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$$\text{Ex: } f(x) = -2(x+4)(x-10)$$

$a = -2 \quad p = -4 \quad q = 10$

Find: x -ints: -4 and 10

$$y\text{-int: } -2(-4)(10) = 80$$

$$\text{AoS: } x = \frac{-4+10}{2} = 3$$

$$\text{Vertex: } (3, 98)$$

Opens: down

$$\text{Ex: } f(x) = \frac{1}{2}(x-6)(x-2)$$

x -ints: 6 and 2

y -ints: 6

$$\text{AoS: } \frac{6+2}{2} = 4 \quad \text{vertex: } (4, -2)$$

h, k

Convert to:

$$\begin{aligned} f(4) &= \frac{1}{2}(4-6)(4-2) \\ &= \frac{1}{2}(-2)(2) \\ &= -2 \end{aligned}$$

Vertex Form: Plug in a, h, k

$$a(x-h)^2 + k$$

$$f(x) = \frac{1}{2}(x-4)^2 - 2$$

Standard Form:

$$\text{FOIL: } \frac{1}{2}(x-6)(x-2)$$

$$\frac{1}{2}(x^2 - 2x - 6x + 12)$$

$$\text{CLT: } \frac{1}{2}(x^2 - 8x + 12)$$

$$\text{Dist: } \boxed{\frac{1}{2}x^2 - 4x + 6}$$

Ex: Given $y = 2x^2 - 4x - 30$

Convert _{to} Vertex ^{form} and Factored ^{form}

Find Vertex:

$$\text{AoS: } x = \frac{4}{2(2)} = 1 \quad \begin{matrix} \nwarrow h \\ = x\text{-value} \\ \text{of vertex} \end{matrix}$$

$$f(1) = 2(1)^2 - 4(1) - 30 = -32$$

$$a = 2$$

$$y = 2(x-1)^2 - 32$$

Factor:

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

$$\boxed{y = 2(x-5)(x+3)}$$

x-ints: 5 and -3

Ex: Given: $f(x) = (x-3)^2 - 4$

Convert to Standard and Factored

* Need to go Vertex $\rightarrow$ Standard $\rightarrow$ Factored

$$\begin{aligned} y &= (x-3)(x-3) - 4 \\ &= (x^2 - 6x + 9) - 4 \end{aligned}$$

s.f. $y = x^2 - 6x + 5$

$$y = (x-5)(x-1)$$

- Factored