

Lesson 8 Lining Up Quadratics

A Practice Understanding Task

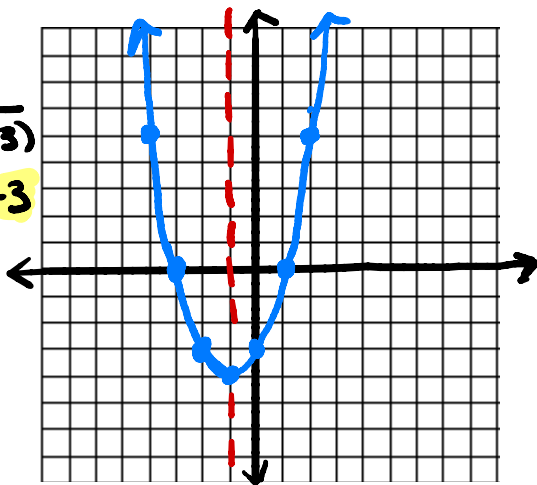


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Graph each function and find the vertex, the y-intercept and the x-intercepts. Be sure to properly write the intercepts as points.

1. $y = (x - 1)(x + 3)$

Standard Form
 $y = (x - 1)(x + 3)$
 $y = x^2 + 2x - 3$



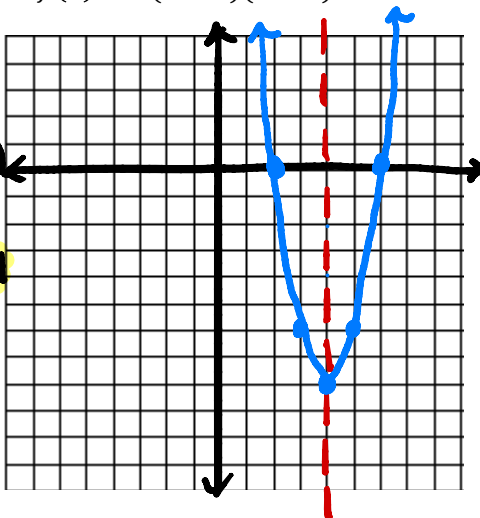
Line of Symmetry $x = -1$
 Vertex $(-1, -4)$
 x-intercepts $(1, 0)$ $(-3, 0)$

y-intercept $(0, -3)$
 $f(0) = (0 - 1)(0 + 3)$
 $= (-1)(3)$
 $= -3$

R.O.C.
 $a = 1$
 $+1$
 $+3$
 $+5$

2. $f(x) = 2(x - 2)(x - 6)$

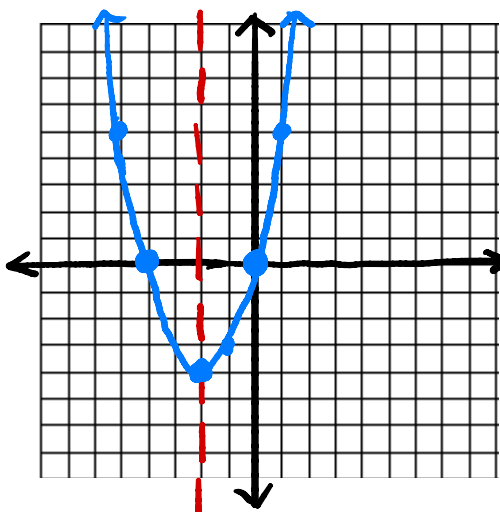
Standard Form
 $y = 2(x - 2)(x - 6)$
 $= 2(x^2 - 8x + 12)$
 $= 2x^2 - 16x + 24$



Line of Symmetry $x = 4$
 Vertex $(4, -8)$
 x-intercepts $(2, 0)$ $(6, 0)$

y-intercept $(0, 24)$
 $f(0) = 2(0 - 2)(0 - 6)$
 $= 2(-2)(-6)$
 $= 24$

3. $g(x) = -1 \cdot x \cdot (x+4)$
 $g(x) = -x(x+4)$



when

$x=0$ $g(0) = -1 \cdot 0 \cdot 4 = 0$
 $x=-4$ $g(-4) = -1 \cdot -4 \cdot 0 = 0$

Line of Symmetry $x = -2$ $g(-2) = -1 \cdot -2 \cdot (-2+4)$
 $= -1(-2)(2)$
 $= 4$

Vertex $(-2, 4)$

x-intercepts $(0, 0)$ $(-4, 0)$

y-intercept $(0, 0)$

$g(0) = -1 \cdot 0 \cdot 4 = 0$

4. Based on these examples, how can you use a quadratic function in factored form to:

a. Find the line of symmetry of the parabola?

$x = \text{average of the } x\text{-intercepts}$

b. Find the vertex of the parabola?

• \rightarrow Plug avg. of x-intercepts back into function.

c. Find the x-intercepts of the parabola?

• Set each factor containing x equal to 0 & solve for x.

d. Find the y-intercept of the parabola?

• Plug 0 into x and solve for y.

e. Find the vertical stretch or shrink

• $|a| > 1$ is a vertical stretch.

• $|a| < 1$ is a vertical shrink.

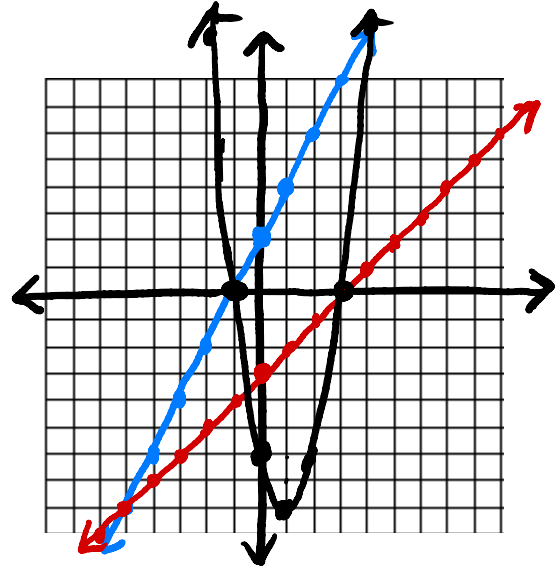
5. Choose any two **linear** functions and write them in the form: $f(x) = m(x - c)$, where m is the slope of the line. Graph the two functions.

Linear function 1:

$$y = 2(x+1) \text{ or } y = 2x+2$$

Linear function 2:

$$y = (x-3)$$



6. On the same graph as #5, graph the function $P(x)$ that is the product of the two linear functions that you have chosen. What shape is created?

$$P(x) = 2(x+1)(x-3)$$

x-int $(-1, 0)$ $(3, 0)$

vertex $(1,)$

$$P(1) = 2(1+1)(1-3) = 2 \cdot 2 \cdot -2 = -8$$

7. Describe the relationship between x -intercepts of the linear functions and the x -intercepts of the function $P(x)$. Why does this relationship exist?

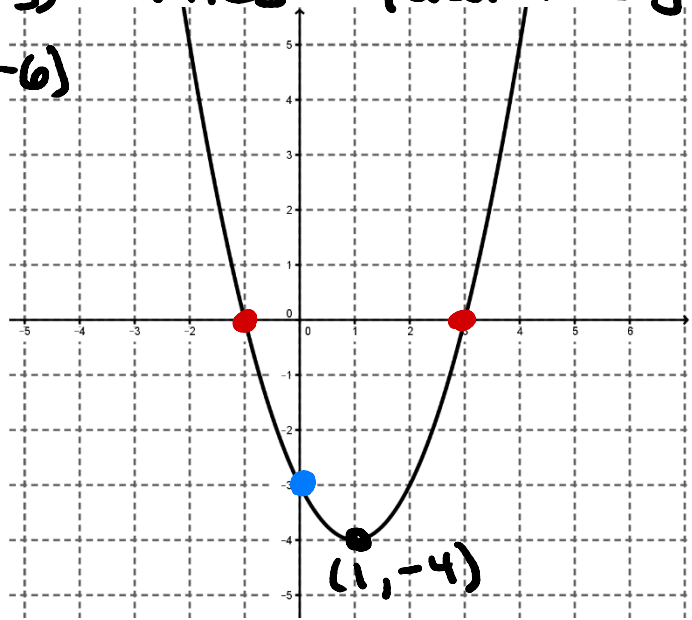
The relationship is the same.
 The values that will make either of the linear factors equal 0 will make $P(x) = 0$

8. Describe the relationship between y -intercepts of the linear functions and the y -intercept of the function $P(x)$. Why does this relationship exist?

$y = 2x + 2$ y -int $(0, 2)$
 $y = x - 3$ y -int $(0, -3)$
 $P(x) = 2(x+1)(x-3) = (0, -6)$

The product of the y -intercepts of the lines equal the y -int of $P(x)$

9. Given the parabola to the right, sketch two lines that could represent its linear factors.



10. Write an equation for each of these two lines.

$y = x - 3$
 $y = x + 1$

11. How did you use the x and y intercepts of the parabola to select the two lines?

x -int $= (3, 0)$ $x - 3 = 0$
 x -int $= (-1, 0)$ $x + 1 = 0$

$3 \cdot -1 = -3$
 y -int $= -3$ so $a = 1$

12. Are these the only two lines that could represent the linear factors of the parabola? If so, explain why. If not, describe the other possible lines.

other lines can have same x -intercept but product of x -intercepts needs to $= -3$.

13. Use your two lines to write the equation of the parabola. Is this the only possible equation of the parabola?

Factored form $y = (x - 3)(x + 1)$

Standard form $y = x^2 - 2x - 3$

Vertex form $y = (x - 1)^2 - 4$