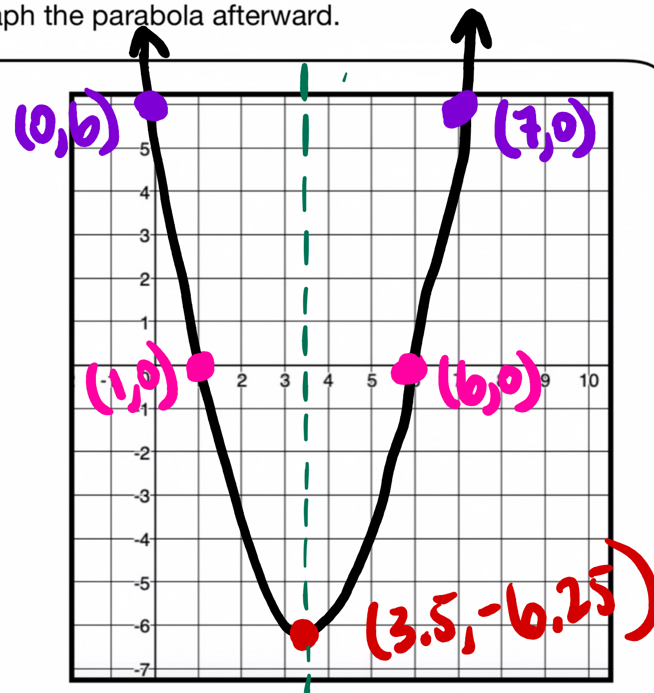
The Factoring - Parabola Connection

Factor the following quadratics. Then use BOTH forms to furnish the information asked for. Graph the parabola afterward.

Function: $y = x^2 - 7x + 6$ (general form)

- Factored Form: $y=(x-1)(x-6)$
- X - Intercepts: (1,0)(6,0)
- Y - Intercept: (0,6)
- Vertex: (3.5, -6.25)
- Line of Symmetry: $x = 3.5$



Factored Form

$x^2 - 7x + 6$

$(x-1)(x-6)$

6 / -1 / -6 / -7

Y-int → plug zero into standard Form

$y = (0)^2 - 7(0) + 6 \rightarrow y = 6$

X-ints → set Factored Form = to 0.

$0 = (x-1)(x-6)$

$x - 1 = 0 \quad x - 6 = 0$

$x = 1 \quad x = 6$

vertex → either form works

general | Factored

$x = \frac{-B}{2A} = \frac{-(-7)}{2(1)} = 3.5$ | $x = \frac{1+6}{2} = 3.5$

$y = (3.5)^2 - 7(3.5) + 6$ | $y = (3.5-1)(3.5-6)$

$y = -6.25$ | $y = -6.25$

Function: $y = 2x^2 - 3x - 5$

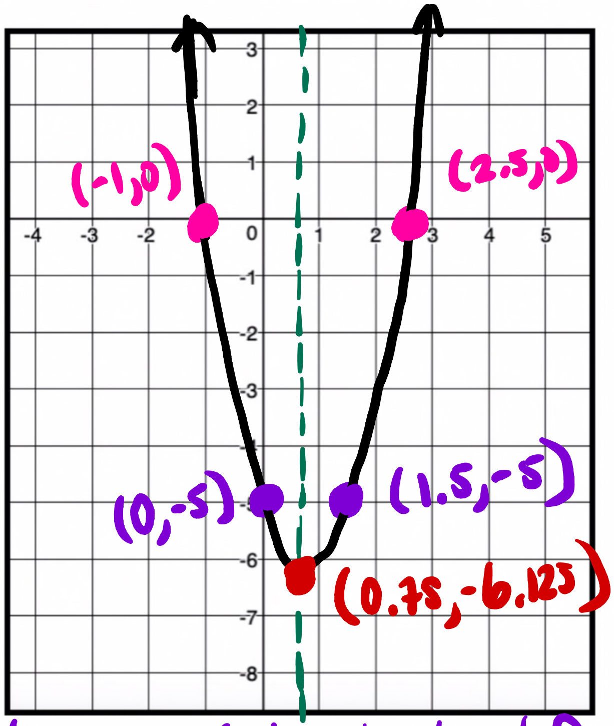
Factored Form: $y = (2x-5)(x+1)$

X - Intercepts: (2.5, 0) (-1, 0)

Y - Intercept: (0, -5)

Vertex: (0.75, -6.125)

Line of Symmetry: $x = 0.75$



factored form...

$2x^2 - 3x - 5$

$x^2 - 3x - 10$

-10, -5, 2, -3

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

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

y-int → plug zero into standard form

$y = 2(0)^2 - 3(0) - 5 = -5$

x-ints → set Factored Form = to 0

$0 = (2x-5)(x+1)$

$2x - 5 = 0 \quad x + 1 = 0$

$x = 2.5 \quad x = -1$

vertex → either form works

general / Factored

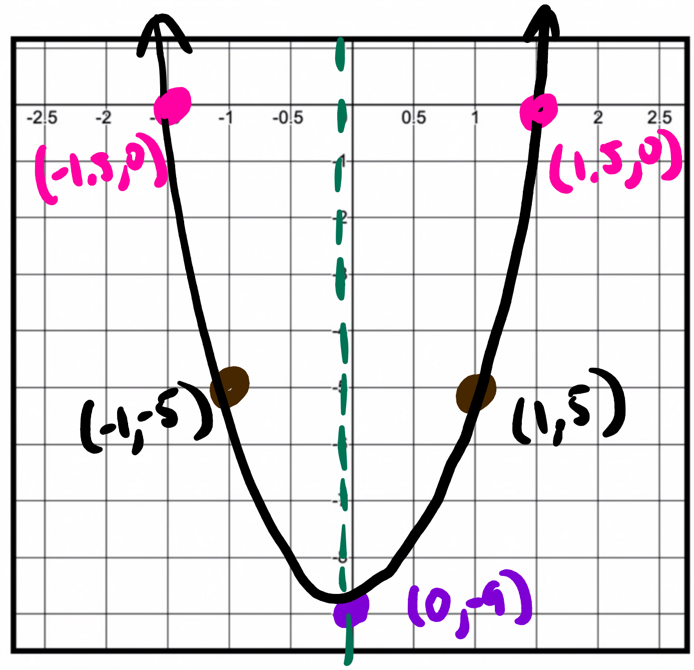
$x = \frac{-B}{2A} = \frac{-(-3)}{2(2)} = 0.75 \qquad x = \frac{2.5 + (-1)}{2} = 0.75$

$y = 2(0.75)^2 - 3(0.75) - 5 \qquad y = [2(0.75) - 5][0.75 + 1]$

$y = -6.125 \qquad y = -6.125$

Function: $y = 4x^2 - 9$

- Factored Form: $y = (2x-3)(2x+3)$
- X - Intercepts: $(1.5, 0)$ $(-1.5, 0)$
- Y - Intercept: $(0, -9)$
- Vertex: $(0, -9)$
- Line of Symmetry: $x = 0$



factored form

$4x^2 - 9$ difference of squares

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

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

y-int → plug zero into standard form

$y = 4(0)^2 - 9 \rightarrow y = -9$

x-ints → set Factored Form = to 0

$0 = (2x-3)(2x+3)$

$2x - 3 = 0 \quad 2x + 3 = 0$

$x = 1.5 \quad x = -1.5$

vertex → either form works

general / Factored

$x = \frac{-B}{2A} = \frac{-(0)}{2(4)} = 0$ $x = \frac{1.5 + (-1.5)}{2} = 0$

$y = 4(0)^2 - 9 = -9$ $y = [2(0) - 3][2(0) + 3] = -9$

* since vertex is same as y-int, need to use strategic points...

let $x = 1 \rightarrow y = 4(1)^2 - 9 = -5$ $(1, -5)$

Function: $y = 3x^2 + 6x + 3$

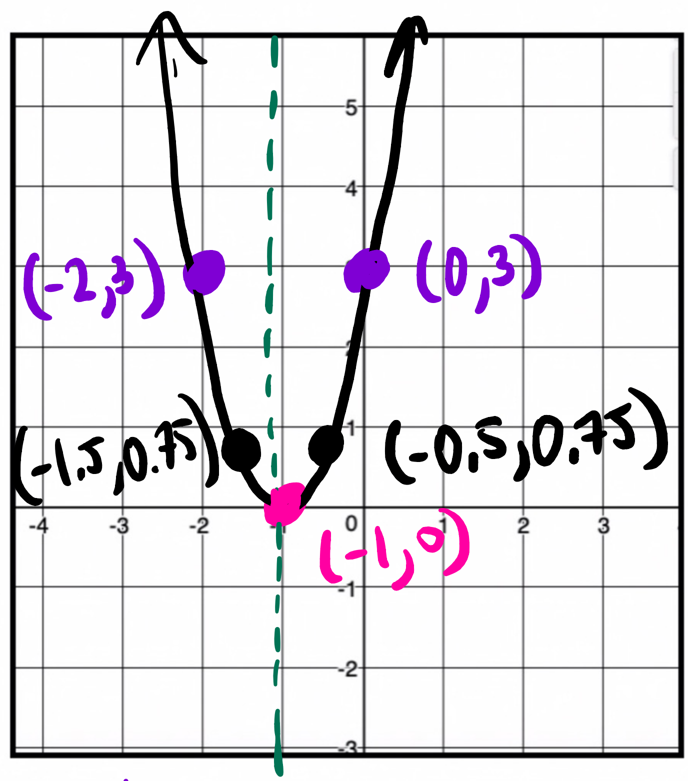
Factored Form: $y = 2(x+1)^2$

X - Intercepts: (−1, 0)

Y - Intercept: (0, 3)

Vertex: (−1, 0)

Line of Symmetry: $x = -1$



Factored form

$3x^2 + 6x + 3$

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

$2(x+1)(x+1)$

$2(x+1)^2$

Y-int → plug zero into standard form

$y = 3(0)^2 + 6(0) + 3 = 3$

X-ints → set Factored Form = to 0

$0 = 2(x+1)^2$

$x + 1 = 0$

$x = -1$

Since only one x-int, need to use standard form for vertex

$x = \frac{-(6)}{2(3)} = -1$

$y = 3(-1)^2 + 6(-1) + 3 = 0$

only 3 points so need another strategic point!

(-0.5, 0.75)

$x = -0.5 \quad y = 3(-0.5)^2 + 6(-0.5) + 3 = 0.75$