

Starter

Grab the worksheet on the desk next to mine, pg. 52, and work on #20-26. We'll finish up 2.8 Lining Up Quadratics shortly.

Vertex Form: $f(x) = a(x-h)^2 + k$
 Vertex: (h, k)
 opens \uparrow or \downarrow
 stretch or shrink
 (dilation)

(23)
 $f(x) = 4(x+2)^2 - 64 \rightarrow 4(x-(-2))^2 + (-64)$

Vertex: $(-2, -64)$

x-int: $(2, 0)$ & $(-6, 0)$

y-int: $(0, -48)$

stretch: 4 (skinner)

y-int:

$$f(0) = 4(0+2)^2 - 64$$

$$= 4(2)^2 - 64$$

$$= 4 \cdot 4 - 64$$

$$= 16 - 64$$

$$= -48$$

$$(0, -48)$$

x-int:

$$0 = 4(x+2)^2 - 64$$

$$+64$$

$$+64$$

$$\frac{64}{4} = \frac{4(x+2)^2}{4}$$

$$\sqrt{16} = \sqrt{(x+2)^2}$$

$$\pm 4 = x+2$$

$$-2 \quad -2$$

$$-2 \pm 4 = x$$

$$-2 + 4 \quad \& \quad -2 - 4$$

$$2 \quad \& \quad -6$$

$$(2, 0) \quad \& \quad (-6, 0)$$

11. $y = 4(x-2)(x+6)$ 12. $y = -3(x+2)(x-6)$ 13. $y = (x+5)(x+7)$
 a. Vertex: $(-2, -64)$ a. Vertex: _____ a. Vertex: _____
 b. x-inter(s) $(2, 0); (-6, 0)$ b. x-inter(s) _____ b. x-inter(s) _____
 c. y-inter $(0, -48)$ c. y-inter: _____ c. y-inter _____
 d. Stretch 4 d. Stretch _____ d. Stretch _____

14. $y = \frac{1}{2}(x-7)(x-7)$ 15. $y = -\frac{1}{2}(x-8)(x+4)$ 16. $y = \frac{3}{5}(x-25)(x-9)$
 a. Vertex: _____ a. Vertex: _____ a. Vertex: _____
 b. x-inter(s) _____ b. x-inter(s) _____ b. x-inter(s) _____
 c. y-inter _____ c. y-inter: _____ c. y-inter _____
 d. Stretch _____ d. Stretch _____ d. Stretch _____

$$y = 4(x-2)(x+6)$$

x-int:

$$\begin{array}{r} x-2=0 \\ +2 \quad +2 \\ \hline x=2 \\ (2, 0) \end{array} \quad \& \quad \begin{array}{r} x+6=0 \\ -6 \quad -6 \\ \hline x=-6 \\ (-6, 0) \end{array}$$

y-int:

$$\begin{aligned} f(0) &= 4(0-2)(0+6) \\ &= 4(-2)(6) \\ &= -48 \\ &(0, -48) \end{aligned}$$

Vertex: $(-2, -64)$

$$x = \frac{-6+2}{2} = \frac{-4}{2} = -2$$

$$\begin{aligned} f(-2) &= 4(-2-2)(-2+6) \\ &= 4(-4)(4) \\ &= -64 \\ &(-2, -64) \end{aligned}$$

2.8 Lining Up Quadratics

A Practice Understanding Task

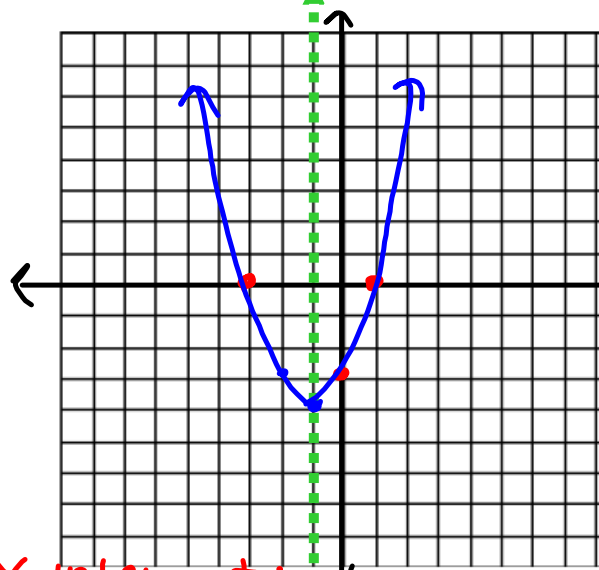


Graph each function and find the vertex, the y-intercept and the x-intercepts. Be sure to properly write the intercepts as points

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

factored form: $y = (x - d)(x - e)$

to find x-intercepts
make $y = 0$
and solve for x .



Line of Symmetry $x = -1$

Vertex $(-1, -4)$

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

y-intercept $(0, -3)$

$y = (-1 - 1)(-1 + 3)$
 $y = -2 \cdot 2$
 $y = -4$

to find y-intercepts:
make $x = 0$
and solve for y

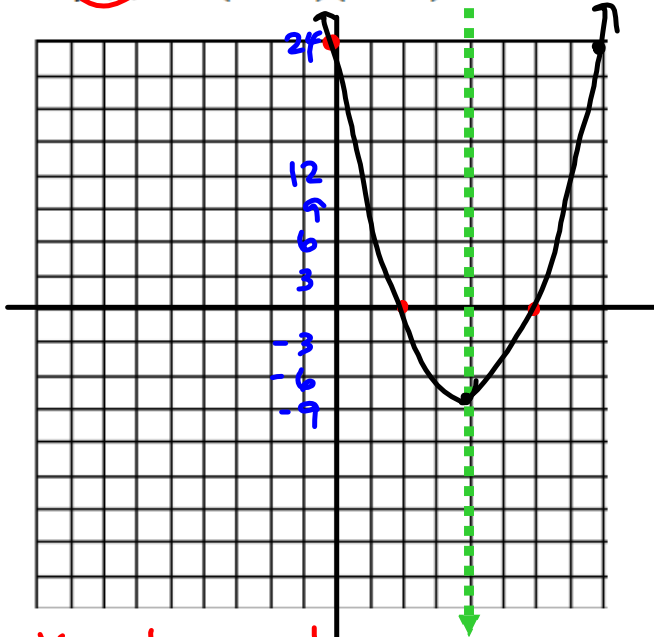
x-intercepts:
 $0 = (x - 1)(x + 3)$

$$\begin{array}{r} x - 1 = 0 \text{ and} \\ +1 \quad +1 \\ \hline x = 1 \end{array}$$

$$\begin{array}{r} x + 3 = 0 \\ -3 \quad -3 \\ \hline x = -3 \end{array}$$

y-intercepts:
 $y = (0 - 1)(0 + 3)$
 $y = -1 \cdot 3$
 $y = -3$

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

Line of Symmetry $x = 4$ Vertex $(4, -8)$ x-intercepts $(2, 0)$ $(6, 0)$ y-intercept $(0, 24)$

$$\begin{aligned} \text{y-intercept:} \\ f(x) &= 2(0-2)(0-6) \\ &= 2(-2)(-6) \\ &= 24 \end{aligned}$$

$$\begin{aligned} \text{vertex} \\ f(4) &= 2(4-2)(4-6) \\ &= 2(2)(-2) \\ &= -8 \end{aligned}$$

x-intercepts:

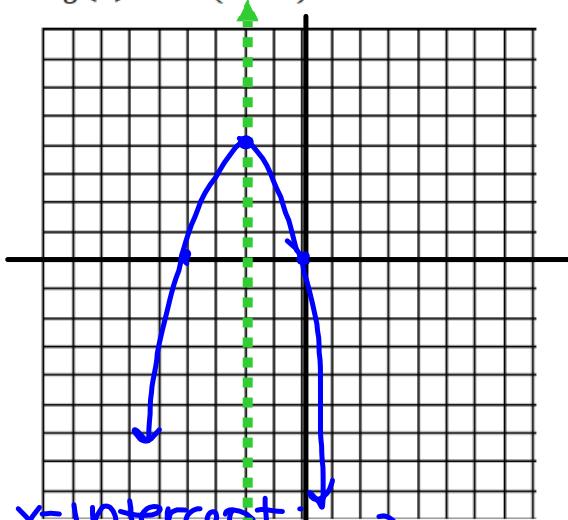
$$0 = \frac{2}{2} (x-2)(x-6)$$

$$0 = (x-2)(x-6)$$

$$\begin{array}{r} x-2=0 \\ +2 \quad +2 \\ \hline x=2 \end{array}$$

$$\begin{array}{r} x-6=0 \\ +6 \quad +6 \\ \hline x=6 \end{array}$$

3. $g(x) = -x(x + 4)$



x-intercept:
 $0 = -x(x+4)$

$$\begin{array}{r} x+4=0 \\ -4 \quad -4 \\ \hline x=-4 \end{array}$$

$$\begin{array}{r} x=0 \\ -1 \quad -1 \\ \hline x=0 \end{array}$$

Line of Symmetry $x = -2$

Vertex $(-2, 4)$

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

y-intercept $(0, 0)$

$$\begin{aligned} f(-2) &= -(-2)(-2+4) \\ &= 2 \cdot 2 \\ &= 4 \end{aligned}$$

HW: # 4 on pg 47
 # 11-19 on pg. 51

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?

From the average of the x-intercepts (add the x-intercepts and divide by 2).

b. Find the vertex of the parabola?

The x-value in the vertex is the axis of symmetry, then plug that x into the equation

c. Find the x-intercepts of the parabola?

Take each factor (what's in each parenthesis) and set equal to 0. Or take the opposite of each factor.

to find the y-value of the vertex.

d. Find the y-intercept of the parabola?

Make $y = 0$ and solve for x.

e. Find the vertical stretch?

The a; it's the # in front of your factors.

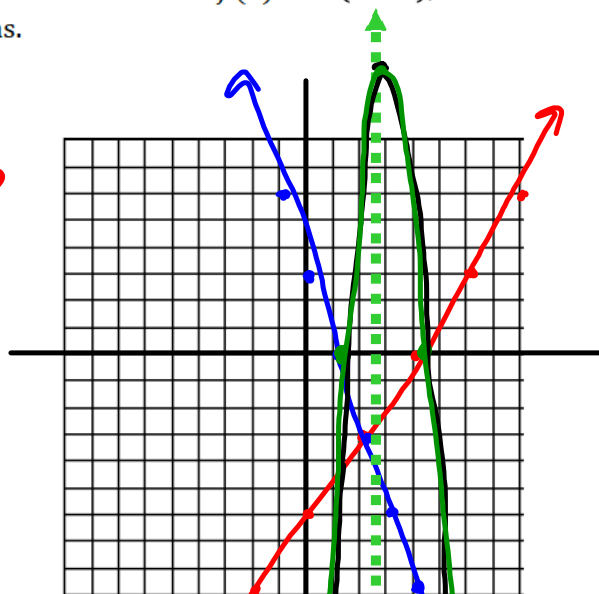
5. Choose any two **linear** functions and write them in the form: $f(x) = m(x - c)$, where m is the slope of the line. Graph the two functions.

Linear function 1:

$$\frac{3}{2}(x-4) = \frac{3}{2}x - 6$$

Linear function 2:

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



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?

$$\begin{aligned} \left(\frac{3}{2}x - 6\right)(-3x + 3) &= \left(\frac{3}{2}\right)(x-4)(-3)(x-1) \\ &= -\frac{9}{2}(x-4)(x-1) \end{aligned}$$

x-int: $x = 4, 1 \rightarrow (4, 0)$ & $(1, 0)$

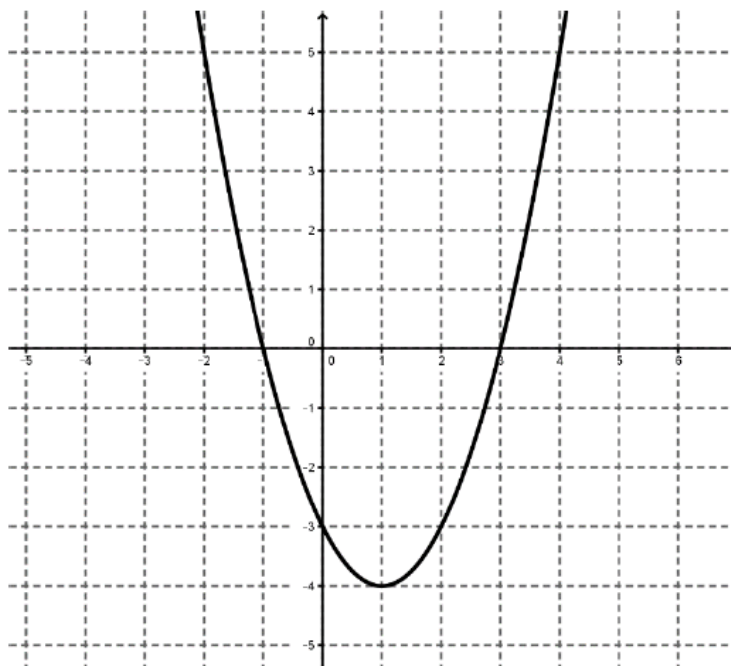
y-int: $-\frac{9}{2}(0-4)(0-1) = -\frac{9}{2}\left(\frac{4^2}{1}\right) = -18 \rightarrow (0, -18)$

Vertex: $f\left(\frac{5}{2}\right) = -\frac{9}{2}\left(\frac{5}{2} - 4\right)\left(\frac{5}{2} - 1\right) = -\frac{9}{2}\left(-\frac{3}{2}\right)\left(\frac{3}{2}\right)$
 $= \frac{81}{8} = 10\frac{1}{8}$

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?

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

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.

Homework

Finish 2.8 "Ready, Set, Go"

Finish pg 49
& pg 50-51