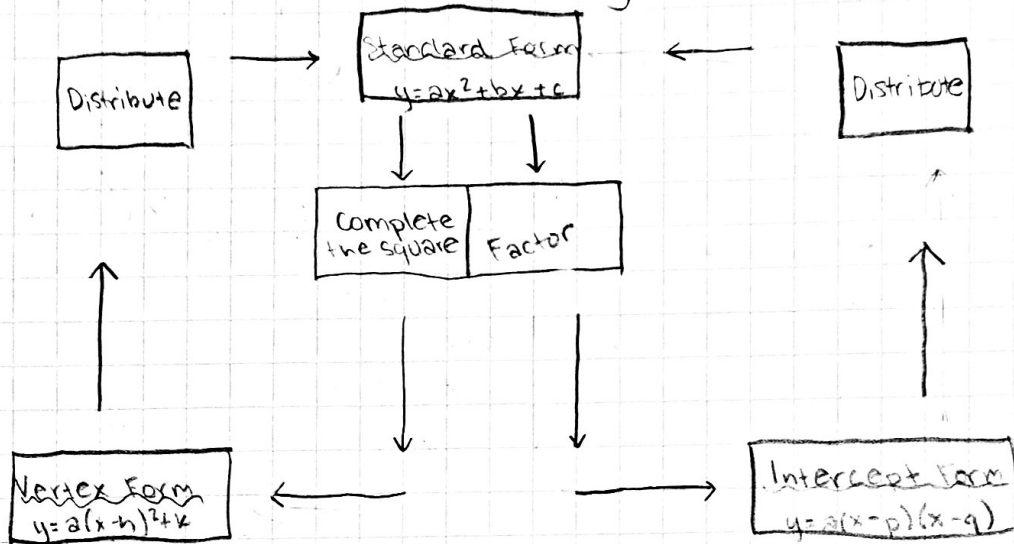


# 3.4 Writing Equations

## Switching Forms



more on complete the square

ex: write in vertex form

\* if you encounter fractions use decimals

$$y = 2x^2 + 12x - 3$$

$$y + 3 = 2x + 12x$$

$$y + 3 = 2(x^2 + 6x + 9)$$

$$y + 21 = 2(x + 3)^2$$

- 1.) move constant to other side
- 2.) factor out a-value
- 3.) find value that completes the square (c)
- 4.) add a · c to other side
- 5.) rewrite as squared
- 6.) Get y by itself

6 ÷ 2 = 3  
3<sup>2</sup> = 9

ex:  $y = -x^2 - 7x + 5$

$$y - 5 = -x^2 - 7x$$

$$y - 5 = -(x^2 + 7x + 12.25)$$

(3.5)<sup>2</sup>

## Writing equations from points

ex: write an equation that models the given info.

a quadratic w/ x-intercepts at  $(-2, 0)$ ,  $(4, 0)$   
that goes through the point  $(3, -5)$

$$y = a(x-p)(x-q)$$

$$y = a(x+2)(x-4)$$

$$-5 = a(3+2)(3-4)$$

$$-5 = a(5)(-1)$$

$$-5 = -5a$$

$$1 = a$$

★ plug all info into ★  
★ matching form, ★  
★ then solve for a.

ex: a quadratic w/ a vertex at  $(-4, -8)$   
that passes through  $(-2, -5)$

$$y = a(x-h)^2 + k$$

$$y = a(x+4)^2 - 8$$

$$-5 + 8 = a(-2+4)^2$$

$$-5 + 8 = a(2)^2$$

$$3 = 4a$$

$$\frac{3}{4} = a$$

vertex

x-int: points where it hits the ground

vertex: halfway between, max/min height

$$y = a(x-h)^2 + k$$

$(h, k)$  are vertex

$$y = a(x-p)(x-q)$$

$p$  &  $q$  are the x-int

# Steps for Word Problems

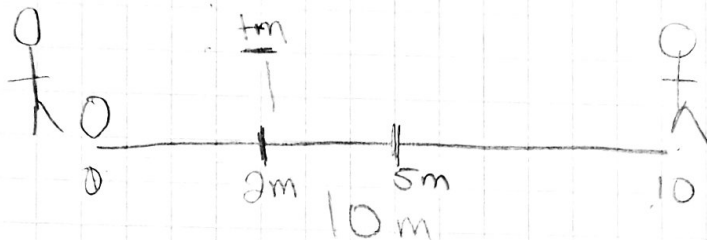
1.) Draw it.

2.) What points do I have?

3.) Which form should I use?!

4.) Plug points into equation.

Sean is kicking a soccer ball to his dad who is 10 meters away. If after 2 meters the ball is 1 meter in the air, write the equation that represents the path of the ball.



$$x \text{ int } \cdot \begin{matrix} (0,0) \\ (10,0) \end{matrix}$$

$$(2,1)$$

$$y = a(x-p)(x-q)$$

$$y = a(x-0)(x-10)$$

$$1 = a(2-0)(2-10)$$

$$1 = a(2)(-8)$$

$$\frac{1}{-16} = \frac{-16a}{-16}$$

What is the max height of the ball?

$$x=5 \xrightarrow{\text{plug it in}}$$

$$y = \frac{-16}{-16} = a$$

$$y = -\frac{1}{16}x(x-10)$$

$$y = -\frac{1}{16}(5-0)(5-10)$$

$$y = \frac{25}{16}$$

$$y = 1.5625 \text{ m}$$

$x$  int - where it hits the ground  
 vertex - halfway between  
 $y$  - max/min height

if given the  $x$  int use intercept form  
 if given vertex use vertex form

- 1) Draw it
- 2) What points do I have
- 3) What form should I use
- 4) plug points into equations and solve for  $a$

$$y = a(x-p)(x-q)$$

$p+q$  are  $x$  int

$$y = a(x-h)^2 + k$$

$(h,k)$  the vertex