

Tues/Wed

4.2 Notes- COMPLETING THE SQUARE TO WRITE QUADRATICS IN VERTEX FORM

The goal: To change an equation from standard form to vertex form by writing it as a perfect square

Example: Change $f(x) = x^2 + 6x + 4$ to vertex form.

Step 1. Scoot the "c" term over and put an empty box before and after it.

$$= x^2 + 6x + \square + 4 + \square$$

Step 2. Fill the first box with $\left(\frac{b}{2}\right)^2$ and the second box with $-\left(\frac{b}{2}\right)^2$

Step 3. Rewrite the first 3 terms as $\left(x + \frac{b}{2}\right)^2$ and simplify the last 2 terms.

You can make sure you did this correctly by multiplying it back out!

Now it is in vertex form!

Example #2- Write in vertex form by completing the square: $f(x) = x^2 - 4x - 5$

$$(x-2)^2 - 9$$

$$x^2 - 4x + \square - 5 + \square$$

$$\left(\frac{-4}{2}\right)^2$$

$$-2^2 = 4$$

Vertex: $(2, -9)$

Example #3- Write in vertex form by completing the square: $f(x) = x^2 + 10x + 1$

$$x^2 + 10x + \square + 1 + \square$$

$$= (x+5)^2 - 24$$

$$\left(\frac{10}{2}\right)^2 = 5^2 = 25$$

Vertex: $(-5, -24)$

If there is an "a" besides 1, factor out a from the first 2 terms to start.

Example #4- Rewrite in vertex form by completing the square: $f(x) = 3x^2 + 12x - 3$

$$3(x^2 + 4x) - 3$$

$$3(x^2 + 4x + \boxed{4}) - 3 + \boxed{-12}$$

$$3(x+2)^2 - 15$$

Vertex:

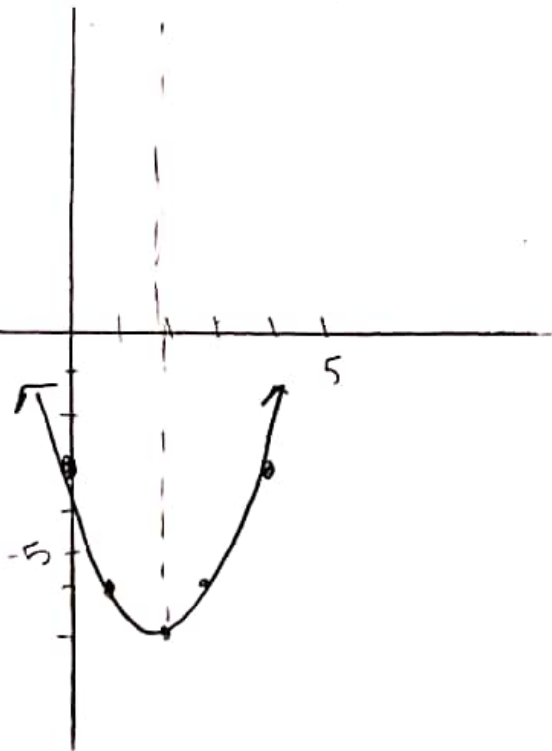
$$(-2, -15)$$

Example #5: Write in vertex form, and then graph. $f(x) = x^2 - 4x - 3$

$$x^2 - 4x + \boxed{4} - 3 + \boxed{-4}$$

$$(x-2)^2 - 7$$

$$(2, -7)$$



x	y
1	-6
0	-3