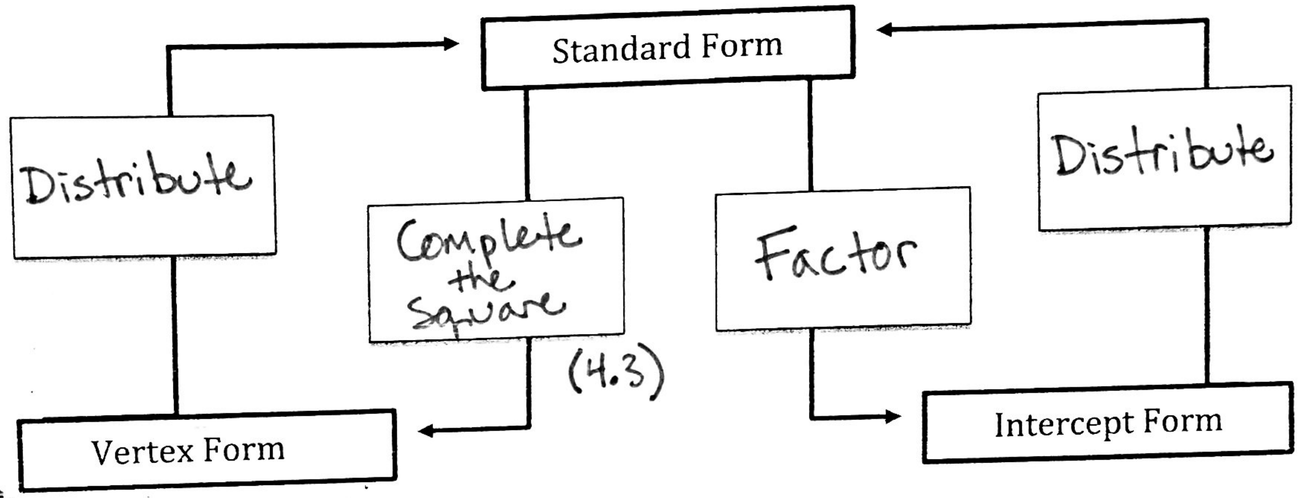
5.6 Switching Between Forms

We have now covered three forms of quadratics: standard form, intercept form, and vertex form. Even though, it is possible to find all critical points from each of these forms individually, it is valuable to know how to switch between forms in case you remember the procedures of one form better than another.

Switching Between Forms



1) Write the equation in all three forms.

a. $y = (x-4)(x+6)$ — Intercept

Standard

$y=(x-4)(x+6)$

$y=x^2+6x-4x-24$

$\boxed{y=x^2+2x-24}$

Vertex

$y=x^2+2x-24$

$0=x^2+2x-24$

$+24 \qquad +24$

$24\_\_ = x^2+2x\_\_$ $\quad 2\div 2=1$ $\quad (1)^2=1$

$24+1=x^2+2x+1$

$25=(x+1)^2$ -25 -25

$\boxed{y=(x+1)^2-25}$

b. $y = 2(x-1)(x+3)$ — Intercept

c. $y = x^2 - 8x + 15$ — Standard

Intercept

$y=x^2-8x+15$ $\quad 15x^2$

$-3 \quad -5$

$\boxed{y=(x-3)(x-5)}$

Vertex

$0=x^2-8x+15$

$-15 \qquad -15$

$-15+16=x^2-8x+16$ $\quad -8\div 2=-4$ $\quad (-4)^2=16$

$1=(x-4)^2$

$-1 \qquad -1$

$\boxed{y=(x-4)^2-1}$

d. $y = 3x^2 + 2x - 8$ — Standard

e. $y = (x-2)^2 - 9$ – Vertex

Standard

$y=(x-2)(x-2)-9$

$y=x^2-2x-2x+4-9$

$\boxed{y=x^2-4x-5}$

Intercept

$y=x^2-4x-5$

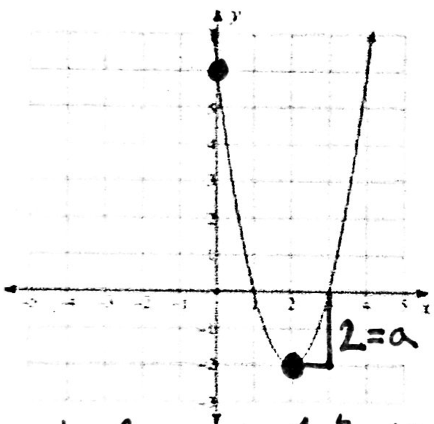
$-5x^2$

-5 ^ 1

$\boxed{y=(x-5)(x+1)}$

f. $y = 2(x+1)^2 + 4$ – Vertex

From a graphing standpoint, we are going to focus on writing equations from graphs in vertex and intercept form.

1) Write the function that the graph represents.	Vertex Form	Intercept Form
	$y=a(x-h)^2+k$	$y=a(x-p)(x-q)$
a-value: go over 1 & up however many until you hit the parabola	Info Needed a-value, vertex	Info Needed a-value, x-intercepts
	Equation $a=2$ Vertex: $(2,-2)$ $\boxed{y=2(x-2)^2-2}$	Equation $a=2$ x-int: $(1,0),(3,0)$ $\boxed{y=2(x-1)(x-3)}$

~~2) Using the equations that you wrote above, write the function that the graph represents in standard form.~~

~~From Vertex Form~~

Standard Form

$y = ax^2 + bx + c$

pattern

use $h=\frac{-b}{2a}$ (x-coordinate of vertex)

y-int

~~From Intercept Form~~

$a=2$

$b=-8$

$c=6$

$\frac{-b}{2a}=2$ ← x-coordinate of vertex

$\frac{-b}{2(2)}=2$

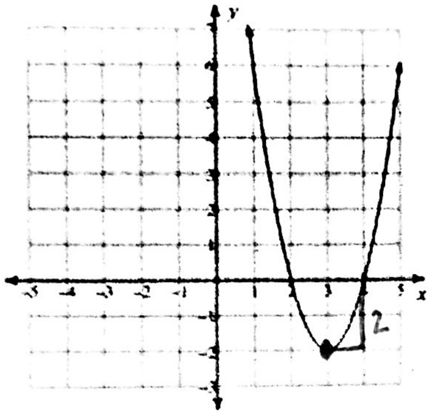
$\frac{-b}{4}=2$ → $-b=8$

$b=-8$

$\boxed{y=2x^2-8x+6}$

If you don't have enough info to write an equation in one form, use another form & switch with the appropriate strategy.

3) Write the function that the graph represents in all three forms.



Vertex form:

$a=2$

$V: (3,-2)$

$\boxed{y=2(x-3)^2-2}$

Intercept form:

$a=2$

x-int: $(2,0), (4,0)$

$\boxed{y=2(x-2)(x-4)}$

Standard form:

$a=2$

$b=$

$c=?$

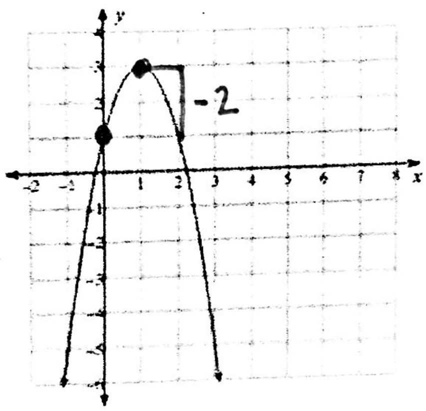
$y=2(x-2)(x-4)$

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

$y=2(x^2-6x+8)$

$\boxed{y=2x^2-12x+16}$

b.



Vertex form:

$a=-2$

$V: (1,3)$

$\boxed{y=-2(x-1)^2+3}$

Intercept form:

x-int aren't clear, so we won't worry about it

Standard form:

$a=-2$

$b=4$

$c=1$

$\frac{-b}{2a}=1$

$\frac{-b}{2(-2)}=1$

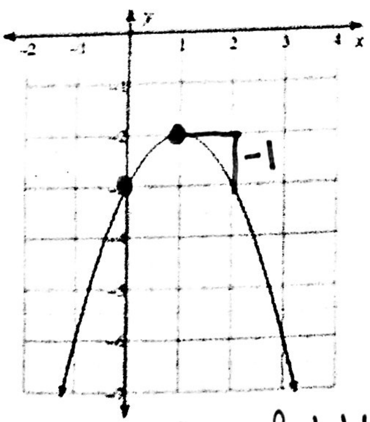
$\frac{+b}{+4}=1$

$\frac{b}{4}=1$

$b=4$

$\boxed{y=-2x^2+4x+1}$

c.



Vertex form:

$a=-1$

$V: (1,-2)$

$\boxed{y=-(x-1)^2-2}$

Intercept form:

No x-intercepts, not possible

Standard form:

$a=-1$

$b=2$

$c=-3$

$\frac{-b}{2a}=1$

$\frac{-b}{2(-1)}=1$

$\frac{+b}{+2}=1$

$\frac{b}{2}=1$

$b=2$

$\boxed{y=-x^2+2x-3}$

*If you are not comfortable with all the ways, remember that you can pick one way and switch forms using methods from the flowchart