

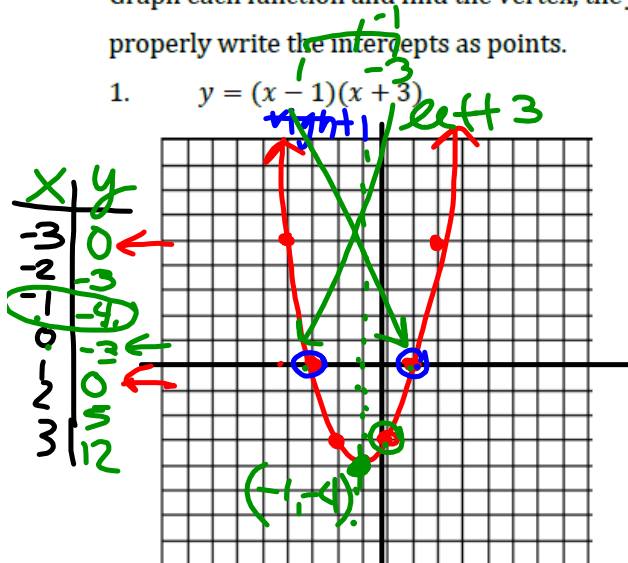
2.9 Lining Up Quadratics

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.

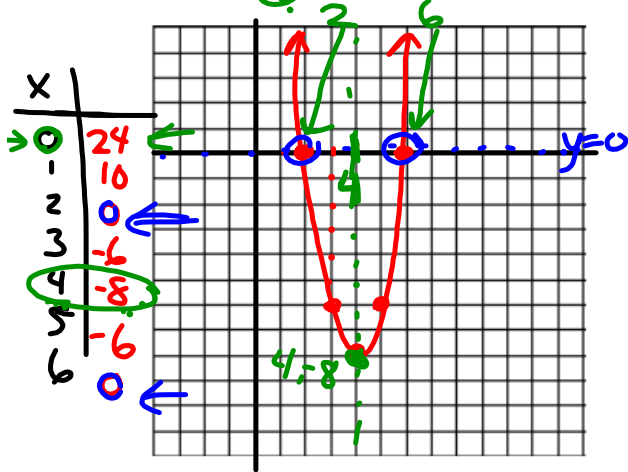
1. $y = (x - 1)(x + 3)$



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

$(1, 0) \rightarrow \text{sub } y=0$
 $(x-1)(x+3)=0$
 ↑ ↑
 -3

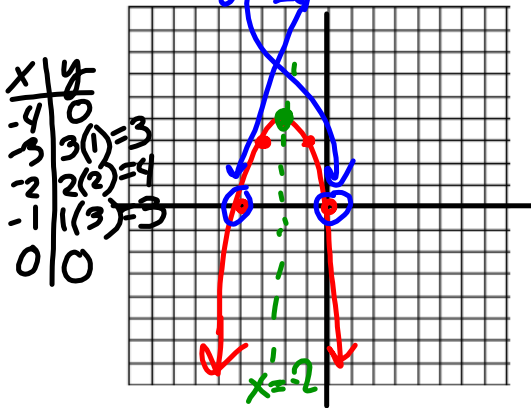
2. $f(x) = 2(x - 2)(x - 6)$ right



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

$(6, 0) \leftarrow \text{sub } y=0$
 $x^{\text{sub}} = 0$

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



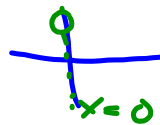
Line of Symmetry $x = -2$
 Vertex $(-2, 4)$
 x-intercepts $(0, 0)$ $(-4, 0)$
 y-intercept $(0, 0)$

find middle between the 2 x-intercepts

$x = -2$
 $(-2, \quad) = (-2, 4)$
 $-x(x+4) = y$
 $-2(-2+4) = 4$

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?
find distance between x-intercepts.
 $x = \frac{\quad}{2}$
- b. Find the vertex of the parabola?
use line of sym. $x = \quad$
- c. Find the x-intercepts of the parabola?
substitute $x = \quad$ into your equation.
sub $y = 0$, opposite of the factor makes it = 0.
- d. Find the y-intercept of the parabola?
sub $x = 0$
- e. Find the vertical stretch?
 $a(x)$
↑ big = steep
small = wide



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.

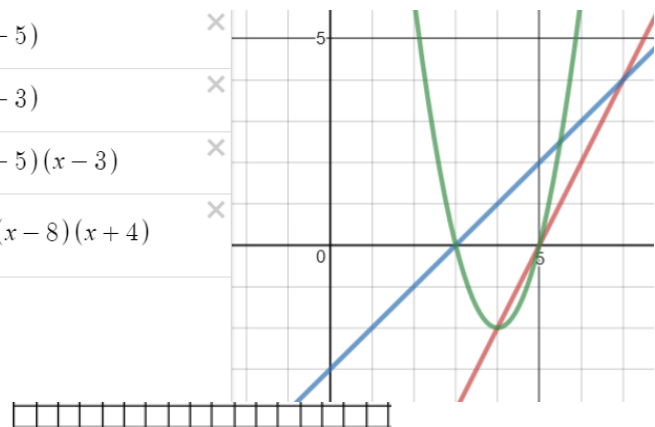
Linear function 1:

$$2(x-5) \\ = 2x-10$$

Linear function 2:

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

- $2(x - 5)$
- $1(x - 3)$
- $2(x - 5)(x - 3)$
- $-\frac{1}{2}(x - 8)(x + 4)$

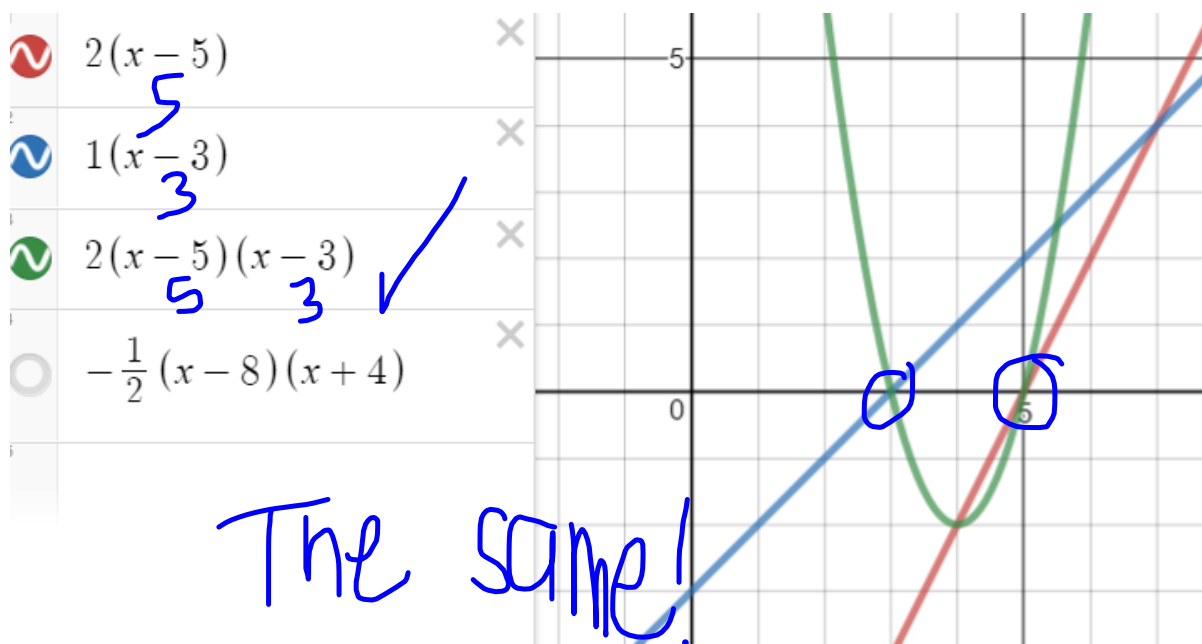


6. On the same graph as #5, graph the function $P(x)$ that is the product of the two linear functions that you have chosen. What shape is created?

parabola

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?

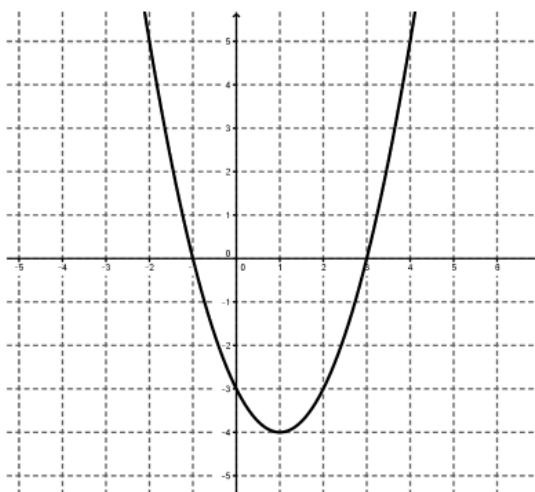
The x -intercepts of the linear parts are the same when multiplied to become quadratic.



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?

SKIP

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.

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

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.

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

SECONDARY MATH II // MODULE 2
STRUCTURES OF EXPRESSIONS - 2.9

2.9

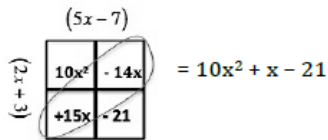
READY, SET, GO!	Name _____	Period _____	Date _____
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READY

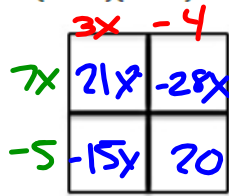
Topic: Multiplying Binomials Using a Two-Way Table

Multiply the following binomials using the given two-way table to assist you.

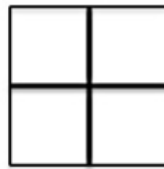
Example: $(2x + 3)(5x - 7)$



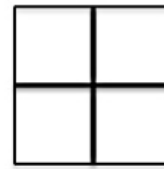
1. $(3x - 4)(7x - 5)$



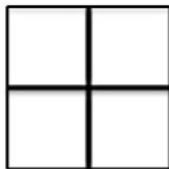
2. $(9x + 2)(x + 6)$



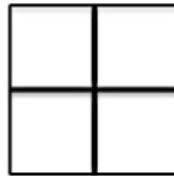
3. $(4x - 3)(3x + 11)$



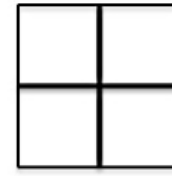
4. $(7x + 3)(7x - 3)$



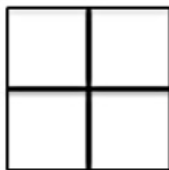
5. $(3x - 10)(3x + 10)$



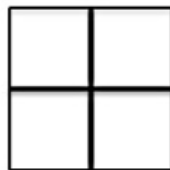
6. $(11x + 5)(11x - 5)$



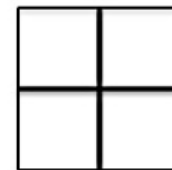
7. $(4x + 5)^2$



8. $(x + 9)^2$



9. $(10x - 7)^2$



10. The "like-term" boxes in #'s 7, 8, and 9 reveal a special pattern. Describe the relationship between the middle coefficient (**b**) and the coefficients (**a**) and (**c**).

Topic: Factored Form of a Quadratic Function

SMART In

Given the factored form of a quadratic function, identify the vertex, intercepts, and vertical stretch of the parabola.

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

a. Vertex: $(2, -64)$

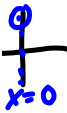
b. x-inter(s) $2, -6$

c. y-inter $\frac{4(0-2)(0+6) = -48$
sub $\frac{4(-2)(6) = -48$

d. Stretch 4

e. middle $-6 \quad +3$
 $-2 = x$

$4(-2-2)(-2+6) = 4(-4)(4) = -64$



12. $y = -3(x + 2)(x - 6)$

a. Vertex: _____

b. x-inter(s) _____

c. y-inter: _____

d. Stretch _____

13. $y = (x + 5)(x + 7)$

a. Vertex: _____

b. x-inter(s) _____

c. y-inter _____

d. Stretch _____

14. $y = \frac{1}{2}(x - 7)(x - 7)$

a. Vertex: _____

b. x-inter(s) _____

c. y-inter _____

d. Stretch _____

15. $y = -\frac{1}{2}(x - 8)(x + 4)$

a. Vertex: $(2, 18)$

b. x-inter(s) $-4, 8$

c. y-inter: $\frac{1}{2}(-8)(4) = 16$

d. Stretch $-\frac{1}{2}$ wide

e. middle $-4 \quad +8$

$-\frac{1}{2}(2-8)(2+4) = 18$ $(2, 18)$

16. $y = \frac{3}{5}(x - 25)(x - 9)$

a. Vertex: _____

b. x-inter(s) _____

c. y-inter _____

d. Stretch _____

17. $y = \frac{3}{4}(x - 3)(x + 3)$

a. Vertex: _____

b. x-inter(s) _____

c. y-inter _____

d. Stretch _____

18. $y = -(x - 5)(x + 5)$

a. Vertex: _____

b. x-inter(s) _____

c. y-inter: _____

d. Stretch _____

19. $y = \frac{2}{3}(x + 10)(x + 10)$

a. Vertex: _____

b. x-inter(s) _____

c. y-inter _____

d. Stretch _____

GO

Topic: Vertex Form of a Quadratic Equation

Given the vertex form of a quadratic function, identify the vertex, intercepts, and vertical stretch of the parabola

20. $y = 1(x + 2)^2 - 4$

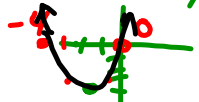
a. Vertex: $(-2, -4)$

b. x-inter(s) $(0, 0)$ $(-4, 0)$

c. y-inter $(2)^2 - 4 = 0$

d. Stretch $1, \text{none}$

Handwritten notes: $(x+2)(x+2) - 4 = x^2 + 4x + 4 - 4 = x^2 + 4x$
 def down $x^2 + 4x$
 $x(x+4)$
 sub $x=0$ $(2)^2 - 4 = 0$



21. $y = -3(x + 6)^2 + 3$

a. Vertex: _____

b. x-inter(s) _____

c. y-inter: _____

d. Stretch _____

22. $y = 2(x - 1)^2 - 8$

a. Vertex: _____

b. x-inter(s) _____

c. y-inter _____

d. Stretch _____

23. $y = 4(x + 2)^2 - 64$

a. Vertex: _____

b. x-inter(s) _____

c. y-inter _____

d. Stretch _____

24. $y = -3(x - 2)^2 + 48$

a. Vertex: $(2, 48)$

b. x-inter(s) $(6, 0)$ $(-2, 0)$

c. y-inter: 36

d. Stretch -3 steep

25. $y = (x + 6)^2 - 1$

a. Vertex: _____

b. x-inter(s) _____

c. y-inter _____

d. Stretch _____

Handwritten work for problem 24:

$-3(x-2)(x-2) + 48$
 $-3(x^2 - 4x + 4) + 48$
 $-3x^2 + 12x - 12 + 48$
 $-3x^2 + 12x + 36 \dots \text{now factor}$
 $-3(x^2 - 4x - 12)$
 $-3(x-6)(x+2)$
 x-inter 6 -2

Vertex: middle 2 A.O.S. sym \rightarrow sub $x=2$ vertex $(2, 48)$

$-3(2-2)^2 + 48$
 $-3(0) + 48 = 48$

y-inter: sub $x=0$
 $-3(0-2)^2 + 48 = 36$ $(0, 36)$

26. Did you notice that the parabolas in problems 11, 12, & 13 are the same as the ones in problems 23, 24, & 25 respectively? If you didn't, go back and compare the answers in problems 11, 12, & 13 and problems 23, 24, & 25.

Prove that a. $4(x - 2)(x + 6) = 4(x + 2)^2 - 64$

b. $-3(x + 2)(x - 6) = -3(x - 2)^2 + 48$

c. $(x + 5)(x + 7) = (x + 6)^2 - 1$