

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: $f(x) = a(x-h)^2 + k$
 stretch \downarrow
 vertex: (h,k)

20) $y = 1(x+2)^2 - 4 = (x-2)^2 + -4$
 vertex: $(-2, -4)$
 x-int: $(0,0)$ & $(4,0)$
 y-int: $(0,0)$
 stretch: 1

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

$$+4 \qquad +4$$

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

$$\pm 2 = x+2$$

$$\frac{-2}{-2} \qquad \frac{-2}{-2}$$

$$-2 \pm 2 = x$$

$-2+2$ and $-2-2$
 0 and -4
 $(0,0)$ and $(-4,0)$

y-int:
 $y = (0+2)^2 - 4$
 $= (2)^2 - 4$
 $= 4 - 4$
 $= 0$
 $(0,0)$

21) $0 = -3(x+6)^2 + 3$
 $\frac{-3}{-3} = \frac{-3(x+6)^2}{-3}$
 $\sqrt{1} = \sqrt{(x+6)^2}$
 $\pm 1 = x+6$
 $\frac{-6}{-6} \qquad \frac{-6}{-6}$
 $-6 \pm 1 = x$
 $-6+1$ and $-6-1$
 -5 and -7
 $(-5,0)$ and $(-7,0)$

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Factor Form: $a(x-d)(x-e)$
 opens \uparrow \downarrow
 stretch \rightarrow

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

Vertex:

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

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

Stretch: 4

x-int:

$0 = 4(x-2)(x+6)$

$x-2=0$ & $x+6=0$
 $\frac{+2}{+2}$ $\frac{-6}{-6}$

$x=2$ $x=-6$

vertex: $(-2,-64)$ $(2,0)$ $(-6,0)$

y-int:

$y = 4(0-2)(0+6)$

$= 4(-2)(6)$

$= -48$

$(0,-48)$

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

if $x=2$

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

$= 4(0)(8)$

$= 0$

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

$y = 4(-4)(4)$

$y = -64$

if $x=-6$

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

$= 4(-8)(0)$

$= 0$

2.8 Lining Up Quadratics

A Practice Understanding Task

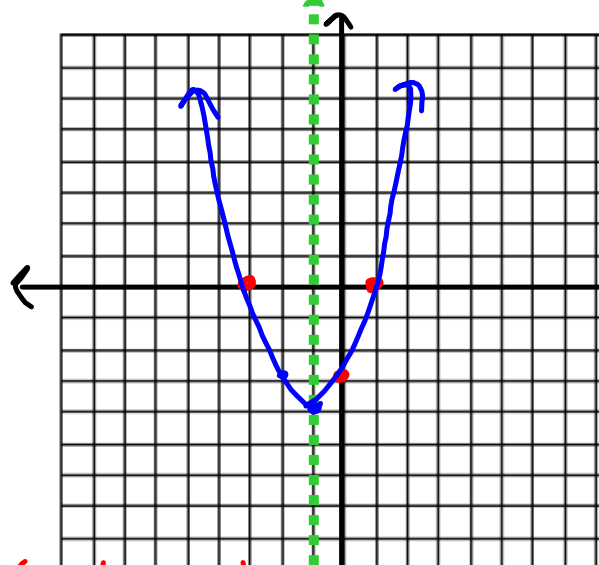
Graph each function and find the vertex, the y-intercept and the x-intercepts. Be sure to properly write the intercepts as points



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

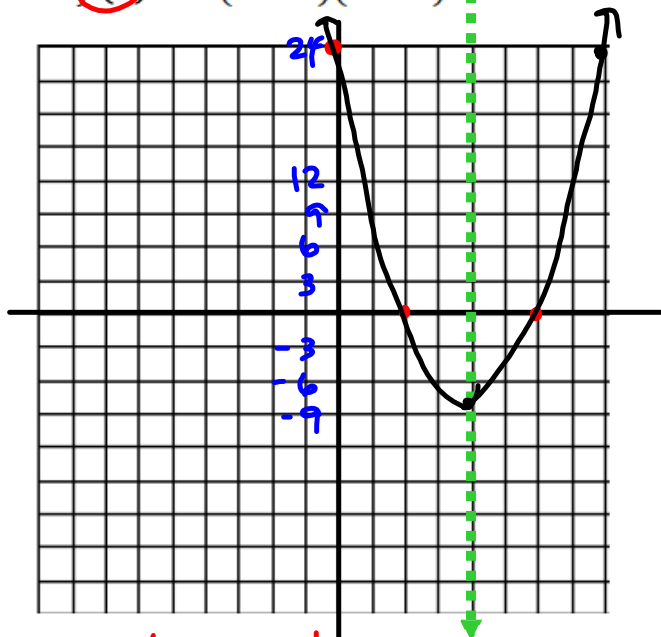
x-intercepts:
 $0 = (x - 1)(x + 3)$

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

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

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:

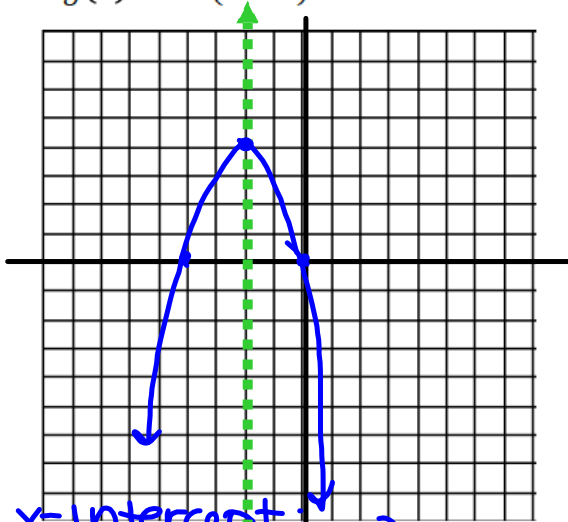
$$0 = \frac{2}{2} (x-2)(x-6)$$

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

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

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

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

p9.47

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?

The very middle of our 2 x-intercepts, which is also the average of our two x-intercepts, so add them together and divide by 2.

b. Find the vertex of the parabola?

The x-value of the vertex is the same as the axis of symmetry. To find the y-value of the vertex, plug the x into the equation and solve for y.

c. Find the x-intercepts of the parabola?

From $a(x-d)(x-e)$, the x-intercepts are what x-values make $(x-d)$ and $(x-e)$ equal 0.

d. Find the y-intercept of the parabola?

Plug 0 in for x and solve for y.

e. Find the vertical stretch?

From $a(x-d)(x-e)$, the stretch is a.

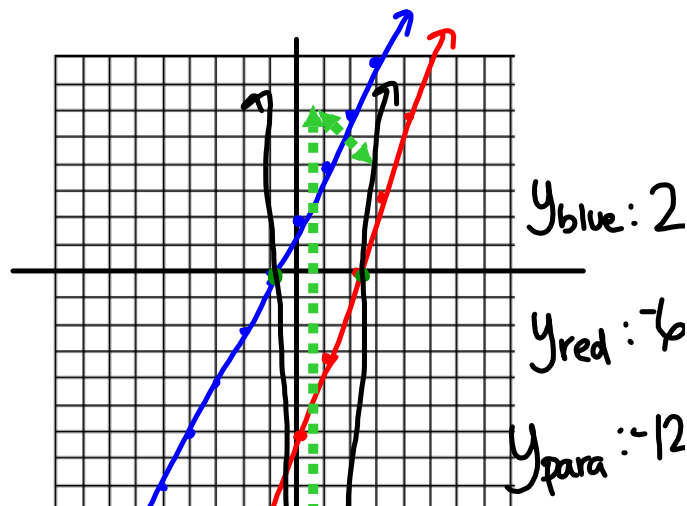
5. Choose any two **linear** functions and write them in the form: $f(x) = m(x - c)$, where m is the slope of the line. Graph the two functions.

Linear function 1:

$$2(x+1) = 2x+2$$

Linear function 2:

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



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?

$$P(x) = (2x+2)(3x-6) = 2(x+1)3(x-2) = 6(x+1)(x-2)$$

AoS: $x = \frac{1}{2}$
 y-int: $y = 6 \cdot 1 \cdot -2$
 $y = -12$
 $(0, -12)$

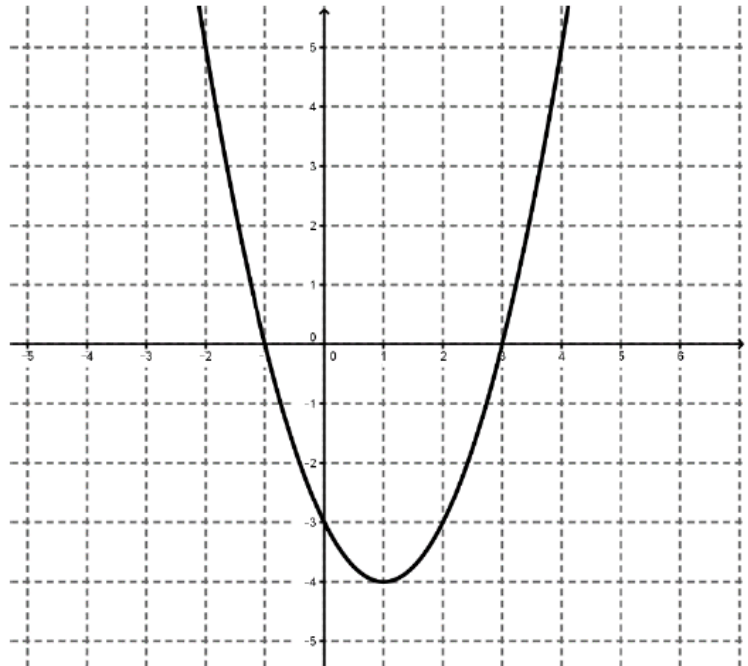
Vertex: $(\frac{1}{2},)$

$$y = 6 \left(\frac{1}{2} + 1 \right) \left(\frac{1}{2} - 2 \right) = \frac{3}{1} \left(\frac{3}{2} \right) \left(-\frac{3}{2} \right) = \frac{3 \cdot 3 \cdot -3}{1 \cdot 1 \cdot 2} = -\frac{27}{2} = -13.5$$

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"