

W/S AA4-18 Parabola Formats

The equation of a parabola can be written in any of three formats:

STANDARD FORM: $y = ax^2 + bx + c$

FACTORED FORM: $y = a(x - x_1)(x - x_2)$

VERTEX FORM: $y = a(x - h)^2 + k$

1) Convert from STANDARD FORM to FACTORED FORM by *factoring the equation*.

STANDARD FORM \longrightarrow **FACTORED FORM**

$y = 5x^2 + 3x - 2$

$5x - 2$

x	$5x^2$	$2x$
$\#$	$5x$	-2

$(5x - 2)(x + 1)$

OR

$5(x - \frac{2}{5})(x + 1)$

2) Convert from STANDARD FORM to VERTEX FORM by *finding the vertex $(-b/2a)$, then using the same "a" value*.

STANDARD FORM \longrightarrow **VERTEX FORM**

$y = 2x^2 - 6x + 1$

$2(x^2 - 3x) + 1$

$x - 1.5$

x	x^2	$-1.5x$	-2.25
-1.5	$-1.5x$	2.25	

$2((x - 1.5)^2 - 2.25) + 1$

$2(x - 1.5)^2 - 4.5 + 1 = 2(x - 1.5)^2 - 3.5$

3) Convert from FACTORED FORM to STANDARD FORM by *algebraically multiplying out the factors*.

FACTORED FORM \longrightarrow **STANDARD FORM**

$y = 3(x - 2)(x + 7)$

$3(x^2 - 2x + 7x - 14)$

$3(x^2 + 5x - 14)$

$3x^2 + 15x - 42$

4) Convert from FACTORED FORM to VERTEX FORM by finding the vertex (midpoint of x-intercepts), then using the same "a" value.

FACTORED FORM \longrightarrow **VERTEX FORM**

$$y = -2(x+3)(x-1)$$

$$-2(x^2 + 3x - 1x - 3)$$

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

$$-2\left(x \begin{array}{c|c} x^2 & 1x \\ \hline 1x & -3 \end{array} \right)$$

$$-2((x+1)^2 - 4)$$

$$-2(x+1)^2 + 8$$

5) Convert from VERTEX FORM to STANDARD FORM by algebraically multiplying out the equation.

VERTEX FORM \longrightarrow **STANDARD FORM**

$$y = 2(x+5)^2 - 6$$

$$y = 2(x+5)(x+5) - 6$$

$$2(x^2 + 5x + 5x + 25) - 6$$

$$2x^2 + 20x + 50 - 6$$

$$2x^2 + 20x + 44$$

6) Convert from VERTEX FORM to FACTORED FORM. There is no way to go directly from Vertex Form to Factored Form. We need to combine the process in #5 to create a Standard Form equation, then follow the process in #1.

VERTEX FORM \longrightarrow **FACTORED FORM**

$$y = (x-2)^2 - 25$$

$$x^2 - 2x - 2x + 4 - 25$$

$$x^2 - 4x - 21$$

$$\begin{array}{c} x \\ \hline x^2 - 4x \\ \hline 3x - 21 \end{array}$$

$$(x-7)(x+3)$$