

UNIT 5: QUADRATICS II

- Learning Goals**
- review expanding
 - review simplifying
 - review factors
 - review solving equations

PRE-REQUISITE SKILLS

Expand (multiplication).

$$4(3x + 7)$$

$$= 12x + 28$$

$$-2x(5x - 7)$$

$$= -10x^2 + 14$$

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

$$= 7x^3 + 35x$$

Simplify (combine like terms).

$$\underline{2x^2} + \underline{6x} + \underline{5} - \underline{8x^2} + \underline{7x} - \underline{2}$$

$$= -6x^2 + 13x + 3$$

$$\underline{2ab} + 5a - \underline{4b} + \underline{3ba} - \underline{7b}$$

$$= 5ab - 11b + 5a$$

Expand and Simplify

$$6(x + 8) - 2(3x - 9)$$

$$= 6x + 48 - 6x + 18$$

$$= 66$$

$$6x^2(x^5 + 2x^3) + 3x^7 - 8x^5$$

$$= \underline{6x^7} + \underline{12x^5} + \underline{3x^7} - \underline{8x^5}$$

$$= 9x^7 + 4x^5$$

List the factors

10 → 1, 2, 5, 10

12 → 1, 2, 3, 4, 6, 12

27 → 1, 3, 9, 27

49 → 1, 7, 49

-81 → ± 1, 3, 9, 27, 81

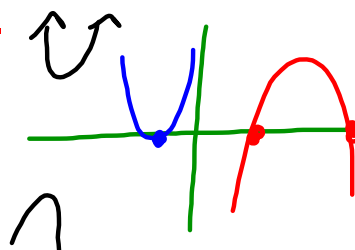
Find two integers with

| Product | Sum | Integers |
|-----------|-----|----------|
| 15 | 8 | 3, 5 |
| <u>-8</u> | -2 | 2, -4 |
| -8 | 2 | -2, 4 |
| -18 | 3 | 6, -3 |
| 12 | -7 | -3, -4 |

4) Recall intercepts:

y-intercept -> where a line crosses the y-axis
 -> where $x = \underline{0}$
 -> a parabola always has 1 y-int.

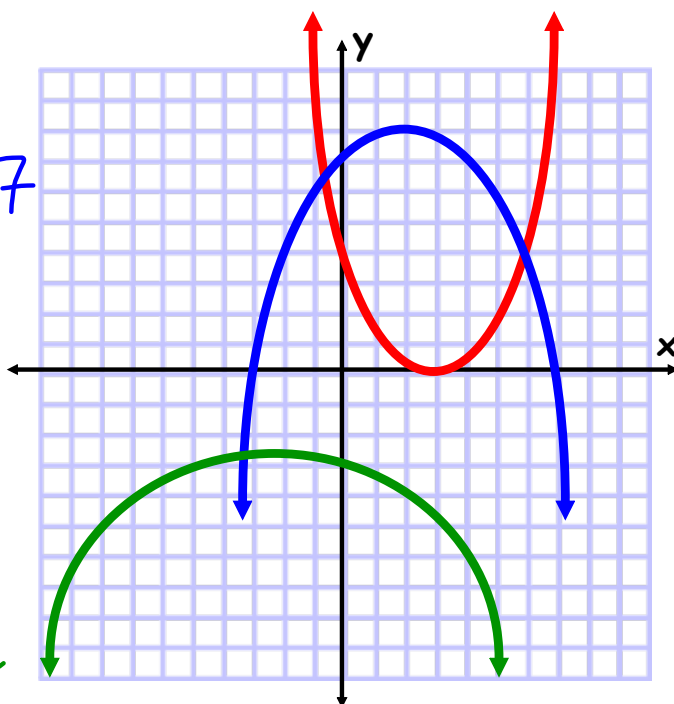
x-intercept -> where a line crosses the x-axis
 -> where $y = \underline{0}$
 -> a parabola may have two, one, or no x-int(s).

**Examples:**

a) y-int = 7
 x-int = -3, 7

b) y-int = 4
 x-int = 3

c) y-int = -3
 x-int = none



Find the y-intercept, **algebraically** (let $x = 0$).

$$y = 4(x - 3)^2 + 15$$

$$y = -4x^2 + 7x - 8$$

$$\left. \begin{aligned} &= 4(0 - 3)^2 + 15 \\ &= 4(-3)^2 + 15 \\ &= 4(+9) + 15 \\ &= 36 + 15 \\ &= 51 \end{aligned} \right\} \begin{aligned} &-4(0)^2 + 7(0) - 8 \\ &= 0 + 0 - 8 \\ &= -8 \end{aligned}$$

Solve for x.

$$x + 7 = 13$$

$$\textcircled{2} \quad 3x + 5 = -4$$

$$x + 7 - 7 = 13 - 7$$

$$x = 6$$

$$3x = -9$$

$$\frac{3x}{3} = \frac{-9}{3}$$

$$x = -3$$

Common Factor

$$2,3 \quad 1,3$$

$$6x+3$$

$$10x+5y$$

$$= 3(2x+1) = 5(2x+y)$$

$$12a^2+6a+4a^3$$

$$= 2a(6a+3+2a^2)$$

← subtract

Difference of Squares

$$a^2-9$$

$$a^4-16$$

$$= (a-3)(a+3)$$

variables
with even
exponents

number

$$\begin{array}{l} 1^2 = 1 \\ 2^2 = 4 \\ 3^2 = 9 \end{array}$$

$$(a^2-4)(a^2+4)$$

On the Boards...

1. Simplify.

- a) $6(3x)$ b) $-9(-15x)$
 c) $11(-8x)$ d) $1.5(3x)$

2. Simplify.

- a) $4x^2 - 3x + 9x^2 + 7x$
 b) $3x + 2 - 5x + 15$
 c) $10x^2 - 12x - 7x + 9$
 d) $5x^2 - 3x + 5 - 7x^2 + 4x - 10$

3. Expand and simplify.

- a) $4(x + 16)$ b) $3x(17 + 2x)$
 c) $-7x(12x - 3)$ d) $10x(4x - 5)$

10. List the factors of each number.

- a) 24 b) 81
 c) 30 d) -18

11. Find two integers with each product and sum.

| | Product | Sum |
|----|---------|-----|
| a) | 21 | 10 |
| b) | 12 | 8 |
| c) | 20 | 12 |
| d) | 32 | 18 |
| e) | 50 | 27 |
| f) | -20 | 1 |
| g) | -64 | 0 |
| h) | -64 | -12 |

12. Solve for x .

- a) $3x = 15$ b) $17 = x + 4$
 c) $x - 15 = 22$ d) $-5x = 65$
 e) $4x - 7 = 21$ f) $-9x + 22 = -50$
 g) $5x + 15 = 2x$ h) $-9x = 6x + 30$

13. Find the greatest common factor, then factor each expression.

- a) $3x + 9$ b) $5x + 20 = 5(x + 4)$
 c) $7x - 35$ d) $-8x - 48 = -8(x + 6)$
 e) $x^2 - 4x$ f) $4x^2 + 24x = 4x(x + 6)$
 g) $-15x^2 + 27x$ h) $20x^2 - 55 = 5(4x^2 - 11)$

Homework

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