Our dear friend from Grade 10 is back. What are quadratics?

- Vertex, the max/min (h, k)

- x-intercepts/zeros/roots/solutions

  $x = r$ and $x = s$

  $(r, 0)$ $(s, 0)$

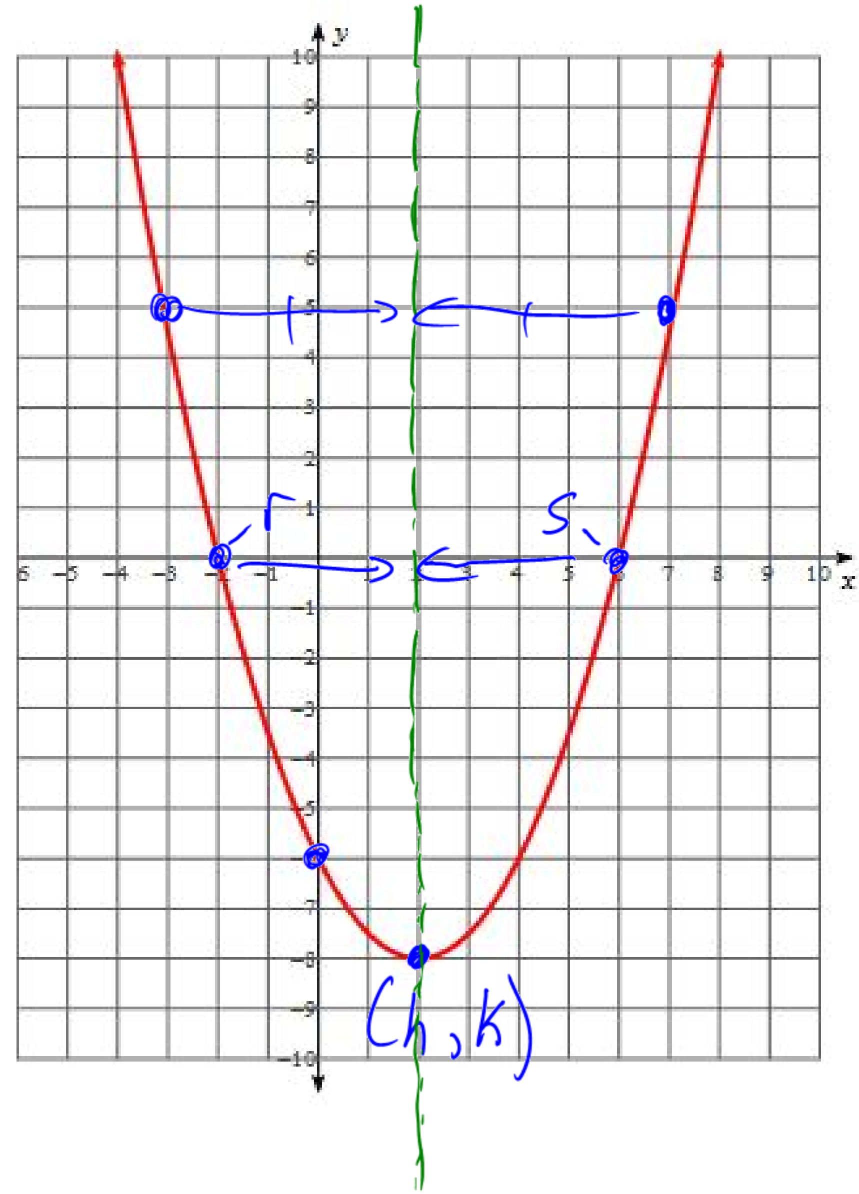
- y-intercept

  $y = c$ $(0, c)$

- axis of symmetry

  $x = h$

  $h = \frac{r+s}{2}$



Three forms (equations) of Quadratics:

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

- vertex form

vertex!

- useful for graphing

If $a > 0$,

If $a < 0$,

$$f(x) = ax^2 + bx + \boxed{c}$$

↳ y-int

- Standard Form
- great for solving quadratics

$$f(x) = a(x - r)(x - s)$$

- Zeros Form or Factored Form
- gives the zeros r and s.

Find the equation of the parabola:

$r = -2$ $\quad x = 2$

$s = 6$ $\quad y = -8 \quad f(x) = -8$

$f(x) = a(x-r)(x-s)$

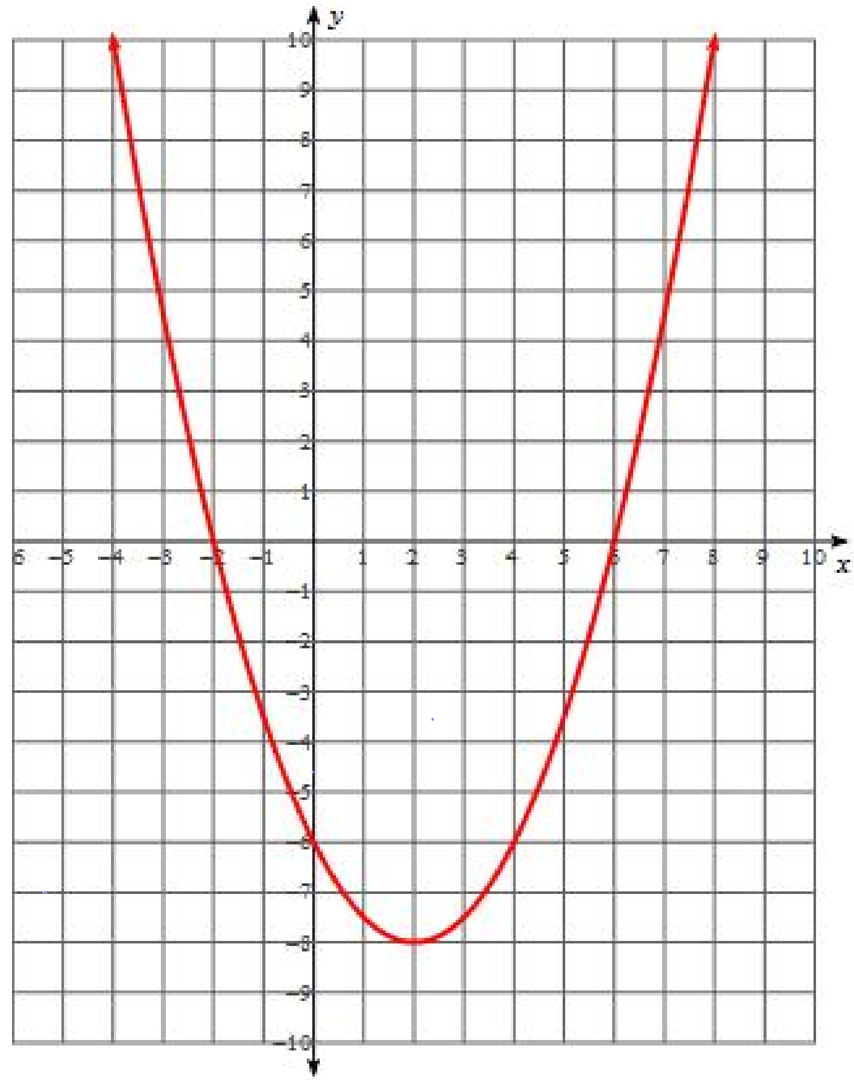
$-8 = a(2+2)(2-6)$

$-8 = a(4)(-4)$

$-8 = a(-16)$

$\frac{-8}{-16} = a$

$\frac{1}{2} = a$



$\therefore f(x) = \frac{1}{2}(x+2)(x-6)$

Write the standard form of the parabola:

$h = -6$ $x = -4$

$k = 4$ $y = -8$

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

$-8 = a(-4+6)^2 + 4$

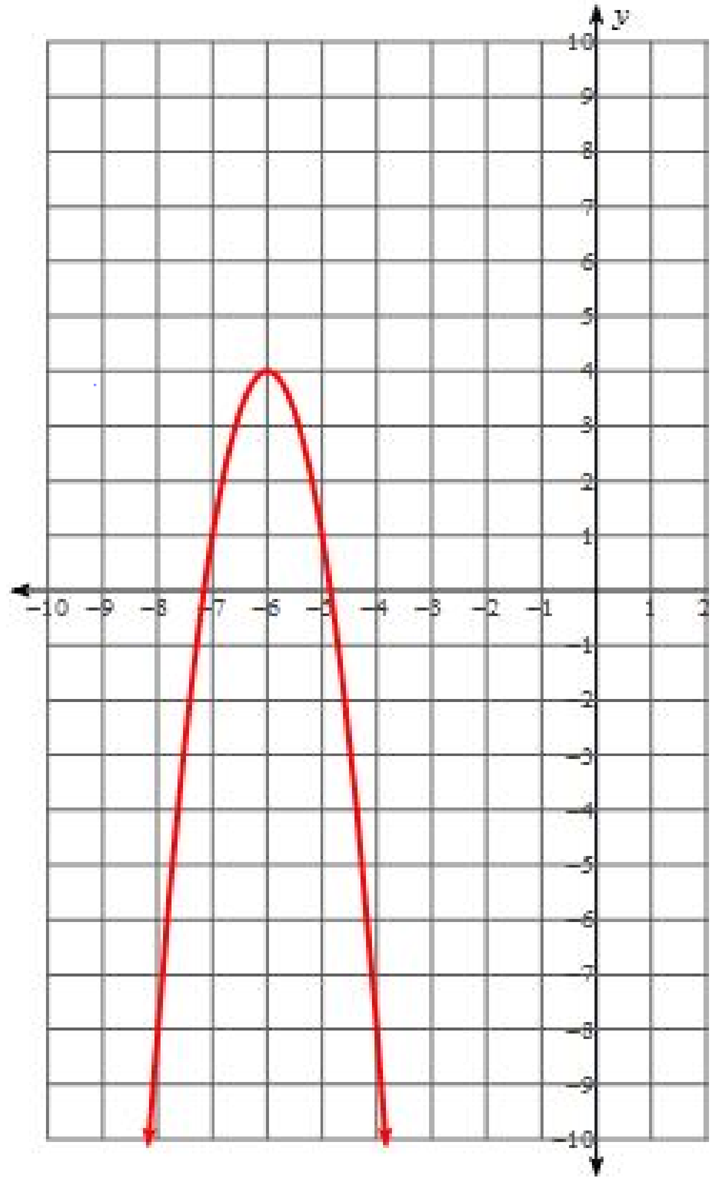
$-8 = a(2)^2 + 4$

$-8 - 4 = a(4) + 4 - 4$

$\frac{-12}{4} = \frac{a(4)}{4}$

$-3 = a$

$f(x) = -3(x+6)^2 + 4$



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

Convert to Standard Form:

$$f(x) = -2\underbrace{(x-4)(x+7)}_{\text{FOIL}}$$

$f(x) = -2(x^2 + 7x - 4x - 28)$

$f(x) = -2(x^2 + 3x - 28)$

$f(x) = -2x^2 - 6x + 56$

$$g(x) = \frac{1}{2}\underbrace{(x+4)^2}_{} - 6$$

$g(x) = \frac{1}{2}\underbrace{(x+4)(x+4)}_{\text{FOIL}} - 6$

$g(x) = \frac{1}{2}(x^2 + 8x + 16) - 6$

$g(x) = \frac{1}{2}x^2 + 4x + 8 - 6$

$g(x) = \frac{1}{2}x^2 + 4x + 2$

State the direction of opening, the equation of axis and the vertex:

$$f(x) = 3(x+6)(x-2)$$

(h, k)

- opens up because $a = 3$ which is greater than zero.

- $r = -6$, $s = 2$

$\therefore h = \frac{-6+2}{2} = \frac{-4}{2} = -2$ $\therefore$ AoS is $x = -2$

- $f(-2) = 3(-2+6)(-2-2)$

$= 3(4)(-4) = -48$ $\therefore$ vertex is $(-2, -48)$

Determine the equation of axis:

$$(4, \underline{3}), (12, \underline{3})$$

$h = \frac{4+12}{2} = \frac{16}{2} = 8$ $\therefore$ AoS is $x = 8$