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## Algebra 1 - Downring

Go over HW - NB Quiz

## Vertex Form of a Quadratic Function

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

- "a" determines up or down
- vertex = (h, k)

~~h~~ h is positive in the coordinate but negative in the formula.

It's always opposite of what you see

Ex)  $f(x) = 2(x-3)^2 + 5$

↑ opens up

vertex: (3, 5)

Ex)  $f(x) = -\frac{1}{2}(x+4)^2 - 7$

↑ opens down

vertex (-4, -7)

## Graphing in Vertex Form

| Steps                                   | Example                                 |
|---|---|
| 1) Plot the vertex                      | $f(x) = 2(x-2)^2 + 5$<br>vertex: (2, 5) |
| 2) Find y-int. by plugging "0" in for x | $f(0) = 2(0-2)^2 + 5$<br>$= 13$ (0, 13) |
| 3) Mirror that point                    |   |
| 4) Draw the parabola                    |   |

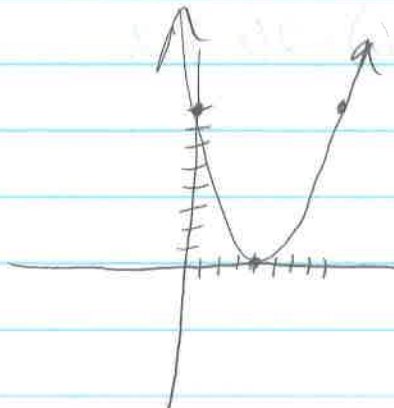
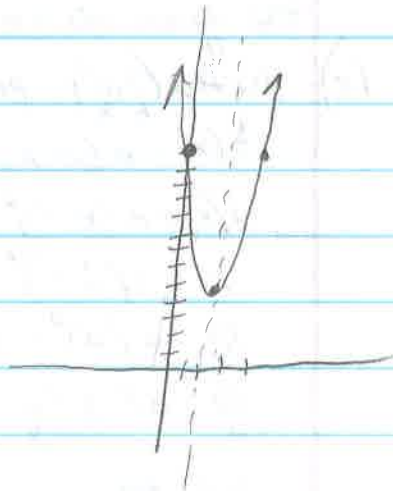
~~if~~ if y-int + vertex are the same... pick another x value

Ex) Graph  $f(x) = \frac{1}{2}(x-4)^2$   $k=0$

vertex: (4, 0)

$f(0) = \frac{1}{2}(0-4)^2$

$y = 8$  y-int (0, 8)



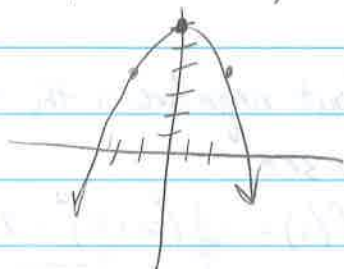
$$a \quad h=0 \quad k=6$$

$$\text{Ex) } f(x) = -\frac{1}{2}(x)^2 + 6 \quad \text{or} \quad -\frac{1}{2}x^2 + 6$$

vertex  $(0, 6)$

$$f(0) = -\frac{1}{2}(0)^2 + 6 = 6$$

y-int  $(0, 6)$



\* pick another number for  $x$

$$x=2$$

$$f(2) = -\frac{1}{2}(2)^2 + 6$$

$$= -2 + 6$$

$$= 4$$

$$(2, 4)$$

Write a quadratic function in vertex form whose graph has the given vertex and passes through the given point.

$$\text{Ex) Vertex } \begin{pmatrix} 1 \\ h \end{pmatrix}, \begin{pmatrix} 2 \\ k \end{pmatrix} \text{ passes thru } \begin{pmatrix} 3 \\ x \end{pmatrix}, \begin{pmatrix} 10 \\ y \end{pmatrix} \quad \text{Ex) Vertex } \begin{pmatrix} -2 \\ h \end{pmatrix}, \begin{pmatrix} -4 \\ k \end{pmatrix} \text{ thru } \begin{pmatrix} -1 \\ x \end{pmatrix}, \begin{pmatrix} -6 \\ y \end{pmatrix}$$

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

$$f(x) = a(x-1)^2 + 2$$

$$10 = a(3-1)^2 + 2$$

$$10 = a(2)^2 + 2$$

$$10 = a(4) + 2$$

$$\frac{8}{4} = \frac{4a}{4}$$

$$2 = a$$

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

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

$$-6 = a(-1+2)^2 - 4$$

$$\frac{-6}{+4} = \frac{a \cdot 1}{-4}$$

$$-2 = a$$

$$f(x) = -2(x+2)^2 - 4$$

HW - Worksheet  
Vertex