

Changing from Factored form and Vertex Form to STANDARD FORM

| Factored Form | Zeros | A.O.S. | Vertex | Min/Max? |
|---------------------------------------|--------------------|-------------------------|--------------|------------------|
| A. $f(x) = -3(x + 9)(x - 1)$ | $(-9, 0)$ $(1, 0)$ | $\frac{-9+1}{2} x = -4$ | $(-4, 75)$ | \downarrow Max |
| B. $f(x) = \frac{1}{4}(x + 2)(x - 8)$ | $(-2, 0)$ $(8, 0)$ | $\frac{-2+8}{2} x = 3$ | $(3, -6.25)$ | \uparrow Min |

1. Explain how you would find the A.O.S. using the Zeros:

Add the roots and divide by 2 (Average)

2. Explain how you find the Vertex using the A.O.S. :

Use AOS x-value to plug in for the vertex y-value

3. Explain how you know is the parabola has a max. or min. :

If it opens down, there's a max.
If it opens up, min.

| Factored Form | Standard Form | |
|---------------------------------------|--------------------------|---------------|
| $f(x) = A(x - r_1)(x - r_2)$ | $f(x) = Ax^2 + Bx + C$ | y-intercept ? |
| C. $f(x) = -3(x + 9)(x - 1)$ | $y = -3x^2 - 24x + 27$ | $(0, 27)$ |
| D. $f(x) = \frac{1}{4}(x + 2)(x - 8)$ | $y = 0.25x^2 - 1.5x - 4$ | $(0, -4)$ |

** Use DESMOS to confirm your Standard Form is the same as your Factored Form!

$x \cdot x = x^2$
Switch \downarrow (h, k)
Keep \leftarrow

| Vertex Form | Vertex | A.O.S. | Min/Max? |
|----------------------------|------------|----------|------------------|
| E. $f(x) = -(x - 2)^2 - 3$ | $(2, -3)$ | $x = 2$ | \downarrow Max |
| F. $f(x) = 2(x + 4)^2 - 5$ | $(-4, -5)$ | $x = -4$ | \uparrow Min |

4. Explain how you would find the A.O.S. using the Vertex:

$x = h$ from the (h, k) vertex

5. Explain how you know is the parabola has a max. or min. :

\downarrow min \uparrow Max

| Vertex Form | Standard form | |
|----------------------------|------------------------|---------------|
| $f(x) = A(x - h)^2 + k$ | $f(x) = Ax^2 + Bx + C$ | y-intercept ? |
| G. $f(x) = -(x - 2)^2 - 3$ | $y = -x^2 + 4x - 7$ | $(0, -7)$ |
| H. $f(x) = 2(x + 4)^2 - 5$ | | |

Use DESMOS to confirm your Standard Form is the same as your Factored Form!

$$C. f(x) = -3(x+9)(x-1)$$

$$y = -3[x^2 - 1x + 9x - 9]$$

GOAL: change from
Factored to Standard
by multiplying

$$y = -3(x^2 + 8x - 9)$$

$$y = -3x^2 - 24x + 27 \quad \text{Standard}$$

$$Ax^2 + Bx + C$$

$$D. y = \frac{1}{4}(x+2)(x-8)$$

$$y = \frac{1}{4}(x^2 - 8x + 2x - 16)$$

$$y = \frac{1}{4}(x^2 - 6x - 16)$$

$$y = 0.25x^2 - 1.5x - 4$$

$$G. y = -(x-2)^2 - 3 \quad \text{GOAL: vertex} \rightarrow \text{Standard}$$

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

$$y = -[x^2 - 2x - 2x + 4] - 3$$

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

$$y = -x^2 + 4x - 4 - 3$$

$$y = -x^2 + 4x - 7$$

$$H. y = 2(x+4)^2 - 5 \quad \text{YOU TRY!}$$

| |
|--|
| $x^2 = x \cdot x$ $5^2 = 5 \cdot 5$ $(x-2)^2 = (x-2)(x-2)$ |
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