

Name: _____ Date: _____

Converting Forms of a Quadratic Notes**Convert from vertex form to standard form by Multiplying it Out ☺**

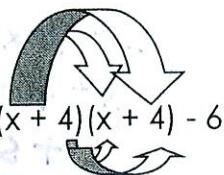
$$y = (x + 4)^2 - 6$$

Steps:

- Rewrite the equation as a product of two binomials

$$(x + 4)(x + 4) - 6$$

- Use Double Distribution to simplify



$$(x + 4)(x + 4) - 6$$

$$(x^2 + 4x + 4x + 16) - 6$$

- Combine like terms

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

Convert from vertex form to standard form by multiplying the function out.

$$\begin{aligned} 1. \quad f(x) &= (x - 1)^2 + 8 \\ &\textcircled{(x-1)(x-1)} + 8 \\ x^2 - x - x + 1 + 8 \\ x^2 - 2x + 1 + 8 \\ \boxed{x^2 - 2x + 9} \end{aligned}$$

$$\begin{aligned} 3. \quad f(x) &= -(x - 4)^2 + 3 \\ &\textcircled{(x-4)(x-4)} \\ &- (x^2 - 4x - 4x + 16) \\ &- x^2 + 8x - 16 + 3 \\ &- x^2 + 8x - 13 \end{aligned}$$

$$\begin{aligned} 2. \quad f(x) &= 2(x + 3)^2 - 5 \\ &\textcircled{(x+3)(x+3)} \\ &x^2 + 3x + 3x + 9 \\ &2(x^2 + 6x + 9) \\ &2x^2 + 12x + 18 - 5 \\ &\boxed{2x^2 + 12x + 13} \end{aligned}$$

$$\begin{aligned} 4. \quad f(x) &= 2(x + 1)^2 - 2 \\ &\textcircled{(x+1)(x+1)} \\ &x^2 + x + x + 1 \\ &2(x^2 + 2x + 1) \\ &2x^2 + 4x + 2 - 2 \\ &\boxed{2x^2 + 4x} \end{aligned}$$

Convert from ~~standard~~ from to vertex form by using $x = -b/2a$.

Steps:

- a) Find a, b, and c from the equation given.

$$y = x^2 + 8x + 10$$

$$a = 1, b = 8, c = 10$$

* Complete the square *

- b) Find the line of symmetry or "h" by using $x = -b/2a$

- c) Find the y value of the vertex, or "k" by substituting "x" into the equation.

$$y = (-4)^2 + 8(-4) + 10 = -32$$

- d) Write the equation in vertex form using the "h" and "k" found above. The "a" will be the same as the "a" in step 1.

$$y = (x-h)^2 + k \rightarrow y = (x+4)^2 - 6$$

9) $f(x) = x^2 + 8x + 1$

$$x^2 + 8x + 1 = 0$$

$$x^2 + 8x = -1 + 14$$

$$(x+4)^2 = 15$$

$$(x+4)^2 - 15 = 0$$

$$V: (-4, -15) \text{ Min: } y = -15$$

$$\text{ADS: } x = -4$$

• Move constant back

$$11) f(x) = 3x^2 - 6x + 5$$

$$X = \frac{-b}{2a} \quad 3(x-1)^2 + 2$$

$$= \frac{6}{2(3)}$$

$$V: (1, 2)$$

$$\text{ADS: } x = 1$$

$$= \frac{6}{6}$$

$$\text{Min: } y = 2$$

$$X = 1$$

$$3(1)^2 - 6(1) + 5$$

10) $f(x) = x^2 + 10x + 20$

$$x^2 + 10x + 20 = 0$$

$$x^2 + 10x = -20 + 25$$

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

$$(x+5)^2 - 5 = 0$$

$$V: (-5, -5) \text{ Min: } y = -5$$

$$\text{ADS: } x = -5$$

12) $f(x) = -2x^2 - 16x - 32$

$$X = \frac{-b}{2a}$$

$$= \frac{16}{2(-2)}$$

$$= \frac{16}{-4}$$

$$X = -4$$

$$-2(x+4)^2 + 0$$

$$V: (-4, 0)$$

$$\text{ADS: } x = -4$$

$$\text{MAX: } y = 0$$

$$-2(-4)^2 - 16(-4) - 32$$