

Mathematics 11U

3.1 – Properties of Quadratics

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

- Vertex : (h, k)

↳ max or min

- x-intercepts / zeros / roots / solutions:

$$x = r \text{ and } x = s$$

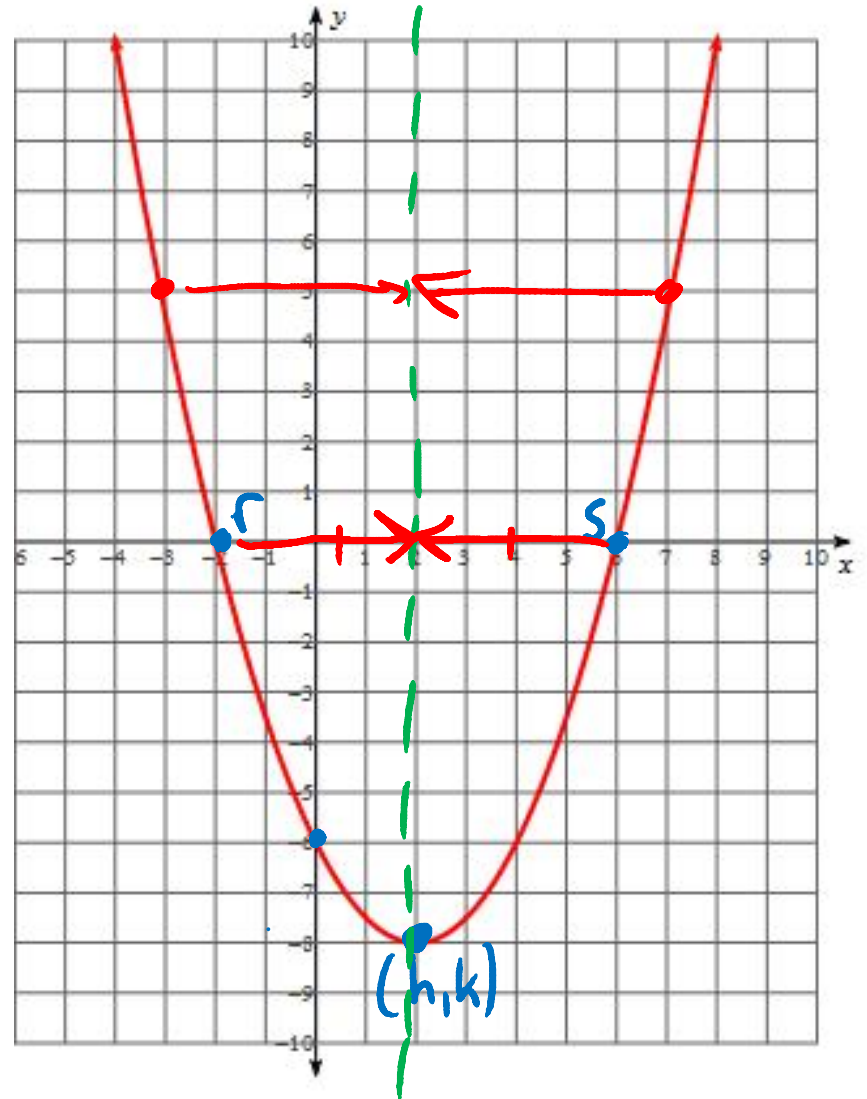
$$(r, 0) \quad (s, 0)$$

- y-intercept

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

- Axis of symmetry:

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



Three forms (equations) of Quadratics:

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

Vertex Form

- vertex (h, k)

- graphing

If $a > 0$ \cup
 $a < 0$ \cap

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

Standard Form

- y-int of c

- great for solving quadratics

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

- gives r and s

Zeros Form or Factored Form

Find the equation of the parabola:

$$h=2 \quad x=6$$
$$k=-8 \quad y=0$$

$$\cancel{f(x)} = a(x-h)^2 + k$$

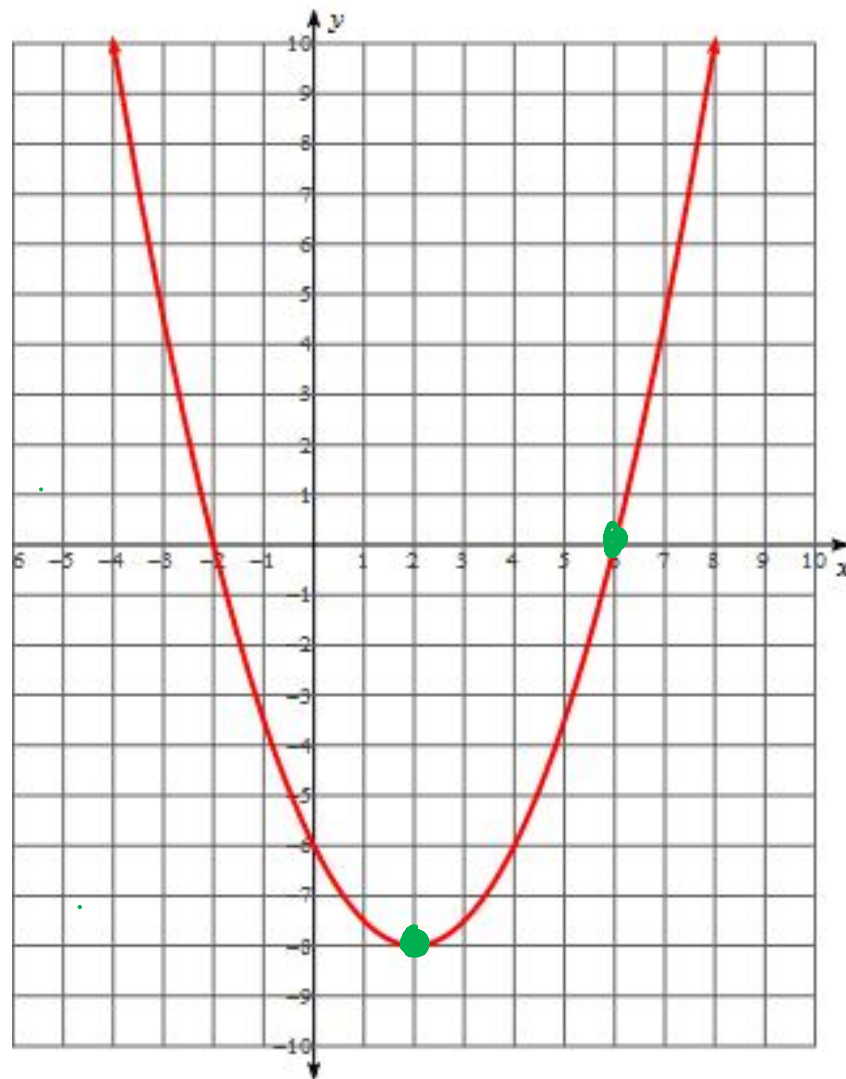
$$0 = a(6-2)^2 - 8$$

$$8 = a(16)$$

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

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

$$\therefore f(x) = \frac{1}{2}(x-2)^2 - 8$$



Write the standard form of the parabola:

$$h = -6 \quad x = -5$$
$$k = 4 \quad y = 1$$

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

$$1 = a(-5 + 6)^2 + 4$$

$$-3 = a(1)$$

$$-3 = a$$

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

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

$$f(x) = -3(x^2 + 12x + 36) + 4$$

$$f(x) = -3x^2 - 36x - 104$$

$y = -x + 4$

