Algebra 1 Unit 1
The Toolbox Unit

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Title **Page #**

This packet belongs to:

____

Georgia Milestones
Assessment System

Algebra 1 Formula Sheet

Below are the formulas you may find useful as you take the test. However, you may find that you do not need to use all of the formulas. You may refer to this formula sheet as often as needed.

Linear Formulas

Slope Formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Linear Equations

Slope-intercept Form: $y = mx + b$

Point-slope Form: $y - y_1 = m(x - x_1)$

Standard Form: $Ax + By = C$

Arithmetic Sequence Formulas

Recursive: $a_n = a_{n-1} + d$

Explicit: $a_n = a_1 + (n - 1)d$

Geometric Sequence Formulas

Recursive: $a_n = r(a_{n-1})$

Explicit: $a_n = a_1 \cdot r^{n-1}$

Compound Interest Formula

$$A = P\left(1 + \frac{r}{n}\right)^{nt}$$

Quadratic Formulas

Quadratic Equations

Standard Form: $y = ax^2 + bx + c$

Vertex Form: $y = a(x - h)^2 + k$

Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Average Rate of Change

The change in the y-value divided by the change in the x-value for two distinct points on a graph.

Statistics Formulas

Mean

$$\bar{x} = \frac{x_1 + x_2 + x_3 + \ldots + x_n}{n}$$

Interquartile Range

$IR = Q_3 - Q_1$

The difference between the first quartile and third quartile of a set of data.

n

The sum of the distances between each data value and the mean, divided by the number of data values.

Write your Questions here!

Lesson 1 – 1: Function Notation and Evaluating Expressions

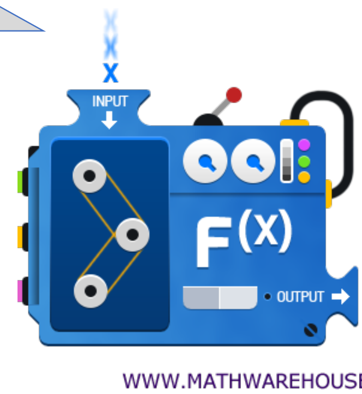
Learning Target(s):

- **I can read and write functions in function notation.**
- **I can use the order of operations to evaluate expressions**

F.IF.1, F.IF.2, A.APR.1

Vocabulary:
- Algebra
- Equation
- Evaluate
- Expression
- Function
- Ordered Pair
- Variable

Begin 1-1 Video 1



A ________________ is a special type of relationship between two sets of numbers that makes it possible for us to know what value will be produced when a specific value is plugged in. It's like a machine that you feed numbers into and get answers back out.

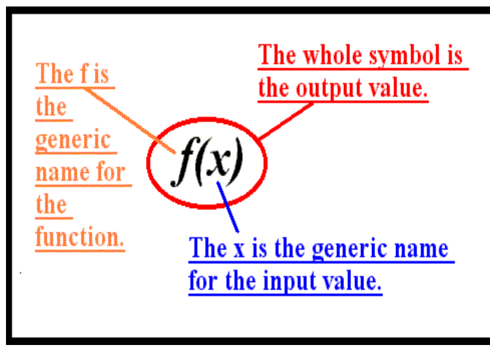
In past math courses, most equations you have dealt with have been written with x's and y's. When writing equations for functions, we often use a specific format called ________________.

We are used to writing equations where __ is a function of ___.

In function notation, we write equations where ____ is a function of ___.

Really, the only difference between function notation and what we are used to writing is that we use *f(x)* instead of y.

So if we had the equation $y = 5x + 9$, in function notation we would write this as __________



Often times, we are asked to evaluate functions at a specific point using function notation. Let's take a look at an example.

Example 1:

If $f(x) = 7x$, find *f(2).*

Write your Questions here!

You try:

1. If $f(x) = x + 9$, find $f(-4)$

2. If $g(x) = \frac{x}{3}$, find $g(27)$

Begin 1-1 Video 2

We can also write ordered pairs in function notation.

Example 2:
Write the following order pair in function notation: (9,-7).

Example 3: Translate the following statement into an ordered pair: $h(3) = 12$.

You try:
Write the following ordered pairs in function notation.

1. (0, 0)
2. (2, -3)
3. (-6,7)

Translate the following statement into an ordered pair.

4. $f(2) = -2$
5. $g(0) = 9$
6. $h(-3) = -3$

Begin 1-1 Video 3

Example 4: $(3-5)^2 + \frac{20}{2} - 3(3)$

G.E.M.S.
G
E
M
S

Write your Questions here!

You Try:

1. $(-7 + 3 \bullet 8) \div -7$

2. $(-4 + 2)^2 + -1 + 7$

Begin 1-1 Video 4

An expression containing variables, numbers, and operation symbols is called an _______________________. $5x + 3y + 8$ is an example of an algebraic expression. Expressions do not have ___________. Algebraic expressions can be evaluated for given values. To evaluate for a given value, we ________________ the given number for the matching ______________.

Example 5: $f(x) = 3x^2 + 1$; find $f(4)$

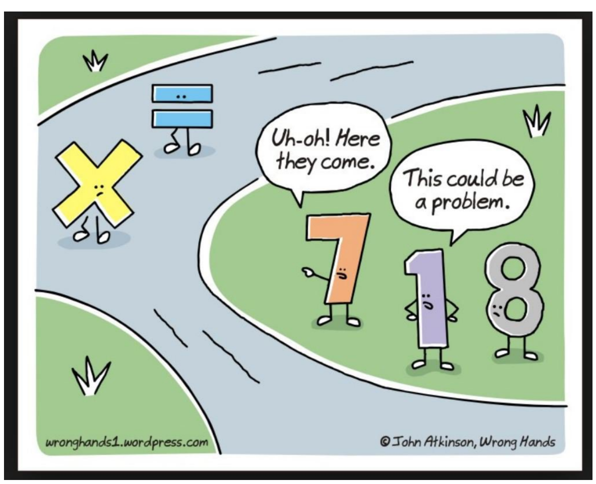
Example 6: $m(p - 7^2 - 10 \div 2)$; use $m = 5$ and $p = -2$

You try:

Evaluate each expression or equation for the given value.

1. $yx + y + z$; use $x = 3$, $y = 4$, and $z = 2$

2. If $k(x) = (x + 2)^2$, find $k(3)$



Practice 1-1 Order of Operations & Evaluating Expressions:

Use the functions below to answer questions 1 – 6.

$\boldsymbol{f(x) = x - 5}$ $\boldsymbol{g(x) = x^3 - 4}$ $\boldsymbol{h(x) = 3x - 6}$

$\boldsymbol{j(x) = x^2 + 3x + 2}$ $\boldsymbol{k(x) = (x + 2)^2}$ $\boldsymbol{m(x) = \sqrt{x - 2}}$

1. Find $f(1)$.
2. Find $g(-2)$.
3. Find $h(0)$.
4. Find $j(k)$.
5. Find $k(-5)$.
6. Find $m(18)$.

Translate the following statements into ordered pairs.

7. $f(-1) = 1$
8. $h(2) = 7$
9. $-1 = g(1)$
10. $j(0) = 0$

Simplify the following expressions:

11. $-9 - (42 - 17) \bullet -4$
12. $7(7 - (12 \bullet 2) + 8)$

13. Add parentheses to the expression below so that it equals 6 when simplified.

$$15 + 9 \div 3 - 2$$

14. Add parentheses to the expression below so that it equals 16 when simplified.

$$15 + 9 \div 3 - 2$$

Evaluate the following expressions using the values given:

15. $y - x + z^2$; use $x = 2$, $y = 5$, and $z = -1$

16. $y^2 - (x + 3^3)$; use $x = -8$ and $y = 3$

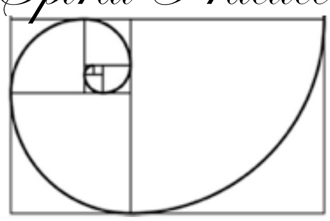
17. $z^2(z \div 3 - y)$; use $y = 1$ and $z = -3$

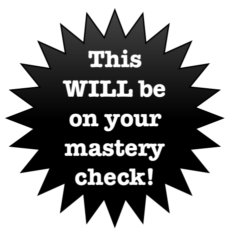
18. $b \bullet a \div 3 - (a + 5)$; use $a = 9$ and $b = -9$

19. $x(z - (y + z - 6))$ use $x = 10$, $y = 10$, and $z = -6$

20. $2x^2 - 6x + 1$ if $x = -3$

Spiral Practice





21. We can rewrite subtraction problems as addition problems by doing what? (example: 3 – 8 and 2 – -5)

22. Describe the rules for adding integers (positive and negative numbers):
    a. Positive + Positive = ________________
    b. Negative + Negative = ________________
    c. Positive + Negative (this one requires a little more explanation)

23. Tell the rules for multiplying or dividing integers:
    a. Positive • Positive or Positive ÷ Positive = ________________
    b. Negative • Negative or Negative ÷ Negative = ________________
    c. Positive • Negative or Positive ÷ Negative = ________________

24. Mt. Everest, the highest elevation in Asia, is 29,028 feet above sea level. The Dead Sea, the lowest elevation, is 1,312 feet below sea level. What is the difference between these two elevations? (write an expression to represent the situation and evaluate)

Write your Questions here!

Lesson 1 – 2: Adding and Subtracting Polynomials

Learning Target(s):

- **I can add and subtract polynomials.**

A.APR.1

Begin 1-2 Video 1

Terms can only be added or subtracted when they have the same variable <u>and</u> degree!

Adding polynomials is just a matter of ______________________, with some ________________ considerations thrown in.

Example 1: Simplify $(2x + 5y) + (3x - 2y)$

You try:

1. $(-4x^2 + 4x - 5) + (8x^2 - x - 7)$

2. $(2p^2 - 3p + 7) + (7p^2 + 8p + 7)$

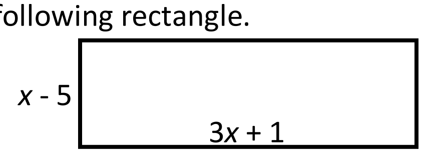
Begin 1-2 Video 2

One possible application for this skill is found in geometry.

Example 2: In a given triangle, the largest side is twice the length of the smallest side. The other side (that is not the smallest or the largest) is 2 units longer than the shortest side. Write an expression that represents the perimeter of the triangle. Let *x* represent the length of the smallest side.

You try:

1. Write an expression for the perimeter of the following rectangle.



Write your Questions here!

Begin 1-2 Video 3

Subtracting polynomials is quite similar to adding polynomials, but you have that pesky minus sign to deal with.

The first thing I have to do is ________________ that negative through the parentheses. You might find it helpful to put a "1" in front of the parentheses, to help them keep track of the minus sign:

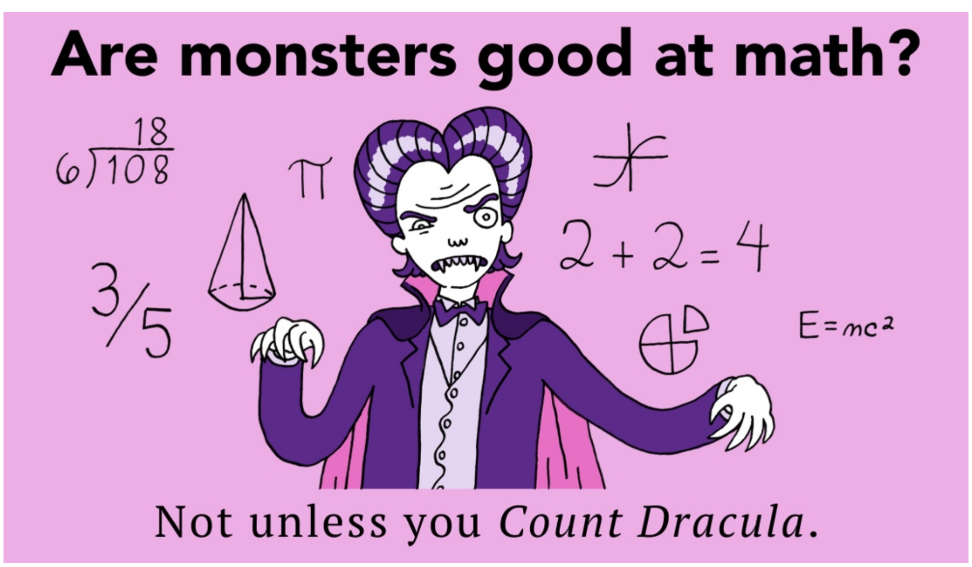
Example 3:

Simplify $(x^3 + 3x^2 + 5x - 4) - (3x^3 - 8x^2 - 5x + 6)$

You try:

1. $(-4x^2 + 7x - 5) - (8x^2 - x - 7)$

2. $(2p^2 - 3p + 7) - (7p^2 + 8p + 7)$



Practice Makes Better

Practice 1-2 Adding and Subtracting Polynomials

Add the following polynomials. Simplify answers by combining like terms and putting answers in standard form.

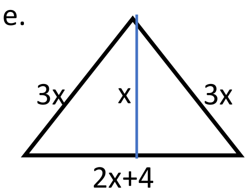
1. $(-5 - 4x^2 + 4x) + (-x + 8x^2 - 7)$

2. $(-3 + 3x^2 + 8x) + (5x + 1 - 4x^2)$

3. $(x + 4) + (-3x^2 - x + 5) + (8x^2 + 2x)$

4. $(7b^2 + 3 + 2b) + (5 + 5b)$

5. Write an expression for the perimeter of the given triangle.



6. The length of a rectangle is 5 inches longer than its width. Write an expression to represent the perimeter. Let *x* represent the width.

Subtract the following polynomials. Simplify answers by combining like terms and putting answers in standard form.

7. $(-11 - 7x^2 + 7x) - (-x + 8x^2 - 7)$

8. $(-3 + 3x^2 + 8x) - (11x + 1 - 7x^2)$

9. $(-2n^2 - 6) - (-7n^2 + 8n) - (-8 + 7n^2)$

10. $(-1 - 11m) - (-7m + 7m^2)$

Add or Subtract the following polynomials. Simplify answers by combining like terms and putting answers in standard form.

11. $(-2n^2 - 6 - 5n) + (-4n^2 + 8n)$

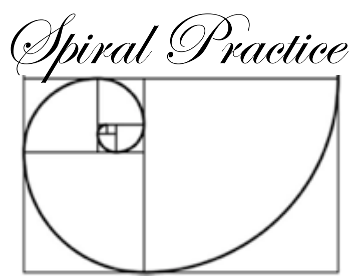
12. $(x^2 - 7x + 7) + (-3 - 5x - 2x^2)$

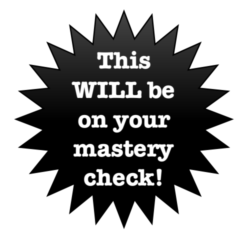
13. $(x^2 - 7x) - (-3 - 11x - 2x^2)$

14. $(7b^2 + 3) + (2b) - (11 + 11b)$

15. $(x - 11x^2) - (-x + 1) + (-2 + 8x^2)$

16. $(6 - 6n) + (-n - 11n^2 - 3)$





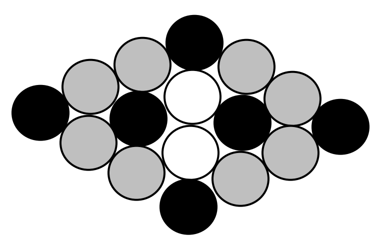
17. Change $\frac{16}{6}$ to a mixed number.

____

Change $6\frac{3}{4}$ to an improper fraction.

____

18. What portion of the stones are white? Write your answer as a fraction **in lowest terms**, a decimal, and a percent.



Fraction: __________ Decimal: __________ Percent: __________

19. What is 5% of $120?

20. Show your steps for dividing fractions: 2/3 ÷ 1/6

21. Look at these 10 terms. Let's find all the like terms that can be combined.

$3x^2y$ $\quad 2x^2y^2$ $\quad -2xy^2$

$4xy^2$ $\quad -7x^2yz$ $\quad \frac{1}{3}xy$

$-8x^2y$ $\quad -\frac{1}{3}x^2y$

$-\frac{4}{5}xy^2$ $\quad -5xy^2z$

	all these terms have $\mathbf{x^2y}$
	all these terms have $\mathbf{xy^2}$
	this is the only $\mathbf{x^2yz}$ term
	this is the only **xy** term
	all these terms have $\mathbf{x^2y^2}$
	this is the only $\mathbf{xy^2z}$ term

Historical Note:

Muhammad ibn Musa al-Khwarizmi is regarded as the "Father of Algebra" Al-Khwarizmi was a Muslim Mathematician and astronomer that lived from 780-850. He is responsible for introducing Hindu-Arabic numerals. (The numbers we use today.) His work *Al-Kitab al-mukhtasar fi hisab al-jabr wa'l-muqabala* was translated into Latin in the 12th Century. It is from this translation that the title and term Algebra was derived.

Write your Questions here!

Lesson 1-3: Exponent Properties/Multiplying Polynomials/GCF

Learning Targets:

- **I can use the properties of exponents to simplify algebraic expressions.**
- **I can multiply polynomials.**
- **I can find the greatest common factor of a set of algebraic terms.**

A.APR.1, F.IF.8

Vocabulary:
- Greatest Common Factor

Begin 1-3 Video 1

Exponent Properties

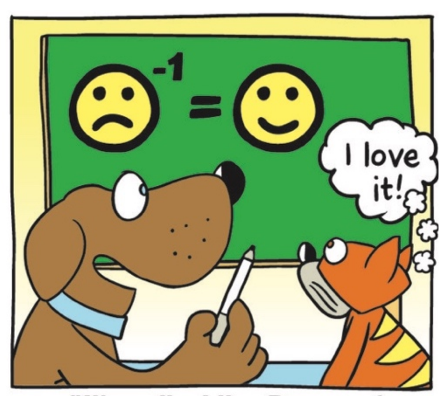
Property Name	Definition	Example
Exponent of 1	$a^1 = a$	
Zero Exponent	$a^0 = 1$	
Product of Powers	$a^m \bullet a^n = a^{m+n}$	
Negative Exponent	$a^{-m} = \dfrac{1}{a^m}$	

You Try!

1. 23^0
2. $4x^2 \bullet 6x^3$
3. $27x^{-3}$
4. 0^1

Historical Note:

The first recorded modern use of an exponent in mathematics was in a book called *Arithemetica Integra*, written in 1544 by English author and mathematician Michael Stifel.

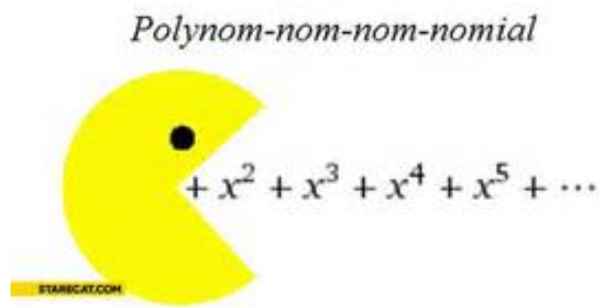


"It's called the *Power of Negative One*, Descartes!"

Write your Questions here!

Begin 1-3 Video 2

Multiplying Polynomials



Remember back to the previous lesson where we talked about adding and subtracting polynomials. In this lesson, we are going to throw in another operation to our repertoire of polynomial skills: multiplying polynomials.

The very simplest case for polynomial multiplication is the product of two monomials. For instance:

Example 1: Simplify $(5x^2)(-2x^3)$
We've already done this type of multiplication when learning about exponents.

The next step up in complexity is a monomial times a multi-term polynomial. For example:

Example 2: Simplify $-3x(4x^2 - x + 10)$

To do this, we have to distribute the $-3x$ through the parentheses:

You try!

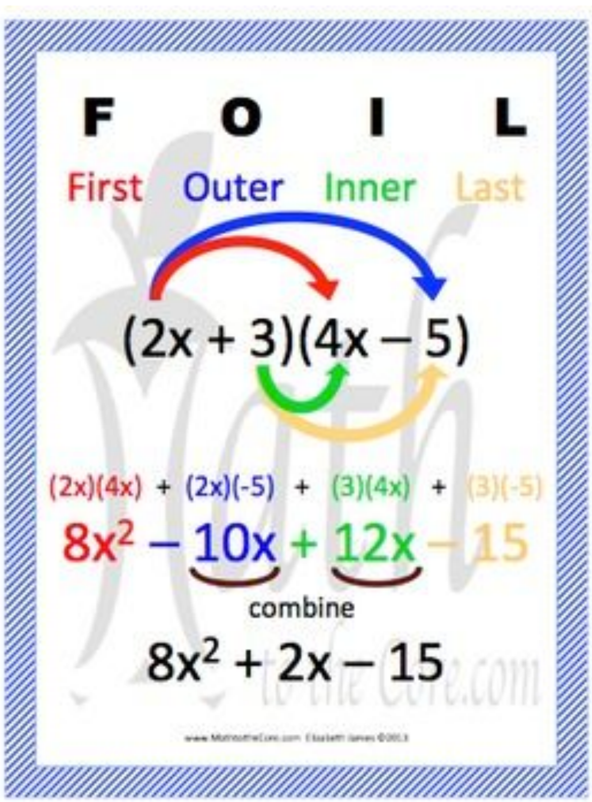
1. $6p(4p)$ 2. $3x^4(2x^3)$ 3. $4x(3x^2 - 5x + 6)$ 4. $2x^2(3x + 4)$

Write your Questions here!

Begin 1-3 Video 3

The next step up is a ______________ times a ________________. This is one of the most common polynomial multiplications that you will be doing.

Example 3: Simplify $(x + 3)(x + 2)$



You Try!

1. $(4r - 1)(7r - 3)$

2. $(4v + 8)(4v - 1)$

3. $(2r + 7)(3r - 6)$

4. $(5b - 6)(3b + 5)$

Write your Questions here!

Begin 1-3 Video 4

Finally, we will multiply a binomial times a trinomial. Just like in a binomial times a binomial, we will distribute the terms in the first binomial to those in the trinomial.

Example 4:

$$(2b + 4)(5b^2 - 3b - 1)$$

You Try!

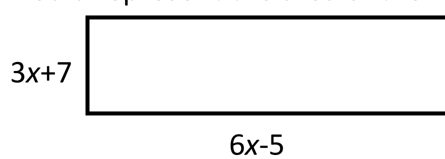
1. $(4x - 2)(5x^2 + 3x + 5)$

2. $(2r - 5)(5r^2 + r - 3)$

Begin 1-3 Video 5

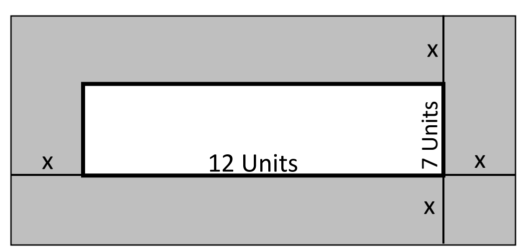
Example 5

1. Determine an expression that would represent the area of the figure shown below:



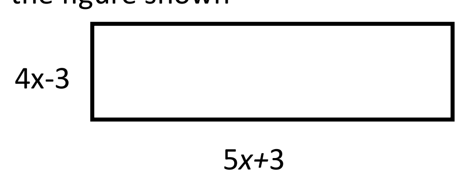
Example 6

2. Determine an expression that would represent the area of the shaded region below:



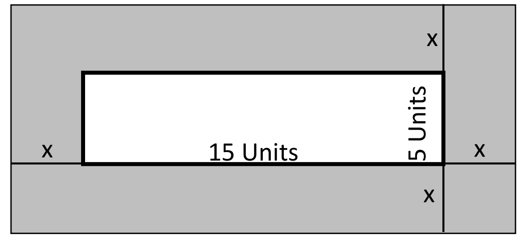
You Try!

1. Determine an expression that would represent the area of the figure shown below:



Write your Questions here!

2. Determine an expression that would represent the area of the shaded region below:

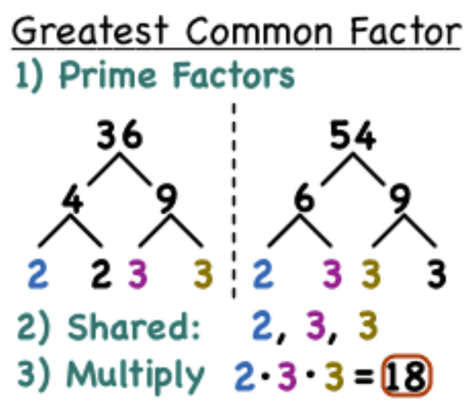


Begin 1-3 Video 6

Greatest Common Factor

Another tool you will need in your mathematician's tool belt is finding the Greatest Common Factor (GCF) of a set of numbers.

Remember, in math, a __________ is anything that is being multiplied by something else.



There are 3 simple steps to finding the GCF:

1. Find the ____________________ of each number.

2. Identify the__________ that are present in each number.

3. Multiply the _______________________ together.

Example 1:
Find the GCF: $12v^2$ and $18v$

Example 2:
Find the GCF: $2x^2$, $6x$ and 8

You try!

1. 36 18 42

2. $27x^2$ $3x$

3. $3x^2$ $7x$

4. $32x^2$ $8x$

Practice Makes Better

Practice 1-3

Simplify each exponential expression:

1. $9x^1$ 2. $3x^3 \bullet x^2$ 3. $3x^0$ 4. $3x^{-7}$

5. $(3x)^{-7}$ 6. $\frac{4}{x^{-10}}$ 7. $4x^2 \bullet 3x$ 8. $(5x)^{-3}$

Multiply and simplify each polynomial expression:

9. $(2n + 8)(2n – 6)$ 10. $(p – 3)(3p – 2)$ 11. $(2x – 3)(6x + 7)$

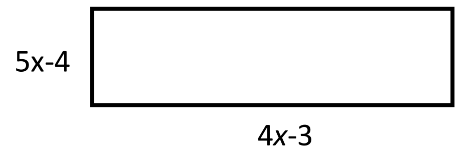
12. $(8r – 5)^2$ 13. $(1 + 3m)^2$ 14. $(6n + 3)(6n – 3)$

15. $(–3b + 9)(–10a – 8b – 7)$ 16. $(3n + 9)(5m – 4n + 10)$

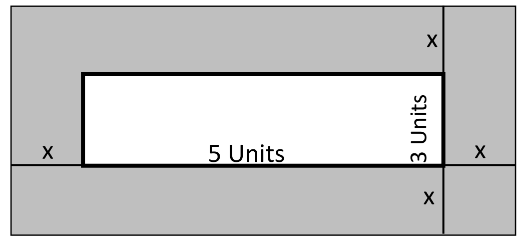
17. $(8x – 5y)(–2x + 6xy + 4y)$ 18. $(–5j + k)(–4j – 5jk – 4k)$

19. $(–3r + 10)(8r^2 + 8r – 2)$ 20. $(–3b^2 – 6b + 10)(–5b – 1)$

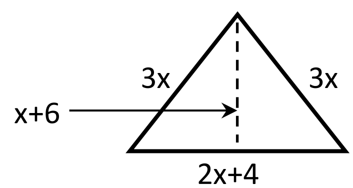
21. Determine an expression that would represent the area of the figure shown below:



22. Determine an expression that would represent the area of the shaded region below:



23. Write an expression that would represent the area of the triangle below. **(A=1/2bh)**



Find the greatest common factor of the following expressions:

24. $14x^2$ $21x$ 63

25. $-17x^2$ 19x 23x

26. $35x^2$ -15x 45

27. $-21x^2$ -36x -81

28. $-12x^2$ -28x -40

29. $42x^2$ -108x^2 240x^2

30. Harry was working on his math homework and encountered the following problem:

$$(4x^2 - 3x + 2) - (3x^2 - 4x + 7)$$

Harry's work is shown below:

$$(4x^2 - 3x + 2) - (3x^2 - 4x + 7)$$

$$4x^2 - 3x + 2 - 3x^2 - 4x - 7$$

$$x^2 - 7x - 5$$

Explain to Harry what mistake he made on his homework and explain to him how to find the correct solution.

31. Ron is working on his math homework and encountered the following problem.

$$-3x(4x - 3)$$

Ron's work is shown below:

$-12x + 9$x

-3x

Explain to Ron what mistake he made and explain to him how to find the correct solution.

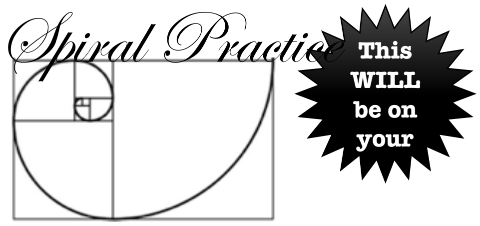
32. Hermione is working on her math homework and encounters the following problem.

$$(2x - 3y)(4x - 2xy + 5y)$$

Hermione's answer is shown below

$$8x^2 - 4x^2y - 12xy + 6xy^2 + 5y$$

Explain to Hermione what mistake she made and explain to her how to find the correct solution.



33. List all the perfect square numbers from 1 to 225. (Remember $2^2=4$ so 4 is a perfect square).

34. Locate the following numbers on the number line below:

$\sqrt{0}$ $\sqrt{1}$ $\sqrt{4}$ $\sqrt{9}$ $\sqrt{16}$ $\sqrt{25}$ $\sqrt{36}$ $\sqrt{49}$ $\sqrt{64}$ $\sqrt{81}$ $\sqrt{100}$

35. Estimate and label where the following numbers would be located on the number line from problem 34.

a) $\sqrt{20}$ b) $\sqrt{27}$ c) $\sqrt{12}$ d) $\sqrt{50}$ e) $\sqrt{80}$

36. Beyonce has 50 pairs of shoes that she wants to take to her new house. The boxes she has to carry them in can hold 3 pairs of shoes each. How many boxes will she completely fill and how many pairs of shoes will be left over?

Give the Prime Factorization of the following numbers:

37) 72 38) 42 39) 56 40) 54

Write your Questions here!

Lesson 1-4: Multiplying and Simplifying Radicals

Learning Target:

- **I can simplify radicals.**
- **I can multiply radicals.**

Standard: N.RN.2

Vocabulary:

- Radical
- Radicand

Begin 1-4 Video 1

The next set of tools that we will add to our tool belt is multiplying and simplifying radicals.

We will talk about how to simplify radicals in a moment, but first let's focus on the basics of multiplying radicals.

To multiply radicals, multiply the radicand by the ____________ and the coefficient by the ____________________.

Historical Note:

The Babylonians were one of the first cultures to develop a system to find square roots Their method may have been developed as early as 1900 BCE. They recorded their calculations on cuneiform tablets like that below.

Example 1 $4\sqrt{3} \bullet 5\sqrt{8}$

Note: When multiplying radicals, you will need to simply your answer. For now, let's just practice the basics of multiplying radicals.

Example 2

$5\sqrt{5x} \bullet \sqrt{3y^2}$

Example 3

$(\sqrt{3}+\sqrt{2x})(\sqrt{3}+\sqrt{4x^2})$

You try:

1. $\sqrt{28} \bullet -10\sqrt{7}$

2. $9\sqrt{6m} \bullet \sqrt{7m}$

3. $(2+5\sqrt{5a})(1+\sqrt{5})$

Write your Questions here!

Begin 1-4 Video 2

Alright, now that we've gotten the basics of multiplying down, let's take a look at simplifying radicals.

SEE APPENDIX A

Instructions	**Example 3:** $\sqrt{18}$
Step 1: Complete a factor tree for the ________________.	
Step 2: Identify any pairs of numbers. These signify a ___________________.	
Step 3: Under the radical, separate the radicand into _____________ and _________________. $\sqrt{ab} = \sqrt{a} \bullet \sqrt{b}$	
Step 4: Pull perfect squares out and multiply them by the radical. This is now the _____________.	

Example 4: $\sqrt{100x^3}$

See Appendix A for a handy list of perfect squares that may help you in your simplifying adventures.

You try!

1. $\sqrt{72a}$ 2. $\sqrt{288v^4}$ 3. $\sqrt{100n^3}$ 4. $\sqrt{50n^3}$

Begin 1-4 Video 3

Write your Questions here!

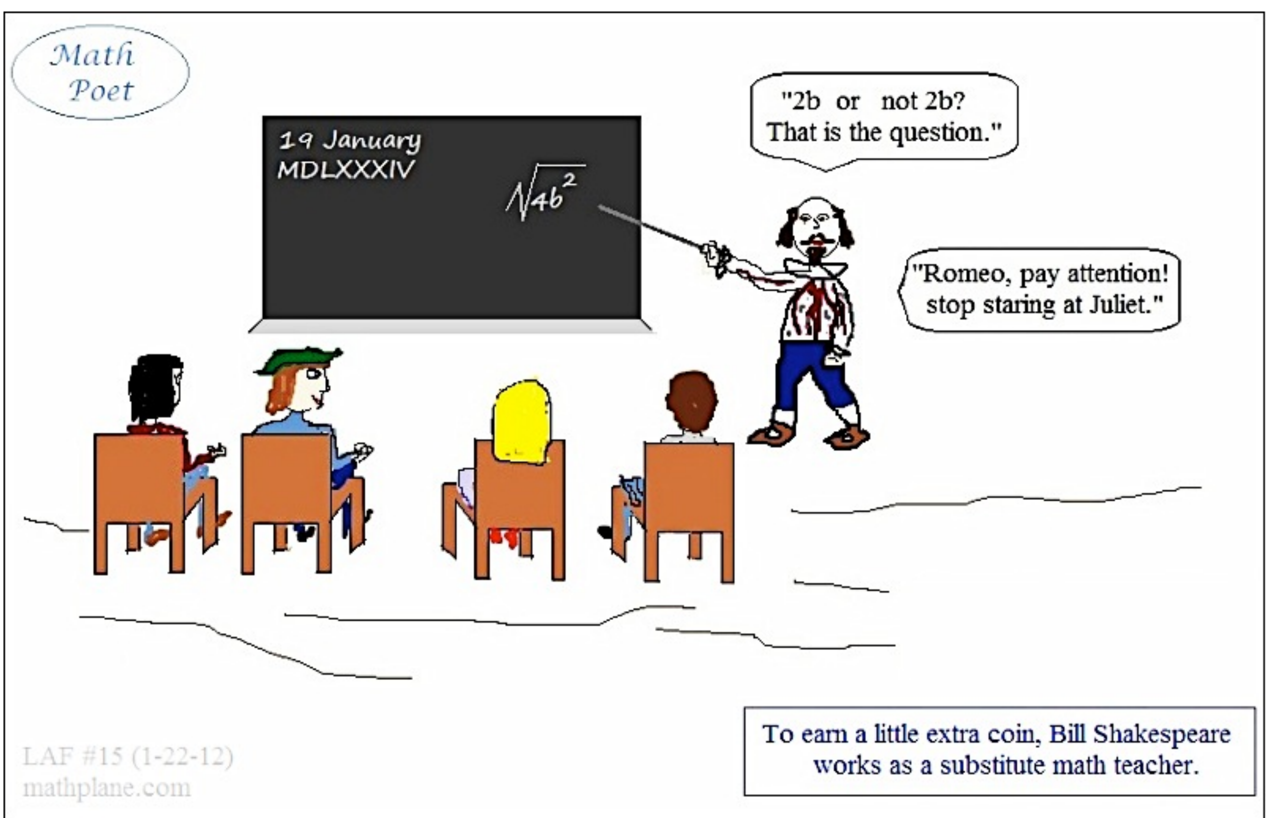
Now that we have discussed how to simplify, let's go back and revisit one of our examples from the first video:

Example 1 (Revisited) $4\sqrt{3} \bullet 5\sqrt{8}$

Example 2 (Revisited) $5\sqrt{5x} \bullet \sqrt{3y^2}$

You try (Revisited)!

1. $\sqrt{28} \bullet -10\sqrt{7}$ 2. $9\sqrt{6m} \bullet \sqrt{7m}$ 3. $(2 + 5\sqrt{5a})(1 + \sqrt{5})$



To earn a little extra coin, Bill Shakespeare works as a substitute math teacher.

Practice Makes Better

Practice 1-4 Multiplying and Simplifying Radicals

Simplify the following radicals:

1. $\sqrt{63p^2}$

2. $-2\sqrt{24a^2}$

3. $8\sqrt{27v^3}$

4. $2\sqrt{56a^4}$

5. $-8\sqrt{24k^2}$

6. $2\sqrt{64m^4}$

7. $\sqrt{3+\sqrt{36}}$

8. $\sqrt{6+\sqrt{100}}$

9. $\sqrt{42xy}$

10. $\sqrt{144mn^2}$

11. $\sqrt{72m^3n^3}$

12. $\sqrt{80x^3y^2}$

Multiply and simplify the following radicals:

13. $\sqrt{28} \bullet -10\sqrt{2}$

14. $8\sqrt{12n^3} \bullet \sqrt{30n^3}$

15. $\sqrt{10} \bullet \sqrt{6}$

16. $5\sqrt{6m} \bullet \sqrt{7m}$

17. $-10\sqrt{45} \bullet 9\sqrt{4}$

18. $(\sqrt{8})^2$

19. $2\sqrt{7} \bullet \sqrt{35}$

20. $(6\sqrt{5})^2$

21. $-8\sqrt{8} \bullet -7\sqrt{12}$

22. $\sqrt{7}(8 + \sqrt{35v})$

23. $\sqrt{14x^3} \bullet \sqrt{20x^3}$

24. $\sqrt{70}\left(\sqrt{20} + \sqrt{15b}\right)$

Spiral Practice

This WILL be on your mastery check!

25. Simplify : $\frac{1}{3}b + \frac{7}{6}b$

26. Simplify:

$38x^2 - 4(-10x - 5) + x - 38x^2$

27. Simplify:

$4(x + 7) - (9x + 7)$

28. Evaluate f(x) = x – 3/8 for f(1/4)

29. Rewrite $\frac{n-6}{5}$ using ( ) instead of the fraction bar.

Write your Questions here!

Lesson 1-5: Adding and Subtracting Radicals

Learning Target:

- **I can add radicals.**
- **I can subtract radicals**

N.RN.2

Begin 1-5 Video 1

Just as with "regular" numbers, square roots can be added together. But you might not be able to simplify the addition all the way down to one number.

Just as you must have ______________to add in an algebraic expression, so you also cannot combine "unlike" radicals.

To add radical terms together, they have to have the same _____________.

Example 1: $2\sqrt{3} + 3\sqrt{3}$

Example 2: $\sqrt{50} + \sqrt{2}$

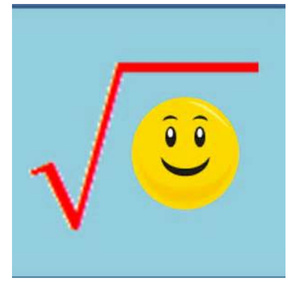
You try!

1. $\sqrt{3} + 5\sqrt{3}$

2. $5\sqrt{90} + \sqrt{250}$

Write your Questions here!

Begin 1-5 Video 2



Just like when you add radicals, before you subtract radicals you must make sure you have ________________.

Once you have ***like bases***, subtract the ________________.

Example 3

$8\sqrt{3} - 5\sqrt{3}$

Example 4

$3\sqrt{11} - \sqrt{176} - \sqrt{11}$

Example 5

$3x\sqrt{80} - 5\sqrt{125x^2}$

You try!

$3\sqrt{20} - 2\sqrt{5}$

$3\sqrt{5} - 3\sqrt{45} - 2\sqrt{5}$

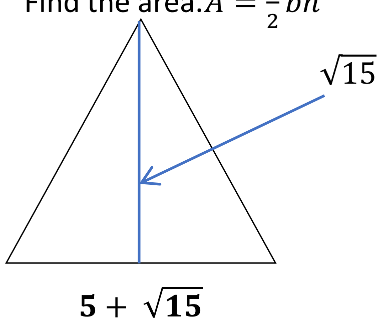
$2x\sqrt{54} - 2\sqrt{24x^2}$

Begin 1-5 Video 3

Now that we have covered adding, subtracting, and multiplying radicals, let's put these skills together to help us find the area of some polygons.

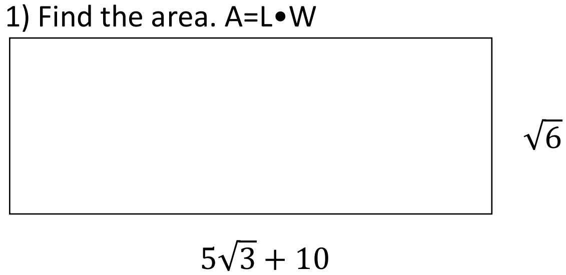
Example 6

Find the area. $A = \frac{1}{2}bh$



You Try

1) Find the area. A=L•W



Practice Makes Better

Practice: Simplify the following expressions

1. $5\sqrt{7} + 2\sqrt{7}$

2. $11\sqrt{3} - 12\sqrt{3}$

3. $2\sqrt{10} + 2\sqrt{10}$

4. $2\sqrt{6} - \sqrt{6}$

5. $\sqrt{80} - \sqrt{45}$

6. $-2\sqrt{40} + 5\sqrt{10}$

7. $-4\sqrt{3} - 2\sqrt{3}$

8. $-5\sqrt{24x^2} + 5\sqrt{6x^2}$

9. $4\sqrt{8y^4} + 5\sqrt{32y^4}$

10. $3\sqrt{200} - 3\sqrt{8}$

11. $3\sqrt{72x^2} - 2\sqrt{8x^2}$

12. $3x\sqrt{48x^2y^6}$

13. $-4\sqrt{48w} + 4\sqrt{3w}$

14. $(2\sqrt{3} + 4)(1 + \sqrt{5})$

15. $-3\sqrt{6} + 2\sqrt{9}$

16. $-5\sqrt{27x^3} - 4\sqrt{3x^3}$

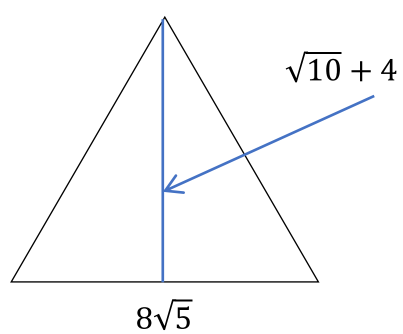
17. $-4x\sqrt{128x^2} - 2x\sqrt{128x^2}$

18. $(4\sqrt{2x} + 8\sqrt{7})(-5\sqrt{2x} + \sqrt{7})$

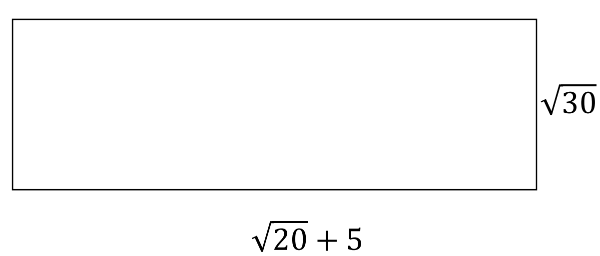
19. $2\sqrt{6x^2} \bullet 3x\sqrt{3x^4}$

20. $5\sqrt{10}(2 - 5\sqrt{5})$

21) Find the area the triangle



22) Find the area of the rectangle.



Spiral Practice

This WILL be on your mastery

23) Mike and Bill both have website subscriptions to download music. The equation $c = 0.50s + 10$, where c is the total cost and s is the number of songs downloaded, can be used to represent the amount that Mike has spent on songs. Bill's amounts can be seen in the table below.

Number of Songs	2	6	8	10
Cost	6.50	9.50	11	12.50

a) What are the y intercepts for both Mike and Bill?

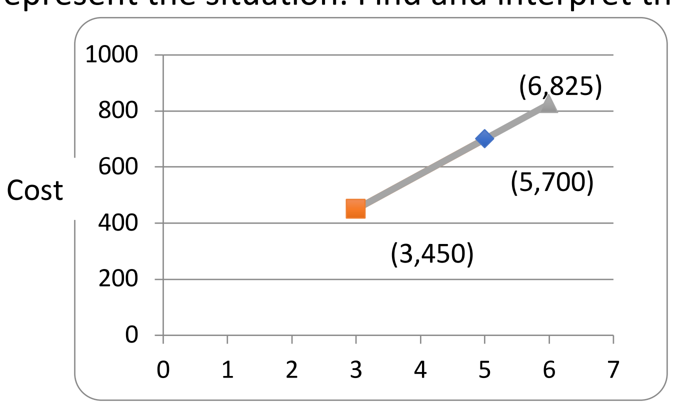
b) What do the y-intercepts represent?

c) What is the rate of change for each function?

d) What do the rates of change represent?

e) If both Mike and Bill each buy 15 songs, who has spent more money?

24) The cost of renting a vacation home consists of a deposit and then a daily fee. The cost to rent a vacation home can be seen in the graph below. Create a function to represent the situation. Find and interpret the rate of change and the initial value.



Unit 1 Study Guide

1. Evaluate the function $f(x) = \frac{4}{5}x - 2$ for f(10)

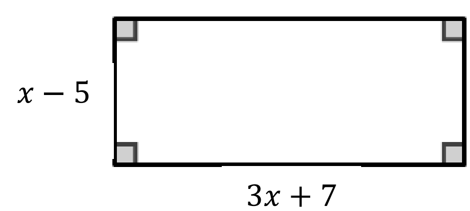
2. Simplify the expression
   10 – 7(3y + 5)

3. Simplify the following expression:
   $(9a^2 + 7 - 6a) - (8 + 3a^2 - a)$

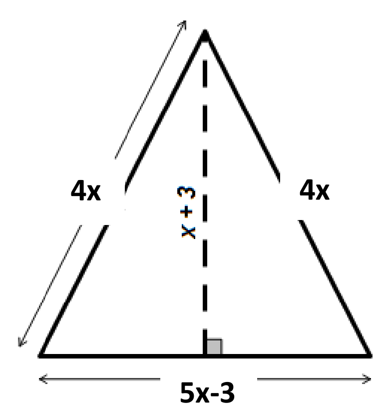
4. Expand and simplify the following expression:
   $-3(x^2 + 5x) + 4(3x^2 - 7) + 9x$

5. Evaluate the function $f(x) = -3x^2 + 6x - 7$ for $f(2)$.

6. What is the perimeter of the following rectangle?



7. Determine an expression that would represent the **perimeter** of the figure shown to the right. Write answer in simplest form.



Perimeter =________________________________

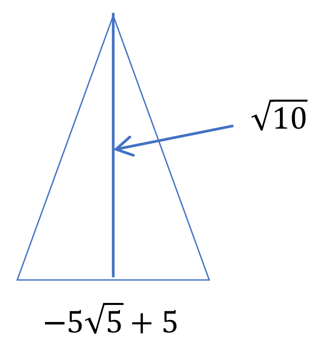
Simplify the radicals:

8. $\sqrt{360}$ 9. $\sqrt{50}$ 10. $\sqrt{75}$

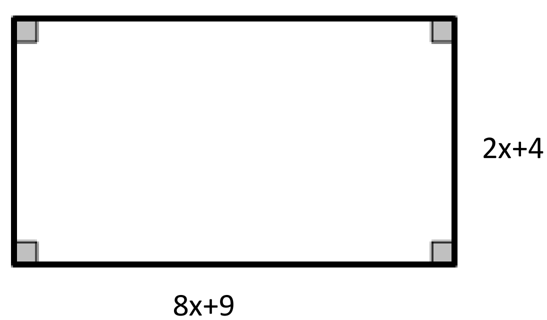
Simplify

11. $\sqrt{15}(3+\sqrt{10})$ 12. $\sqrt{6}(4\sqrt{6}+3+\sqrt{24})$ 13. $2\sqrt{5}-\sqrt{54}-3\sqrt{45}$

14. Find the area of the triangle. (Hint $A=\frac{1}{2}bh$)



15. Determine and expression that would represent the area of the figure shown below.



Simplify

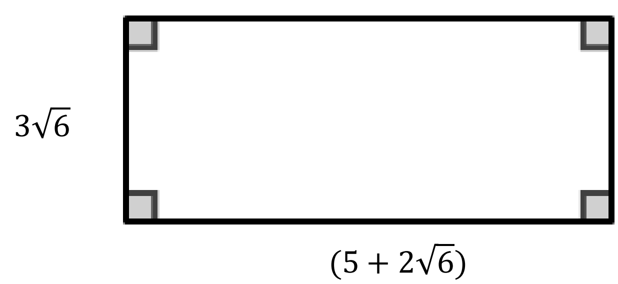
16. $(6x+3)(5x+7)$

17. $(5x+4)(2x-9)+3x-8$

18. $(x-1)(3-3x)+9$

19. In a given triangle, the largest side is triple length of the smallest side. The other side (that is not the smallest or largest) is 3 units shorter than the longest side. Write an expression to represent the perimeter of the triangle if *x* represents the length of the smallest side.

20. What is the area of the following rectangle? (Hint: A=lw)



Simplify

21. $3x^4 \bullet 7x$

22. $(18x)^0$

23. $7x^{-3}$

24. $19x^0$

Find the GCF

25. $9x^2, 3x, and\ 12$

26. $10x, 15x^2\ and, 25$x

27. $14x\ and\ 20$

28. Bartholomew is working on his math homework and encounters the following problem:

$$-\boldsymbol{6x}(\boldsymbol{5x}-\boldsymbol{3})$$

Bartholomew's work is shown below

$$-30x+18x$$

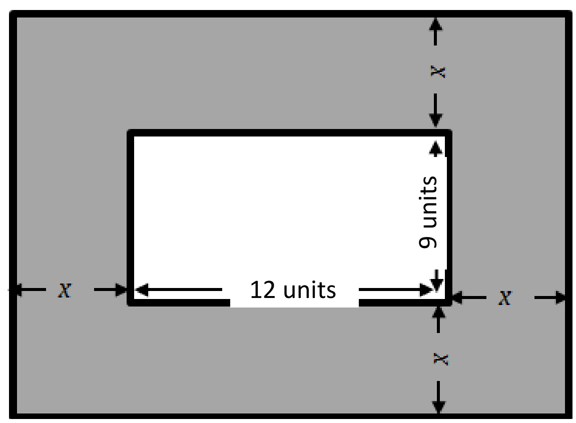
$$-12x$$

Explain to Bartholomew what mistake he made and explain to him how to find the correct solution.

Correct Answer:___________________

Explanation:____

29. Determine an expression that would represent the **area** of the shaded region shown below:



30. Would the following result in a rational number, irrational number or could it be both?

a) the product of a rational number and an irrational number

b) the sum of a rational number and an irrational number

c) the product of two rational numbers

31. Is $3\sqrt{2}+\sqrt{12}$ a rational or irrational sum?

If you found any of the above problems difficult, you should revisit the videos, notes and practice from that section to refresh yourself before test day.

Test Date: ____________________ Packet Due: __________________

Appendix A: Perfect Square

$1^2 = 1$	$16^2 = 256$	$31^2 = 961$	$46^2 = 2116$
$2^2 = 4$	$17^2 = 289$	$32^2 = 1024$	$47^2 = 2209$
$3^2 = 9$	$18^2 = 324$	$33^2 = 1089$	$48^2 = 2304$
$4^2 = 16$	$19^2 = 361$	$34^2 = 1156$	$49^2 = 2401$
$5^2 = 25$	$20^2 = 400$	$35^2 = 1225$	$50^2 = 2500$
$6^2 = 36$	$21^2 = 441$	$36^2 = 1296$	$51^2 = 2601$
$7^2 = 49$	$22^2 = 484$	$37^2 = 1369$	$52^2 = 2704$
$8^2 = 64$	$23^2 = 529$	$38^2 = 1444$	$53^2 = 2809$
$9^2 = 81$	$24^2 = 576$	$39^2 = 1521$	$54^2 = 2916$
$10^2 = 100$	$25^2 = 625$	$40^2 = 1600$	$55^2 = 3025$
$11^2 = 121$	$26^2 = 676$	$41^2 = 1681$	$56^2 = 3136$
$12^2 = 144$	$27^2 = 729$	$42^2 = 1764$	$57^2 = 3249$
$13^2 = 169$	$28^2 = 784$	$43^2 = 1849$	$58^2 = 3364$
$14^2 = 196$	$29^2 = 841$	$44^2 = 1936$	$59^2 = 3481$
$15^2 = 225$	$30^2 = 900$	$45^2 = 2025$	$60^2 = 3600$

Glossary

Algebra: The branch of mathematics that deals with relationships between numbers, utilizing letters and other symbols to represent specific sets of numbers, or to describe a pattern of relationships between numbers.

Binomial Expression: An algebraic expression with two unlike terms.

Coefficient: A number multiplied by a variable in an algebraic expression.

Constant Term: A quantity that does not change its value.

Equation: A number sentence that contains an equals symbol.

Expression: A mathematical phrase involving at least one variable and sometimes numbers and operation symbols.

Greatest Common Factor: The highest number that divides exactly into two or more numbers.

Monomial Expression: An algebraic expression with one term.

Parameter: The independent variable or variables in a system of equations with more than one dependent variable.

Polynomial Expression: An algebraic expression with multiple terms.

Radical: An expression that has a square root, cube root, etc. Also may refer to the symbol over the radicand. $\sqrt{}$

Radicand: The number under the radical sign.

Standard Form of a Polynomial: To express a polynomial by putting the terms in descending exponent order.

Term: any of the monomials that make up a polynomial.

Trinomial: An algebraic expression with three unlike terms.

Variable: A letter or symbol used to represent a number.