\Delta y$  is negative.

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