Listing all of the known values:

First for the vector quantities:

You will need to solve for the components of the initial velocity:

Now write in all of the values that you know:

\[
\begin{align*}
\text{x-components} & \quad \text{y-components} \\
x_i &= x_f = \quad y_i = y_f = \\
v_{ix} &= v_{fx} = \quad v_{iy} = v_{fy} = \\
a_x &= \quad a_y = \\
\end{align*}
\]

Next for the scaler quantities:

\[
\begin{align*}
t_i &= t_f = \\
\end{align*}
\]

Write out the six equations and mark all values known:

<table>
<thead>
<tr>
<th></th>
<th>x-Direction</th>
<th>y-Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Velocity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acceleration</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Solve the equations. Begin with any equation that is solvable:

Check your work:

Draw a Motion Diagram for the horizontal motion. Use it to check your signs.

Draw a Motion Diagram for the vertical motion. Use it to check your signs.
### Projectile Motion Homework Guide: Problem Solving

**Filling out projectile motion charts:**

(For these charts, you may round off $a_g$ to 10 m/s.)

First list the initial conditions ($t=0$).

- **Initial velocity** = ________ m/s $@$ ________
- **Initial position** $x=$______ m and $y=$______m

Solve for the components and place them in the chart below:

Now fill in the chart:

Step 1: Fill in $v_x$-values for several seconds. Round to nearest whole number. Include the signs.

Step 2: Fill in $x$-values for several seconds. Round to nearest whole number. Include the signs.

Step 3: Fill in $v_y$-values for several seconds until you have a couple seconds after it turns around. Round to nearest whole number. Include the signs. (You should know how to recognize when it turns around.)

Step 4: Fill in $y$-values until you read a $y$ value that is equal to zero. (If you find one less than zero then fill it in as a zero.) Round to nearest whole number. Include the signs. (Be careful on this column because the velocity is not constant!)

<table>
<thead>
<tr>
<th>time (s)</th>
<th>$v_x$ (x velocity) (m/s)</th>
<th>$x$ position (m)</th>
<th>$v_y$ (y velocity) (m/s)</th>
<th>$y$ position (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1</td>
<td></td>
<td></td>
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</tbody>
</table>

Add enough rows for the ball to hit the ground.

**Check your work for the y-columns:**

Draw a Motion Diagram for the ball moving in the vertical direction only ($y$ components). Choose one time for the initial time and another for final. Write out all of the motion equations and solve for what you can. Check your table values for these times.