Name: _____ Date: _____

So far, we have learned to graph quadratic functions in:

- Standard Form $y = ax^2 + bx + c$ ↑ y-intercept: $(x = 0)$
- Factored Form $y = (x - m)(x - n)$ x-intercepts $x = m, n$

Today we will look at graphing quadratic functions in Vertex Form.

$y = a(x - p)^2 + q$ vertex (p, q)

Warmup Expand and simplify

F O I L

a. $y = (x - 2)(3x - 4)$ factored → standard

$= 3x^2 - 4x - 6x + 8$

first outer inner last.

$= 3x^2 - 10x + 8$

$3^2 = 3 \times 3$

b. $y = (x - 3)^2 + 2$ vertex → standard.

$= (x - 3)(x - 3) + 2$

$= x^2 - 3x - 3x + 9 + 2$

F O I L

$= x^2 - 6x + 11$

Exploration: Use your graphing calculator to graph each pair of functions below. Compare the second function to $y = x^2$.

a. $y = x^2$ and $y = (x - 2)^2$ moves 2 to the right.

b. $y = x^2$ and $y = (x + 2)^2$ moves 2 to the left.

c. $y = x^2$ and $y = x^2 + 3$ moves 3 up

d. $y = x^2$ and $y = x^2 - 3$ moves 3 down

e. $y = x^2$ and $y = (x - 2)^2 + 3$ moves 2 to the right 3 up

f. $y = x^2$ and $y = (x + 4)^2 - 5$ moves 4 to the left 5 down.

Vertex form of a quadratic function: $y = a(x-p)^2 + q$

vertex @ (p, q)

Example Sketch the graph of $f(x) = (x-1)^2 - 5$

vertex $(+1, -5)$

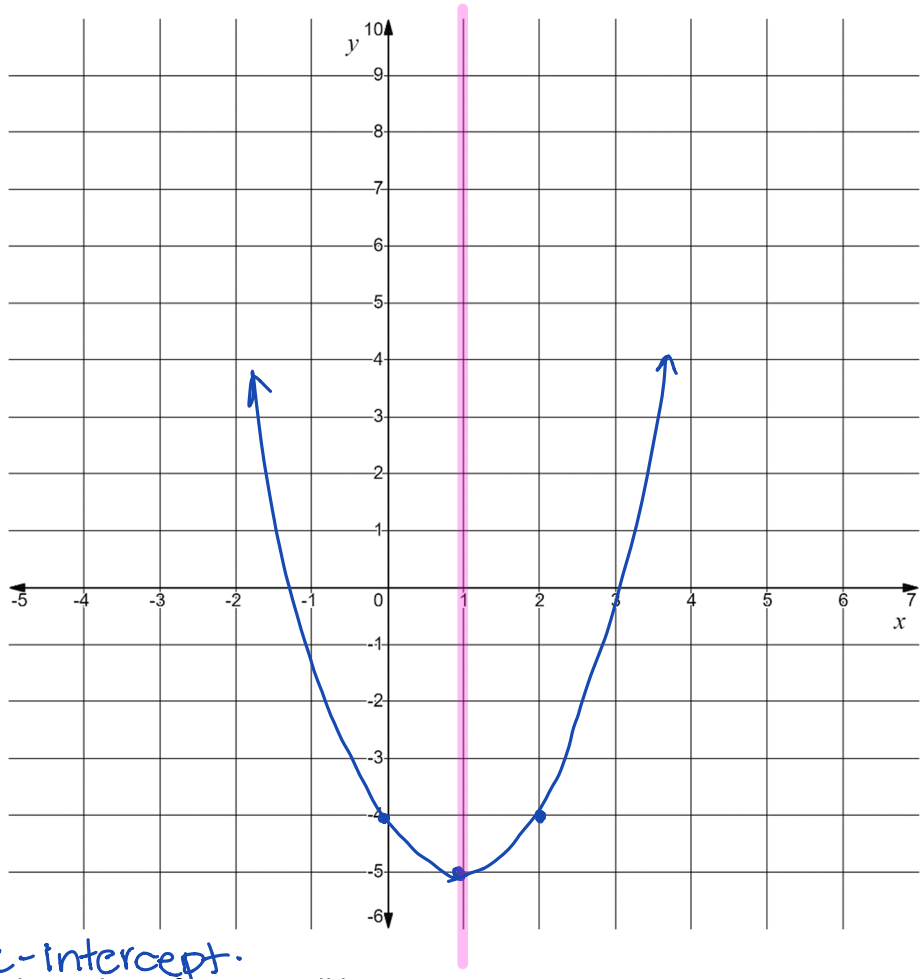
$f(x) = (x-1)^2 - 5$

$= (x-1)(x-1) - 5$

$= x^2 - x - x + 1 - 5$

F O I L

$= x^2 - 2x - 4$

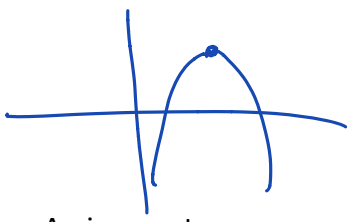


← x-intercept.

Example Predict the number of zeros each quadratic function will have.

a. $y = -2(x-4)^2 + 3$

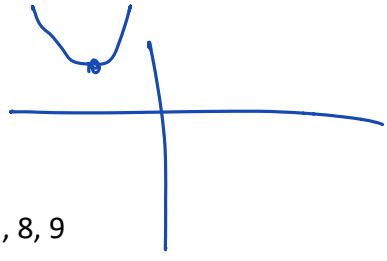
vertex $(4, 3)$



2 zeros

b. $g(x) = 2(x+1)^2 + 4$

vertex $(-1, 4)$



0 x-intercepts

Assignment | p. 417 #1, 2, 4 – 5, 8, 9 | Quiz Next Day!