Converting Quadratic Equations between **Standard and Vertex Forms**

What am I learning today?

How to convert a quadratic between different equation types

How will I show that I learned it?

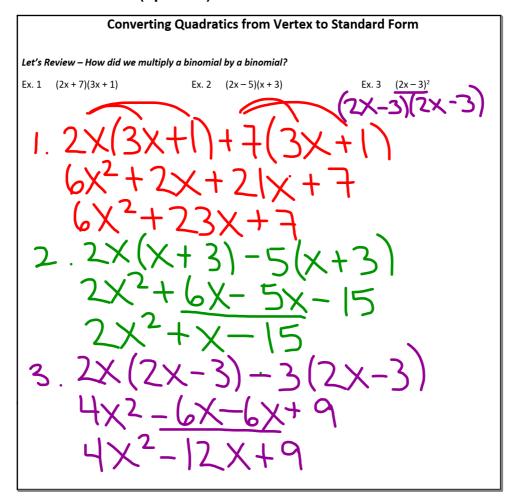
Convert a quadratic equation from vertex form to standard form and from standard form to vertex form

Forms of quadratics:

Standard:
$$y = ax^2 + bx + c$$
 $y = 5x^2 + 3x - 2$

Vertex:
$$y = a(x - h)^2 + k$$
 $y = -2x^2 + 5$

Standard:
$$y = ax^{2} + bx + c$$
 $y = 5x^{2} + 3x^{2}$
Vertex: $y = a(x - h)^{2} + k$ $y = -2x^{2} + k$
 $y = 4(x + 2)^{2} + 3$
 $y = 6x^{2} + 7$



 $\rightarrow \quad y = ax^2 + bx + c$ To convert from VERTEX FORM to STANDARD FORM: $y = a(x - h)^2 + k$

1. Rewrite the squared term as 2 BINOMIALS.

- 2. Multiply the BINOMIALS. Combine all like terms to create an expression.
- 3. Place the expression from the binomials back in a parentheses behind the "a" value.
- 4. DISTRIBUTE "a" TO THE EXPRESSION IN PARENTHESES. Do not distribute to a value outside the parentheses.
- 5. Add any values outside the parentheses to the expression.

Example 1
$$f(x) = (x-3)^2 + 8$$

 $= (x-3)(x-3) + 8$
 $= [x(x-3)-3(x-3)] + 8$
 $= [x^2-3x-3x+9] + 8$
 $= (x^2-6x+9) + 8$
 $= (x^2-6x+9) + 8$
Vertex: (3, 8) Y-Int: (0, 17)
V.F. 5.F.

Example 2
$$f(x) = 2(x+4)^2 + 1$$

 $= 2(x+4)(x+4) + 1$
 $= 2[x(x+4)+4(x+4)] + 1$
 $= 2[x^2+4x+4x+1] + 1$
 $= 2[x^2+8x+1] + 1$
 $= 2x^2+1[x+32+1]$
 $f(x) = 2x^2+1[x+32+1]$
Vertex: $(-4,1)$ Y-Int: $(0,33)$

Example 3
$$f(x) = -(x-7)^2$$

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

Example 4
$$f(x) = -\frac{1}{2}(x+8)^2 + 14$$

 $= -\frac{1}{2}(x+8)(x+8) + 14$
 $= -\frac{1}{2}[x(x+8) + 8(x+8)] + 14$
 $= -\frac{1}{2}[x^2 + 8x + 8x + 64] + 14$
 $= -\frac{1}{2}[x^2 + 16x + 64] + 14$
 $= -\frac{1}{2}x^2 - 8x - 32 + 14$
 $f(x) = -\frac{1}{2}x^2 - 8x - 18$
Vertex: $(-8, 14)$ Y-Int: $(0, -18)$