

# Intro to Quadratics – Tutorial Wednesday



# Big Ideas

- A quadratic relation's:
  - GRAPH
    - Is a symmetric curve called a parabola.
    - It has a u-shape that either opens up or down.
  - EQUATION
    - One form is called standard form  $y = ax^2 + bx + c$ , it has a degree of 2.
    - The “a” gives the direction of the parabola.
    - The “b” changes the line of symmetry.
    - The “c” is the y-intercept.



# Big Ideas

- A second way of writing the equation of a quadratic relation is called FACTORED FORM.
- It is  $y = a(x - r)(x - s)$ .
- You can find the key features of the parabola from this equation. ( You may have to perform some calculations.)

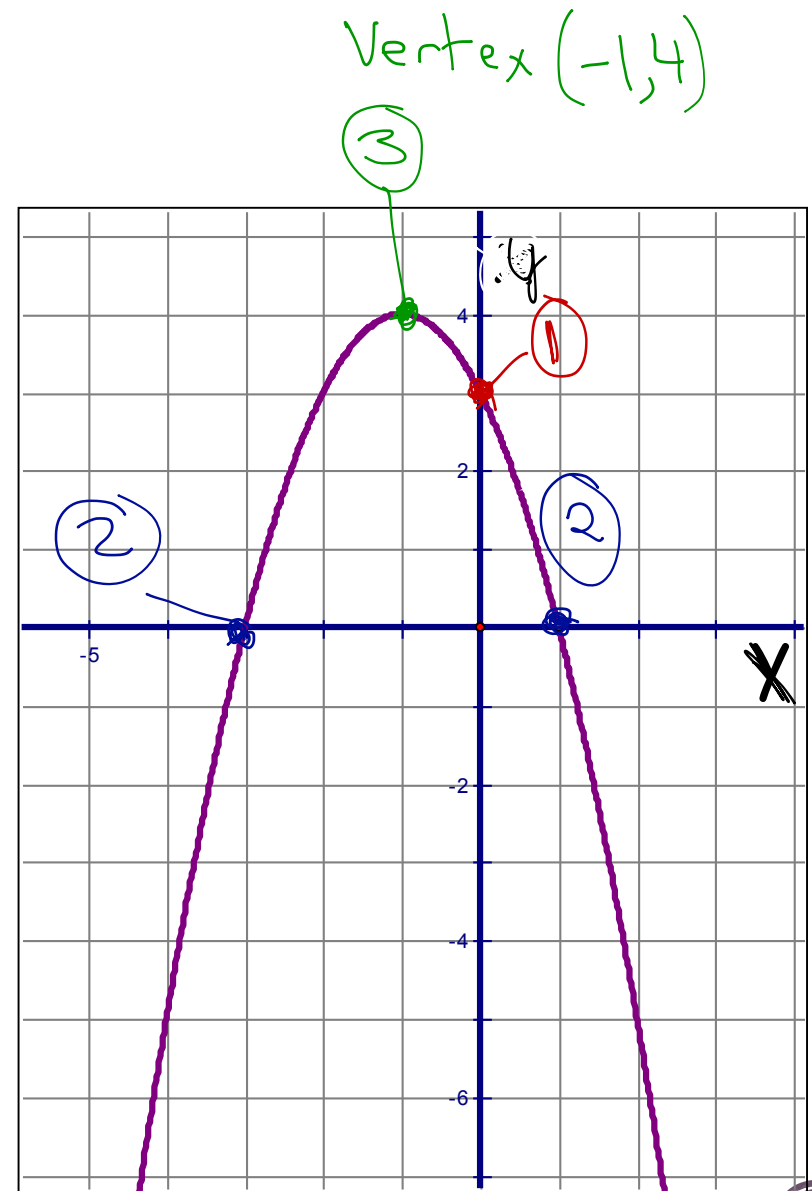


# Big Ideas

- The key features of a parabola:

- Y-intercept (1)
- Zeros (x-intercepts) (2)
- Vertex (3)
- Equation of Axis of Symmetry  $x = -1$
- Direction of Opening

Opens down.



# Constant Differences

- A relation is quadratic if:
  - The second differences are constant but not zero

$x$	$y$	1 <sup>st</sup> Diff	2 <sup>nd</sup> Diff
0	0	1	2
1	1	3	2
2	4	5	2
3	9	7	2
4	16		

quadratic



# Multiplying Binomials

- Expanding is **MULTIPLYING** using the distributive property.
- Simplifying is **COLLECTING** the like terms by adding and subtracting.



# Expanding

- Strategies that can be used to multiply two binomials are:
  - Area Diagram
  - Distributive Property

↘ FOIL



# Big Ideas

- Steps to write the factored form of the equation of a quadratic relation from a graph:
  - Start with  $y = a(x - r)(x - s)$ .
  - Replace the “r” and “s” with the zeros of the curve.
  - Find the “a” by substituting a point  $(x, y)$  into the equation and solving.





# Some Practice

▪ Pg. 160 #4

4. The points  $(-3, 8)$  and  $(9, 8)$  lie on opposite sides of a parabola. Determine the equation of the axis of symmetry.

Because  $y$  values are the same

A.o.s.  $x = \frac{-3+9}{2}$

$$x = \frac{6}{2}$$

$$x = 3$$

Symmetry



# More Practice

▪ Pg. 160 #8

8. The zeros of a parabola are  $-10$  and  $30$ .

The parabola crosses the  $y$ -axis at  $50$ .

$\begin{matrix} x & y \\ (0, & 50) \end{matrix}$

a) Determine an equation for the parabola.

b) Determine the coordinates of the vertex.

$$50 = -300a$$

$$\frac{50}{-300} = a$$

$$-\frac{1}{6} = a$$

$$\therefore y = -\frac{1}{6}(x+10)(x-30)$$

Factored Form

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

$$y = a(x+10)(x-30)$$

$$50 = a(0+10)(0-30)$$

$$50 = a(10)(-30)$$

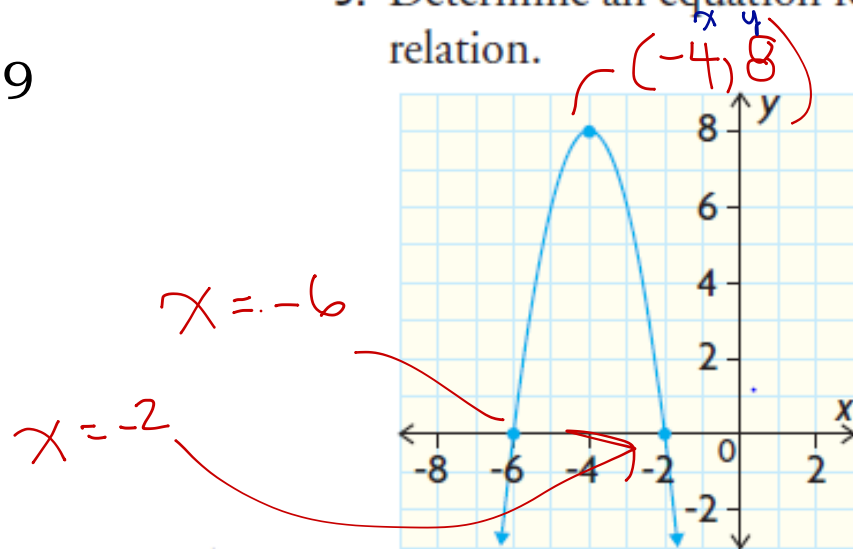
$$50 = a(-300)$$



# Even More Practice

- Pg. 160 #9

9. Determine an equation for this quadratic relation.



$$\begin{aligned} y &= a(x-r)(x-s) \\ y &= a(x+2)(x+6) \\ 8 &= a(-4+2)(-4+6) \\ 8 &= a(-2)(2) \end{aligned}$$

A.O.S.  $x = -4$

$$\begin{aligned} 8 &= -4a \\ \frac{8}{-4} &= a \\ a &= -2 \end{aligned}$$

$$\therefore y = -2(x+2)(x+6)$$

$$4 \quad a) \quad (-2)^{-5}$$

$$= \frac{1}{(-2)^5}$$

$$= \frac{1}{(-2) \times (-2) \times (-2) \times (-2) \times (-2)}$$

$$= \frac{1}{-32}$$

$$= -\frac{1}{32}$$

$$-2^{-5}$$

$$= \frac{1}{-2^5}$$

$$= \frac{1}{-(2 \times 2 \times 2 \times 2 \times 2)}$$

$$= \frac{1}{-(32)}$$

$$= -\frac{1}{32}$$

$$(-2)^4$$
$$= (-2) \times (-2) \times (-2) \times (-2)$$

$$= 16$$

$$-(2^4)$$

$$= -(2 \times 2 \times 2 \times 2)$$

$$= -16$$

# New Work

- Pg. 160 #1,2,7abc
- Quiz Friday

