Vertex Form of Quadratic Relations: $y = a(x-h)^2 + k$

Summary

St. Louis Gateway Arch

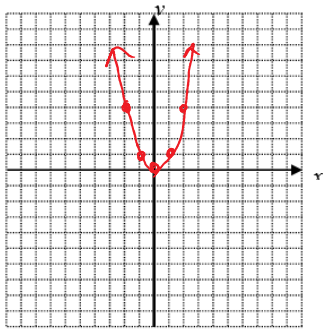The transformed parabola $y = a(x-h)^2 + k$ is known as **vertex form**.

- a represents the _reflection_ and _vertical stretch/compress_
- k represents the _vertical translation_
- h represents the _horizontal translation_
- the coordinates of the vertex of the parabola are _(h, k)_

Sketching Vertex Form: $y = -4(x-3)^2 + 5$

1. Graph the basic parabola.
2. Plot the vertex (h, k) by determining the horizontal and vertical translations.
3. Find additional points on the parabola by multiplying the value of a by the step pattern of the basic parabola.
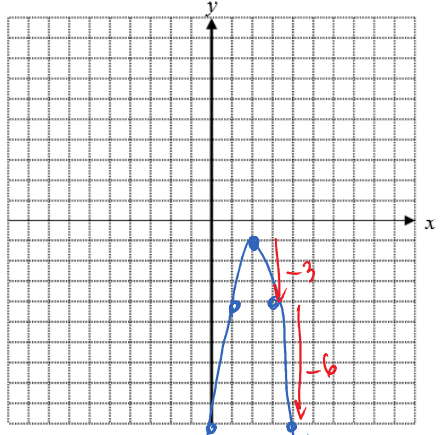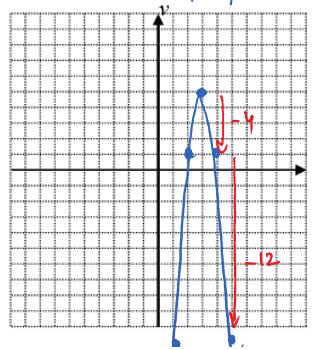
step 1

step 2

$h = 3$
$k = 5$

step 3

$(1, 3, 5) \times (-4)$
$= -4, -12, -20$

Angry Birds

$4x \div y^2$
$x/z = 4^3$
$x = ?$

GLASBERGEN
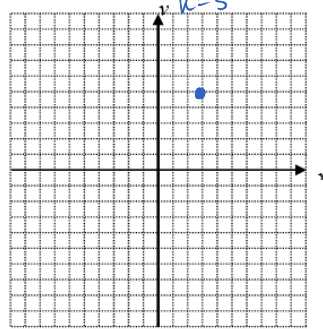
"Algebra class will be important to you later in life because there's going to be a test six weeks from now."

Example 1

For each of the following quadratic relations in vertex form, (i) state the transformations, and (ii) graph the parabola.

$y = -3(x - 2)^2 - 1$	$y = \frac{1}{2}(x + 3)^2 + 1$
(I) TRANSFORMATIONS $a = -3 \rightarrow$ reflected $\rightarrow$ vertical stretch $h = 2 \rightsquigarrow$ shift right $k = -1 \rightsquigarrow$ shift down step: $(1,2,3) \times (-3) = -3, -6, -9$	$a = 0.5 \rightarrow$ not reflected $\rightarrow$ vertically compressed $h = -3 \rightsquigarrow$ shift left $k = 1 \rightsquigarrow$ shift up step: $(1,2,3) \times 0.5 = 0.5, 1, 1.5$
(II) GRAPH	

$ax^2 + bx + c = 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

a.bacall

"If you think I do a good job teaching quadratic equations, like me on Facebook."

roller coaster