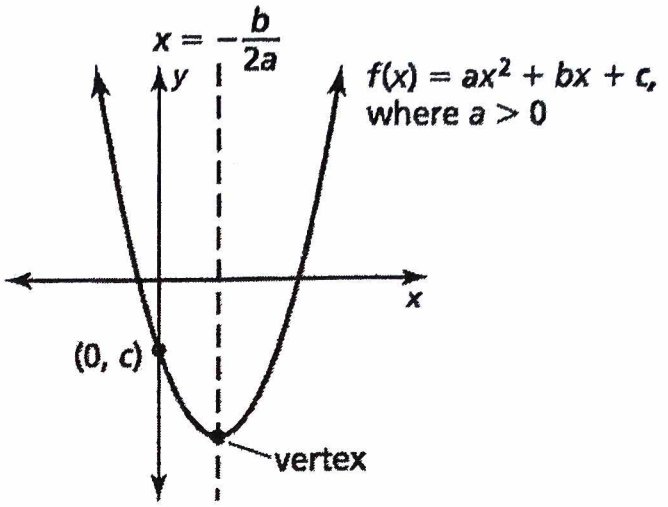
Graphing $f(x) = ax^2 + bx + c$

- The graph opens up when $a > 0$, and the graph opens down when $a < 0$.
- The y-intercept is c.
- The x-coordinate of the vertex is $-\frac{b}{2a}$.
- The axis of symmetry is $x = -\frac{b}{2a}$.



X-Intercepts: Plug in $y = 0$ and solve for x-values.

Y-Intercept: Plug in $x = 0$ and solve for y-value.

EX 1: For each quadratic function, identify the vertex, axis of symmetry, x-intercepts, and y-intercept Graph!

a) $y = x^2 + 2x - 8$

$y = ax^2 + bx + c$

Vertex: $(-1, -9)$

$x = \frac{-b}{2a}$ $x = \frac{-2}{2(1)} = \frac{-2}{2} = -1$

$y = (-1)^2 + 2(-1) - 8 = 1 - 2 - 8 = -9$

Axis of Symmetry: $x = -1$

$x = \frac{-b}{2a}$ $x = -1$

X-Intercepts: $(-4, 0)$ AND $(2, 0)$

$y = 0$ $0 = x^2 + 2x - 8$

-8 P

4 -2

2 S

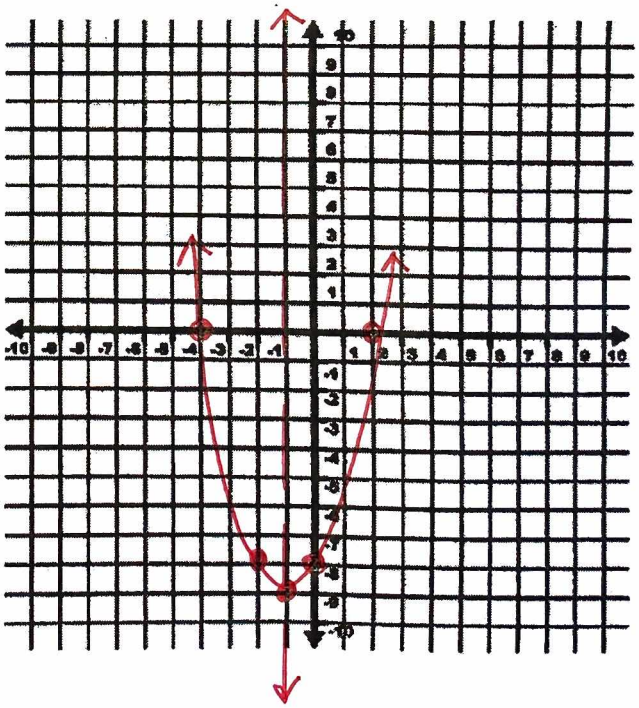
$0 = (x + 4)(x - 2)$

$x = -4$ $x = 2$

Y-Intercept: $(0, -8)$

$x = 0$ $y = (0)^2 + 2(0) - 8$

$y = -8$



EX 1 (continued): For each quadratic function, identify the vertex, axis of symmetry, x-intercepts, and y-intercept. Graph!

b) $y = -x^2 + 9$

$y = ax^2 + bx + c$

Vertex: $(0, 9)$

$x = \frac{-b}{2a}$ $\quad x = \frac{-0}{2(-1)} = \frac{0}{-2} = 0$

$y = -(0)^2 + 9 = 9$

Axis of Symmetry: $x = 0$

$x = \frac{-b}{2a}$

X-Intercepts: $(3, 0)$ AND $(-3, 0)$

$y = 0$

$0 = -x^2 + 9$

$-9 \quad -9$

$\frac{-9}{-1} = \frac{-x^2}{-1}$

$\sqrt{x^2} = \sqrt{9}$ $\quad x = \pm 3$

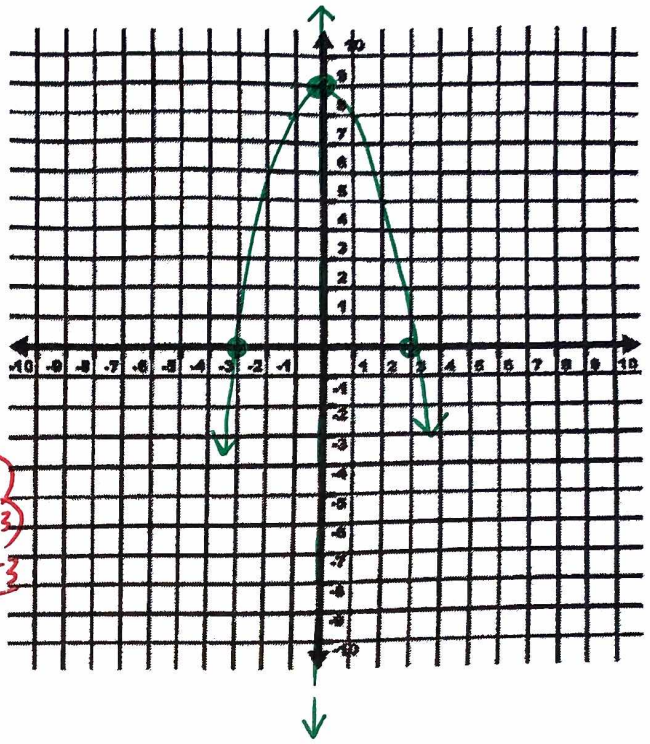
$0 = -x^2 + 9$

$0 = -(x^2 - 9)$

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

$x = 3$ $\quad x = -3$

Y-Intercept: $(0, 9)$



c) $y = x^2 - 5x$

$y = ax^2 + bx + c$

Vertex: $\left(\frac{5}{2}, \frac{-25}{4}\right)$ $\quad \left(2\frac{1}{2}, -6\frac{1}{4}\right)$

$x = \frac{-b}{2a}$ $\quad x = \frac{-(-5)}{2(1)} = \frac{5}{2}$

$y = \left(\frac{5}{2}\right)^2 - 5\left(\frac{5}{2}\right) = \frac{25}{4} - \frac{25}{2}\left(\frac{2}{2}\right) =$

$\frac{25}{4} - \frac{50}{4} = \frac{-25}{4}$

Axis of Symmetry: $x = \frac{5}{2}$

$x = \frac{-b}{2a}$

X-Intercepts: $(0, 0)$ AND $(5, 0)$

$y = 0$

$0 = x^2 - 5x$

$0 = x(x-5)$

$x = 0$ $\quad x = 5$

Y-Intercept: $(0, 0)$

$x = 0$

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

