

Dynamics II

1. Practice midterm exam
2. Roll for workbook collection: ch 5 & 6
3. Dynamics worksheets

Use the dynamics worksheets for Chapter 5 & 6 problems.

DYNAMICS WORKSHEET Name _____ St No _____ Prob: _____

1) Pictorial Representation

- a. sketch showing important points in the motion
- b) coordinate system
- c. symbols for knowns and unknowns

known:

find:

2) Physical Representation

- a. motion diagram
- b. force identification
- c. free-body diagram

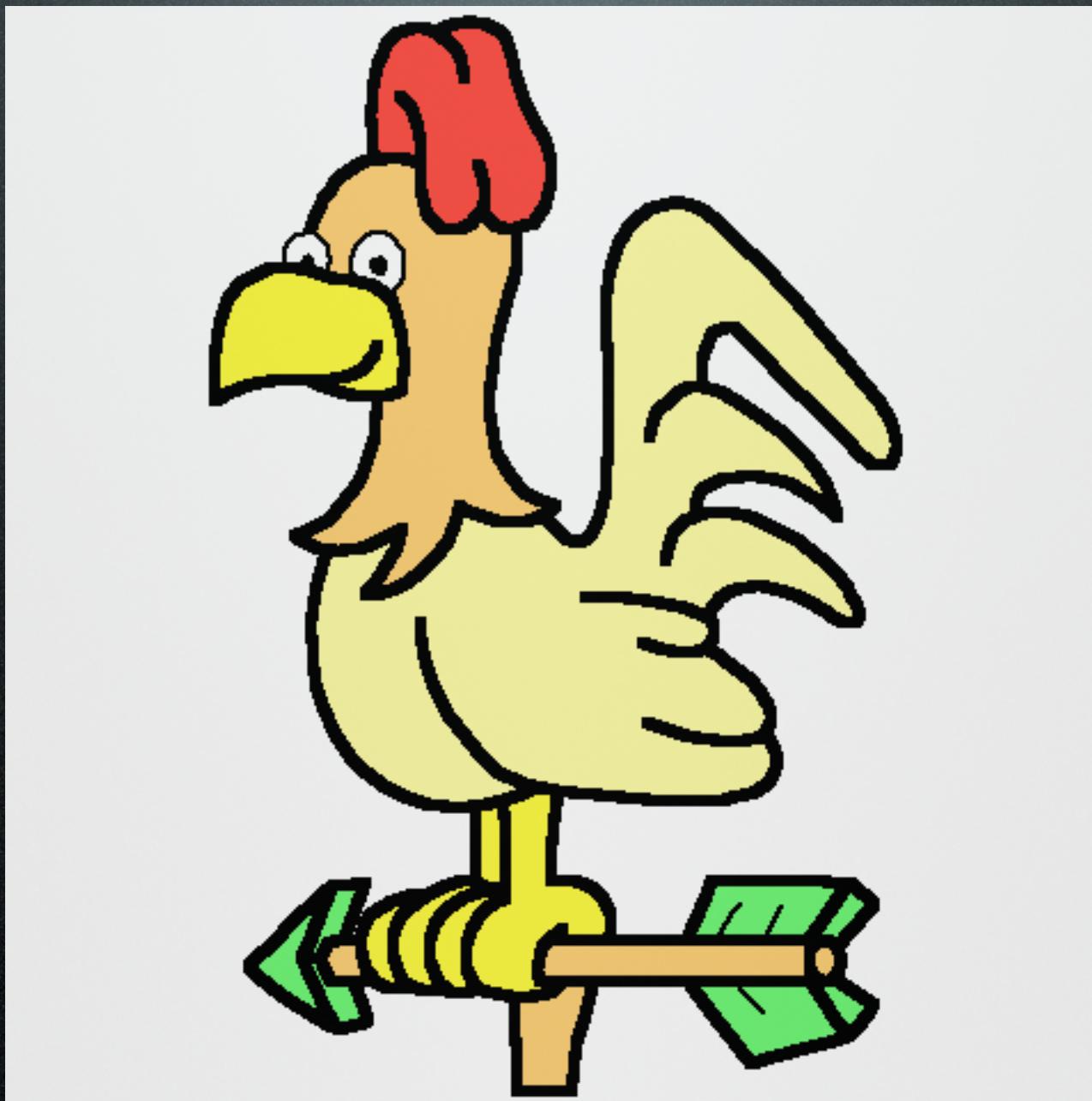
3) Mathematical Representation

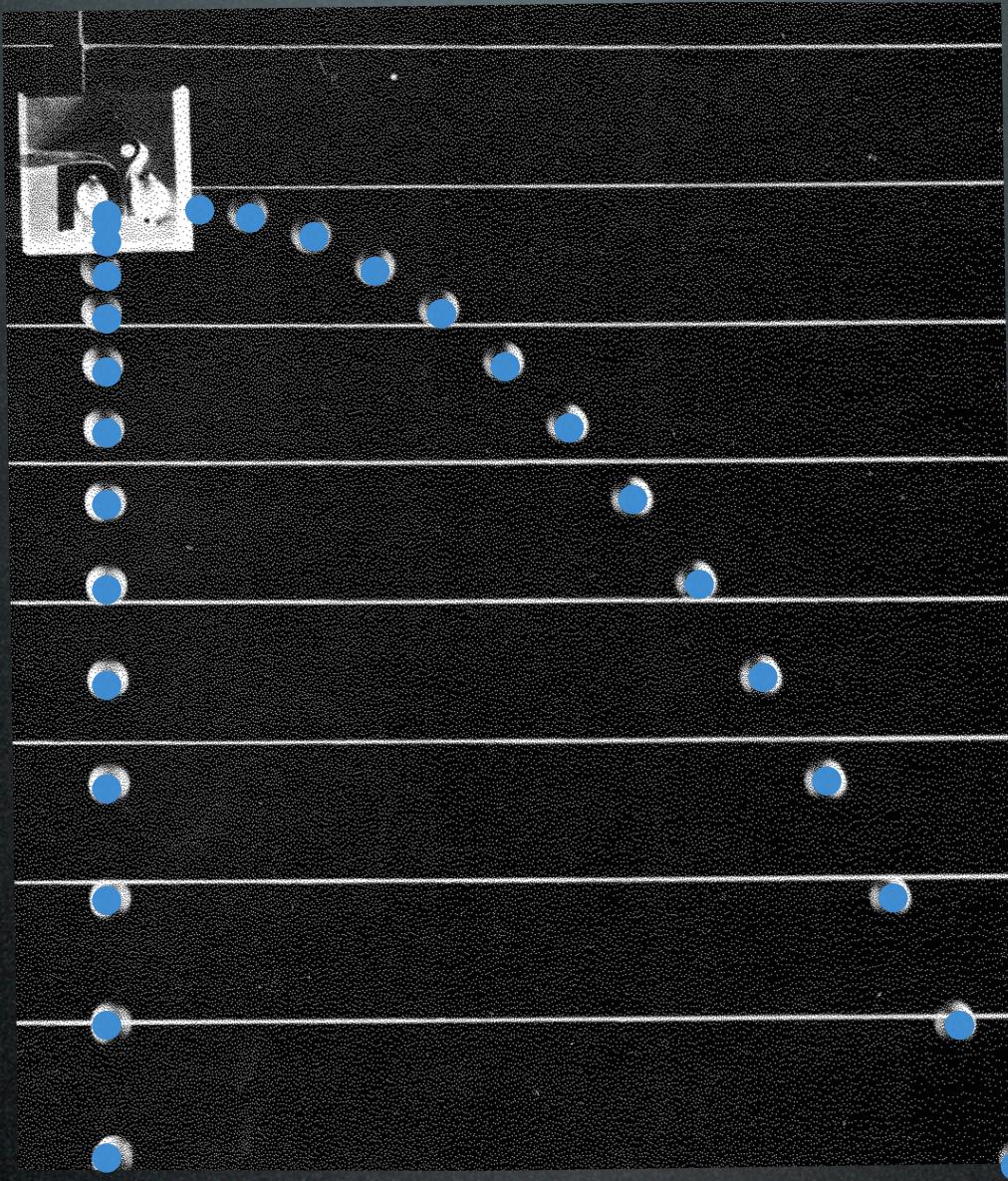
- a. start with Newton's first or second law
- b. include other information as needed
- c. solve.

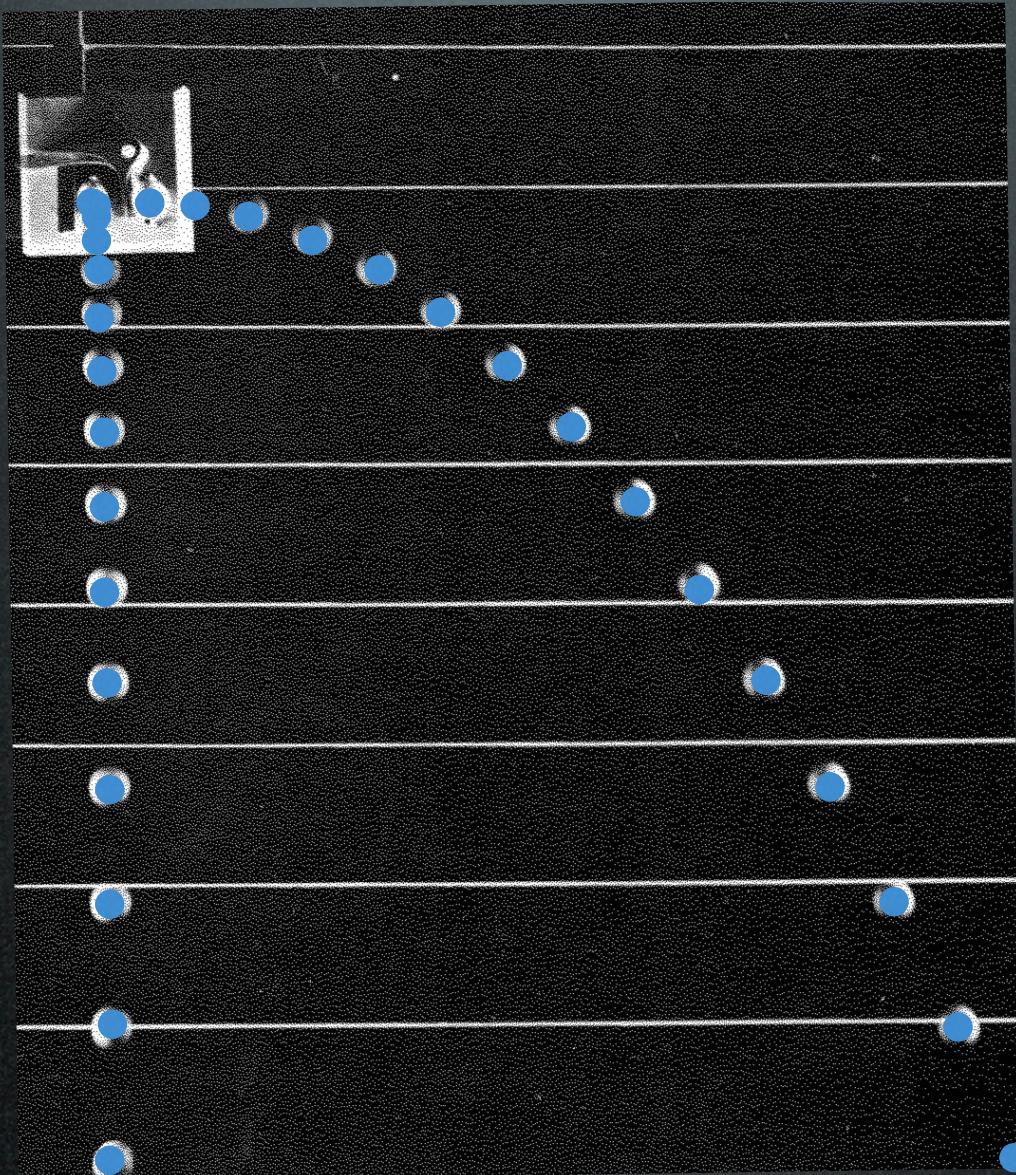
4) Assess

- a. units?
- b. reasonable?

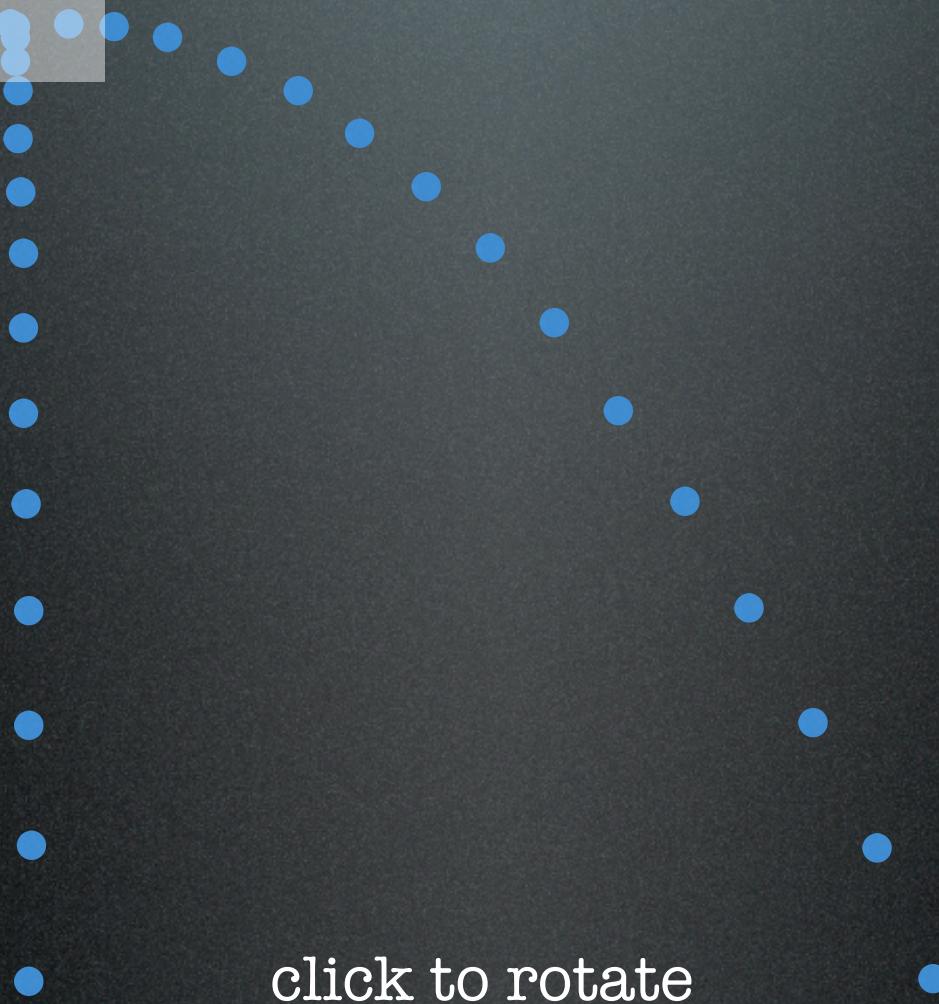
Class Rooster







Front View

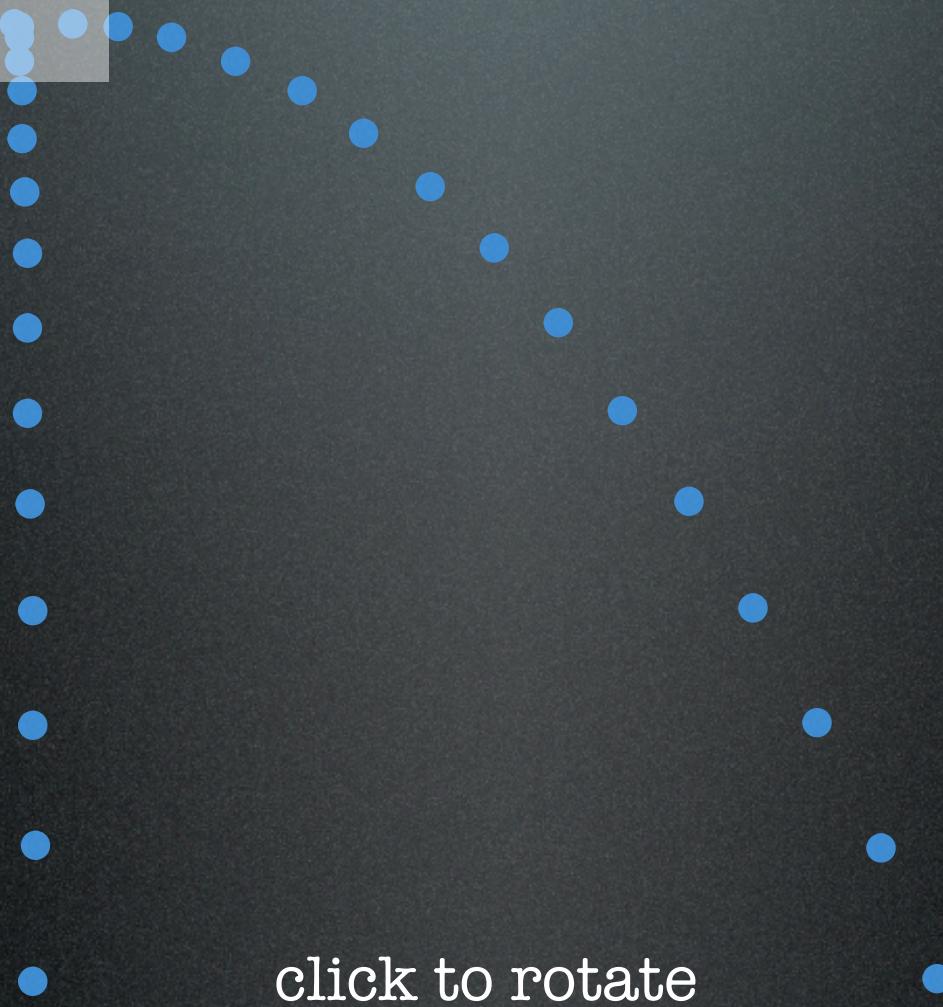


click to rotate



Side View
 v_y increases downward
 a_y constant, $= -g$

Front View

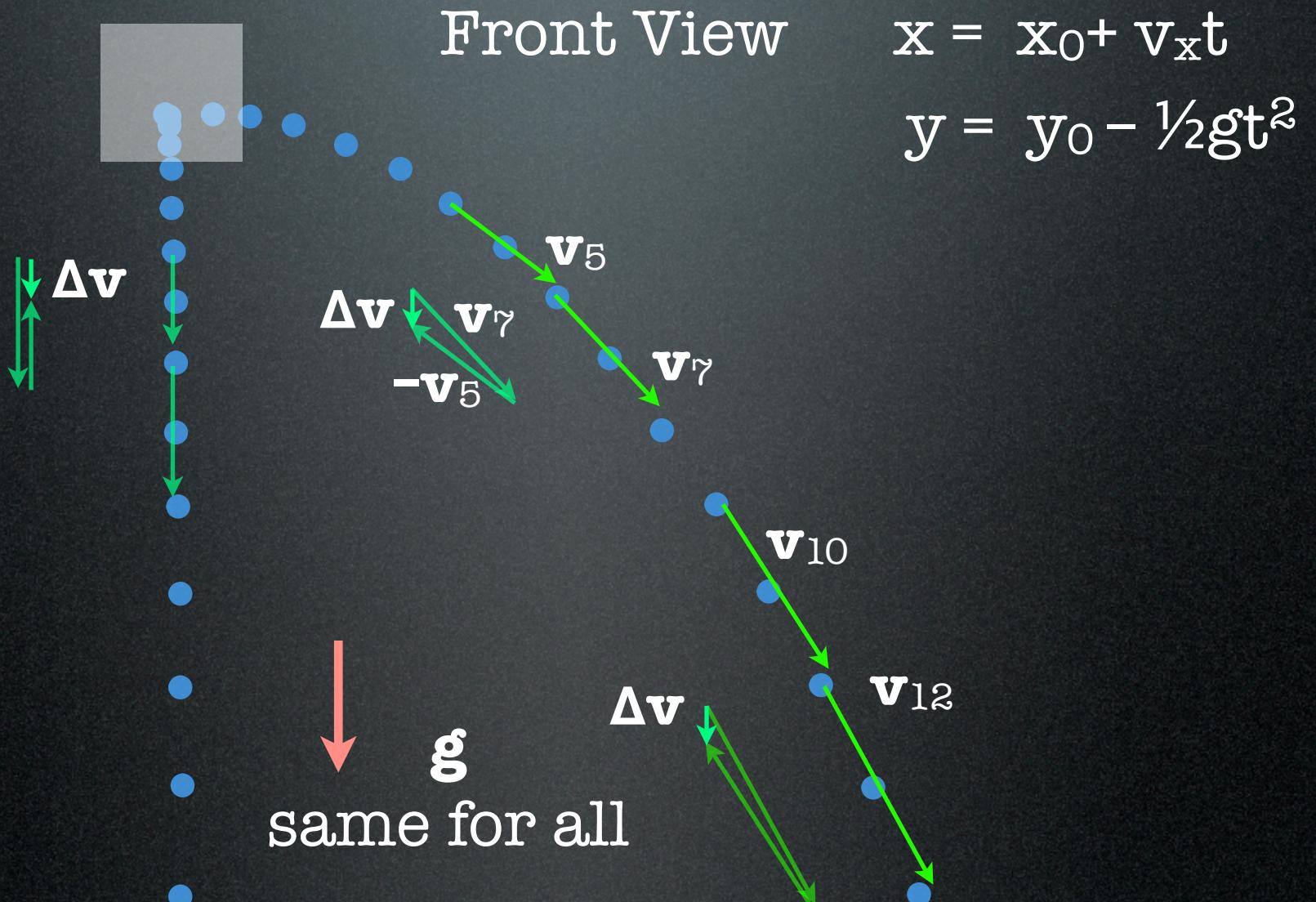


click to rotate

Top View



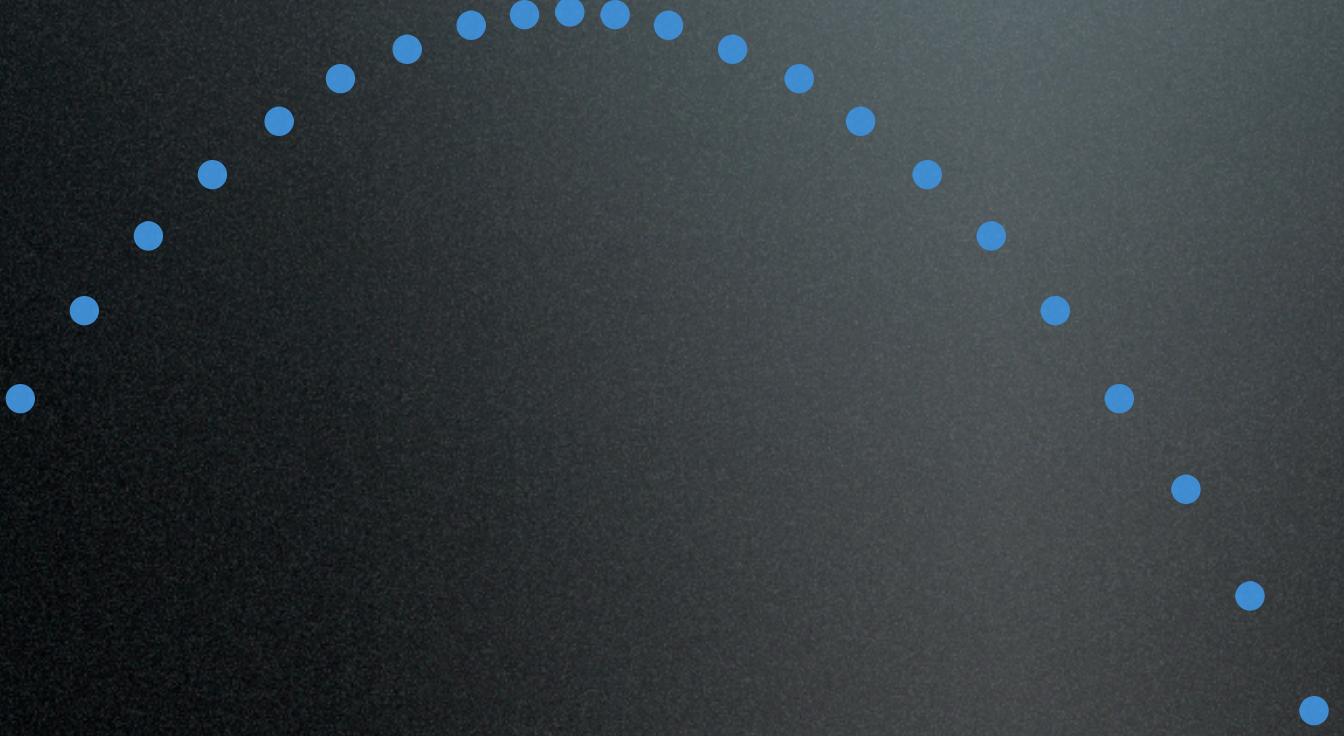
v_x is constant
 v_x is 0



Cannon

$$x = x_0 + v_{0x}t$$

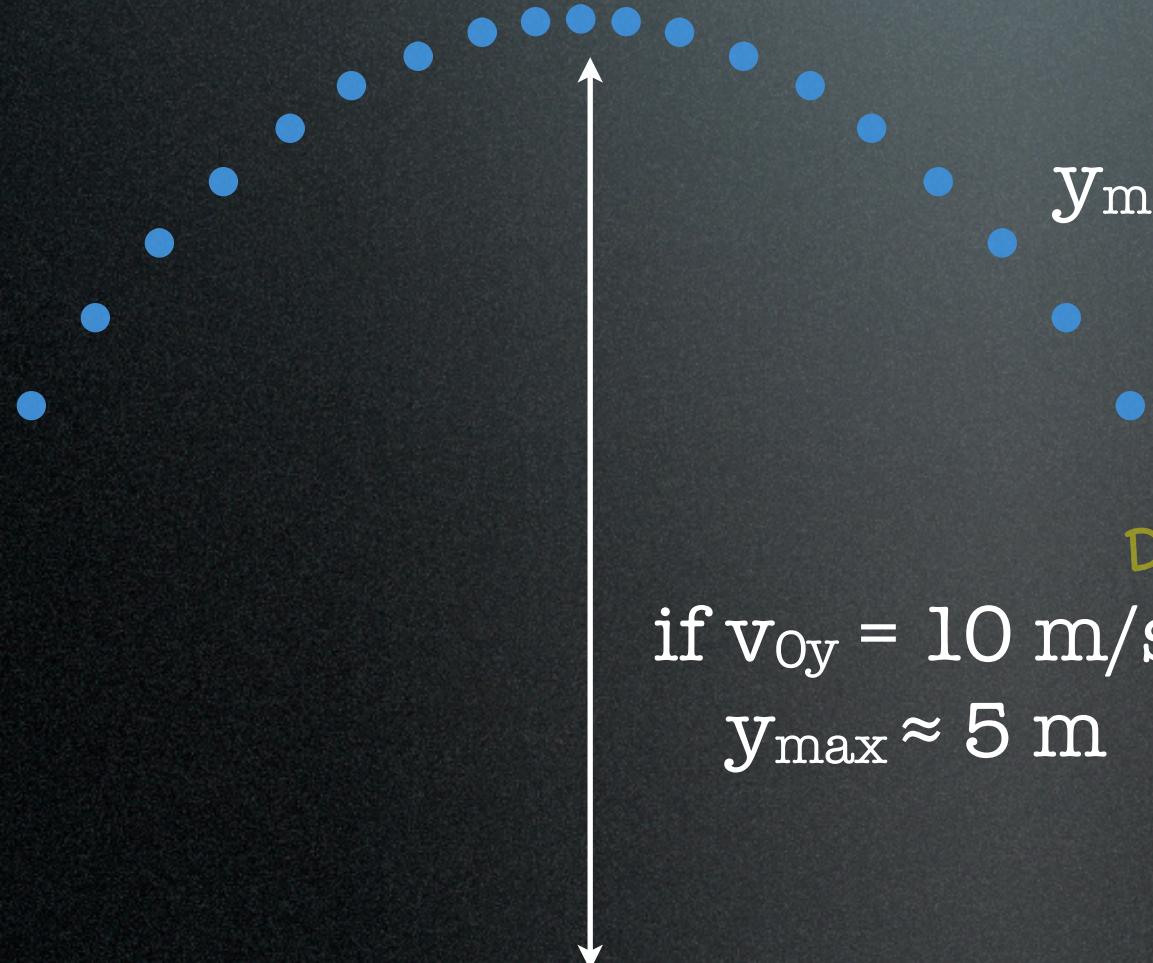
$$y = y_0 + v_{0y}t - \frac{1}{2}gt^2$$



go ballistic!

$$x = x_0 + v_{0x}t$$

$$y = y_0 + v_{0y}t - \frac{1}{2}gt^2$$



$$\text{if } v_{0y} = 10 \text{ m/s}$$

$$y_{\max} \approx 5 \text{ m}$$

$$\text{highest: } \frac{dy}{dt} = v_y = 0$$

$$v_y = v_{0y} - gt_{\max} = 0$$

$$t_{\max} = \frac{v_{0y}}{g}$$

$(\text{m/s})/(\text{m/s}^2) = \text{s}$

$$y_{\max} = y_0 + \frac{v_{0y}^2}{g} - \frac{1}{2} \frac{v_{0y}^2}{g}$$

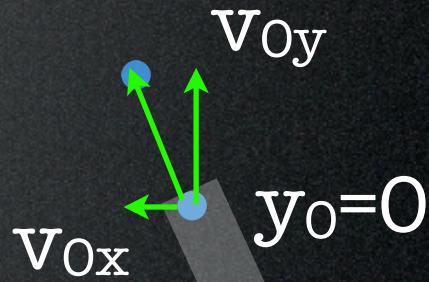
$$y_{\max} = y_0 + \frac{1}{2} \frac{v_{0y}^2}{g}$$

$(\text{m/s})^2/(\text{m/s}^2) = \text{m}$

Don't memorize these equations.

Remember the logic.

Check units!



go ballistic!

$$x = x_0 + v_{0x}t$$

$$y = y_0 + v_{0y}t - \frac{1}{2}gt^2$$

range: find when $y = 0$

trick $t_{\text{final}} = 2t_{\text{max}}$

$$t_{\text{final}} = 2v_{0y} / g$$

avoid the quadratic equation!

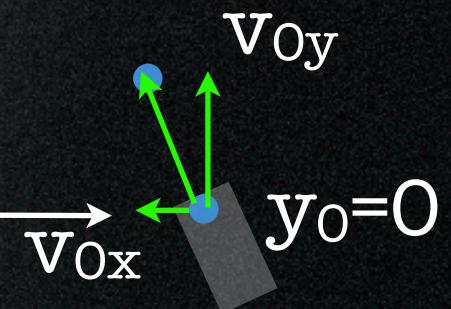
$$x_{\text{final}} = x_0 + 2 v_{0x} v_{0y} / g$$

if $v_{0y} = 10 \text{ m/s}$

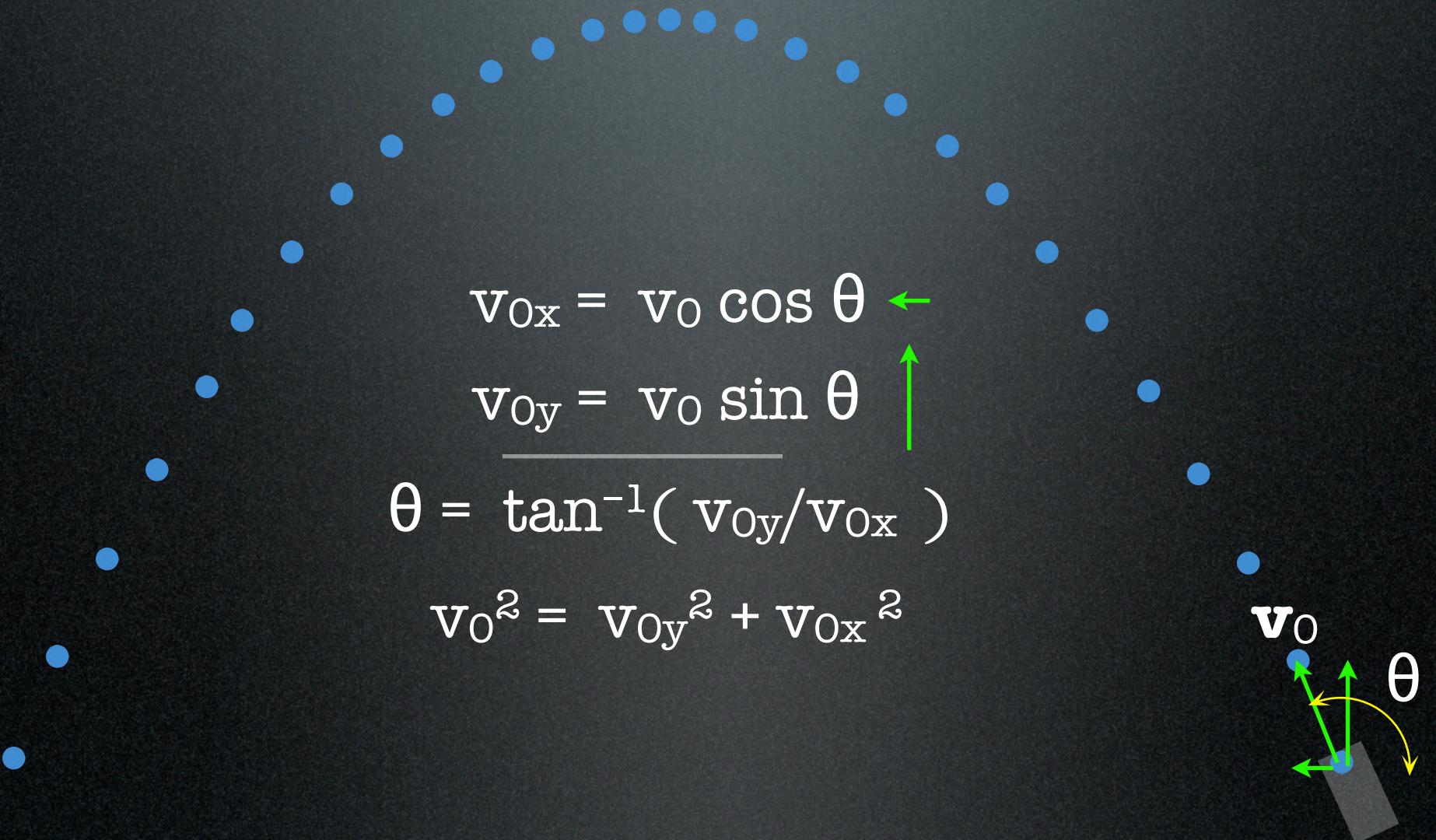
$v_{0x} = 5 \text{ m/s}$

range $\approx 10 \text{ m}$

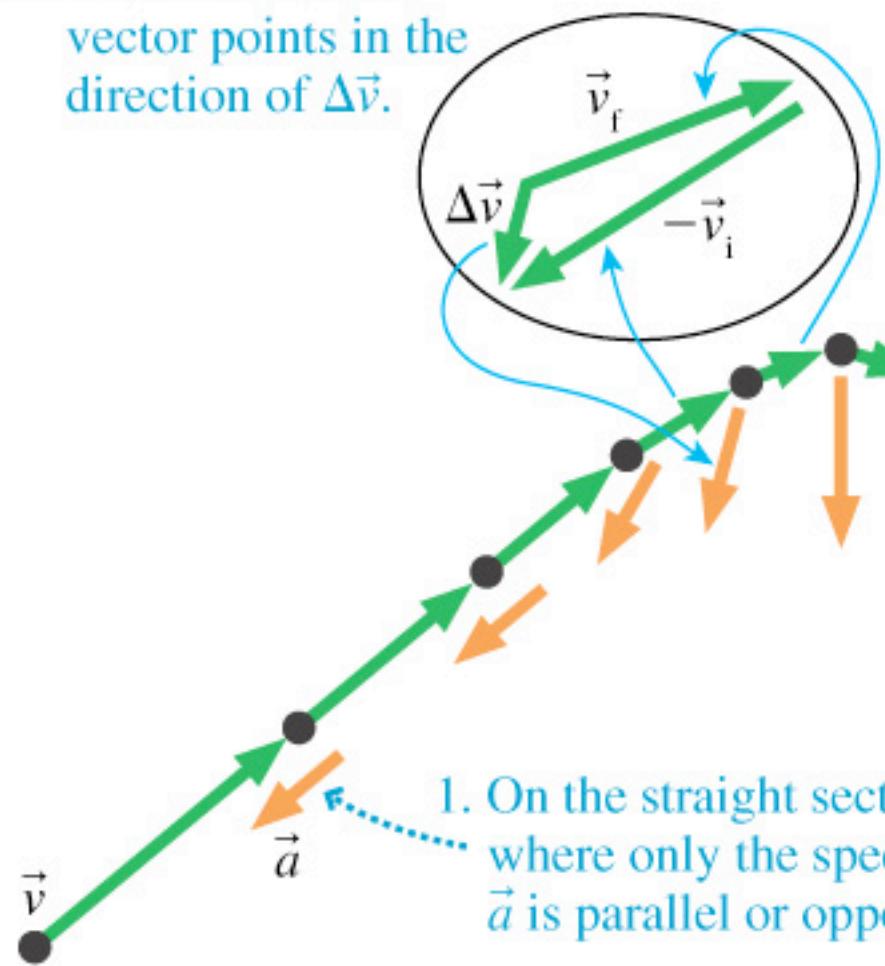
x_{final}



different strokes



3. The acceleration vector points in the direction of $\Delta\vec{v}$.



1. On the straight sections, where only the speed changes, \vec{a} is parallel or opposite to \vec{v} .

2. Both speed and direction are changing. \vec{a} has components parallel and perpendicular to \vec{v} .

5. Only the direction is changing at this point, not the speed. Thus \vec{a} is perpendicular to \vec{v} .

4. The acceleration vector can be decomposed into \vec{a}_{\parallel} and \vec{a}_{\perp} .

