$y = ax^2 + bx + c \rightsquigarrow y = a(x-h)^2 + k$

Math 110- 8.7 Notes

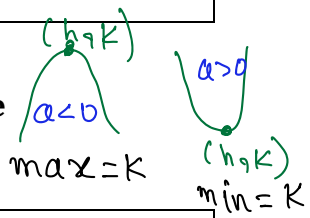
Vertex will be at $h = \frac{-b}{2a}$, $k = \frac{4ac - b^2}{4a} = f(h)$

Use the vertex equation to rewrite the function in vertex form.

$f(x) = x^2 - 8x + 18$` $a=1, b=-8, c=18$ $h = \frac{-(-8)}{2(1)} = 4$, $k = \frac{4(1)(18)-(-8)^2}{4(1)} = 2$ $\Rightarrow f(x) = (x-4)^2 + 2$	$f(x) = x^2 - 6x - 1$ $a=1, b=-6, c=-1$ $h = \frac{-(-6)}{2(1)} = 3$, $k = \frac{4(1)(-1)-(-6)^2}{4(1)} = -10$ $\Rightarrow f(x) = (x-3)^2 - 10$
$f(x) = 3x^2 + 6x - 2$ $a=3, b=6, c=-2$ $h = \frac{-6}{2(3)} = -1$, $k = \frac{4(3)(-2)-6^2}{4(3)} = -5$ $f(x) = 3(x+1)^2 - 5$	$f(x) = -2x^2 - 8x + 4$ $a=-2, b=-8, c=4$ $h = \frac{-(-8)}{2(-2)} = -2$, $k = \frac{4(-2)(4)-(-8)^2}{4(-2)} = 12$ $\Rightarrow f(x) = -2(x+2)^2 + 12$

Determine if the functions above have a max or a minimum and determine the value

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



$f(x) = x^2 - 8x + 18$` **Vertex Form:** $(x-4)^2 + 2$ **Max or Min** min **Value :** 2	$f(x) = x^2 - 6x - 1$ **Vertex Form:** $(x-3)^2 - 10$ **Max or Min** min **Value :** -10
$f(x) = 3x^2 + 6x - 2$ **Vertex Form:** $3(x+1)^2 - 5$ **Max or Min** min **Value :** -5	$f(x) = -2x^2 - 8x + 4$ **Vertex Form:** $-2(x+2)^2 + 12$ **Max or Min** max **Value :** 12

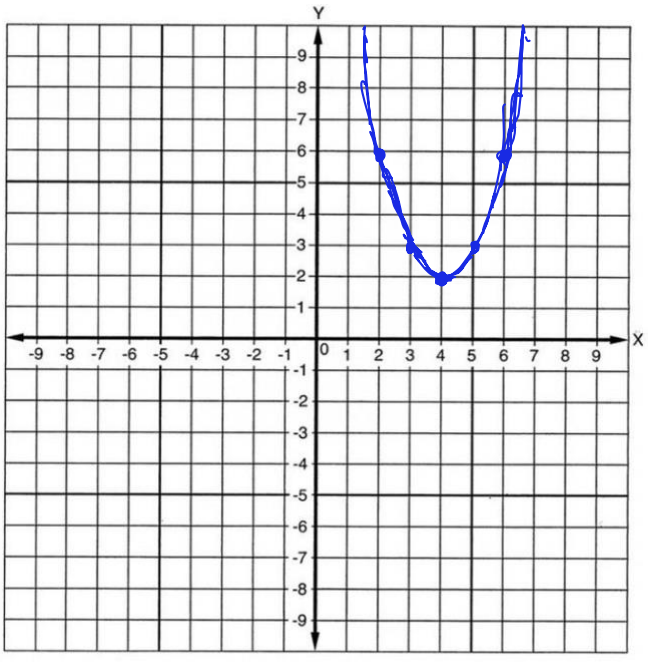
Graph $f(x) = x^2 - 8x + 18$

1. Find Vertex Form

$(x-4)^2+2$

2. Create table (2 points less than, 2 points greater than vertex)

x	y
3	$(3-4)^2+2=3$
2	$(2-4)^2+2=6$
5	$(5-4)^2+2=3$
6	$(6-4)^2+2=6$



Vertex: $(4,2)$

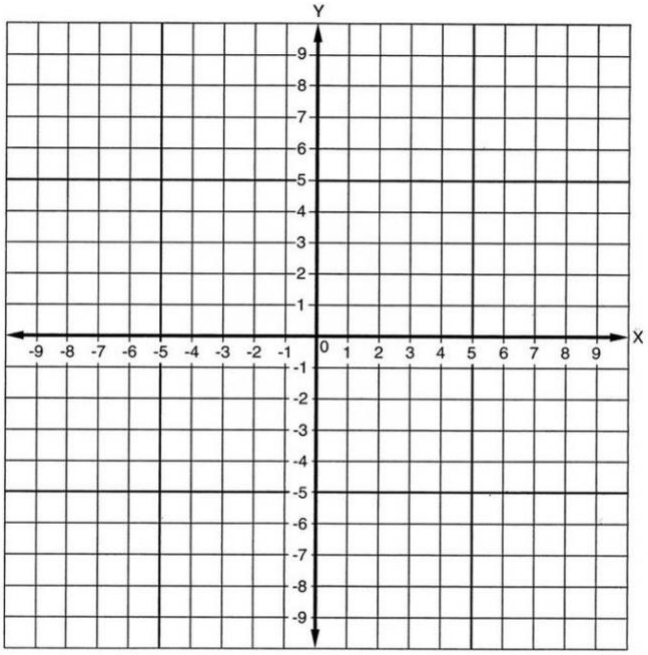
Axis of Symmetry: $x=4$

Graph $f(x)=-2x^2-6x+1$

1. Find Vertex Form

2. Create table (2 points less than, 2 points greater than vertex)

H.W



Vertex: _____

Axis of Symmetry: _____

$y = mx + b$ ← y-int.

$f(x) = ax^2 + bx + c \Rightarrow f(0) = c$ ← y-int.

y-intercept : $(0, f(0))$ or $f(0) = c$

x-intercepts : $(x_1, 0)$, $(x_2, 0)$ for which $f(x_1) = 0$, $f(x_2) = 0$
or x_1, x_2

Find any x-intercepts and the y-intercepts of the graph of $f(x) = x^2 - 6x + 2$

y-int. $= 2$ or $(0, 2)$

x-intercepts : Solve $f(x) = 0$ for x

$x^2 - 6x + 2 = 0$

$a = 1, \; b = -6, \; c = 2$

$$x = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(2)}}{2(1)}$$

$$= \frac{6 \pm \sqrt{36 - 8}}{2}$$

$$= \frac{6 \pm \sqrt{28}}{2}$$

$$= \frac{6 \pm \sqrt{4 \cdot 7}}{2} = \frac{6 \pm \sqrt{4}\sqrt{7}}{2}$$

$$= \frac{6 \pm 2\sqrt{7}}{2} = \frac{2(3 \pm \sqrt{7})}{2}$$

$$= 3 \pm \sqrt{7}$$

$x_1 = 3 + \sqrt{7}, \quad x_2 = 3 - \sqrt{7}$

Find any x-intercepts and the y-intercepts of the graph of $f(x) = x^2 - 3x - 4$

y-int $(0, -4)$ or -4

x-int.

Solve

$x^2 - 3x - 4 = 0$

Try (HW): → Quadratic formula or factor.

$\Rightarrow \; x = 4$ or -1

x-ints. 4 and -1 or $(4, 0)$ and $(-1, 0)$