Algebra I
1-1: Variables and Expressions

Name ______________________
Date ____________ Class Period ______

Learning Target: Today you will be able to WRITE ALGEBRAIC EXPRESSIONS

Question/Main Ideas:	Notes:	
Definition: Quantity	Anything that can be measured or counted	
Definition: Variable	A symbol, usually a letter, that represents the value(s) of a variable (changing) quantity	
Definition: Algebraic Expression Versus Numerical Expression	Algebraic Expression - mathematical phrase that includes one or more variables	Numerical Expression - mathematical phrase involving numbers & symbols, but no variables
Math Word Wall	Addition Words/Phrases sum, add, plus, increase, added to, more than, greater	Subtraction Words/Phrases difference, subtract from, minus, decrease, taken from, less, taken away
	Multiplication Words/Phrases product, times, multiplied by	Division Words/Phrases quotient, divided by, into
Example 1: Writing Expressions with One Operation	Write an algebraic expression for the word phrase. a. 32 more than a number n $32+n$	b. 8 times a number n $8n$
Now It's Your Turn	Write an algebraic expression for the word phrase. a. 58 less a number n $58-n$	b. the quotient of a number n and 5 $n \div 5,\ \frac{n}{5}$

Group Question	Do the phrases 6 *less a number y* and 6 *less than a number y* mean the same thing? Explain. Discuss with a partner Possible Answer: No; 6 less a number y means $6-y$ 6 less than a number y means $y-6$
Example 2: Writing Expressions with Two Operations	Write an algebraic expression for the word phrase. a. 3 more than twice a number x $3+2x$; $2x+3$ b. 9 less than the quotient of 6 and a number x $\frac{6}{x}-9$; $6 \div x - 9$ c. the product of 4 and the sum of a number x and 7 $4(x+7)$
Now It's Your Turn	Write an algebraic expression for the word phrase. a. 8 less than the product of a number x and 4 $4x-8$ b. Twice the sum of a number x and 8 $2(x+8)$ c. The quotient of 5 and the sum of 12 and a number x $5 \div (12+x)$; $\frac{5}{12+x}$

Summary: ____

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Algebra I
1-2 and 1-3: Exponents and Square Roots

Name ______________________
Date ____________ Class Period ______

Learning Target: Today you will be able to SIMPLIFY EXPRESSIONS INVOLVING EXPONENTS AND FIND AND ESTIMATE SQUARE ROOTS

Question/Main Ideas:	Notes:
Definitions: Power, Exponent, Base	A power has two parts, a base and an exponent. The exponents tell you how many times to use the base as a factor. base → 2^3 ← Exponent $= 2 \cdot 2 \cdot 2$
Definition: Simplify	You simplify a numerical expression when you replace it with its single numerical value. $6+4-5 = 10-5 = \boxed{5}$ ← simplified
Definition: Exponential Form Versus Expanded Form	Exponential Form – written as a power 5^4 Expanded Form – written as a product of its factors $5 \cdot 5 \cdot 5 \cdot 5$

Example 1: Writing Powers in all Three Forms

Complete the following table.

Exponential Form	Expanded Form	Simplified
10^7	$10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10$	10,000,000
$(0.2)^5$	$0.2 \cdot 0.2 \cdot 0.2 \cdot 0.2 \cdot 0.2$	0.00032
$\left(\frac{1}{2}\right)^3$	$\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2}$	$\frac{1}{8}$

Now It's Your Turn

Complete the following table.

Exponential Form	Expanded Form	Simplified
3^5	$3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$	243
$(0.5)^4$	$0.5 \cdot 0.5 \cdot 0.5 \cdot 0.5$	0.0625
$\left(\frac{2}{3}\right)^3$	$\frac{2}{3} \bullet \frac{2}{3} \bullet \frac{2}{3}$	$\frac{8}{27}$

Definition: Square Root, Radicand, and Radical	$7^2 = 49$ so $\sqrt{49} = 7$ $7 \cdot 7 = 49$ square root (radical symbol)
Example 2: Simplifying Square Root Expressions	Simplify the following. a. $\sqrt{81} = 9$ $9^2 = 81$ b. $\sqrt{\frac{9}{16}} = \frac{\sqrt{9}}{\sqrt{16}} = \frac{3}{4}$ c. $\sqrt{0.000064} = 0.008$ 6 decimals $\div 2 = 3$
Now It's Your Turn	Simplify the following. a. $\sqrt{25} = 5$ b. $\sqrt{\frac{1}{36}} = \frac{\sqrt{1}}{\sqrt{36}} = \frac{1}{6}$ c. $\sqrt{1.21} = 1.1$
Definition: Perfect Square	The square of an integer. The answer to the square root is a whole number
Memorize the Perfect Squares between 1 and 225	$1^2 =$ 1 $6^2 =$ 36 $11^2 =$ 121 $2^2 =$ 4 $7^2 =$ 49 $12^2 =$ 144 $3^2 =$ 9 $8^2 =$ 64 $13^2 =$ 169 $4^2 =$ 16 $9^2 =$ 81 $14^2 =$ 196 $5^2 =$ 25 $10^2 =$ 100 $15^2 =$ 225
Example 3: Estimating a Square Root	Estimate the square root. Round to the nearest integer. a. $\sqrt{67} =$ $\sqrt{64} = 8$ $\sqrt{81} = 9$ closer to 67 $\boxed{8}$ b. $\sqrt{226} = \boxed{15}$ $\sqrt{225} = 15$ one off
Now It's Your Turn	Estimate the square root. Round to the nearest integer. a. $\sqrt{12}$ $\sqrt{9} = 3$ $\sqrt{16} = 4$ $\boxed{3}$ b. $\sqrt{31} = \boxed{6}$ $\sqrt{25} = 5$ $\sqrt{36} = 6$

Summary: ______________________________

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Algebra I
1-2 Part 2: Order of Operations

Name ______________________________
Date _____________ Class Period _______

Learning Target: Today you will be able to USE ORDER OF OPERATIONS TO SIMPLIFY EXPRESSIONS

Question/Main Ideas:	Notes:
Concept: Order of Operations	G - Grouping symbols - Perform all operations in parenthesis (brackets, etc) 1ST.
	E - Exponents - Simplify all powers and
	M/D - Multiply and Divide from left to right
	A/S - Add and Subtract from left to right
Example 1: Simplifying a Numerical Expression	Simplify. a. $(6 - 2)^3 \div 2$ $(4)^3 \div 2$ G $64 \div 2$ E $\boxed{32}$ D b. $\frac{(2^4 - 1)}{5} = \frac{16-1}{5} = \frac{15}{5} = \boxed{3}$ E S D The top is in "Parenthesis"
Now It's Your Turn	Simplify. a. $5 \cdot 7 - 4^2 \div 2$ $5 \cdot 7 - 16 \div 2$ E $35 - 8$ M/D $\boxed{27}$ S b. $\frac{(4 + 3^4)}{(7 - 2)} = \frac{4+81}{5} = \frac{85}{5}$ $= \boxed{17}$

Summary: ____

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Algebra I
1-2 Part 3: Evaluating Expressions

Name ______________________________
Date ______________ Class Period _______

Learning Target: Today you will be able to USE ORDER OF OPERATIONS TO EVALUATE EXPRESSIONS

Question/Main Ideas:	Notes:
Definition: Evaluate	To evaluate an algebraic expression, replace each variable with a given number. Then simplify using order of operations.
Example 1: Evaluating Algebraic Expressions	Evaluate the following expressions for the given values of the variables. a. $x^2 + x - 12 \div y^2$; $x = 5$ and $y = 2$ $(5)^2 + (5) - 12 \div (2)^2$ $25 + 5 - 12 \div 4$ $25 + 5 - 3$ $30 - 3$ $\boxed{27}$ b. $4xy^2 + (2x)^3$; $x = 3$ and $y = 4$ $4(3)(4)^2 + (2(3))^3$ $4(3)(16) + (6)^3$ $4(3)(16) + 216$ $12 \cdot 16 + 216$ $192 + 216$ $\boxed{408}$
Now It's Your Turn	Evaluate the following expressions for the given values of the variables. a. $2b^2 - 7a$; $a = 3$ and $b = 4$ $2(4)^2 - 7(3)$ $2(16) - 21$ $32 - 21$ $\boxed{11}$ b. $\dfrac{2a^2b - 4a}{a - b}$; $a = 5$ and $b = 4$ $\dfrac{2(5)^2(4) - 4(5)}{(5) - (4)}$ $\dfrac{2 \cdot 25 \cdot 4 - 20}{1}$ $200 - 20$ $\boxed{180}$

Summary: ____

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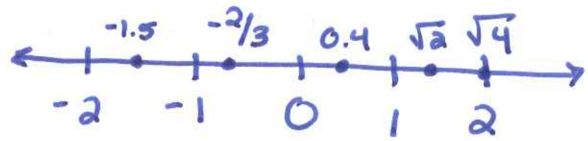
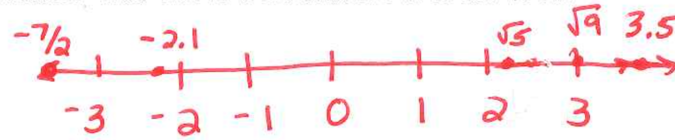
Algebra I
1-3 Part 2: Real Numbers and the Number Line

Name ______________________
Date ____________ Class Period ______

Learning Target: Today you will be able to CLASSIFY, GRAPH, AND COMPARE REAL NUMBERS

Question/Main Ideas:	Notes:
Definition: Set, Element of the Set, and Subset	A set is a well-defined collection of objects. Each object is called an element of the set. A subset consists of elements from the given set. You can list elements using braces { }
Definition: Natural Numbers	Counting numbers $\{1, 2, 3, \ldots\}$ 
Definition: Whole Numbers	Counting numbers plus zero $\{0, 1, 2, 3, \ldots\}$ 
Definition: Integers	Negative and Positive whole numbers $\{\ldots -3, -2, -1, 0, 1, 2, 3 \ldots\}$ 
Definition: Rational Numbers	Any number that can be written as a fraction with integers as the numerator and denominator. This includes terminating and repeating decimals
Definition: Irrational Numbers	Any number that cannot be written as a fraction. Decimals that go on forever without a repeating pattern. Includes pi and square roots of non-perfect squares
Definition: Real Numbers	Rational and Irrational Numbers form the set of real numbers.
Concept: Real Numbers and It's Subsets	Real Numbers Rational #s Irrational #s ↓ Integers ↓ Whole #s ↓ Natural #s

Example 1: Classifying Real Numbers	To which subsets of the real numbers does each number belong? a. 15 – natural, whole, integers, rational b. -1.4583 – rational c. $\sqrt{57}$ – irrational
Now It's Your Turn	To which subsets of the real numbers does each number belong? a. $\sqrt{9}$ – natural, whole, integers, rational b. $\frac{3}{10}$ – rational c. -0.45 – rational
Definition: Inequality	Mathematical sentence that compares the values of two expressions using an inequality symbols
Concept: Inequality Symbols	$<$ less than | $\leq$ less than or equal to $>$ greater than | $\geq$ greater than or equal to
Example 2: Comparing Real Numbers	Compare the Numbers Using an Inequality Symbol. $\sqrt{129} = 11.36$ $\sqrt{17} \approx 4.1$ $4\frac{1}{3} = 4.3$ $\sqrt{17}$ and $4\frac{1}{3}$ Your Turn: $\sqrt{129}$ and 11.52 $\sqrt{17} < 4\frac{1}{3}$ $\sqrt{129} < 11.52$
Example 3: Graphing and Ordering Real Numbers	2 -.67 1.41 Graph $\sqrt{4}$, 0.4, $-\frac{2}{3}$, $\sqrt{2}$ and -1.5 on a number line. Write the numbers in order from least to greatest.  $-1.5, -\frac{2}{3}, 0.4, \sqrt{2}, \sqrt{4}$
Now It's Your Turn	3 -3.5 2.24 Graph 3.5, -2.1, $\sqrt{9}$, $-\frac{7}{2}$, and $\sqrt{5}$ on a number line. Write the numbers in order from least to greatest.  $-\frac{7}{2}, -2.1, \sqrt{5}, \sqrt{9}, 3.5$

Summary: ______________________________

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Algebra I
1-4: Properties of Real Numbers

Name ____________________
Date __________ Class Period ______

Learning Target: Today you will be able to IDENTIFY AND USE PROPERTIES OF REAL NUMBERS

<table>
<tr><th>Question/Main Ideas:</th><th colspan="2">Notes:</th></tr>
<tr><td>Definition: Equivalent Expressions</td><td colspan="2">Two algebraic expressions that have the same value(s) for all the values of the variable(s)</td></tr>
<tr><td>Property: Commutative Properties of Addition and Multiplication</td><td>Addition – Changing the order of the addends does not change the sum.
$a+b=b+a$ $\quad 3+7=7+3$</td><td>Multiplication - Changing the order of the factors does not change the product.
$a\cdot b=b\cdot a$ $\quad 4\cdot 8=8\cdot 4$</td></tr>
<tr><td>Property: Associative Properties of Addition and Multiplication</td><td>Addition – Changing the grouping of the addends does not change the sum.
$a+(b+c)=(a+b)+c$</td><td>Multiplication – Changing the grouping of the factors does not change the product
$a\cdot(b\cdot c)=(a\cdot b)\cdot c$</td></tr>
<tr><td>Property: Identity Properties of Addition and Multiplication</td><td>Addition – The sum of any real number and 0 is the original number.
$a+0=a$ $\quad 8+0=8$</td><td>Multiplication - The product of any real number and 1 is the original number.
$a\cdot 1=a$ $\quad 7\cdot 1=7$</td></tr>
<tr><td>Property: Zero Property of Multiplication</td><td colspan="2">The product of any real number and 0 is zero.
$a\cdot 0=0$ $\quad 6.728\cdot 0=0$</td></tr>
<tr><td>Property: Multiplication Property of -1</td><td colspan="2">The product of -1 and a number is the opposite of the original number.
$-1\cdot a=-a$ $\quad -1\cdot 6=-6$</td></tr>
<tr><td>Example 1: Identifying Properties</td><td colspan="2">What property is illustrated by each statement?
a. $42\cdot 0=0$
zero property of multiplication
b. $(y+2.5)+28=y+(2.5+28)$
Associative Property of Addition</td></tr>
</table>

Now It's Your Turn	What property is illustrated by each statement? a. $4x \cdot 1 = 4x$ Identity Prop. of Mult. b. $x + (\sqrt{y} + z) = x + (z + \sqrt{y})$ Commutative Prop. of Add
Definition: Deductive Reasoning	The process of reasoning logically from given facts to a conclusion
Definition: Counterexample	An example showing that a statement is false
Example 2: Using Deductive Reasoning and Counterexamples	Is the statement true or false? If it is false, give a counterexample. a. For all real numbers a and b, $a \cdot b = b + a$ False; $a = 2, b = 6$ $2 \cdot 6 = 6 + 2$ $12 \neq 8$ b. For all real numbers a, b, and c, $(a + b) + c = b + (a + c)$ True $(b+a)+c = b+(a+c)$ CPA $b+(a+c) = b+(a+c)$ APA
Now It's Your Turn	Is the statement true or false? If it is false, give a counterexample. a. For all real numbers j and k, $j \cdot k = (k + 0) \cdot j$ True $j \cdot k = k \cdot j$ IPM $j \cdot k = j \cdot k$ CPM b. For all real numbers m and n, $m(n + 1) = mn + 1$ False $m = 6$, $n = 5$ $6(5+1) = 6 \cdot 5 + 1$ $6 \cdot 6 = 30 + 1$ $36 \neq 31$

Summary: ____

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Algebra I
1-5: Adding and Subtracting Real Number

Name ____________________________
Date ______________ Class Period _______

Learning Target: Today you will be able to FIND THE SUM AND DIFFERENCES OF REAL NUMBERS

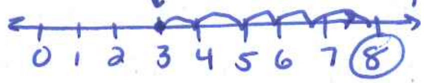
Question/Main Ideas:	Notes:

Example 1: Using Number Line Models

What is the sum of each? Use a number line.

a. $3 + 5 = \boxed{8}$

start at 3 Move 5 units right

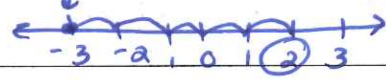


b. $3 + (-5) = \boxed{-2}$

moves 5 units left Start

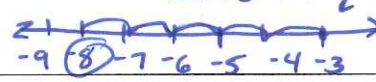
c. $-3 + 5 = 2$

Start Move 5 units right



d. $-3 + (-5) = -8$

Move 5 units left start



Now It's Your Turn

What is the sum of -8 + 4? Use a number line.

start Move 4 units right $\boxed{-4}$

Definition: Absolute Value

The distance a number is from 0 on a number line. $|4| = 4$ $|-4| = 4$

Concept: Adding Real Numbers

Adding Numbers With the Same Sign

Add their absolute values. The sum has the same sign as the original numbers

Adding Numbers With Different Signs

Subtract their absolute values. The difference has the sign of the "larger" original number.

Example 2: Adding Real Numbers

Simplify.

a. $-12 + 7$ larger

$12 - 7 = 5$

$\boxed{-5}$

b. $-18 + (-2)$ neg.

$18 + 2 = 20$

$\boxed{-20}$

c. $-4.8 + 9.5$ larger

$9.15 - 4.8 = \boxed{4.7}$

d. $\frac{3}{4} + \left(-\frac{5}{6}\right)$ larger

$\frac{5}{6} - \frac{3}{4}$

$\frac{10}{12} - \frac{9}{12} = \boxed{-\frac{1}{12}}$

Now It's Your Turn	Simplify. a. -16 + (-8) $16+8=24$ $\boxed{-24}$ b. -11 + 9 $11-9=2$ $\boxed{-2}$ c. 9 + (-11) $11-9=2$ $\boxed{-2}$ d. -6 + (-2) $6+2=8$ $\boxed{-8}$
Definition: Opposites	Two numbers that are the same distance from zero but in opposite directions. 7 and -7
Definition: Additive Inverses	A number and its opposite.
Property: Inverse Property of Addition	For every real number a, there is an additive inverse -a, such that $a+(-a)=0$ $-14+14=0$
Concept: Subtracting Real Numbers	To subtract a real number, add the opposite. $a-b=a+(-b)$ $3-5=3+(-5)=-2$
Example 3: Subtracting Real Numbers	What is each difference? a. -8 - (-13) $-8++13$ $\boxed{5}$ b. 9 - 9 $9+-9$ $\boxed{0}$
Now It's Your Turn	What is each difference? a. 6 - 14 $6+-14$ $\boxed{-8}$ b. -3 - 3 $-3+-3$ $\boxed{-6}$

Summary: ____________________

Algebra I
1-6: Multiplying and Dividing Real Numbers

Name ______________________________
Date _____________ Class Period _______

Learning Target: Today you will be able to FIND THE PRODUCTS AND QUOTIENTS OF REAL NUMBERS

Question/Main Ideas:	Notes:	
Concept: Multiplying Real Numbers	Multiplying Numbers with Different Signs The product of two real numbers w/ different signs is NEGATIVE.	Multiplying Numbers with the Same Signs The product of two real numbers w/ the same signs is POSITIVE.
Example 1: Multiplying Real Numbers	Simplify. a. $12(-8) = -96$ diff c. $-\frac{3}{4}\bullet\frac{1}{2} = -\frac{3}{8}$ diff.	b. $24(0.5) = 12$ same d. $(-3)^2 = -3 \cdot -3 = 9$ *Watch out $-3^2 = -9$*
Now It's Your Turn	Simplify. a. $6(-15) = -90$ c. $-\frac{7}{10}\left(\frac{3}{5}\right) = -\frac{21}{50}$	b. $12(0.2) = 6$ d. $(-2)^3 = -2 \cdot -2 \cdot -2 = -8$
Concept: Negative Answers to Square Roots	Since $3^2 = 9$ and $(-3)^2 = 9$ then $\sqrt{9} = 3$ and $\sqrt{9} = -3$	plus or minus $\pm\sqrt{9}$
Example 2: Simplifying Square Root Expressions	Simplify. a. $-\sqrt{25} = -5$	b. $\pm\sqrt{\frac{4}{49}} = \pm\frac{2}{7}$

Now It's Your Turn	Simplify. a. $\sqrt{64} = 8$ b. $\pm\sqrt{16} = \pm 4$ c. $-\sqrt{121} = -11$ d. $\pm\sqrt{\frac{1}{36}} = \pm\frac{1}{6}$
Concept: Dividing Real Numbers	Dividing Numbers with Different Signs The quotient of two real numbers w/ different signs is NEGATIVE Dividing Numbers with the Same Signs The quotient of two real numbers w/ the same sign is POSITIVE
Example 3: Dividing Real Numbers	A sky diver's elevation changes by -3600 ft in 4 minutes after the parachute opens. What is the average change in the sky diver's elevation each minute? $\frac{-3600\text{ ft}}{4\text{ min}} = -900\text{ ft/min}$
Now It's Your Turn	You make five withdrawals of equal amounts from your bank account. The total amount you withdrew was \$360. What is the change in your account balance each time you make a withdrawal? $\frac{-\$360}{5} = -\$72$
Property: Inverse Property of Multiplication	For every nonzero real number a, there is a multiplicative inverse $\frac{1}{a}$ such that $a\left(\frac{1}{a}\right)=1$ $-4\left(-\frac{1}{4}\right)=1$
Definition: Reciprocal	The reciprocal of a nonzero real number of the form $\frac{a}{b}$ is $\frac{b}{a}$ Ex. 6 and 1/6 OR 2/3 and 3/2
Example 4: Dividing Fractions	What is the value of $\frac{3}{4} \div \left(-\frac{5}{2}\right)$? $\frac{3}{4} \cdot -\frac{2}{5} = -\frac{6}{20} = \boxed{-\frac{3}{10}}$

Summary: ______________________________

Algebra I
1-6 Part 2: Order of Operations with Negatives

Name ______________________________
Date ____________ Class Period ______

Learning Target: Today you will be able to SIMPLIFY EXPRESSIONS WITH NEGATIVES AND EVALUATE EXPRESSIONS FOR NEGATIVE VALUES

Question/Main Ideas:	Notes:
Example 1: Simplifying Expressions with Negatives	Simplify. a. $4-\frac{12}{-3}+2$ $4-(-4)+2$ $4+4+2$ $8+2$ $\boxed{10}$ b. $\frac{-6}{-1}+(-3)(-2)+3\lvert -4-2\rvert$ $6+6+3\lvert -6\rvert$ $6+6+3(6)$ $6+6+18$ $12+18$ $\boxed{30}$
Now It's Your Turn	Simplify. a. $-5(-3-2)+(-2)-(-3-4)$ $-5(-5)+(-2)-(-7)$ $25+-2+7$ $23+7$ $\boxed{30}$ b. $-\lvert -11\rvert+(-3)\lvert -3+5\rvert$ $-11+(-3)\lvert 2\rvert$ $-11+(-3)(2)$ $-11+-6$ $\boxed{-17}$
Example 2: Evaluating Expressions with Negatives	Evaluate. USE PARENTHESIS WHEN SUBSTITUTING a. $-x(a+b)$; $x=4$, $a=-3$, $b=-5$ $-(4)((-3)+(-5))$ $-4(-8)$ $\boxed{32}$ b. $-a+b+ab$; $a=-5$, $b=-2$ $-(-5)+(-2)+(-5)(-2)$ $5+-2+10$ $3+10$ $\boxed{13}$

Now It's Your Turn	Evaluate. a. $-xy - x(x-y)$; $x = -4, y = -1$ $-(-4)(-1) - (-4)((-4)+(+1))$ $4(-1) - (-4)(-3)$ $-4 - 12$ $\boxed{-16}$ b. $\lvert -b - a \rvert + a$; $a = -4, b = 2$ $\lvert -(2) - (-4) \rvert + (-4)$ $\lvert -2+4 \rvert + -4$ $\lvert 2 \rvert + -4$ $2 + -4 = \boxed{-2}$
Warning: Watch Your Exponents	PARENTHESIS ARE CRUCIAL $(-4)^2 = 16$ $-4^2 = -16$
Example 3: Evaluating with Negatives and Exponents	Evaluate. a. $-x^2 - y^3$; $x = -3, y = -2$ $-(-3)^2 - (-2)^3$ Exp. 1ST $-9 - (-8)$ $-9+8$ $\boxed{-1}$ b. $a^2 - b^2a$; $a = -2$ and $b = 3$ $(-2)^2 - (3)^2(-2)$ $4 - 9(-2)$ $4 + 18$ $\boxed{22}$
Now It's Your Turn	Evaluate. a. $x^2 - y^2$; $x = -3, y = -2$ $(-3)^2 - (-2)^2$ $9 - 4$ $\boxed{5}$ b. $a(b^3 - a)$; $a = -2$ and $b = -4$ $(-2)((-4)^3 - (-2))$ $-2(-64+2)$ $-2(-62)$ $\boxed{124}$

Summary: ____

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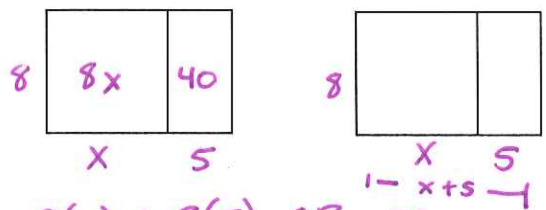
Algebra I
1-7 Part 1: The Distributive Property

Name ____________________
Date ______________ Class Period _______

Learning Target: Today you will be able to USE THE DISTRIBUTIVE PROPERTY TO SIMPLIFY EXPRESSIONS

Question/Main Ideas:	Notes:
Area Model: The Distributive Property	 $8(x) + 8(5)$ OR $8(x+5)$ Multiply terms in parenthesis by 8 $8(x+5) = 8(x) + 8(5)$ $= 8x + 40$
Property: The Distributive Property	Let a, b, and c be real numbers.

Algebra	Example
$a(b+c) = ab + ac$	$4(20+x) = 4(20) + 4(x)$
$(b+c)a = ba + ca$	$(20+x) = 20(4) + x(4)$
$a(b-c) = ab - ac$	$3(x-6) = 3(x) - 3(6)$
$(b-c)a = ba - ca$	$(x-6)3 = x(3) - 6(3)$

Example 1: Simplifying Expressions

Simplify.

a. $3(x + 8)$

$3(x) + 3(8)$

$3x + 24$

b. $(5b - 4)(-7)$

$5b(-7) - 4(-7)$

$-35b + 28$

Now It's Your Turn

Simplify.

a. $5(x + 7)$

$5x + 35$

b. $12(3 - \frac{1}{6}x)$

$36 - 2x$

c. $(0.4 + 1.1d)(3)$

$1.2 + 3.3d$

d. $(2y - 1)(-y)$

$-2y^2 + y$

Example 2: Rewriting Fraction Expressions	Write each fraction as a sum or difference. a. $\frac{7x+2}{5} = \frac{7x}{5} + \frac{2}{5}$ OR $\frac{7}{5}x + \frac{2}{5}$ b. $\frac{12x+8}{3} = \frac{12x}{3} + \frac{8}{3}$ $= 4x + \frac{8}{3}$
Now It's Your Turn	Write each fraction as a sum or difference. a. $\frac{4x-16}{3} = \frac{4x}{3} - \frac{16}{3}$ b. $\frac{15+6x}{12} = \frac{15}{12} + \frac{6x}{12}$ $= \frac{5}{4} + \frac{1}{2}x$
Reminder: Multiplication Property of -1	States that $-x = -1 \cdot x$
Example 3: Distributing a Negative Sign	Simplify. a. $-(x + 6y) = -1(x + 6y)$ $-1(x) + -1(6y)$ $-x - 6y$ b. $-1(5x - 8)$ $-1(5x) - (-1)(8)$ $-5x + 8$
Now It's Your Turn	Simplify. a. $-(-x - 31)$ $x + 31$ b. $-(6m - 9n)$ $-6m + 9n$

Summary: ______________________________

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Algebra I
1-7 Part 2: Combining Like Terms

Name ______________________
Date ____________ Class Period ______

Learning Target: Today you will be able to SIMPLIFY EXPRESSIONS BY COMBINING LIKE TERMS

Question/Main Ideas:	Notes:
Definition: Term	A number, a variable, or the product of a number and one or more variables.
Definition: Constant	A term that has no variables.
Definition: Coefficient	A numerical factor of a term. The number in front of the variables.
Definition Example: Term, Constant, and Coefficient	$6a^2 / -5ab / +3b / -12$ Constant: -12 Terms: $6a^2$; $-5ab$; $3b$; -12 Coefficients: 6; -5; 3
Definition: Like Terms	Terms w/ the same variable factors. (Same letters w/ same exponents).

Definition Example: Like Terms

Expression	Terms	Variable Factors	Like Terms?
$7a - 3a$	$7a$; $-3a$	a; a	Yes
$4x^2 + 12x^2$	$4x^2$; $12x^2$	x^2; x^2	Yes
$6ab + -2a$	$6ab$; $-2a$	ab; a	No
$xy^2 + x^2y$	xy^2; x^2y	xy^2; x^2y	No

Simplified vs. Not Simplified

Not Simplified	Simplified
$2(3x-5+4x)$ $2(7x-5)$	$2(3x-5+4x)$ $2(7x-5)$ $14x-10$

Example 1: Combining Like Terms	Simplify. a. $8x^2 + 2x^2$ add coeff. $10x^2$ b. $5x - 3 - 3x + 6y + 4$ $2x + 1 + 6y$
Now It's Your Turn	Simplify. a. $3y - 1y$ $2y$ b. $-7mn^4 - 5mn^4$ $-12mn^4$ c. $7y^3z - 6yz^3 + y^3z$ $8y^3z - 6yz^3$ d. $8x^2 - 2x^4 - 2x + 2 + xy$ $-2x^4 + 8x^2 - 2x + 2 + xy$
Example 2: Distributive Property and Combining Like Terms	Simplify. a. $4 - 1(7x + 8) - 2x$ $4 - 7x - 8 - 2x$ $-4 - 9x$ $-9x - 4$ b. $8(4 - 9x) - 3(6x + 1) - 7x + 8$ $32 - 72x - 18x - 3 - 7x + 8$ $-97x + 37$
Now It's Your Turn	Simplify. a. $-(9 - 7x) + 4(x - 5) - 6x$ $-9 + 7x + 4x - 20 - 6x$ $5x - 29$ b. $9x - 5 + 7(x - 3) - 2(7 + 4x) - 3x$ $9x - 5 + 7x - 21 - 14 - 8x - 3x$ $5x - 40$

Summary: ______________________________

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Algebra I
1.7 Review - Justify, Oops, Simplify

Name ______________________________
Date ______________ Class Period _______

Task 1: The following expression has been simplified. Please justify each step (explain in words what was done in each step).

$8x-7(9-3x)-8+2(x-10)-11x$	
$8x-63+21x-8+2(x-10)-11x$	Distributive Property
$8x-63+21x-8+2x-20-11x$	Distributive Property
$29x-63-8+2x-20-11x$	Combine Like Terms
$29x-71+2x-20-11x$	Combine Like Terms
$31x-71-20-11x$	Combine Like Terms
$31x-91-11x$	Combine Like Terms
$20x-91$	Combine Like Terms

Task 2: The following expression has been simplified, but there are a few mistakes (One per step). Identify the mistake and explain what should have been done instead.

$3(2x-9)+5x-3(5-4x)-7x$	
$6x-9+5x-3(5-4x)-7x$	Didn't Distibute 3 to 9
$6x-9+5x-15-12x-7x$	Didn't fully distribute the (−)
$11x+6-12x-7x$	−9, −15 combine to −24
$23x+6-7x$	11x, −12x combine to −1x
$30x+6$	23x, −7x combine to 16x

Task 3: Simplify the following expression. Show all your work.

$8-(9+7x)-11x+13+4(6-3x)-14x$

$8-9-7x-11x+13+24-12x-14x$

$-1-18x+37-26x$

$36-44x$

$-44x+36$

Algebra I
1-8: An Introduction to Equations

Name ______________________
Date ____________ Class Period ______

Learning Target: Today you will be able to CLASSIFY EQUATIONS AND CHECK SOLUTIONS OF EQUATIONS

Question/Main Ideas:	Notes:
Definition: Equation	A mathematical sentence that has an equal sign (=)
Definition: Open Sentence	An equation that contains one or more variables.
Example 1: Classifying Equations	Is the equation true, false, or open? Explain. a. $24 + 18 = 20 + 22$ Explain: T; $42 = 42$ b. $7 \cdot 8 = 54$ Explain: F; $7 \cdot 8 = 56$ c. $2x - 14 = 54$ Explain: O; Has an x
Now It's Your Turn	Is the equation true, false, or open? Explain. a. $3y + 6 = 5y - 8$ Explain: O; has an x b. $16 - 7 = 4 + 5$ Explain: T; $9 = 9$ c. $32 \div 8 = 2 \cdot 3$ Explain: F; $32 \div 8 = 4$ $2 \cdot 3 = 6$
Definition: Solution of an Equation	The value of a variable that makes an equation true.
Example 2: Identifying Solutions of an Equation	a. Is $x = 6$ a solution of the equation $32 = 2x + 12$? $32 = 2(6) + 12$ $32 = 12 + 12$ $32 \neq 24$ $\boxed{\text{No}}$ **Now It's Your Turn:** b. Is $x = \frac{1}{2}$ a solution of the equation $6x - 8 = -5$? $6(\frac{1}{2}) - 8 = -5$ $3 - 8 = -5$ $-5 = -5$ $\boxed{\text{Yes}}$

Summary: ____

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Algebra I
1-9: Patterns, Equations, and Graphs

Name ______________________
Date ____________ Class Period ______

Learning Target: Today you will be able to USE TABLES, EQUATIONS, AND GRAPHS TO DESCRIBE RELATIONSHIPS

Question/Main Ideas:	Notes:
Definition: Solution of an Equation with Two Variables	Any ordered pair (x, y) that makes the equation true.

Example 1: Identifying Solutions of a Two-Variable Equation

Tell whether the given equation has the ordered pair as a solution.

a. $y = 4x$; (3, 10)

$10 = 4(3)$

$10 \neq 12$

$\boxed{\text{No}}$

b. $2x - 5y = 10$; (0, -2)

$2(0) - 5(-2) = 10$

$10 = 10$

$\boxed{\text{Yes}}$

Now It's Your Turn

Tell whether the given equation has the ordered pair as a solution.

a. $y = 3x - 5$; (-4, -17)

$-17 = 3(-4) - 5$

$-17 = -12 - 5$

$-17 = -17$ $\boxed{\text{Yes}}$

b. $4x + 8y = 16$; (2, -1)

$4(2) + 8(-1) = 16$

$8 + -8 = 16$

$0 \neq 16$ $\boxed{\text{No}}$

Keys to Graphing

T - Title (Descriptive to given scenario)

A - Axis (Identify indep. (x) and dep. (y))

I - Intervals (what's the lowest/highest #)

L - Labels (Axis labels) – DRY MIX

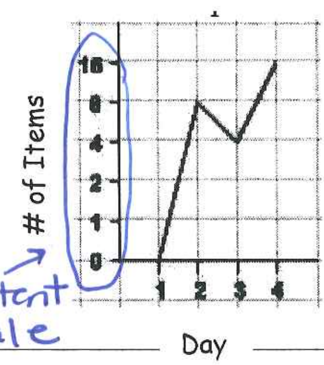
S - Scale (what number should you count by)

Example 2: Identifying Errors - Graphing

Identify the error(s) in the following graphs.

a.

Items Sold				
Day	1	2	3	4
# of Items	0	8	4	16

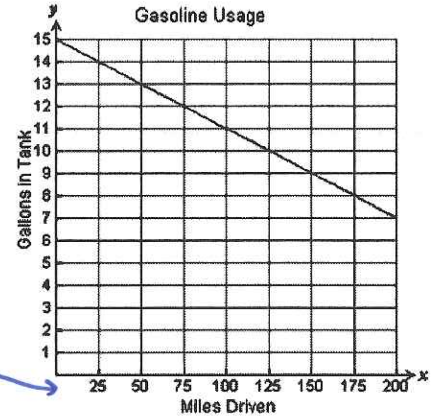


inconsistent scale

b.

Gasoline Usage				
Miles Driven	0	100	175	300
Gallons in Tank	15	11	8	3

Didn't represent all data

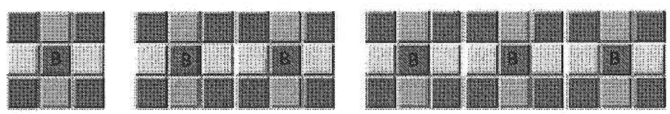


Definition: Inductive Reasoning

The process of reaching a conclusion based on an observed pattern.

Example 3: Extending a Pattern

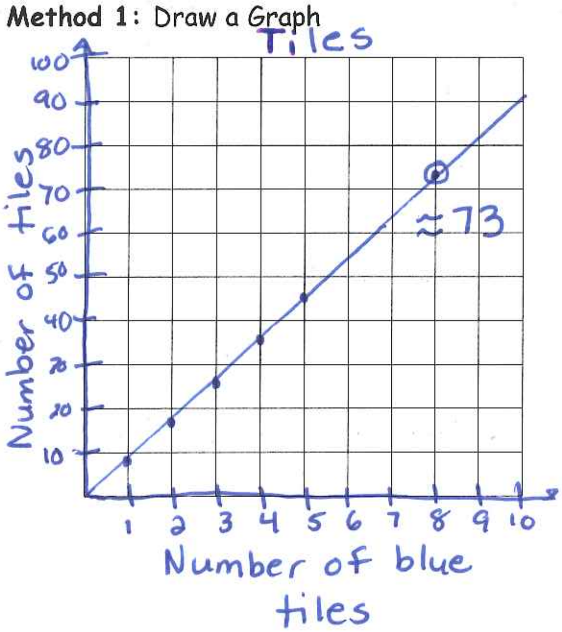
The table shows the relationship between the number of blue (B) tiles (center tile of each pattern) and the total number of tiles in each figure. Extend the pattern. What is the total number of tiles in a figure with 8 blue tiles?



Tiles

Number of Blue Tiles, x	Total Number of Tiles, y
1	9
2	18
3	27
4	36
5	45

Method 1: Draw a Graph



Method 2: Write an Equation

Adding 9

Repeated Addition means multiplication

$y = 9x$

Summary: