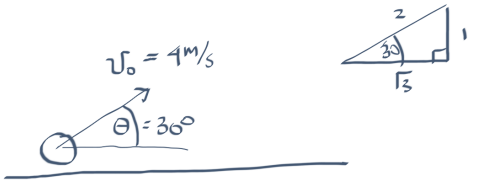
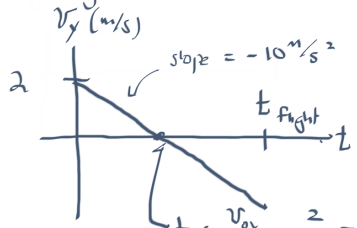


$$\frac{v_{0x}}{v_0} = \frac{\sqrt{3}}{2} \Rightarrow v_{0x} = \frac{\sqrt{3}\,v_0}{2} = 2\sqrt{3}\ m/s$$

$$\frac{v_{0y}}{v_0} = \frac{1}{2} \Rightarrow v_{0y} = \frac{1}{2}v_0 = 2\ m/s$$

How long will the ball be in the air?



$$t = \frac{v_{0y}}{a} = \frac{2}{10} = \frac{1}{5}\ sec$$

$$t_{flight} = \frac{2}{5}\ sec.$$

- Range of ball $= v_{0x} \cdot t_{flight} = (2\sqrt{3})\left(\frac{2}{5}\right) = \boxed{\frac{4\sqrt{3}}{5}\ meters}$
- At its peak, $\boxed{\vec{v} = (2\sqrt{3}\ m/s)\,\hat{x}}$
- When it strikes the ground $\boxed{\vec{v} = (2\sqrt{3}\ m/s)\,\hat{x} - (2\ m/s)\,\hat{y}}$
- When it is halfway to its peak? How high does it get? $\boxed{\frac{1}{5}\ meter}$

  So when is it at $\frac{1}{10}$ meter? Use $y = y_0 + v_{0y}t + \frac{1}{2}at^2$ and solve for t when $y = \frac{1}{10}$ meter.

  $\frac{1}{10} = 0 + 2t - 5t^2$

  $t^2 - \frac{2}{5}t + \frac{1}{50} = 0 \Rightarrow t = 0.059\ sec$ (on the way up).

  $v_x = v_{0x}$, $v_y = v_{0y} + a_y t = 2\ m/s - (10\ m/s^2)(0.059\ sec) = 1.41\ m/s$

  So: $\boxed{\vec{v} = (2\sqrt{3}\ m/s)\,\hat{x} + (1.41\ m/s)\,\hat{y}}$