Mrs. Holman's Classroom's

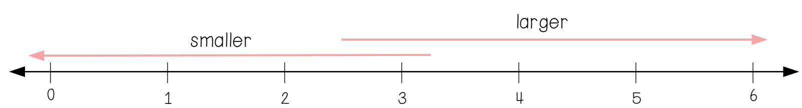
Algebra 1

Unit 1

Answer Key

Name: Key Date: ________ Period: ______

Place Value with Whole Numbers notes

Vocabulary		
Term	Definition	Example
Counting Numbers (Natural)	Basic numbers used to count objects	1, 2, 3, 4....
Whole Numbers	Counting numbers plus zero	0, 1, 2, 3, 4, 5...
Number Line		

Place Value

Our number system is called a **place value system,** because the value of a digit depends on its position in a number. The place values are separated into groups of three, which are called periods. The periods are ones, thousands, millions, billions, trillions, etc. When we write a number, commas separate the periods.

To write a number in words, write the number in each period, followed by the name of the period, without the "*s*" at the end. Start at the left, where the periods have the largest value. The ones period is not named. The commas separate the periods, so wherever there is a comma in the number, put a comma between the words. The number 74,218,369 is written as seventy-four million, two hundred eighteen thousand, three hundred sixty-nine.

Place Value														
Trillions			Billions			Millions			Thousands			Ones		
Hundred trillions	Ten trillions	Trillions	Hundred billions	Ten billions	Billions	Hundred millions	Ten millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
								5	2	6	8	9	0	1

Name: Key Date: ________ Period: ______

Place Value with Whole Numbers Practice

HOW TO NAME A WHOLE NUMBER WITH WORDS

- Step 1. Start at the left and name the number in each period, followed by the period name.
- Step 2. Put commas in the number to separate the periods.
- Step 3. Do not name the ones period.

Example: Name the number 8,934,242,354 using words.

Eight billion, nine hundred thirty-four million, two hundred forty-two thousand, three hundred fifty-four

Name the number using words.

9,825,317,904,390	19,864,323,619,005
nine trillion, eight hundred twenty-five billion, three hundred seventeen million, nine hundred four thousand, three hundred ninety	nineteen trillion, eight hundred sixty-four billion three hundred twenty-three million, six hundred nineteen thousand, five.

HOW TO WRITE A WHOLE NUMBER USING DIGITS

- Step 1. Identify the words that indicate periods. (Remember, the ones period is never named.)
- Step 2. Draw three blanks to indicate the number of places needed in each period. Separate the periods by commas.
- Step 3. Name the number in each period and place the digits in the correct place value position.

Example: Write *nine billion, two hundred forty-six million, seventy-three thousand, one hundred eighty-nine* as a whole number using digits.

Write the number using digits.

Three billion, two hundred sixty-six million, eight hundred fourteen thousand, fifty-one	Twelve billion, nine hundred forty-one million, eight hundred five thousand, two hundred six
3, 266, 814, 051	12, 941, 805, 206

Name: Key Date: ________ Period: ______

Rounding Whole Numbers notes

Rounding Numbers

In 2013, the U.S. Census Bureau estimated the population of the state of New York as 19,651,127. We could say the population of New York in 2013 was approximately 20 million. In several cases, like population, you don't need an exact number; an approximate number is good enough.
The process of approximating a number is called **rounding**. Numbers are rounded to a specific place value, depending on how much accuracy is needed. Saying that the population of New York is approximately 20 million means that we rounded to the millions place.

HOW TO ROUND WHOLE NUMBERS

- Step 1. Locate the given place value and mark it with an arrow. All digits to the left of the arrow do not change.
- Step 2. Underline the digit to the right of the given place value.
- Step 3. Is this digit greater than or equal to 5?
  - Yes–add a one to the digit in the given place value.
  - No–do not change the digit in the given place value.
- Step 4. Replace all digits to the right of the given place value with zeros.

Example: Round 203,958 to the nearest: ⓐ hundred ⓑ thousand ⓒ ten thousand

204,000 204,000 200,000

your Turn

Round each number to the nearest ⓐ hundred ⓑ thousand ⓒ ten thousand	
307, 971 a) 308,000 b) 308,000 c) 310,000	793,952 a) 794,000 b) 794,000 c) 790,000

Name: Key Date: ________ Period: ______

Identify Multiples & Apply Divisibility notes

Vocabulary		
Term	**Definition**	**Example**
Multiples	A number is a **multiple** of *n* if it is the product of a counting number and *n*.	Multiples of 2 are 2, 4, 6, 8, 10, 12 …
Divisible	If a number *m* is a multiple of *n*, then *m* is **divisible** by *n*.	12 is divisible by 3, because 12 divided by 3 is 4.
Divisibility Test	A number is divisible by: • 2 if the last digit is 0, 2, 4, 6, or 8. • 3 if the sum of the digits is divisible by 3. • 5 if the last digit is 5 or 0. • 6 if it is divisible by both 2 and 3. • 10 if it ends with 0.	

Example

Is 5,635 divisible by 2? By 3? By 5? By 6? By 10?

2 – no
3 – no
5 – yes
6 – no
10 – no

Your Turn

Determine whether each number is divisible by 2, by 3, by 5, by 6, and by 10.	
4,832 2 - yes 3 - no 5 - no 6 - no 10 - no	3,865 2 - no 3 - no 5 - yes 6 - no 10 - no

Name: Key Date: ________ Period: ______

Prime Factorization notes

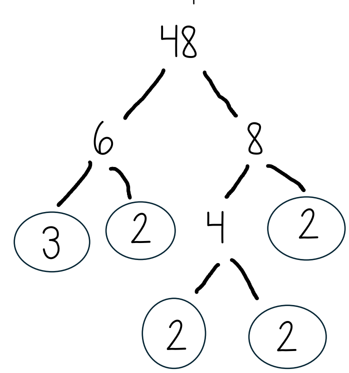
Vocabulary		
Term	Definition	Example
Factors	In the expression $a \cdot b$, both a and b are called **factors**. If $a \cdot b = m$ and both a and b are integers, then a and b are **factors** of m.	The factors of 12 are 1, 2, 3, 4, and 6, because $1 \times 12 = 12$, $3 \times 4 = 12$, and $2 \times 6 = 12$
Prime Number	A counting number greater than 1, whose only factors are 1 and itself.	1, 2, 3, 5, 7, 9, 11, 13, 17....
Composite Number	A counting number that is not prime. A composite number has factors other than 1 and itself.	4, 6, 8, 10, 12, 14, 15, 16, 18...
Prime Factorization	The product of prime numbers that equals the number	The prime factorization of 12 is $2 \times 2 \times 3$.

HOW TO FIND THE PRIME FACTORIZATION OF A COMPOSITE NUMBER

There are several different methods to finding the prime factorization of a composite number. One common method is the **factor tree method.**

1. Find two factors whose product is the given number and use these numbers to create two branches.
2. If a factor is prime, that branch is complete. Circle the prime, like a bud on the tree.
3. If a factor is not prime, write it as the product of two factors and continue the process.
4. Write the composite number as the product of all the circled primes.

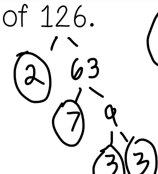
Example:



$48 = 2 \times 2 \times 2 \times 2 \times 3$

Your Turn

Find the prime factorization of 126.



$2 \cdot 3 \cdot 3 \cdot 7$

Name:____________________________________ Date: _________ Period: ______

Finding the LCM notes

Least Common Multiple (LCM)

One of the reasons we look at multiples and primes is to use them to find the **least common multiple** (LCM) of two numbers. LCMs are useful when we add and subtract fractions with different denominators. The **least common multiple** (LCM) of two numbers is the smallest number that is a multiple of both numbers.

Listing Multiples Method

To find the least common multiple of 12 and 18, we list the first few multiples of 12 and 18:

12: 12, 24, 36, 48, 60, 72, 84...

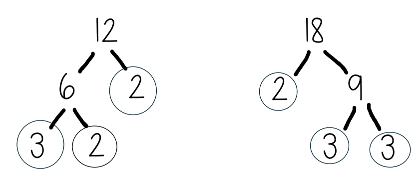
18: 18, 36, 54, 72, 90...

The multiples that are found in both lists are your common multiples. The smallest number in that common least is your LCM.

Prime Factors Method

To find LCM using prime factors method:

1. Write each number as a product of primes.
2. List the primes of each number. Match them vertically when possible.
1. Bring down the number from each column.
2. Multiply the factors.



$12 = 2 \cdot 2 \cdot 3$

$18 = 2 \cdot 3 \cdot 3$

LCM = 2 x 2 x 3 x 3

LCM = 36

your Turn

Find the LCM using the Prime Factors method.	
9 and 12 $9 = 3 \cdot 3$ $12 = 2 \cdot 2 \cdot 3$ $2 \cdot 2 \cdot 3 \cdot 3$ $4 \cdot 9$ 36	18 and 24 $18 = 2 \cdot 3 \cdot 3$ $24 = 2 \cdot 2 \cdot 2 \cdot 3$ $2 \cdot 2 \cdot 3 \cdot 2 \cdot 3$ $4 \cdot 2 \cdot 9$ $8 \cdot 9$ 72

Name: Key Date: ________ Period: ______

Unit 1.1: Intro to Whole Numbers Practice

Find the given place value of each digit in the given numbers.

1. 51,493

ⓐ 1 Thousands
ⓑ 4 hundreds
ⓒ 9 Tens
ⓓ 5 ten thousands
ⓔ 3 ones

2. 7,284,915,860,132

ⓐ 7 Trillions
ⓑ 4 billions
ⓒ 5 millions
ⓓ 0 thousands
ⓔ 3 tens

Name each number using words.

3. 5,902

five thousand nine hundred two

4. 37,889,005

Thirty-seven million, eight hundred eighty-nine thousand five

5. 34,904,837

thirty-four million, nine hundred four thousand, eight hundred thirty-seven

6. 53,000,000,454

fifty-three billion, four hundred fifty-four

Write each number using whole digits.

7. Four hundred twelve

412

8. sixty-two thousand, fifteen

62,015

9. Three billion, two hundred three million, five hundred fifty-two thousand, four

3,203,552,004

10. Eleven million, forty-four thousand, one hundred sixty-three

11,044,163

Round each number to the nearest ⓐ ten, ⓑ hundred, and © thousand.

11. 2,931

a) 2,930 b) 2,900 c) 3,000

12. 481,628

a) 481,630 c) 482,000

b) 481,600

13. 63,940

a) 63,940 c) 64,000

b) 63,900

14. 4,287,965

a) 4,287,970 c) 4,288,000

b) 4,288,00

Name: Key Date: ________ Period: ______

Unit 1.1: Intro to Whole Numbers Practice

Use the divisibility tests to determine if each number is divisible by 2, 3, 5, 6, and 10.

15. 84

2 - yes
3 - yes
5 - no
6 - yes
10 - no

16. 942

2 - yes
3 - yes
5 - no
6 - yes
10 - yes

17. 22,335

2 - no
3 - yes
5 - yes
6 - no
10 - no

18. 39,075

2 - no
3 - yes
5 - yes
6 - no
10 - no

Find the prime factorization of each number.

19. 86

$2 \cdot 43$

20. 400

400 → 4, 100
4 → 2, 2
100 → 2, 50
50 → 2, 25
25 → 5, 5

$\boxed{2 \cdot 2 \cdot 2 \cdot 2 \cdot 5 \cdot 5}$

21. 2,520

2,520 → 252, 10
252 → 2, 126
126 → 2, 63
63 → 7, 9
9 → 3, 3
10 → 5, 2

$2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 5 \cdot 7$

Find the least common multiple using any method.

22. 20, 30

$$\begin{array}{r|rr} 2 & 20 & 30 \\ 5 & 10 & 15 \\ & 2 & 3 \end{array}$$

$2 \cdot 5 \cdot 2 \cdot 3 = 60$
$10 \cdot 6$

23. 8, 12

$$\begin{array}{r|rr} 4 & 8 & 12 \\ & 2 & 3 \end{array}$$

$4 \cdot 2 \cdot 3 = 24$

24. 55, 88

$$\begin{array}{r|rr} 11 & 55 & 88 \\ & 5 & 8 \end{array}$$

$5 \cdot 8 \cdot 11 = 440$
$40 \cdot 11$

25. 12, 16

$$\begin{array}{r|rr} 4 & 12 & 16 \\ & 3 & 4 \end{array}$$

$4 \cdot 3 \cdot 4 = 48$
$12 \cdot 4$

Answer the following questions.

26. Give an everyday example where it helps to round numbers.

Answers vary

27. What is the difference between prime numbers and composite numbers?

Answers vary

Ex: prime numbers only have two factors

Name: Key Date: ________ Period: ______

Use Variables and Algebraic Symbols notes

Vocabulary		
Term	**Definition**	**Example**
Variables	A letter than represents a number whose value may change	x, y, z The "x" in 2x + 3 = 5
Constants	A number whose value always stays the same	0, 1, 2, 3, 4, 5…

Using Variables and Symbols in Algebra

Let's say that Lily is 5 and Joe is 12. You know that Lily is 6 years younger than Joe. No matter what Lily's age, Joe will always be 6 years older, and no matter how old Joe is, Lily will always be 6 years younger.

In the language of algebra, we say that Lily's age and Joe's age are **variables**, and the 6 is a **constant.** The ages change ("vary") but the 6 years between them always stay the same ("constant").

In algebra, we use letters of the alphabet to represent **variables**. We could call Lily's age L and Joe's age J, then we could use $J - 6$ to represent Lily's age.

The letters we used to represent the changing ages are called **variables**, and the most commonly used letters to represent variables are x, y, a, b, and c.

Writing Algebraically

To write algebraically, we need operation symbols as well as numbers and variables. These operations are the ones you have seen all through elementary and middle school! Some of them have new symbols that you may or may not have seen before.

Operation	Notation	Say:	The result is…
Addition	a + b	a plus b	The sum of a and b
Subtraction	a – b	a minus b	The difference of a and b
Multiplication	a · b; ab; (a)(b); (a)b; a(b)	a times b	The product of a and b
Division	a ÷ b; a/b; $b\overline{)a}$	a divided by b	The quotient of a and b, where a is the dividend and b is the divisor.

Name: Icey Date: ________ Period: ______

Writing Algebraically continued…

When translating from symbolic form to English, or from English to symbolic form, pay attention to the words "of" and "and."

- The *difference of* 8 and 3 means to subtract 8 and 3, or in other words, 8 minus 3, which we would write as $8 - 3$.
- The *product of* 8 and 2 means to multiply 8 and 2, or in other words 8 times 2, which we would write as $8 \cdot 2$.

One thing to note: in algebra, the cross symbol, ×, is not used to show multiplication because that symbol may cause confusion. To make it clearer, we use · or parentheses to indicate multiplication.

Just a few more things…

- When two quantities have the same value, we say they are equal and connect them with an equal sign.
- $a = b$ is read as "a is equal to b"
- On the number line, the numbers get larger as they go from left to right.
- $a < b$ is read as "a is less than b"; a is to the left of b on the number line
- $a > b$ is read as "a is greater than b"; a is to the right of b on the number line.
- $\neq$ means "not equal to"
- $\leq$ means "less than or equal to"
- $\geq$ means "greater than or equal to."

Example

Translate from algebra to English:

ⓐ $17 \leq 26$ 17 less than or equal to 26

ⓑ $8 \neq 17 - 3$ 8 is not equal to the difference of 17 and 3

ⓒ $12 > 27 \div 3$ 12 is greater than the quotient of 27 and 3

ⓓ $y + 7 < 19$ a number plus 7 is less than 19

your Turn

Translate from algebra to English:

1. ⓐ $14 \leq 27$ 14 is less than or equal to twenty-seven

ⓑ $19 - 2 \neq 8$ The difference of 19 and 2 is not equal to eight.

ⓒ $12 > 4 \div 2$ 12 is greater than the quotient of 4 and 2

ⓓ $x - 7 < 1$ The difference of a number and seven is less than one

Name: Key Date: ________ Period: ______

Vocabulary		
Term	**Definition**	**Example**
Grouping Symbols	Help make clear which expressions are to be kept together and separate from other expressions.	Parentheses ( ) Brackets [ ] Braces { }
Expression	A number, a variable, or a combination of numbers and variables using operation symbols. *Does NOT have an equal sign*	$3 + 5$ $n - 1$ $6 \cdot 7 + 8$
Equation	Two expressions linked with an equal sign.	$3 + 6 = 9$ $X - 8 = 4$ $z - 4 = 3z + 5$

Examples

Determine if each is an expression or an equation:

ⓐ $2(x + 3) = 10$ — Equation

ⓑ $4(y - 1) + 1$ — Expression

ⓒ $x \div 25$ — Expression

ⓓ $y + 8 = 40$ — Equation

Your Turn

Determine if each is an expression or an equation:			
2) $3(x - 7) = 27$ Equation	3) $5(4y - 2) - 7$ Expression	4) $y^2 \div 14$ Expression	5) $4x - 6 = 22$ Equation

Name: Key Date: ________ Period: ______

Exponents notes

Exponents

Suppose we need to multiply 2 nine times. We could write this as $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$.

This is tedious and it can be hard to keep track of all those 2s, so we use exponents. We write $2 \cdot 2 \cdot 2$ as 2^3 and $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$ as 2^9.

In expressions such as 2^3, the 2 is called the ***base*** and the 3 is called the ***exponent***. The exponent tells us how many times we need to multiply the base.

We read 2^3 as "two to the third power" or "two cubed."

base $\rightarrow 2^3 \leftarrow$ **exponent**

We say 2^3 is in *exponential notation* and $2 \cdot 2 \cdot 2$ is in *expanded notation.*

Anything to the zero power is equal to 1.

Example

Simplify:

3^4

$3 \cdot 3 \cdot 3 \cdot 3$

$9 \cdot 9$

81

5^6

$5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5$

$25 \quad 25 \quad 25$

$15{,}625$

x^2

$x \cdot x$

your Turn

Simplify:	
5^3 $5 \cdot 5 \cdot 5 = 125$	1^7 $1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 = 1$
7^2 $7 \cdot 7$ 49	0^5 $0 \cdot 0 \cdot 0 \cdot 0 \cdot 0 = \boxed{0}$

Name: Icey Date: ________ Period: ______

Simplifying Expressions Using Order of Operations notes

Simplifying Expressions

To **simplify an expression** means to do all the math possible.
For example, to simplify $4 \cdot 2 + 1$ we'd first multiply $4 \cdot 2$ to get 8 and then add the 1 to get 9.
I like to work down the page, writing each step of the process below the previous step to keep things organized. The example just described would look like this:

$$4 \cdot 2 + 1$$
$$8 + 1$$
$$9$$

By not using an equal sign when you simplify an expression, you may avoid confusing expressions with equations.

Order of Operations

Let's take a moment and review the Order of Operations.

HOW TO SIMPLIFY WITH THE ORDER OF OPERATIONS	
Parentheses and Other Grouping Symbols	Simplify all expressions inside the parentheses or other grouping symbols, working from the inside out
Exponents	Simplify all expressions with exponents
Multiplication & Division	Perform all multiplication and division in order from left to right. They have equal priority.
Addition and Subtraction	Perform all addition and subtraction in order from left to right. They have equal priority.

Example

$70 \div 10 + 4(6 - 2)$

$7 + 4(4)$

$7 + 16$

23

$5 + 23 + 3[6 - 3(4 - 2)]$

$5 + 23 + 3[6 - 3(2)]$

$5 + 23 + 3[6 - 6]$

$5 + 23 + 3(0)$

28

Name: Key Date: ________ Period: ______

Order of Operations Practice

ORDER OF OPERATIONS

Parentheses	**P**lease
Exponents	**E**xcuse
Multiplication & **D**ivision	**M**y **D**ear
Addition & **S**ubtraction	**A**unt **S**ally

Simplify.

1) $4 + 3 \cdot 7$

$4 + 21$

25

2) $(12 - 5) \cdot 7$

$7 \cdot 7$

49

3) $8 + 3 \cdot 9$

$8 + 27$

35

4) $18 \div 6 + 4(5 - 2)$

$3 + 4(3)$

$3 + 12$

15

5) $30 \div 5 + 10(3 - 2)$

$6 + 10(1)$

16

6) $80 \div 10 + 5(9 - 2)$

$8 + 5(7)$

$8 + 35$

43

7) $9 + 53 - [4(9 + 3)]$

$9 + 53 - [4(12)]$

$9 - 53 - 48$

-92

8) $72 - 2[4(5 + 1)]$

$72 - 2[4(6)]$

$72 - 2(24)$

$72 - 48$

24

7

Name: Kerf Date: ________ Period: ______

Evaluating Expressions notes

Evaluating Expressions

In the last few examples, we simplified expressions using the order of operations. Now we'll evaluate some expressions—again following the order of operations. To **evaluate an expression** means to find the value of the expression when the variable is replaced by a given number.

To evaluate an expression, substitute that number for the variable in the expression and then simplify the expression.

Example

Evaluate $7x-4$, when

ⓐ $x = 5$

$7(5)-4$

$35-4 = 31$

ⓑ $x = 1$

$7(1)-4$

$7-4$

3

Evaluate the following for $x = 4$, when

ⓐ x^2 $(4)^2 = 16$

ⓑ 3^x

$3^4 = 81$

Evaluate $2x^2 + 3x + 8$ when $x = 4$

$2(4)^2 + 3(4) + 8$

$2(16) + 12 + 8$ → $32 + 12 + 8$

$44 + 8$ → 52

your Turn

Evaluate the given function.

1) $8x - 3$, when ⓐ $x = 2$ and ⓑ $x = 1$

a) $8(2)-3$

$16-3$

13

b) $8(1)-3$

5

2) $4y - 4$, when ⓐ $y = 3$ and ⓑ $y = 5$

a) $4(3)-4$

$12-4$

8

b) $4(5)-4$

$20-4$

16

3) $x = 6$, when ⓐ x^3 ⓑ 2^x

a) $6^3 = 216$

b) $2^6 = 2\cdot2\cdot2\cdot2\cdot2\cdot2$

$4\cdot4\cdot4$

$16\cdot4 = 64$

4) $2x^2 + 3x + 8$ when $x = 5$

$2(5)^2 + 3(5) + 8$

$2(25) + 15 + 8$

$50 + 15 + 8$ → $65 + 8$

73

5) $3x^2 + 4x + 1$ when $x = 3$

$3(3)^2 + 4(3) + 1$

$3(9) + 12 + 1$

$27 + 12 + 1$ → $39 + 1$

40

6) $6x^2 - 4x - 7$ when $x = 2$

$6(2)^2 - 4(2) - 7$

$6(4) - 8 - 7$

$24 - 8 - 7$ → $16 - 7$

9

Name: Key Date: ________ Period: ______

Identify and Combine Like Terms notes

Identify Coefficients

Algebraic expressions are made up of terms. A **term** is a constant, or the product of a constant and one or more variables.

Examples of terms are 7, y, $5x^2$, 9a, and b^5.

The constant that multiplies the variable is called the **coefficient**.
Think of the coefficient as the number in front of the variable. The coefficient of the term $3x$ is 3. When we write x, the coefficient is 1, since $x = 1 \cdot x$.

Example

Identify the coefficient of each term:

ⓐ $14y$

14

ⓑ $15x^2$

15

ⓒ a

1

Identify Like Terms

Some terms share common traits. Look at the following 6 terms. Which ones seem to have traits in common?

$5x \quad 7 \quad n^2 \quad 4 \quad 3x \quad 9n^2$

The 7 and the 4 are both constant terms.
The $5x$ and the $3x$ are both terms with x.
The n^2 and the $9n^2$ are both terms with n^2.

When two terms are constants or have the same variable and exponent, we say they are **like terms**.

- 7 and 4 are like terms.
- $5x$ and $3x$ are like terms.
- n^2 and $9n^2$ are like terms.

Example

Identify the like terms:

$y^3, \quad 7x^2, \quad 14, \quad 23, \quad 4y^3, \quad 9x, \quad 5x^2$

$y^3, 4y^3 \quad 7x^2, 5x^2 \quad 14, 23 \quad 9x$

Name: Key Date: ________ Period: ______

Identify & Combine Like Terms

Adding or subtracting terms forms an **expression.** In the expression $2x^2 + 3x + 8$, the three terms are $2x^2$, $3x$, and 8.

If there are **like terms** in an expression, you can simplify the expression by combining the like terms. What do you think $4x + 7x + x$ would simplify to?
If you thought $12x$, you would be right!

$$4x + 7x + x$$
$$x + x + x + x \quad + x + x + x + x + x + x + x \quad + x$$
$$12x$$

Add the coefficients and keep the same variable. It doesn't matter what x is — if you have 4 of something and add 7 more of the same thing and then add 1 more, the result is 12 of them. For example, 4 oranges plus 7 oranges plus 1 orange is 12 oranges. We will discuss the mathematical properties behind this later.

Example

Identify the terms in each expression:

ⓐ $9x^2 + 7x + 12$

$9x^2$, $7x$, 12

ⓑ $8x + 3y$

$8x$, $3y$

Simplify:
$2x^2 + 3x + 7 + x^2 + 4x + 5$

$3x^2 + 7x + 12$

How to Combine Like Terms

- Step 1. Identify like terms.
- Step 2. Rearrange the expression so like terms are together.
- Step 3. Add or subtract the coefficients and keep the same variable for each group of like terms.

Name: Key Date: ________ Period: ______

Identify and Combine Like Terms Practice

Your Turn

Identify the coefficient of each term:	
ⓐ $17x$ ⓑ $41b^2$ ⓒ z 17 41 1	ⓐ $9p$ ⓑ $13a^3$ ⓒ y^3 9 13 1

Identify the like terms:	
9, $2x^3$, y^2, $8x^3$, 15, $9y$, $11y^2$. $2x^3, 8x^3$ $y^2, 11y^2$ $9y$ 15	$4x^3$, $8x^2$, 19, $3x^2$, 24, $6x^3$ $4x^3, 6x^3$ $8x^2, 3x^2$ $19, 24$

Identify the terms in the expression:	
$4x^2 + 5x + 17$ $4x^2$, $5x$, 17	$5x + 2y$ $5x$, $2y$

Simplify the expression:	
$3x^2 + 7x + 9 + 7x^2 + 9x + 8$ $10x^2 + 16x + 17$	$4y^2 + 5y + 2 + 8y^2 + 4y + 5$ $12y^2 + 9y + 7$

Name: Keiz ______________________ Date: ________ Period: ______

Translate to an Algebraic Expression notes

Translate an English Phrase to an Algebraic Expression

In the last section, we listed many operation symbols that are used in algebra and then we translated expressions and equations into English phrases and sentences. Now we'll reverse the process. We'll translate English phrases into algebraic expressions. The symbols and variables we've talked about will help us do that.

Operation	Say:	Expression
Addition	a plus b The sum of a and b a increased by b b more than a The total of a and b b added to a	$a + b$
Subtraction	a minus b the difference of a and b a decreased by b b less than a b subtracted from a	$a - b$
Multiplication	a times b the product of a and b twice a	$a \cdot b$; ab; $(a)(b)$; $(a)b$; $a(b)$
Division	a divided by b the quotient of a and b the ratio of a and b b divided into a	$a \div b$; a/b; $b\overline{)a}$

Example

Translate each English phrase into an algebraic expression:

ⓐ the difference of $17x$ and 5 $17x-5$

ⓑ the quotient of $10x^2$ and 7 $\frac{10x^2}{7}$

Name: Key Date: ________ Period: ______

Translate an English Phrase to an Algebraic Expression

How old will you be in eight years? What age is eight more years than your age now?
Did you add 8 to your present age?
Eight "more than" means 8 added to your present age.
How old were you seven years ago?
This is 7 years less than your age now.
You subtract 7 from your present age.
Seven "less than" means 7 subtracted from your present age.

Example

Translate each English phrase into an algebraic expression:

a) Seventeen more than y

$y+17$

b) Nine less than $9x^2$

$9x^2-9$

c) five times the sum of m and n

$5(m+n)$

d) the sum of five times m and n.

$5m+n$

e) The length of a rectangle is 6 less than the width. Let w represent the width of the rectangle. Write an expression for the length of the rectangle.

$L=w-6$

f) June has dimes and quarters in her purse. The number of dimes is three less than four times the number of quarters. Let q represent the number of quarters. Write an expression for the number of dimes.

$d=4q-3$

Name: Key Date: ________ Period: ______

Translate to an Algebraic Expression Practice

Your Turn

Translate each English phrase into an algebraic expression.

The difference of $24x^2$ and 15 $24x^2 - 15$	The sum of $17y^2$ and 20 $17y^2 + 20$
The quotient of 14x and 9 $\frac{14x}{9}$	The product of 9 and *b* $9b$
Eleven more than x $x+11$	Sixteen less than 14y $14y-16$
Four times the sum of *a* and *b* $4(a+b)$	The sum of four times *a* and *b* $4a+b$
The length of a rectangle is 9 less than the width. Let *w* represent the width of the rectangle. Write an expression for the length of the rectangle. $l = w-9$	Laura has dimes and quarters in her purse. The number of dimes is two more than twelve times the number of quarters. Let *q* represent the number of quarters. Write an expression for the number of dimes. $d = 12q+2$

Name: Key Date: ________ Period: ______

Unit 1.2: Use The Language Of Algebra Practice

Translate from algebra to English	
1. 16 - 9 The difference of sixteen and nine	2. $y - 1 > 6$ The difference of y and 1 is greater than six.
Determine if each is an expression or an equation:	
3. $9 \cdot 6 = 54$ Equation	4. $5 \cdot 6 + 3$ Expression
5. $x + 10$ Expression	6. $z + 7 = 29$ Equation
Simplify each expression:	
7. 5^3 $5 \cdot 5 \cdot 5 = 125$	8. 2^7 $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 = 128$
9. $(2 + 5) \cdot 6$ $7 \cdot 6$ 42	10. $2^3 - 12 \div (9 - 6)$ $8 - 12 \div 3$ $8 - 4$ 4
11. $20 \div 5 + 6 \cdot 9$ $4 + 54$ 58	12. $4^2 + 8^2$ $16 + 64$ 80
13. $3(2 + 9 \cdot 7) - 4^2$ $3(2+63)-16$ $3(65)-16$ $195-16$ 179	14. $2[1 + 3(10 - 2)]$ $2[1+3(8)]$ $2[1+24]$ $2(25)$ 50

Name: Key Date: ________ Period: ______

Unit 1.2 : Use The Language Of Algebra Practice

Evaluate the following expressions.

15. $7x+8$ when $x = 2$ $7(2)+8$ $14+8$ 22	16. x^5 when $x = 2$ $(2)^5 = 32$	17. $(x-y)^2$ when $x = 9$, $y = 6$ $(9-6)^2$ 3^2 9	18. $2x + 2y$ when $x = 18$ and $y = 14$ $2(18)+2(14)$ $36+28$ 64

Identify the coefficient of each term.

19. $8a$ 8	20. $5r^5$ 5	21. xy 1

Identify the like terms.

22. x^3, $8x$, 4, $8y$, 5, $8x^3$ $x^3, 8x^3$ $4, 5$ $8x$ $8y$	23. $9a$, a^2, 16, $16b^2$, 4, $9b^2$ $9a$ $16b^2, 9b^2$ a^2 $16, 4$

Identify the terms in each expression.

24. $14x^2 + 7x + 3$ $14x^2, 7x, 3$	25. $9y^3 + 7y + 5$ $9y^3, 7y, 5$

Simplify the following expressions by combining like terms.

26. $10x + 4x$ $14x$	27. $8d + 7 + 2d + 8$ $10d + 15$
28. $10a + 9 + 5a - 3 + 7a - 5$ $22a + 1$	29. $3x^2 + 12x + 11 + 14x^2 + 7x + 6$ $17x^2 + 19x + 17$

Name: Key Date: ________ Period: ______

Unit 1.2: Use The Language Of Algebra Practice

Translate the phrases in algebraic expressions.

30. The difference of 15 and 8 $15-8$	31. The product of 6 and 9 $6(9)$
32. The quotient of y and 3 $\frac{y}{3}$	33. The sum of 13x and 4x $13x+4x$
34. Sam has jazz and classical CDs in his car. The number of jazz CDs is 4 more than the number of classical CDs. Let c represent the number of classical CDs. Write an expression for the number of jazz CDs. $j = c+4$	35. Joe has \$5 and \$10 bills in his wallet. The number of fives is four more than six times the number of tens. Let t represent the number of tens. Write an expression for the number of fives. Fives = $6t+4$

Answer each question.

36. Explain the difference between an expression and an equation.

Answers Vary

Ex. equations have equal signs, expressions don't

37. Explain how you identify the like terms in the expression $9a^2 + 5a + 8 - a^2 - 2$.

Answers Vary

Name: Key Date: ________ Period: ______

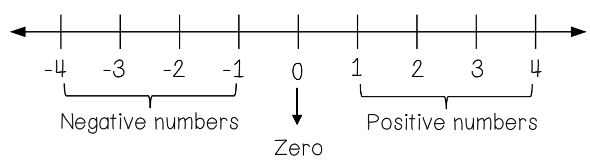
Intro to Integers notes

Vocabulary		
Term	**Definition**	**Example**
Negative Numbers	Numbers less than 0	-1, -2, -3, -4, …
Positive Numbers	Numbers greater than zero.	0, 1, 2, 3, 4, 5…
Opposite	The number that is the same distance from zero on a number line, but on the opposite side.	5 and -5 3 and -3 -7 and 7

Negative Numbers

Negative numbers are numbers less than zero. Some real-world examples of negatives are:

- Temperature below zero
- Elevation below sea level
- Overdrawn checking account



Zero is neither positive or negative.
You can order negatives just like you can order positives!

Example

Order each of the following pairs of numbers using < or > :

14 _>_ 6   -1 _<_ 9   -1 _>_ -4   2 _>_ -20

your Turn

Order each of the following pairs of numbers using < or > :

8 _<_ 13   -2 _<_ 5   -5 _<_ -2   9 _>_ -21

 Name: Key Date: ________ Period: ______

Vocabulary		
Term	**Definition**	**Example**
Negative Numbers	Numbers less than 0	-1, -2, -3, -4, …
Positive Numbers	Numbers greater than zero.	0, 1, 2, 3, 4, 5…
Opposite	The number that is the same distance from zero on a number line, but on the opposite side.	5 and -5 3 and -3 -7 and 7

Opposites

Sometimes in algebra the same symbol has different meanings. Just like some words in English, the specific meaning becomes clear by looking at how it is used. Let's look at how we can use the symbol "-" :

- Between two numbers to show subtraction like 10 – 4
- In front of a number to show a negative number like -8
- In front of a variable to show the opposite, like –x ("the opposite of x")
- When you have two, like - (-5) you read it as "the opposite of -5"

All that to say, -a means "the opposite of a"

Example

Find the opposite of each number:

8	-12	–(-7) +7	-x
-8	12	-7	x

your Turn

Find the opposite of each number:

5	–(-1) → 1	-60	-z
-5	-1	60	z

Integers

The whole numbers and their opposites create integers!
The integers are the numbers ...-3, -2, -1, 0, 1, 2, 3, 4 ...

Be careful though, when evaluating the opposite of a variable, watch your negatives closely!

Example

Evaluate $-x$ when $x = 4$ -4	Evaluate $-x$ when $x = -4$ $-(-4)$ 4

Your Turn

Evaluate given the function.	
$-n$, when $n = 5$ -5	$-m$, when $m = -11$ $-(-11)$ 11
$-n$, when $n = -5$ $-(-5)$ 5	$-m$, when $m = 11$ -11

Name: Key Date: ________ Period: ______

Absolute Value notes

Vocabulary		
Term	**Definition**	**Example**
Absolute Value	A number's distance from 0 on the number line Written as $\|n\|$	$\|5\| = 5$ $\|-5\| = 5$
Property of Absolute Value	$\|n\| \geq 0$ for all numbers Absolute values are always positive!	
Grouping Symbols	Absolute value can be added to our list of grouping symbols.	Parentheses ( ) Brackets [ ] Braces { } Absolute Value | |

Absolute Value

Absolute value is a number's distance from zero, and since distance is always positive, absolute value is always positive!

When simplifying expressions with absolute value, treat the absolute value as a grouping symbol and follow the order of operations just like usual.

Example

Simplify:

$\|3\|$ 3	$\|-44\|$ 44	$\|0\|$ $\boxed{0}$

Fill in <, >, or = for each of the following pairs of numbers:

$\|-5\|$ $\geq$ $-\|-5\|$ 5 -5	8 $>$ $-\|-8\|$ 8 -8	-9 = $-\|-9\|$ -9 -9	-(-16) $>$ $-\|-16\|$ 16 -16

Simplify:	Evaluate:
$24 - \|19 - 3(6-2)\|$ $24 - \|19-3(4)\|$ $24 - \|19-12\|$ $24 - 7$ 17	$\|-y\|$ when $y = -39$ $\|-(-39)\|$ 39 $-\|p\|$ when $p = -11$ $-\|-11\| =$ -11

Name: Key Date: ________ Period: ______

Absolute Value Practice

Simplify:

1) |4| 4

2) |-34| 34

3) |0| $\boxed{0}$

4) |-45| 45

Fill in <, >, or = for each of the following pairs of numbers:

5) |-8| > -|-8|
8 -8

6) |3| > -|-3|
3 -3

7) -(-15) > -|-15|
15 -15

Simplify:

8) 19 - |11 – 4 (2 – 1)|

19 - |11-4(1)|
19 - |11-4|
19 - 7
12

9) 11 + | 8 – 4(7 – 5)|

11 + |8-4(2)|
11 + | 8-8|
11

Evaluate:

10) |x| when x = −21

|-21|
21

12) -|z| when z = 54

-|54| -54

11) |-y| when y = -41

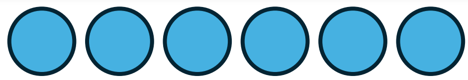
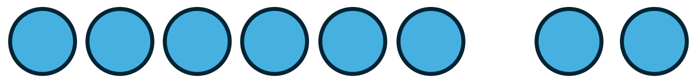
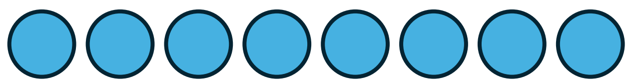
|-(-41)|
41

13) -|r| when r = -32

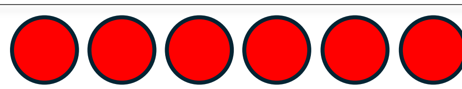
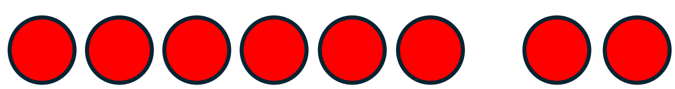
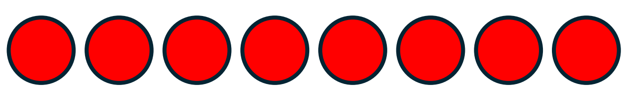
- |-32|
-32

Name: Key Date: ________ Period: ______

Add Integers notes

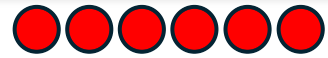
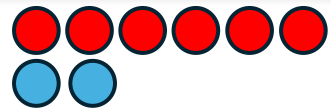
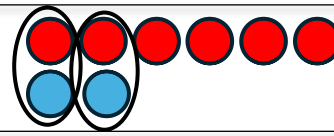
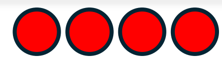
Modeling Adding Integers: 6 + 2	
Step	**Model**
Start with 6 positives	
Add 2 positives	
Now we have 8 positives. The sum of 6 and 2 is 8.	

What if we add negative numbers?
When adding -6 + (-2), we are finding the sum of -6 and -2.

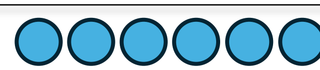
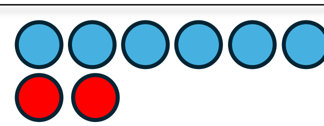
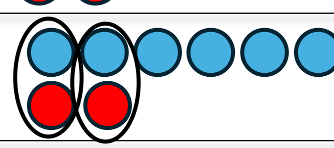
Modeling Adding Integers: -6 + (-2)	
Step	**Model**
Start with 6 negatives	
Add 2 negatives	
Now we have 8 negatives. The sum of -6 and -2 is -8.	

From these two examples we can see that if the signs are the same, the circles are all the same color, and so you can just add them. The sign matches the signs of the numbers. So, when adding two positives you get a positive answer. When you add two negatives, you geta negative answer.

EXAMPLE: $-1 + (-5) =$ -6 $-23 + (-45) =$ -68 $-12 - 24 =$ -36

Modeling Adding Integers: -6 + 2	
Step	**Model**
Start with 6 negatives	
Add 2 positives	
Remove any neutral pairs.	
We have 4 negatives left.	
The sum of -6 and 2 is -4.	-6 + 2 = -4

Notice that there were more negatives than positives, so our answer was negative.

Modeling Adding Integers: 6 + (-2)	
Step	**Model**
Start with 6 positives	
Add 2 negatives	
Remove any neutral pairs.	
We have 4 positives left.	
The sum of 6 and -2 is 4.	6 + (-2) = 4

Notice that this time we had more positives than negatives, so our answer was positive. When adding negatives with different signs, subtract the numbers, then you can imagine the counters to help you decide whether your answer is positive or negative. If the larger number is positive, your answer is positive. If the larger number is negative, your answer is negative.

EXAMPLE: -1 + 4 = 3 18 + (-49) = -31 29 + (-19) = 10

Name: Key Date: ________ Period: ______

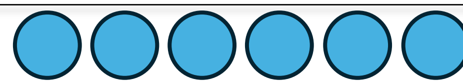
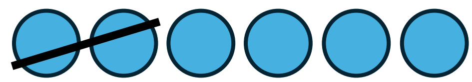
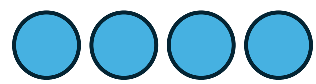
Add Integers Practice

Simplify:	
1) 5 + 9 14	2) -5 + (-9) -14
3) 4 + 9 13	4) -4 + (-9) -13
5) -5 + 9 4	6) 5 + (-9) -4
7) -4 + 9 5	8) 4 + (-9) -5
9) -32 + (-21) -53	10) 16 + (-31) -15
11) -3 + 4(-5 + 6) -3 + 4(1) 1	12) -3 + 3(-4 + 4) -3 + 3(0) -3

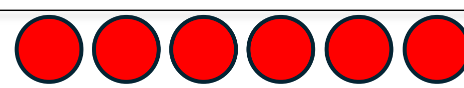
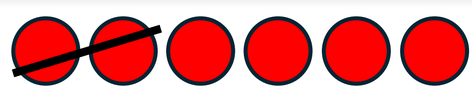
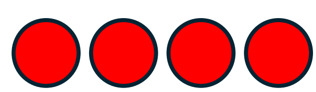
9

Name: Key ______________________ Date: ________ Period: ______

Subtract Integers notes

Modeling Subtracting Integers: 6 - 2	
Step	**Model**
Start with 6 positives	
Take away 2 positives	
Now we have 4 positives. The difference of 6 and 2 is 4.	

What if we subtract negative numbers?
When subtracting -6 - (-2), we are finding the difference of -6 and -2.

Modeling Subtracting Integers: -6 - (-2)	
Step	**Model**
Start with 6 negatives	
Think "6 negatives take away 2 negatives"	
Now we have 4 negatives. The difference of -6 and -2 is -4.	

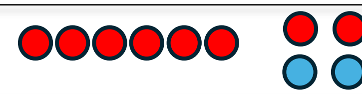
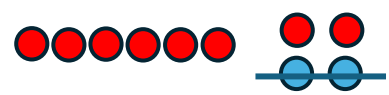
Notice that these two examples are much alike: The first example, we subtract 2 positives from 6 positives and end up with 4 positives.
In the second example, we subtract 2 negatives from 6 negatives and end up with 4 negatives.
Each example used circles of only one color, and the "take away" model of subtraction was easy to apply.

EXAMPLES: -4 - (-2) =
-4 + 2
-2

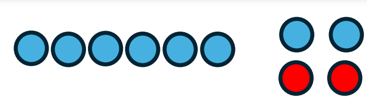
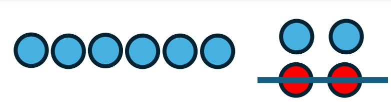
-33 - (-11) =
-33 + 11
-22

12 – 5 =
7

What if we need to subtract a negative and a positive number? We will need to add neutral pairs so that we have positive numbers to take away. A neutral pair doesn't change the value, because they cancel each other out. In the next example, we will add two neutral pairs so we can subtract a positive two.

Modeling Subtracting Integers: -6 - 2	
Step	**Model**
Start with 6 negatives	
Add the neutrals needed to get 2 positives (this doesn't change our value!)	
Now we can take away 2 positives. The difference of -6 and -2 is 8.	

Now for 6 – (-2). We start with 6 positives. We need to take away 2 negatives, but we don't have any negatives to take away, so we add neutral pairs till we have those two negatives to take away.

Modeling Subtracting Integers: 6 – (-2)	
Step	**Model**
Start with 6 positives	
Add the neutrals needed to get 2 negatives. (this doesn't change our value!)	
Now we can take away 2 negatives. The difference of 6 and -2 is 8.	

Did you notice that subtraction of signed numbers can be done by adding the opposite?
-3 – 1 is the same as -3 + (-1) and 3 – (-1) is the same as 3 + 1.
This is the subtraction property: $a - b = a + (-b)$ and $a - (-b) = a + b$

EXAMPLES:

12 – 7 5	12 + (-7) 5	-16 – 8 -24	-16 + (-8) -24
7 – (-13) 7+13 20	7 + 13 20	- 8 – (-5) -8+5 -3	- 8 + 5 -3

Name: Key Date: ________ Period: ______

Subtract Integers Practice

Simplify:	
1) 4 - 3 1	2) -4 – (-3) −4+3 −1
3) 8 – 4 4	4) -8 – (-4) -8 +4 -4
5) -6 – 4 −10	6) 6 – (-4) 6+4 10
7) -8 – 4 -12	8) 8 – (-4) 8+4 12
9) -32 + (-21) -53	10) 16 + (-31) -15
11) -3 + 4(-5 + 6) -3 +4(1) 1	12) -3 + 3(-4 + 4) -3 + 3(0) -3
13) -11 – 7 −18	14) -14 – 8 -22
15) 6 – (-13) 6+13 19	16) -4 – (-7) −4+7 3
17) 8 – (-3 – 2) – 7 8-(-5)-7 8+5-7 6	18) 12 – (-9 – 5) – 14 12-(-14)-14 12+14-14 12

Name: Key Date: ________ Period: ______

Unit 1.3 : Add & Subtract Integers Practice

Order the following pairs of numbers using < or >.	
1. -8 _<_ -2	2. 1 _>_ -10
Find the opposite of each number.	
3. 2 -2	4. -6 6
Simplify.	
5. - (-3) 3	6. - (-13) 13
Evaluate.	
7. -c when c = -12 $-(-12) = 12$	8. -|z| when z = -13 $-\|-13\| = -13$
Fill in <, >, or = for each of the following pairs of numbers.	
9. -6 _<_ |-6| 6	10. -|-3| _=_ -3 -3
Simplify.	
11. |15 – 7| - |14 – 7| 8 – 7 1	12. 18 - |2(8 – 3)| 18 – |2(5)| 18 – 10 8
13. -21 + (-69) -90	14. 48 + (-16) 32
15. 134 + (-112) + 42 22+42 64	16. 8 – (-4) 8+4 12

Name: Key Date: ________ Period: ______

Unit 1.3 : Add & Subtract Integers Practice

Simplify:	
17) -17 – 43 -60	18) -105 – (-55) -105 + 55 -50
19) 8 – 3 – 6 5 - 6 -1	20) -14 – (-27) + 9 -14 + 27 + 9 13 + 9 22
21) (2 – 7) – (3 – 8) -5 – (-5) -5 + 5 0	22) -(6 – 8) – (2 – 4) -(-2) - (-2) 2 + 2 4
23) 25 – [11 (4 – 10)] 25 – [11 (-6)] 25 – (-66) 25 + 66 91	24) 5 · 7 – 8 · 3 – 5 · 11 35 – 24 - 55 -44

Name: Key Date: ________ Period: ______

Unit 1.3 : Add & Subtract Integers Practice

27. The highest elevation in the United States is Mount McKinley, Alaska, at 20,320 above sea level. The lowest elevation is Death Valley, California, at 282 feet below sea level. What is the difference between the two elevations?

$20,320 - (-282)$

$20,320 + 282$

$20,602$

28. Explain why the sum of -8 and 5 is negative, but the sum 8 and -5 is positive.

Answers Vary

Name: Key Date: ________ Period: ______

Multiplication & Division of Integers notes

Multiplication and Division of Signed Numbers		
Same Signs	**Product**	**Example**
Two positives Two negatives	Positive Positive	$7 \cdot 5 = 35$ $-8(-3) = 24$
Different Signs	**Product**	**Example**
Positive · Negative Negative · Positive	Negative Negative	$4(-9) = -36$ $-8 \cdot 10 = -80$
If the signs are the same, the answer is positive. If the signs are different, the result is negative.		

Example

$-9 \cdot 4$	$-12 \cdot 3$	$(-3)(-5)$	$3 \cdot 13$
-36	-36	15	39

your Turn

$-42 \div 6$	$-132 \div -2$	$-77 \div 7$	$-108 \div -12$
-7	66	-11	9

Name: Key Date: ________ Period: ______

Simplify Expressions with Integers notes

Simplifying Expressions

When you have an expression with multiple integers, the Order of Operations applies just like with all other expressions.

Remember PEMDAS!

Example

Simplify.	
$7(-3) + 4(-7) - 8$ $-21 - 28 - 8$ $-49 - 8$ -57	$(-2)^4$ $(-2)(-2)(-2)(-2)$ $4 \cdot 4$ 16
-2^4 $-(2^4)$ -16	$12 - 4(8 - 11)$ $12 - 4(-3)$ $12 + 12$ 24
$8(-9) \div (-2)^2$ $-72 \div 4$ -18	$-30 \div 3 + (-3)(-6)$ $-10 + 18$ 8

Name: Key Date: ________ Period: ______

Simplify Expressions with Integers Practice

Simplify:

1) $8(-2) + 6(-6) - 5$

$-16 - 36 - 5$

$-52 - 5$

-57

2) $9(-3) + 8(-7) - 2$

$-27 - 56 - 2$

-85

3) $(-3)^4$ 81

4) -3^4 -81

5) $(-7)^2$ 49

6) -7^2 -49

7) $17 - 4(8 - 19)$

$17 - 4(11)$

$17 - 44$

-27

8) $16 - 6(7 - 13)$

$16 - 6(-6)$

$16 + 36$

52

9) $12(-9) \div (-3)^3$

$-108 \div (-27)$

4

10) $18(-4) \div (-2)^3$

$-72 \div (-8)$

9

11) $-27 \div 3 + (-5)(-6)$

$-9 + 30$

21

12) $-32 \div 4 + (-2)(-7)$

$-9 + 14$

5

Name: Key Date: ________ Period: ______

Evaluate Variables Expressions with Integers notes

Evaluating Expressions

To evaluate an expression means to substitute a number for the variable in the expression. Now we know how to work with negative numbers, we can evaluate expressions using both positive and negative numbers.

Example

Evaluate $n + 1$ when $n = -5$	Evaluate $-n + 1$ when $n = -5$
$-5+1$ $+4$	$-(-5)+1$ $5+1$ 6
Evaluate $(x + y)^2$ when $x = -12$ and $y = 24$ $(-12+24)^2$ 12^2 144	
Evaluate $20 - z$ when $z = 13$ $20-13$ 7	Evaluate $20 - z$ when $z = -13$ $20-(-13)$ $20+13$ 33
Evaluate $2x^2 + 3x + 8$ when $x = 4$ $2(4)^2+3(4)+8$ $2(16)+12+8$ $32+12+8$ $32+20$ 52	

Name: Key Date: ________ Period: ______

Evaluate Variables Expressions with Integers Practice

Evaluate:	
1) $n + 2$ when $n = -8$ $-8+2$ -6	2) $-n + 2$ when $n = -8$ $-(-8)+2$ $8+2 = 10$
3) $y + 8$ when $y = -9$ $-9+8$ -1	4) $-y + 8$ when $y = -9$ $-(-9)+8$ $9+8 = 17$
5) $(x+y)^2$ when $x = -8$ and $y = 29$ $(-8+29)^2$ $(21)^2$ 441	6) $(x + y)^3$ when $x = -8$ and $y = 10$ $(-8+10)^3$ $2^3 = 8$
7) $17 - k$ when $k = 19$ $17-19$ -2	8) $17 - k$ when $k = -19$ $17-(-19)$ $17+19$ 36
9) $-5 - b$ when $b = 14$ $-5-14$ -19	10) $-5 - b$ when $b = -14$ $-5-(-14)$ $-5+14$ 9
11) $3x^2 - 2x + 6$ when $x = -3$ $3(-3)^2-2(-3)+6$ $3(9)+6+6$ $27+6+6$ $27+12$ 39	12) $4x^2 - x - 5$ when $x = -2$ $4(-2)^2-(-2)-5$ $4(4)+2-5$ $16+2-5$ $18-5$ 13

Name: Key Date: ________ Period: ______

Translate Phrases to Expressions with Integers notes

Translating Phrases

Everything we have learned about translating English to Algebra also applies to phrases that include both positive and negative numbers.

When subtracting, make sure you get it in the correct order:

a – b
a minus b the difference of a and b b subtracted from a b less than a

Example

Translate and simplify:	
The sum of 8 and -11, increased by 3 $8+(-11)+3$ $-3+3$ $\boxed{0}$	The difference of 13 and -23 $13-(-23)$ $13+23 \rightarrow 36$
Subtract 24 from -18. $-18-24$ -42	The product of -2 and 13 $-2(13)$ -26
The quotient of -56 and -7 $-56\div(-7)$ 8	

your Turn

Translate and simplify:	
The sum of 9 and -15, increased by 4 $9+(-15)+4$ $-6+4$ -2	The difference of 11 and -20 $11-(-20)$ $11+20$ 31
Subtract 18 from -11 $-11-18$ -29	The product of -5 and -10 $-5(-10)$ 50
The quotient of -72 and 9 $-72\div 9$ -8	

Name: Key Date: ________ Period: ______

Use Integers in Applications notes

Applications

You can always follow a set of steps to help you solve application problems. First determine what the problem is asking you to find. Then write a phrase that gives the information to find it. Translate that phrase into an expression and then simplify the expression to get the answer. Finally, summarize the answer in a sentence to make sure it makes sense.

Example

In the morning, the temperature in Illinois was 11 degrees. By mid-afternoon the temperature had dropped to -8 degrees. What was the difference of the morning and afternoon temperatures?

$11-(-8) = 11+8 = 19$

A football team received four penalties in the third quarter. Each penalty gave them a loss of fifteen yards. What is the number of yards lost?

$4(-15) = -60$

your Turn

In the morning, the temperature in Alaska was 15 degrees. By mid-afternoon it had dropped to 35 degrees below zero. What was the difference in the morning and afternoon temperatures?

$15-(-35)$

$15+35 = 50$

The Bears played poorly and had eight penalties in the game. Each penalty resulted in a loss of 15 yards. What is the number of yards lost due to penalties?

$8(-15) = -120$

Name: Key Date: ________ Period: ______

Unit 1.4: Multiply and Divide Integers Practice

Simplify.	
1. $-4 \cdot 9$ -36	2. $-1(-15)$ 15
3. $-52 \div (-4)$ 13	4. $-140 \div 20$ -7
5. $5(-6) + 8(-2) - 4$ $-30 - 16 - 4$ $-46 - 4$ -50	6. $(-2)^2$ 4
7. $-3(-6)(5)$ $18(5)$ 90	8. $65 \div (-5) + (-21) \div (-7)$ $-13 + 3$ -10
9. $(-4)^2 - 24 \div (8 - 2)$ $16 - 24 \div 6$ $16 - 4$ 12	10. $9 - 2[3 - 7(-2)]$ $9 - 2[3 + 14]$ $9 - 2(17)$ $9 - 34 \rightarrow -25$
Evaluate.	
11. $y + (-15)$ when $y = -33$ $-33 + (-15)$ -48	12. $y + (-15)$ when $y = 40$ $40 - 15$ 25
13. $-2x + 17$ when $x = -9$ $-2(-9) + 17$ $18 + 17$ 35	14. $-2x + 17$ when $x = 9$ $-2(9) + 17$ $-18 + 17$ -1
15. $2w^2 - 3w + 7$ when $w = -3$ $2(-3)^2 - 3(-3) + 7$ $2(9) + 9 + 7$ $18 + 9 + 7 \rightarrow 27 + 7$ 34	16. $9a - 2b - 6$ when $a = -6$ and $b = -3$ $9(-6) - 2(-3) - 6$ $-54 + 6 - 6$ -54

Name: Key Date: ________ Period: ______

Unit 1.4: Multiply and Divide Integers Practice

Translate to an algebraic expression and simplify if possible.

17. The sum of 4 and -15, increased by 7

$4+(-15)+7$

$-11+7$

-4

18. The difference of -5 and -31

$-5-(-31)$

$-5+31$

26

19. The product of -2 and 14

$-2(14)$

-28

20. The quotient of -40 and -10

$\frac{-40}{-10} = 4$

21. The quotient of -6 and the sum of x and y

$\frac{-6}{x+y}$

22. The product of -10 and the difference of a and b

$-10(a-b)$

Solve.

23. In your own words, state the rules for multiplying integers.

Answers Vary

24. Why is $-3^4 \neq (-3)^4$?

Answers vary

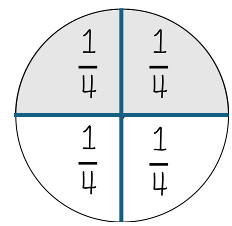
Name: key Date: ________ Period: ______

Find Equivalent Fractions notes

Fractions

Fractions are a way to represent parts of a whole. The fraction 1/4 means that one whole will be divided into 4 equal parts and each part is one of the four equal parts. The fraction 2/4 represents two of the four equal parts. In fractions, the top number is called the numerator, and the bottom number is called the denominator.

If a whole pizza is cut into 4 pieces, and we eat all 4 pieces, we ate 4/4 pieces, or one whole pizza. That means that 4/4 = 1, which brings us to the **Property of One: Any number divided by itself is one.**



Equivalent Fractions

If any number divided by itself equals 1, then that means that 4/4 and 5/5 both equal one. We call them equivalent fractions, because equivalent fractions have the same value.

Some other examples of equivalent fractions are 1/2 and 2/4. Let's look at how we can make equivalent fractions using multiplication:

$$\frac{1\cdot 2}{2\cdot 2}=\frac{2}{4} \text{ so } \frac{1}{2}=\frac{2}{4}$$

$$\frac{1\cdot 3}{2\cdot 3}=\frac{3}{6} \text{ so } \frac{1}{2}=\frac{3}{6}$$

Example

Find three fractions equivalent to: Answers may vary	
3/5 $\frac{3}{5}=\frac{9}{15}=\frac{30}{50}=\frac{60}{100}$	4/7 $\frac{4}{7}=\frac{8}{14}=\frac{12}{21}=\frac{16}{28}$
Your Turn!	
5/6 $\frac{5}{6}=\frac{20}{24}=\frac{50}{60}=\frac{100}{120}$	4/11 $\frac{4}{11}=\frac{8}{22}=\frac{12}{33}=\frac{16}{44}$

Name: Key Date: ________ Period: ______

Simplify Fractions notes

Simplifying Fractions

A fraction is "simplified" when there are no other common factors (other than 1) in its numerator and denominator.
For example, 1/3 is simplified cause there are no common factors of 2 and 3.
10/20 is NOT simplified cause 10 is a common factor of 10 and 20.

The phrase "reduce a fraction" means to simplify the fraction. We can simplify a fraction by removing the common factors in the numerator and the denominator.

Example

Simplify:	
-32/56 $\frac{-32}{56} \div \frac{4}{4} = \frac{-8}{14} \div \frac{2}{2} = \frac{-4}{7}$	-201/385 $\frac{-201}{385}$ can't simplify
6x/6y $\frac{\cancel{6}x}{\cancel{6}y} = \frac{x}{y}$	8xy/24x $\frac{^{1}\cancel{8}\cancel{x}y}{\cancel{24}_{3}\cancel{x}} = \frac{y}{3}$
Your Turn!	
-42/56 $\frac{-42}{56} = \frac{-21}{28} = \frac{-3}{4}$	-45/81 $\frac{-45}{81} = \frac{-5}{9}$
-69/120 $\frac{-69}{120} \div \frac{3}{3} = \frac{-21}{40}$	-120/192 $\frac{-120}{192} \div \frac{2}{2} = \frac{-60}{96} \div \frac{3}{3} = \frac{-20}{32} \div \frac{2}{2} = \frac{-10}{16}$ $\frac{-5}{8}$
7x/7y $\frac{7x}{7y} = \frac{x}{y}$	5a/5b $\frac{5a}{5b} = \frac{a}{b}$

Name: Key Date: ________ Period: ______

Multiply Fractions notes

Multiplying Fractions

To multiply fractions, you multiply your numerators and then multiply your denominators. Here is a model to help you understand why.

Let's start with 3/4:

Now we will take 1/2 of 3/4 (that's multiplying!)

We now have 3/8 (the black squares), because each fourth was cut in half, which is how we got the 3/8.

$$\frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$$

Example

Multiply:	
$-\frac{11}{13} \cdot \frac{5}{7} = -\frac{55}{91}$	$-\frac{12}{\cancel{5}_1}(-\cancel{25}^{5}x) = 60x$
Your Turn!	
$-\frac{\cancel{10}^{2}}{\cancel{28}_{7}} \cdot \frac{\cancel{8}^{2}}{\cancel{15}_{3}} = \frac{-4}{21}$	$-\frac{\cancel{9}^{1}}{\cancel{25}_{5}} \cdot \frac{\cancel{5}^{1}}{\cancel{18}_{2}} = \frac{-1}{10}$
$-\frac{12}{\cancel{7}_1}(-\cancel{21}^{3}b) =$ $36b$	$\frac{24}{\cancel{5}_1}(-\cancel{15}^{3}b) = -72b$

Name: Key Date: ________ Period: ______

Divide Fractions notes

Divide Fractions

Dividing fractions is pretty cool – you never actually have to divide!

To divide fractions, you multiply by the **reciprocal. The reciprocal of a fraction** is found by inverting (flipping upside down) the numerator and the denominator.
For example, the reciprocal of 2/5 is 5/2. Notice that when you multiply 2/5 and 5/2, you get 1. Reciprocals always multiply to equal one.

You can use the idea "keep – change – flip" to remember how to divide fractions.

$$\frac{1}{2} \div \frac{3}{4} = \frac{1}{2} \times \frac{4}{3} = \frac{4}{6} = \frac{2}{3}$$

Example

Divide.	
$-\frac{2}{3} \div \frac{n}{5} = -\frac{2}{3} \cdot \frac{5}{n} = -\frac{10}{3n}$	$-\frac{7}{18} \div \left(-\frac{14}{27}\right)$ $-\frac{\cancel{7}^{1}}{\cancel{18}_{2}} \cdot -\frac{\cancel{27}^{3}}{\cancel{14}_{2}} = \frac{3}{4}$
Your Turn!	
$-\frac{3}{5} \div \frac{p}{8}$ $-\frac{3}{5} \cdot \frac{8}{p} = -\frac{24}{5p}$	$-\frac{5}{8} \div \frac{x}{4}$ $-\frac{5}{\cancel{8}_{2}} \cdot \frac{\cancel{4}^{1}}{x} = -\frac{5}{2x}$
$-\frac{7}{27} \div -\frac{42}{36}$ $-\frac{\cancel{7}^{1}}{\cancel{27}_{3}} \cdot -\frac{\cancel{36}^{4\ 2}}{\cancel{42}_{6\ 3}} = \frac{2}{9}$	$-\frac{5}{14} \div \frac{15}{28}$ $-\frac{\cancel{5}^{1}}{\cancel{14}_{2\ 1}} \cdot \frac{\cancel{28}^{4\ 2}}{\cancel{15}_{3}} = -\frac{2}{3}$

Name: Key Date: ________ Period: ______

Complex Fractions *notes*

Complex Fractions

Sometimes your fractions will contain fractions. These are called Complex Fractions. Some examples of complex fractions are:

$$\frac{\frac{6}{8}}{4}\ ;\ \frac{\frac{3}{5}}{8\frac{4}{7}}\ ;\ \frac{\frac{x}{2}}{\frac{y}{4}}$$

To simplify a complex fraction, just remember that a fraction bar means division. So, 6/8 over 4 is the same thing as 6/8 ÷ 4.

Example

Simplify:	
$\frac{\frac{3}{4}}{\frac{5}{8}}$ $\quad \frac{3}{\cancel{4}_1} \cdot \frac{\cancel{8}^2}{5} = \frac{6}{5}$	$\frac{\frac{y}{2}}{\frac{yz}{8}}$ $\quad \frac{\cancel{y}^1}{\cancel{2}_1} \cdot \frac{\cancel{8}^4}{\cancel{y}z} \quad \frac{4}{z}$
Your Turn!	
$\frac{\frac{2}{3}}{\frac{5}{9}}$ $\quad \frac{2}{\cancel{3}_1} \cdot \frac{\cancel{9}^3}{5} \quad \frac{6}{5}$	$\frac{\frac{3}{7}}{\frac{9}{11}}$ $\quad \frac{\cancel{3}^1}{7} \cdot \frac{11}{\cancel{9}_3} \quad \frac{11}{21}$
$\frac{\frac{x}{8}}{\frac{xy}{10}}$ $\quad \frac{\cancel{x}}{\cancel{8}_4} \cdot \frac{\cancel{10}^5}{\cancel{x}y} \quad \frac{5}{4y}$	$\frac{\frac{a}{2}}{\frac{ab}{6}}$ $\quad \frac{\cancel{a}}{\cancel{2}} \cdot \frac{\cancel{6}^3}{\cancel{a}b} \quad \frac{3}{b}$

Name: Key Date: ________ Period: ______

Simplify Expressions with a Fraction Bar notes

Expressions with a Fraction Bar

The line that separates the numerator from the denominator in a fraction is called a fraction bar. We treat a fraction bar as a grouping symbol. The order of operations then tells us to simplify the numerator and then the denominator. Then we divide.

To simplify the expression $\frac{6-3}{8+1}$, simplify the numerator first, then simplify the denominator, then divide the resulting expression.

$$\frac{6-3}{-8+2} = \frac{3}{-6} = -\frac{1}{2}$$

Note: It doesn't matter where the negative goes in a fraction.

Example

Simplify:	
$\frac{4-2(3)}{2^2+4} = \frac{4-6}{4+4} = \frac{-2}{8} = \frac{-1}{4}$	$\frac{4(-3)+6(-2)}{-3(2)-4}$ $\frac{-12-12}{-6-4} = \frac{-24}{-10} = \frac{12}{5}$
Your Turn!	
$\frac{6-4(5)}{3^2-2} = \frac{6-20}{9-2} = \frac{-14}{7} = -2$	$\frac{4-4(6)}{3^2+6} = \frac{4-24}{9+6} = \frac{-20}{15} = \frac{-4}{3}$
$\frac{8(-2)+4(-3)}{5(2)+3} = \frac{-16-12}{10+3} = \frac{-28}{13}$	$\frac{7(-1)+9(-3)}{-6(3)-2} = \frac{-7-27}{-18-2} = \frac{-34}{-20}$ $\frac{17}{10}$

Name: Key Date: ________ Period: ______

Translate Phrases to Expressions with Fractions notes

Translating Phrases

Now that we know a little about how fractions work, we can translate phrases into expressions, even if they have fractions!

The English words "quotient" and "ratio" are often used to describe fractions.

.

Example

Translate the English phrase into an expression:
a) The quotient of the difference of m and n, and p. $\frac{m-n}{p}$
Your Turn!
b) The quotient of the difference of a and b, and cd. $\frac{a-b}{cd}$
c) The quotient of the sum of p and q, and r. $\frac{p+q}{r}$

Name: Key Date: ________ Period: ______

Unit 1.5: Visualize Fractions Practice

Find three fractions equivalent to the given fraction. Show your work. Answers Vary

1. 3/8 $\frac{3}{8} = \frac{30}{80} = \frac{6}{16} = \frac{9}{24}$	2. 6/11 $\frac{6}{11} = \frac{12}{22} = \frac{18}{33} = \frac{24}{44}$

Simplify.

3. -40/88 $\frac{-40}{88} = -\frac{20}{44} = \frac{-5}{11}$	4. 120/252 $\frac{120}{252} = \frac{60}{126} = \frac{30}{63} = \frac{10}{21}$
5. -3x/12w $\frac{-\cancel{3}^{1}x}{\cancel{12}_{4}w} = \frac{-x}{4w}$	6. $14x^2/21z$ $\frac{\cancel{14}^{2}x^2}{\cancel{21}_{3}z} = \frac{2x^2}{3z}$

Multiply.

7. $\frac{3}{4} \cdot \frac{9}{11}$ $\frac{27}{44}$	8. $\frac{\cancel{2}^{1}}{5} \cdot \left(-\frac{3}{\cancel{8}_{4}}\right)$ $\frac{3}{20}$
9. $4 \cdot \frac{6}{11}$ $\frac{24}{11}$	10. $\frac{3}{\cancel{7}_{1}} \cdot \cancel{28}^{4}m$ $12m$

Divide.

11. $-\frac{5}{18} \div \frac{10}{24}$ $-\frac{\cancel{5}^{1}}{\cancel{18}_{3}} \cdot \frac{\cancel{24}^{4\,2}}{\cancel{10}_{2\,1}} = \frac{-2}{3}$	12. $-\frac{8x}{15} \div \left(-\frac{12y}{25}\right)$ $\frac{\cancel{8}^{2}x}{\cancel{15}_{3}} \cdot \frac{\cancel{25}^{5}}{\cancel{12}_{3}y}$ $\frac{10x}{9y}$
13. $-7 \div \frac{1}{2}$ $-7 \cdot 2 = -14$	14. $\frac{3}{5} \div (-12)$ $\frac{\cancel{3}^{1}}{5} \cdot \frac{1}{-\cancel{12}_{4}} = \frac{1}{-20}$

Name: Key Date: ________ Period: ______

Unit 1.5: Visualize Fractions Practice

Simplify.

15. $-\dfrac{\frac{8}{21}}{\frac{12}{35}}$

$\dfrac{\cancel{8}^{2}}{\cancel{21}_{3}} \cdot \dfrac{\cancel{35}^{5}}{\cancel{12}_{3}} = \dfrac{-10}{9}$

16. $-\dfrac{4}{\frac{5}{6}}$

$4 \cdot \dfrac{-6}{5} = \dfrac{-24}{5}$

17. $\dfrac{\frac{x}{4}}{\frac{y}{3}}$

$\dfrac{x}{4} \cdot \dfrac{3}{y} = \dfrac{3x}{4y}$

18. $\dfrac{22 + 3}{15}$

$\dfrac{25}{15} = \dfrac{5}{3}$

19. $\dfrac{48}{24 - 15}$

$\dfrac{48}{9} = \dfrac{16}{3}$

20. $\dfrac{-7 + 7}{8 + 4}$

$\dfrac{0}{12} = \boxed{0}$

21. $\dfrac{\cancel{6} \cdot 2}{3 \cdot \cancel{6}_{1}} = \dfrac{2}{3}$

22. $\dfrac{5^2 - 1}{15} = \dfrac{25-1}{15}$

$\dfrac{24}{15} = \dfrac{8}{5}$

Name: Key Date: ________ Period: ______

Unit 1.5: Visualize Fractions Practice

Simplify.

23. $\frac{5 \cdot 6 - 6 \cdot 2}{4 \cdot 5 - 2 \cdot 3}$

$\frac{30 - 12}{20 - 6} = \frac{18}{14} = \frac{9}{7}$

24. $\frac{9(5 + 1) - 3(15 - 7)}{6(7 - 1) - 3(17 - 9)}$

$\frac{9(6) - 3(8)}{6(6) - 3(8)} = \frac{54 - 24}{36 - 24} = \frac{30}{12} = \frac{5}{2}$

Translate each phrase into an algebraic expression.

25. The quotient of x and the sum of y and 11

$\frac{x}{y+11}$

26. The quotient of the difference of a and b, and -4

$\frac{a-b}{-4}$

27. Explain how you find the reciprocal of a negative number.

Answers Vary

Ex. Find the reciprocal of the positive number and keep it negative

Name: Key Date: ________ Period: ______

Add & Subtract Fractions: Common Denominator notes

Add & Subtract Fractions with a Common Denominator

When we multiplied fractions, we just multiplied straight across. To add or subtract fractions, they must have a common denominator (the denominators must be the same).

If a, b, and c are numbers where $c \neq 0$, then

$$\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c} \text{ and } \frac{a}{c} - \frac{b}{c} = \frac{a-b}{c}$$

To add or subtract fractions, add or subtract the numerators and place the result over the common denominator.

Example

Simplify.	
$\frac{x}{3} + \frac{1}{3} = \frac{x+1}{3}$	$-\frac{23}{24} - \frac{12}{24} = \frac{-35}{24}$
$-\frac{10}{x} - \frac{5}{x}$ $\frac{-15}{x}$	$\frac{3}{8} + \left(-\frac{5}{8}\right) - \frac{2}{8} = \frac{-2}{8}\ \frac{-2}{8} = \frac{-4}{8} = \frac{-1}{2}$
Your Turn!	
$\frac{x}{7} + \frac{3}{7} = \frac{x+3}{7}$	$\frac{y}{9} - \frac{4}{9}$ $\frac{y-4}{9}$
$-\frac{27}{32} - \frac{1}{32}$ $\frac{-28}{32} = \frac{-7}{8}$	$-\frac{19}{25} - \frac{7}{25} = \frac{-26}{25}$
$-\frac{10}{z} - \frac{7}{z} = \frac{-17}{z}$	$-\frac{17}{b} - \frac{5}{b} = \frac{-22}{b}$
$-\frac{2}{10} + \left(-\frac{4}{10}\right) - \frac{7}{10}$ $\frac{-6}{10} - \frac{7}{10} = \frac{-13}{10}$	$\frac{5}{9} + \left(-\frac{4}{9}\right) - \frac{8}{9}$ $\frac{1}{9} - \frac{8}{9} = \frac{-7}{9}$

Name: Key Date: ________ Period: ______

Add & Subtract Fractions: Different Denominator notes

Add & Subtract Fractions with Different Denominators

As we have seen, to add or subtract fractions, their denominators must be the same.
The **least common denominator** (LCD) of two fractions is the smallest number that can be used as a common denominator of the fractions. The LCD of the two fractions is the least common multiple (LCM) of their denominators.
After we find the LCD of two fractions, we convert the fractions to equivalent fractions with the LCD. Putting these steps together allows us to add and subtract fractions because their denominators will be the same!

Example

Simplify	
$\frac{7}{12}+\frac{5}{18}$ $\frac{7}{12}=\frac{21}{36}$ $\frac{21}{36}+\frac{10}{36}=\frac{31}{36}$ $\frac{5}{18}=\frac{10}{36}$ $6\overline{)12\ \ 18}$ → $2\ \ 3$ $6\cdot2\cdot3=36$	$\frac{7}{15}-\frac{17}{24}$ $\frac{7}{15}=\frac{56}{120}$ $\frac{56}{120}-\frac{85}{120}=\frac{-29}{120}$ $\frac{17}{24}=\frac{85}{120}$ $3\overline{)15\ \ 24}$ → $5\ \ 8$ $=3\cdot5\cdot8=15\cdot8=120$
$\frac{3}{5}+\frac{y}{8}=\frac{24}{40}+\frac{5y}{40}=\frac{24+5y}{40}$	

Your Turn!	
$\frac{5}{12}+\frac{11}{15}$ $\frac{5}{12}=\frac{25}{60}$ $\frac{25}{60}+\frac{44}{60}=\frac{69}{60}=\frac{23}{20}$ $\frac{11}{15}=\frac{44}{60}$ $3\overline{)12\ \ 15}$ → $4\ \ 5$ $=3\cdot4\cdot5=60$	$\frac{13}{15}+\frac{19}{20}$ $\frac{13}{15}=\frac{52}{60}$ $\frac{52}{60}+\frac{57}{60}=\frac{109}{60}$ $\frac{19}{20}=\frac{57}{60}$ $5\overline{)15\ \ 20}$ → $3\ \ 4$ $=5\cdot3\cdot4=60$
$-\frac{13}{24}-\frac{15}{32}=$ $\frac{13}{24}=\frac{52}{96}$ $-\frac{52}{96}-\frac{45}{96}=\frac{-97}{96}$ $\frac{15}{32}=\frac{45}{96}$ $4\overline{)24\ \ 32}$ → $2\overline{)6\ \ 8}$ → $3\ \ 4$ $=4\cdot2\cdot3\cdot4=96$	$-\frac{21}{32}-\frac{9}{28}$ $\frac{21}{32}=\frac{147}{224}$ $\frac{-147}{224}-\frac{72}{224}=-\frac{219}{224}$ $\frac{9}{28}=\frac{72}{224}$ $4\overline{)32\ \ 28}$ → $8\ \ 7$ $=4\cdot8\cdot7=224$
$\frac{x}{6}+\frac{8}{9}$ $\frac{x}{6}=\frac{3x}{18}$ $\frac{3x}{18}+\frac{16}{18}=\frac{3x+16}{18}$ $\frac{8}{9}=\frac{16}{18}$ $3\overline{)6\ \ 9}$ → $2\cdot3$ $=18$	$-\frac{b}{6}+\frac{7}{15}$ $\frac{b}{6}=\frac{5b}{30}$ $-\frac{5b}{30}+\frac{14}{30}$ $\frac{7}{15}=\frac{14}{30}$ $\frac{-5b+14}{30}$ $3\overline{)6\ \ 15}$ → $2\ \ 5$ $=30$

Name: Key Date: ________ Period: ______

Order of Operations to Simplify Complex Fractions notes

Simplify Complex Fractions

We have seen that a complex fraction is a fraction in which the numerator or denominator contains a fraction. The fraction bar indicates division. Now we'll look at complex fractions where the numerator or denominator contains an expression that can be simplified. First, we completely simplify the numerator and denominator separately using the order of operations. Then we divide the numerator by the denominator.

Example

Simplify:

$$\frac{\left(\frac{1}{2}\right)^2}{4+3^2} = \frac{\frac{1}{4}}{4+9} = \frac{\frac{1}{4}}{13} = \frac{1}{4}\cdot\frac{1}{13} = \frac{1}{52}$$

$$\frac{\frac{1}{2}+\frac{2}{3}}{\frac{3}{4}-\frac{1}{6}} = \frac{\frac{3}{6}+\frac{4}{6}}{\frac{9}{12}-\frac{2}{12}} = \frac{\frac{7}{6}}{\frac{7}{12}} = \frac{7}{6}\cdot\frac{12}{7} = 2$$

Your Turn!

$$\frac{\left(\frac{1}{4}\right)^2}{2^3+2} \quad \frac{\frac{1}{16}}{8+2} = \frac{1}{16} \div 10$$

$$= \frac{1}{16}\cdot\frac{1}{10} = \frac{1}{160}$$

$$\frac{1+4^2}{\left(\frac{1}{4}\right)^2} = \frac{1+16}{\frac{1}{16}} = 17 \div \frac{1}{16}$$

$$17 \cdot 16 = 272$$

$$\frac{\frac{1}{4}+\frac{1}{2}}{\frac{3}{4}-\frac{1}{3}} \quad \frac{\frac{1}{4}+\frac{2}{4}}{\frac{9}{12}-\frac{4}{12}} = \frac{3}{4} \div \frac{5}{12}$$

$$\frac{3}{\cancel{4}_1}\cdot\frac{\cancel{12}^3}{5} = \frac{9}{5}$$

$$\frac{\frac{2}{3}-\frac{1}{2}}{\frac{3}{4}+\frac{1}{3}} = \frac{\frac{4}{6}-\frac{3}{6}}{\frac{9}{12}+\frac{4}{12}} = \frac{\frac{1}{6}}{\frac{13}{12}}$$

$$= \frac{1}{\cancel{6}_1}\cdot\frac{\cancel{12}^2}{13} = \frac{2}{13}$$

Name: Key Date: ________ Period: ______

Evaluate Variable Expressions with Fractions notes

Evaluate Variable Expressions with Fractions

We have evaluated expressions before, but now we can evaluate expressions with fractions.

Remember, to evaluate an expression, we substitute the value of the variable into the expression and then simplify.

Example

Evaluate x + 2/3 when	
$x = -\frac{1}{3}$ $\quad \frac{-1}{3} + \frac{2}{3} = \frac{1}{3}$	$x = -\frac{3}{4}$ $\quad \frac{-3}{4} + \frac{2}{3} = \frac{-9}{12} + \frac{8}{12} = \frac{-1}{12}$
Evaluate -5/6 – z when	Evaluate $3x^2y$ when
$z = -\frac{2}{3}$ $\quad \frac{-5}{6} - \left(-\frac{2}{3}\right) = \frac{-5}{6} + \frac{4}{6} = \frac{-1}{6}$	$x = \frac{1}{4}$ and $y = -\frac{2}{3}$ $\quad 3\left(\frac{1}{4}\right)^2\left(-\frac{2}{3}\right)$ $\cancel{3}^{1}\left(\frac{1}{\cancel{16}_{8}}\right)\left(-\frac{\cancel{2}^{1}}{\cancel{3}_{1}}\right) = \frac{-1}{8}$
Evaluate $\frac{a+b}{c}$ when $a = -4$, $b = -2$, and $c = 8$ $\frac{-4+(-2)}{8} = \frac{-6}{8} = \frac{-3}{4}$	
Your Turn!	
Evaluate $x + \frac{3}{4}$ when $x = -\frac{7}{4}$ $\frac{-7}{4} + \frac{3}{4} = \frac{-4}{4} = -1$	Evaluate $y + \frac{1}{4}$ when $y = \frac{2}{3}$ $\frac{2}{3} + \frac{1}{4} = \frac{8}{12} + \frac{3}{12} = \frac{11}{12}$
Evaluate $-\frac{3}{8} - w$ when $w = -\frac{5}{2}$ $-\frac{3}{8} - \left(-\frac{5}{2}\right) = -\frac{3}{8} + \frac{20}{8} = \frac{-17}{8}$	Evaluate $3ab^2$ when $a = -\frac{2}{3}$ and $b = \frac{1}{2}$ $3\left(-\frac{2}{3}\right)\left(\frac{1}{2}\right)^2 = \cancel{3}^{1}\left(-\frac{\cancel{2}^{1}}{\cancel{3}_{1}}\right)\left(\frac{1}{\cancel{4}_{2}}\right) = \frac{-1}{2}$
Evaluate $\frac{a+b}{c}$ when $a = 9$, $b = -18$, and $c = -6$ $\frac{9-18}{-6} = \frac{-9}{-6} = \frac{3}{2}$	

Name: Key Date: ________ Period: ______

Unit 1.6: Add & Subtract Fractions Practice

Simplify.

1. $\frac{6}{13}+\frac{7}{13} = \frac{13}{13} = 1$

2. $-\frac{8}{17}-\frac{15}{17}$ $\quad -\frac{23}{17}$

3. $\frac{5}{12}-\frac{7}{12}-\frac{11}{12}$

   $-\frac{2}{12}-\frac{11}{12} = \frac{-13}{12}$

4. $\frac{19}{21}-\frac{5}{21} = \frac{14}{21} = \frac{2}{3}$

5. $\frac{x}{5}-\frac{4}{5}$ $\quad \frac{x-4}{5}$

6. $-\frac{\cancel{3}^{1}}{\cancel{14}_{2}}\cdot\frac{\cancel{7}^{1}}{\cancel{15}_{5}} = \frac{-1}{10}$

7. $-\frac{8}{15}\div\frac{-16}{3}$ $\quad \frac{-\cancel{8}^{1}}{\cancel{15}_{5}}\cdot\frac{\cancel{3}^{1}}{-\cancel{16}_{2}} = \frac{1}{10}$

8. $\frac{1}{2}\cdot\frac{1}{7} = \frac{1}{14}$

9. $-\frac{7}{12}+\frac{5}{8}$ $\quad \frac{-7}{12}=\frac{-14}{24}$ $\quad \frac{-14}{24}+\frac{15}{24}$

   $\frac{5}{8}=\frac{15}{24}$ $\quad \frac{1}{24}$

   $4\,|\,12\;\;8 \to 3\;\;2$ $= 4\cdot3\cdot2 = 24$

10. $\frac{3}{4}+\frac{5}{8}$

    $\frac{6}{8}+\frac{5}{8} = \frac{11}{8}$

11. $-\frac{5}{13}\div\left(-\frac{5}{9}\right)$

    $\frac{-\cancel{5}}{13}\cdot\frac{-9}{\cancel{5}} = \frac{9}{13}$

12. $\frac{11}{\cancel{120}_{4}}\cdot\frac{\cancel{90}^{3}}{16} = \frac{33}{64}$

13. $\frac{2^3+4^2}{\left(\frac{2}{5}\right)^2}$ $\quad \frac{8+16}{\frac{4}{25}} = \cancel{24}^{6}\cdot\frac{25}{\cancel{4}_{1}}$

    $= 150$

14. $\frac{2}{\frac{1}{3}+\frac{1}{5}} = \frac{2}{\frac{5}{15}+\frac{3}{15}} = \frac{2}{\frac{8}{15}} = \cancel{2}^{1}\cdot\frac{15}{\cancel{8}_{4}}$

    $\frac{15}{4}$

15. $\frac{1}{2}+\frac{\cancel{2}^{1}}{3}\cdot\frac{5}{\cancel{12}_{6}}$

    $\frac{1}{2}+\frac{5}{18}$

    $\frac{9}{18}+\frac{5}{18} = \frac{14}{18} = \frac{7}{9}$

16. $\left(\frac{5}{9}+\frac{1}{6}\right)\div\left(\frac{2}{4}-\frac{1}{2}\right)$

    $\left(\frac{10}{18}+\frac{3}{18}\right)\div\left(\frac{2}{4}-\frac{2}{4}\right)$

    $\frac{13}{18}\div 0 \to$ undefined

Name: Key Date: ________ Period: ______

Unit 1.6: Add & Subtract Fractions Practice

Evaluate:

17. $x + \left(-\frac{5}{6}\right)$ when $x = \frac{1}{3}$

$\frac{1}{3} + \left(-\frac{5}{6}\right)$

$\frac{2}{6} - \frac{5}{6} = -\frac{3}{6} = \frac{-1}{2}$

18. $x + \left(-\frac{5}{6}\right)$ when $x = -\frac{1}{6}$

$-\frac{1}{6} + \left(-\frac{5}{6}\right) = -\frac{6}{6} = -1$

19. $\frac{7}{10} - z$ when $z = \frac{1}{2}$

$\frac{7}{10} - \frac{1}{2} = \frac{7}{10} - \frac{5}{10} = \frac{2}{10} = \frac{1}{5}$

20. $2x^2y^3$ when $x = \frac{1}{3}$ and $y = -\frac{1}{2}$

$2\left(\frac{1}{3}\right)^2\left(-\frac{1}{2}\right)^3$

$\cancel{2}^{1}\left(\frac{1}{9}\right)\left(-\frac{1}{\cancel{8}_4}\right) = \frac{-1}{36}$

21. $\frac{r - s}{r + s}$ when $r = -3,\ s = 8$

$\frac{-3-8}{-3+8} = \frac{-11}{5}$

Solve.

22. Why do you need a common denominator to add or subtract fractions? Explain.

Answers Vary

Ex: you have to add like things

or fractions must have the same "name"

Name: Key Date: _________ Period: ______

Name and Write Decimals notes

Name and Write Decimals

Decimals are another way of writing fractions whose denominators are powers of 10.

0.1 = 1/10 0.1 is "one tenth"
0.01 = 1/100 0.01 is "one hundredth"
0.001 = 1/1000 0.001 is "one thousandth"

Notice that "thousand" is a number larger than one, but "one thousandth" is a number smaller than one. The "th" at the end of the name tells you that it is a fraction and/or decimal.

When we name a whole number, the name corresponds to the place value based on the powers of ten. We read 10,000 as "ten thousand" and 10,000,000 as "ten million." Likewise, the names of the decimal places correspond to their fraction values.

Place Value											
Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones		Tenths	Hundredths	Thousandths	Ten thousandths	Hundred Thousandths
						.					

Example

Name the decimal.	
4.3 Four and three tenths	-15.571 negative fifteen and five hundred seventy-one
Write as a decimal.	
Fourteen and twenty-four thousandths 14.024	

Name: Key Date: ________ Period: ______

Name and Write Decimals Practice

Name and Write Decimals

Place Value											
Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones		Tenths	Hundredths	Thousandths	Ten thousandths	Hundred Thousandths
						.					

Your Turn

Name the decimal.	
6.8 Six and eight tenths	5.9 five and nine tenths
-13.461 negative thirteen and four hundred sixty-one	-2.053 negative two and fifty-three

Write as a decimal.
Fifteen and sixty-eight thousandths 15.068
Five and ninety-four thousandths 5.094

Name: Key ______ Date: ________ Period: ______

Round Decimals notes

Round Decimals

Rounding decimals is very much like rounding whole numbers. We will round decimals with a method based on the one we used to round whole numbers.

- Step 1. Locate the given place value and mark it with an arrow.
- Step 2. Underline the digit to the right of the place value.
- Step 3. Is this digit greater than or equal to 5?
    - Yes—add 1 to the digit in the given place value.
    - No—do not change the digit in the given place value.
- Step 4. Rewrite the number, deleting all digits to the right of the rounding digit.

Example

Round to the nearest a) hundredth b) tenth c) whole number	
19.379 a) 19.38 b) 19.4 c) 19	
Your Turn!	
1.047 a) 1.05 b) 1.0 c) 1	10.173 a) 10.17 b) 10.2 c) 10
6.582 a) 6.58 b) 6.6 c) 7	14.2175 a) 14.22 b) 14.2 c) 14

Name: Key Date: ________ Period: ______

Add and Subtract Decimals notes

Add and Subtract Decimals

To add or subtract decimals, just line up the decimal points.

By lining up the decimal points, you can add or subtract the corresponding place values, adding and subtracting the numbers as if they were whole numbers and then place the decimal point in the sum or difference.

Example

Simplify:

23.5 + 41.38

$$\begin{array}{r} 23.5 \\ +\,41.38 \\ \hline 64.88 \end{array}$$

20 – 14.65

$$\begin{array}{r} \overset{1}{\cancel{2}}\overset{9}{\cancel{0}}.\overset{9}{\cancel{0}}\overset{10}{\cancel{0}} \\ -\,14.65 \\ \hline 5.35 \end{array}$$

Your Turn!

4.8 + 12.69

$$\begin{array}{r} \overset{1}{1}2.69 \\ +\;\;4.8 \\ \hline 17.49 \end{array}$$

5.223 + 18.47

$$\begin{array}{r} {}^{1}5.223 \\ +\,18.47 \\ \hline 23.693 \end{array}$$

10 – 9.68

$$\begin{array}{r} 10 \\ -\;\;9.68 \\ \hline \end{array}$$

+0.3

9.70

+0.02

0.3 + 0.02

= 0.32

50 – 37.42

$$\begin{array}{r} \overset{4}{\cancel{5}}\overset{9}{\cancel{0}}.\overset{9}{\cancel{0}}\overset{10}{\cancel{0}} \\ -\,37.42 \\ \hline 12.58 \end{array}$$

Name: Key Date: ________ Period: ______

Multiplying Decimals notes

Multiplying Decimals

Multiplying decimals is just like multiplying whole numbers, just with one extra step: you have to know where to put the decimal point!

	(0.3) (0.7) 1 place x 1 place	(0.2) (0.46) 1 place x 2 places
Convert to fractions	$\frac{3}{10} \cdot \frac{7}{10}$	$\frac{2}{10} \cdot \frac{46}{100}$
Multiply	$\frac{21}{100}$	$\frac{92}{1000}$
Convert to decimals	0.21 2 places	0.092 3 places

Notice how in the first example, we multiplied two numbers that each had one decimal place, and the product had two decimal places? And how in the second example we multiplied a number with one decimal place by a number with two decimal places and we got an answer with three decimal places?

That is because to **multiply decimals, just multiply like normal, then at the end count the decimal places in your factors** and put that number of decimal places in your answer. The rules for multiplying and dividing integers applies to decimals too.

Example

Multiply:	
(-3.9)(4.023) -15.9627	5.63 · 10 56.3
5.63 x 100 563	(5.63)(1000) 5,630

Your Turn!		
-4.5(6.102) -27.459	2.58 x 10 25.8	2.58 x 1000 2580

Name: Key Date: ________ Period: ______

Dividing Decimals notes

Dividing Decimals

Just like multiplying, dividing with decimals is very similar to dividing with whole numbers. The main thing is to make sure you get your decimal in the correct place!

To divide decimals, determine what power of 10 to multiply the denominator by to make it a whole number. Then multiply the numerator by that same power of 10. Because of equivalent fractions, the value won't change.

$$\frac{0.8}{04} = \frac{0.8(10)}{0.4(10)} = \frac{8}{4}$$

The rules for dividing with negatives apply also. If the signs are the same, its positive, and if the signs are different, the answer is negative.

Example

Divide.

-25.65 ÷ 0.06	$3.99 ÷ 24
$\frac{-25.65}{0.06} = \frac{2565}{6} = -427.5$	$24\overline{)3.990}$ = .166; −24, 159, −144, 150, −144, 6; ≈ $0.17

Your Turn!

-23.492 ÷ 0.04	4.11 ÷ (-0.12)	$4.99 ÷ 12
$\frac{-23.492}{0.04} = \frac{-2349.2}{4} = -587.3$	$-\frac{4.11}{0.12} = \frac{411}{12} = -34.25$	$12\overline{)4.990}$ = 0.415; −48, 19, −12, 70, −60, 10; = $0.42

Name: Key Date: ________ Period: ______

Convert Decimals and Fractions notes

Converting Decimals

You can convert decimals into fractions by identifying the place value of the last digit. In the decimal 0.04, the 4 is in the hundredths place, so 100 is the denominator of the fraction equivalent to 0.04.

$$0.04 = \frac{4}{100}$$

When the number to the left of the decimal is zero, we get a fraction whose numerator (top) is less than the denominator (bottom). This is called a proper fraction.

Converting Fractions

You can convert fractions to decimals by dividing the numerator by the denominator, since a fraction bar means division.

Sometimes you might get a repeating decimal. A repeating decimal is a decimal in which the last digit or group of digits repeats endlessly. You place a bar over the repeating block of digits to show that it repeats.

Examples

Write as a fraction.	Write as a decimal.
0.384 $\frac{384}{1000} = \frac{48}{125}$	-5/8 -0.625
Write as a decimal	Simplify.
43/22 $22\overline{)43.0}$ = 1.95454, -22, 210, -198, 120, 110, 100 $= 1.9\overline{54}$	7/8 + 6.4 $0.875 + 6.4 = 7.275$

Your Turn!

Write 0.043 as a fraction.	Write -7/8 as a decimal.	Write 27/11 as a decimal.
$\frac{43}{1000}$	-0.875	$11\overline{)27.0}$ = 2.4545, -22, 50, -44, 60, 55, 50 $= 2.\overline{45}$

Name: Key Date: ________ Period: ______

Convert Decimals, Fractions, & Percents notes

Converting Percents

A percent is a ratio whose denominator is 100. Percent means "per one hundred."
Since a percent is a ratio that means per hundred, it's easy to write it as a fraction with a denominator of 100.

$0.04 = \frac{4}{100} = 4\%$ $75\% = \frac{75}{100} = 0.75$ $2.5\% = \frac{2.5}{100} = \frac{25}{1000} = 0.025$

The short cut to convert a percent to a decimal, just move the decimal point two places to the left.

Examples

Convert each percent to a decimal.		
63% 0.63	145% 1.45	36.7% $\frac{36.7}{100} = \frac{367}{1000}$
Convert each decimal to a percent.		
0.52 52%	1.35 135%	0.094 9.4%
Your Turn!		
Convert each decimal to a percent and each percent to a decimal.		
9% 0.09	85% 0.85	3.9% 0.039
0.42 42%	0.0935 9.35%	1.75 175%

Name: Key Date: ________ Period: ______

Unit 1.7: Decimals Practice

Write as a decimal.	
1. Twenty-eight and ninety-one hundredths 28.91	2. Eight tenths 0.8
3. Negative eleven and seven ten-thousandths -11.0007	4. Five thousandths 0.005
Name each decimal	
5. 5.6 five and six tenths	6. 0.002 two thousandths
7. -17.9 negative seventeen and nine-tenths	8. 15.004 fifteen and four-thousandths
Round each number to the nearest tenth.	
9. 0.67 0.7	10. 2.85 2.9
Round each number to the nearest hundredth.	
11. 0.845 0.85	12. 0.299 0.30
Round each number to the nearest a) hundredth b) tenth c) whole number.	
13. 5.891 a) 5.89 b) 5.9 c) 6	14. 63.469 a) 63.47 b) 63.5 c) 63

Name: Key Date: ________ Period: ______

Unit 1.7: Decimals Practice

Add or subtract.

15. 16.92 + 7.55 16.92 + 7.55 24.47	16. 21.76 – 92.29 92.29 – 21.76 –70.53
17. -38.69 + 31.47 38.69 – 31.47 –7.22	18. 91.95 - (-10.462) 91.95 + 10.462 102.412

Multiply or divide.

19. (0.24)(0.7) 24 × 7 0.168	20. (55.2)(1000) 55,200
21. 4.75 ÷ 25 0.19 25⟌4.75 –25 225	22. 0.6 ÷ 0.2 $\frac{0.6}{0.2} = \frac{6}{2} = 3$
23. 5.2 ÷ 2.5 $\frac{5.2}{2.5} = \frac{52}{25}$ 2.04 25⟌52.00 50 200	24. 14 ÷ 0.35 $\frac{14}{0.35} = \frac{1400}{35} =$ 40 35⟌1400

Name: key Date: ________ Period: ______

Unit 1.7: Decimals Practice

Write each decimal as fraction and each fraction as a decimal.

25. 0.04 $\frac{4}{100} = \frac{1}{25}$	26. 0.52 $\frac{52}{100} = \frac{13}{25}$
27. 0.375 $\frac{375}{1000} = \frac{3}{8}$	28. 17/20 $\frac{17}{20} \times 5 = \frac{85}{100} = 0.85$
29. 15/11 $1.3636 = 1.\overline{36}$ $11 \overline{)15.00}$ 11 40 −33 70 −66 40	30. 2.4 + 5/8 2.4 + 0.625 3.025

Convert each percent to a decimal and each decimal to a percent.

31. 1% 0.01	32. 21.63% 0.2163

Name: Key ______________________________ Date: ________ Period: ______

Unit 1.7: Decimals Practice

Convert each percent to a decimal and each decimal to a percent.	
33. 150% 1.5	34. 0.5% 0.005
35. 0.01 1%	36. 1.36 136%
37. 3 300%	38. 0.0865 8.65%

Answer the following question.

Without solving the problem "44 is 80% of what number," think about what the solution might be. Should it be a number that is greater than 44 or less than 44? Explain your reasoning.

Answer Key

Name: Key Date: ________ Period: ______

Simplify Expressions with Square Roots notes

Squares

Remember that when a number "n" is multiplied by itself, we write n^2 and read it "n squared." The result we call the square of "n." For example, 8^2 is read "8 squared."

Complete the following table to show the squares of the counting numbers 1 through 15:

Number	n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Square	n^2								64			121				

The second-row numbers are called perfect squares. It will be helpful to learn to recognize perfect squares, or to keep the above list handy when answering questions.

The squares of the counting numbers are always positive numbers. The squares of negative numbers are always positive as well, since a negative times a negative equals a positive.

$$(-4)^2 = 64 \qquad 4^2 = 64$$

Sometimes we need to look at the relationship between numbers and their squares in reverse. Because $9^2 = 81$, we say that 81 is the square of 9. We also can say that 9 is the **square root** of 81. A number whose square is "m" is called a square root of "m."

Notice that $(-9)^2 = 81$, so -9 is also a square root of 81. Therefore, both 9 and -9 are square roots of 81.

That means that every positive number has two square roots – one positive and one negative. The positive root is called the principal root.

The radical sign, $\sqrt{m}$ means we want the positive root. The number under the radical sign is called the radicand.

Example

Simplify.			
$\sqrt{25}$ 5	$\sqrt{121}$ 11	$-\sqrt{9}$ -3	$-\sqrt{144}$ -12
Your Turn!			
$\sqrt{36}$ 6	$\sqrt{196}$ 14	$-\sqrt{81}$ -9	$-\sqrt{225}$ -15

Name: Key Date: ________ Period: ______

Identify Integers, Rational & Irrational and Real Numbers notes

Rational & Irrational Numbers

We've already described numbers as counting numbers, whole numbers, and integers.

- Counting Numbers: 1, 2, 3, 4, 5…
- Whole Numbers: 0, 1, 2, 3, 4, 5 …
- Integers: …-3, -2, -1, 0, 1, 2, 3, 4…

If you start with all the integers and then included all the fractions, you get the set of rational numbers. A **rational number** is a number that can be written as a ratio of two integers (a fraction). All integers, whole numbers, and counting numbers are also rational numbers. Decimals are rational if they stop (terminate) or repeat.

Numbers whose decimal form do NOT stop or repeat are called **irrational numbers** because they cannot be written as a fraction of integers. Numbers like π and $\sqrt{2}$ are irrational numbers.

Real Numbers

When we put all of the rational and irrational numbers together, we get the set of real numbers. All numbers that you have learned so far are real numbers!

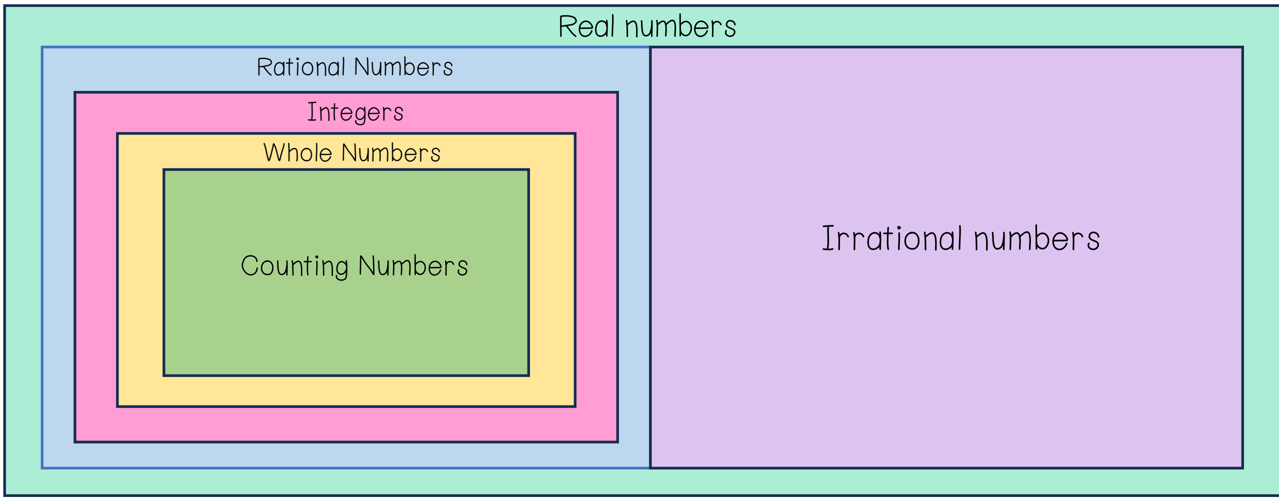
Take a moment and think about $\sqrt{-25}$. Can you find a number whose square is -25? NOPE! At least, not yet. The square root of a number can NOT be negative, so we say that $\sqrt{-25}$ is not a real number.

Example

Write as the ratio of two integers:	
-27 $-27/1$	7.32 $732/100$
Given the following numbers, list the rational and irrational numbers.	
$0.58\overline{3}$, 0.47, 3.948578923… Rational: $0.58\overline{3}$, 0.47 Irrational: 3.94857823…	
For each number given, identify whether it is rational or irrational.	
$\sqrt{36}$ rational	$\sqrt{45}$ irrational
For each number given, identify whether it is a real number or not a real number.	
$\sqrt{-49}$ not real	$-\sqrt{81}$ real

Name: Key Date: ________ Period: ______

Identify Integers, Rational & Irrational and Real Numbers Practice



Your Turn

Write as the ratio of two integers:

-25 $-25/1$	3.88 $\frac{388}{100}$	-19 $-19/1$	8.41 $\frac{841}{100}$

Given the following numbers, list the rational and irrational numbers.

$0.28,\ 0.81\overline{6},\ 2.38927892384...,\ 0.125$

Rational: $0.28,\ 0.81\overline{6},\ 0.125$

Irrational: $2.38927892384...$

For each number given, identify whether it is rational or irrational.

$\sqrt{121}$ 11 rational	$\sqrt{18}$ irrational	$\sqrt{116}$ irrational

For each number given, identify whether it is a real number or not a real number.

$\sqrt{-35}$ not real	$-\sqrt{45}$ real	$\sqrt{-16}$ not real

Given the following numbers, list the whole numbers, integers, rational numbers, irrational numbers, and real numbers (you may have one number in more than one category).

$-3,\ -\sqrt{2},\ 0.\overline{4},\ 0.125,\ \frac{9}{6},\sqrt{121}$

Whole Number: $\sqrt{121}$

Irrational Number: $-\sqrt{2}$

Rational Number: $-3,\ 0.\overline{4},\ 0.125,\ 9/6,\ \sqrt{121}$

Integers: $-3,\ \sqrt{121}$

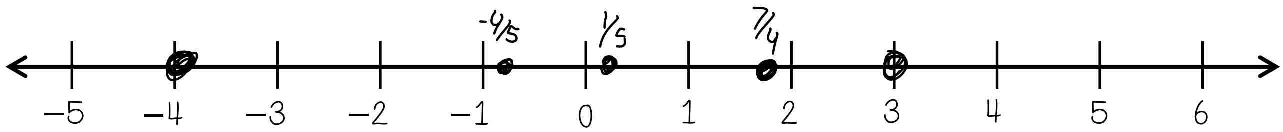
Real Numbers: all of them!

Name: Key Date: ________ Period: ______

Locate Fractions on the Number Line notes

Locating Fractions

Just like you can put positive and negative numbers on a number line, you can put fractions on a number line as well. Let's locate 1/5, -4/5, 3, -4, and 7/4 on a number line.



You can use a number line to help you answer inequality problems.

Which is greater, 1/5 or -4/5? What about 3 or 7/4?

Using a number line can help answer those questions.

Example

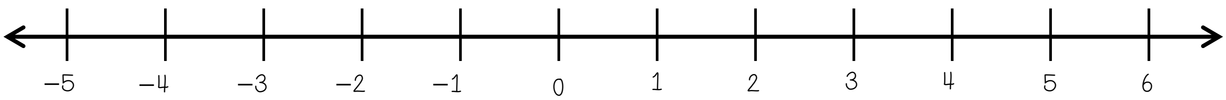
Order the following pairs of numbers using < or >.			
-2/3 __>__ -1	$-3\frac{1}{2}$ __<__ -3	-3/5 __<__ -1/5	-2 __>__ -8/3
		Your Turn!	
$-1\frac{1}{2}$ __>__ -2	-1/3 __>__ -1	-2/3 __<__ -1/3	-3 __<__ -7/3
-1 __<__ -1/2	$-2\frac{1}{4}$ __<__ -2	-3/5 __>__ -4/5	-4 __<__ -10/3

Name: Key Date: ________ Period: ______

Locate Decimals on the Number Line notes

Locating Decimals

Since decimals are another way of writing fractions, locating decimals on the number is similar to locating fractions on the number. Let's locate 0.4, -1.6, and -0.7 on the number line.



You can use a number line to help you answer inequality problems for decimals also.

Which is greater, 0.31 or 0.308?

To help you figure it out you can give each decimal the same number of decimal places or convert them to fractions. 0.31 = 0.310 because I can add as many zeros as I want onto the end of a decimal without changing the value. It/s like taking the fraction 31/100 and turning it into the equivalent fraction 310/1000.

That being said, since $\frac{310}{1000}$ is more than $\frac{308}{1000}$, 0.31 > 0.308.

Example

<table>
<tr><td colspan="6">Order the following pairs of numbers using < or >.</td></tr>
<tr><td colspan="2">0.64 __>__ 0.6
0.60</td><td colspan="2">0.83 __>__ 0.803</td><td colspan="2">-0.1 __>__ -0.8</td></tr>
<tr><td colspan="6">Your Turn!</td></tr>
<tr><td colspan="3">0.43 __>__ 0.4</td><td colspan="3">0.19 __>__ 0.1</td></tr>
<tr><td colspan="3">0.77 __>__ 0.707</td><td colspan="3">0.305 __<__ 0.35</td></tr>
<tr><td colspan="3">-0.4 __>__ -0.5</td><td colspan="3">-0.6 __>__ -0.7</td></tr>
</table>

Name: Key ______ Date: ______ Period: ______

Unit 1.8: The Real Numbers Practice

Simplify.			
1. $\sqrt{36}$ 6	2. $\sqrt{64}$ 8	3. $\sqrt{100}$ 10	4. $-\sqrt{121}$ −11

Write as the ratio of two integers.	
5. 5 5/1	6. 4.399 $\frac{4399}{1000}$

Identify whether each number is rational or irrational.	
7. $\sqrt{169}$ rational	8. $\sqrt{45}$ irrational

Identify whether each number is a real number or not a real number.	
9. $-\sqrt{81}$ real	10. $\sqrt{-144}$ not real

11. List the whole numbers, integers, rational numbers, irrational numbers, and real numbers for the given set of numbers:

$$\sqrt{36},\ -8,\ 0,\ 1.98733\ldots,\ \frac{12}{5},\ \ -\frac{8}{3},\ 0.\overline{714285}$$

Whole numbers: $\sqrt{36}$, 0

Integers: $\sqrt{36}$, -8, 0

Rational Numbers: $\sqrt{36}$, -8, 0, $\frac{12}{5}$, $\frac{-8}{3}$, 0.714285

Irrational Numbers: 1.98733...

Real Numbers: all of them

Order each pair of numbers, using < or > .		
12. -1 < -1/3	13. -5/12 > -7/12	14. -4 < -12/5
15. 0.37 < 0.63	16. 0.91 > 0.901	17. -0.5 < -0.3

18. In your own words, explain the difference between a rational number and an irrational number.

answers vary

Name: Key Date: ________ Period: ______

Use Commutative and Associative Properties notes

Use Commutative & Associative Properties

When adding numbers like 4 + 2, it doesn't matter what order you add them. 4 + 2 is the same as 2 + 4. The same thing is true when multiplying!

That property is called the **commutative property**. When adding or multiplying, changing the order doesn't change the result.

The commutative property only works for addition and multiplication, though. It does NOT work for subtraction and division!

What if you have more than 2 numbers? Let's say you have 7 + 1 + 3. You could add (7 + 1) + 3, or you could add 7 + (1 + 3) and still get the same answer. The same thing is true for multiplying! This is called the **associative property**. When adding and multiplying, changing the grouping does NOT change your answer. Again, the associative property does NOT work for subtraction and division.

We can use these properties to help us simplify expressions.

Example

Simplify.	
$18a + 6b + 15a + 5b$ $23a + 11b$	b) $\left(\frac{5}{13} + \frac{3}{4}\right) + \frac{1}{4}$ $\frac{5}{13} + \frac{4}{4} = 1\frac{5}{13}$
Use the associative property to simplify $6(3x)$ $18x$	
Your Turn!	
$23x + 14y + 9x + 15y$ $32x + 29y$	$39a + 21c + 4a - 15c$ $43a + 6c$
$\left(\frac{7}{15} + \frac{5}{8}\right) + \frac{2}{8} = \frac{7}{15} + 1 = 1\frac{7}{15}$	$\left(\frac{2}{9} + \frac{7}{12}\right) + \frac{4}{8} = \frac{8}{36} + \frac{21}{36} + \frac{1}{2}$ $3 \cdot 3 \cdot 4$ $3)\overline{9\ 12}$ 36 $= \frac{29}{36} + \frac{18}{36} = \frac{47}{36}$
Use the associative property to simplify.	
$8(4x)$ $32x$	$-6(7y)$ $-42y$

Name: Key Date: ________ Period: ______

Use Identity & Inverse Properties notes

Identity Properties

What happens when we add 0 to any number? Adding 0 doesn't change the value. For this reason, we call 0 the additive identity. This goes hand in hand with Identity Property of Addition that states that for any real number a, $a + 0 = a$.

Multiplying a number by one also doesn't change the value. Therefore, we call 1 the **multiplicative identity.** And just like with addition, we have the Identity Property of Multiplication that states that for any real number a, $a \cdot 1 = a$.

Inverse Properties

The next property is the **Inverse Property of Addition.** The additive inverse of a number x is $-x$. Another way of saying it is the additive inverse is just the opposite of that number!

A number and its opposite add to zero, which is the Inverse Property of Addition, which states that for any real number a, $a + (-a) = 0$. We use this property a LOT in Algebra!

Multiplication has a special inverse property as well. The multiplicative inverse of a number is that number's reciprocal. And since a number an its reciprocal multiply to one, you have the Inverse Property of Multiplication, which states that for any real number a, $a \neq 0$,

$a \cdot \frac{1}{a} = 1$

Example

Find the additive inverse:			
5/8 $-5/8$	0.7 -0.7	-9 9	-4/7 $4/7$

Find the multiplicative inverse:		
9 $1/9$	-1/7 -7	0.7 $\frac{7}{10}$ $\frac{10}{7}$

Your Turn!

Find the additive inverse.			
7/9 $-7/9$	1.2 -1.2	-46 46	-5/2 $\frac{5}{2}$
Find the multiplicative inverse			
4 $1/4$	-1/7 -7	0.3 $\frac{3}{10} = \frac{10}{3}$	$2\frac{5}{6}$ $\frac{17}{6}$ $\frac{6}{17}$

Name: Key Date: ________ Period: ______

Use Properties of Zero notes

Properties of Zero

The identity property of addition says that when we add 0 to any number, the result is that same number. When we multiply by zero, however, we get a product of zero.

What about dividing by zero? Think about a real example for $0 \div 4$: If there are no donuts in the box and 4 people want to eat donuts, how many donuts does each person get? There aren't any donuts, so each person gets 0 donuts.

$$0 \div 4 = 0$$

So, whenever you divide zero by a real number, you always get zero.
Now, what if you divide a number by zero, like $4 \div 0$? $4 \div 0$ means what number times 0 equals 4? Since anything multiplied by zero equals zero, we conclude that there is no answer, so we say that division by zero is undefined.

Let's take all our properties and put them into practice!

Example

Simplify:	
$-8 \cdot 0$ zero	$-32/0$ undefined
$\frac{0}{n+5}$ zero	$-\cancel{84}n + (-73n) + \cancel{84}n$ $-73n$
$\frac{8}{\cancel{15}} \cdot \frac{\cancel{8}}{23} \cdot \frac{\cancel{15}}{\cancel{8}} = \frac{8}{23}$	$\frac{\cancel{3}}{\cancel{4}} \cdot \frac{\cancel{4}}{\cancel{3}}(6x + 12)$ $6x+12$

Your Turn!

$-14 \cdot 0$ zero	$0/-6$ zero	$-2/0$ undefined	$0(-17)$ zero

$-27a + (-49a) + 27a$ $-49a$	$39x + (-94x) + (-39x)$ $-94x$
$\frac{\cancel{9}}{\cancel{16}} \cdot \frac{7}{25} \cdot \frac{\cancel{16}}{\cancel{9}}$ $7/25$	$\frac{\cancel{3}}{\cancel{7}} \cdot \frac{\cancel{7}}{\cancel{3}}(12x + 16)$ $12x+16$

Name: Key Date: ________ Period: ______

Simplify Expressions Using Distributive Property notes

Distributive Property

The distributive property is used a LOT in upper-level math, so it's really important to learn! It helps us simplify expressions that we might not be able to simplify otherwise.

For example, if we are asked to simplify the expression 4 (x + 2), the order of operations wouldn't work because it says do parenthesis first, but x + 2 cannot be added together because they are not like terms. Never fear though, distributive property to the rescue!

The Distributive Property says that we can take an outside number and multiply it by the sum of the inside numbers (distribute it!) and get an equivalent expression. In math notation it looks like this:

$$a(b + c) = a \cdot b + a \cdot c$$

In our example it looks like this:

$$4\,(x + 2) = 4 \cdot x + 4 \cdot 2 = 4x + 8$$

You might find it helpful to draw arrows from the outside terms to each of the inside terms.

$$4\,(x + 2)$$

Example

Simplify:	
$3(x + 4)$ $3x + 12$	$8(\frac{3}{8}x + \frac{1}{4})$ $3x + 2$
$100(0.3 + 0.25x)$ $30 + 25x$	$-3(6m + 5)$ $-18m - 15$
$-11\,(4 - 3a)$ $-44 + 33a$	$-(y + 5)$ $-y - 5$
$9 - 3(x + 2)$ $9 - 3x - 6$ $3 - 3x$	$4(x - 8) - (x + 3)$ $4x - 32 - x - 3$ $3x - 35$

Name: Key Date: ________ Period: ______

Using Distributive Property Practice

Your Turn

Simplify.	
1) 4 (y + 2) 4y+8	2) 6(a + 7) 6a+42
e) $6\left(\frac{5}{6}c + \frac{1}{2}\right)$ 5c+3	e) $12\left(\frac{1}{3}b + \frac{3}{4}\right)$ 4b+9
5) 100 (0.7 + 0.24x) 70+24x	6) 100 (0.04 + 0.35d) 4+35d
7) -3 (6y + 4) -18y-12	8) -6 (8n + 12) -48n-72
9) -5 (2 – 3a) -10+15a	
10) -7 (8 – 15z) -56+105z	11) -(z – 11) -z+11
12) -(r - 5) -r+5	13) 9 – 3 (x + 4) 9-3x-12 -3-3x
14) 7x – 5 (x + 4) 7x-5x-20 2x-20	15) 6 (x – 9) – (x + 13) 6x-54-x-13 5x-67

Name: Key Date: ________ Period: ______

Unit 1.9: Properties of Real Numbers Practice

Use the associative property to simplify.

1. $3(4x)$ $12x$

2. $(y + 12) + 28$ $y + 40$

Simplify.

3. $\frac{1}{2} + \frac{7}{8} + \left(-\frac{1}{2}\right)$ $\frac{7}{8}$

4. $\frac{3}{\cancel{20}} \cdot \frac{49}{11} \cdot \frac{\cancel{20}}{\cancel{3}}$ $\frac{49}{11}$

5. $[2.48(12)](0.5)$
$29.76(0.5)$
14.88

6. $\overset{2}{\cancel{12}}\left(\frac{5}{\underset{1}{\cancel{6}}}p\right)$ $10p$

7. $43m + (-12n) + (-14m) + (-9n)$
$29m - 21n$

8. $\frac{3}{8}g + \frac{1}{12}h + \frac{7}{8}g + \frac{5}{12}h$
$\frac{10}{8}g + \frac{6}{12}h = \frac{5}{4}g + \frac{1}{2}h$

9. $6.8c + 9.41b + (-4.37c) + (-0.88b)$
$2.43c + 8.53b$

Find the additive inverse of each number.

10. $\frac{2}{5}$ $-\frac{2}{5}$

11. 4.3 -4.3

12. -8 8

13. $-\frac{12}{5}$ $\frac{12}{5}$

Find the multiplicative inverse of each number.

14. 6 $\frac{1}{6}$

15. $-\frac{3}{4}$ $-\frac{4}{3}$

16. 0.9
$\frac{9}{10} \rightarrow \frac{10}{9}$

Simplify.

17. $\frac{0}{5}$ zero

18. $\frac{2}{0}$ undefined

19. $19c + 44 - 19c$ 44

20. $10(0.1f)$ f

21. $\overset{5}{\cancel{15}} \cdot \frac{3}{\underset{1}{\cancel{5}}}(4x + 10)$ $15(4x + 10)$
$60x + 150$

Name: Key Date: ________ Period: ______

Unit 1.9: Properties of Real Numbers Practice

Simplify using the distributive property.	
22. $8(4x + 9)$ $32x + 72$	23. $6(c - 13)$ $6c - 78$
24. $\frac{1}{4}(3n + 12)$ $\frac{3}{4}n + 3$	25. $9\left(\frac{5}{9}y - \frac{1}{3}\right)$ $5y - 3$
26. $12(\frac{1}{4} + \frac{2}{3}f)$ $3 + 8n$	27. $h(s - 29)$ $hs - 29h$
28. $(y + 4)k$ $yk + 4k$	29. $-7(4j + 2)$ $-28j - 14$
30. $-(3x - 7)$ $-3x + 7$	31. $16 - 3(y + 8)$ $16 - 3y - 24$ $-8 - 3y$

Name: Key Date: ________ Period: ______

Unit 1.9: Properties of Real Numbers Practice

Simplify using the distributive property.

32. $22 - (a + 3)$

$22 - a - 3$

$19 - a$

33. $(5m - 3) - (m + 7)$

$5m - 3 - m - 7$

$4m - 10$

34. $5(2x + 9) + 12(x - 3)$

$10x + 45 + 12x - 36$

$22x + 9$

35. $9 \cdot 8x - 3 - (-2)$

$72x - 3 + 2$

$72x - 1$

36. $6(7y + 8) - (30y - 12)$

$42y + 48 - 30y + 12$

$12y + 60$

37. What is the difference between the additive inverse and the multiplicative inverse of a number?

Answers vary

Name: Key Date: _________ Period: ______

Unit Conversions in the U.S. System notes

U.S Systems

There are two systems of measurement commonly used around the world. Most countries use the metric system, but the U.S. uses a different system of measurement.

The U.S. system uses units of inch, foot, yard, and mile to measure length, and the units of pound and ton to measure weight. Capacity is measured using cup, pint, quart, and gallon. Both the metric and the U.S. system measure time in seconds, minutes, and hours.

U.S. Systems of Measurement			
Length	1 foot (ft.) = 12 inches (in.) 1 yard (yd.) = 3 feet (ft.) 1 mile (mi.) = 5,280 feet (ft.)	Volume	3 teaspoons (t) = 1 tablespoon (T) 16 tablespoons (T) = 1 cup (C) 1 cup (C) = 8 fluid ounces (fl. oz.) 1 pint (pt.) = 2 cups (C) 1 quart (qt) = 2 pints (pt.) 1 gallon (gal) = 4 quart (qt.)
Weight	1 pound (lb.) = 16 ounces (oz.) 1 ton = 2000 pounds (lb.)	Time	1 minute (min) = 60 seconds (sec) 1 hour (hr) = 60 minutes (min) 1 day = 24 hours (hr) 1 week (wk) = 7 days 1 year (yr) = 365 days

In many real-life applications, we need to convert between units of measurement, such as feet to years, minutes to seconds, or quarts to pints. We can use the **identity property** of multiplication to do this conversions.

Identity Property of Multiplication

For any real number *a*, 1 is the multiplicative identity.

$a \cdot 1 = a \qquad 1 \cdot a = a$

To use the property, we write 1 in a form that will help us to convert the units, such as

$\frac{1 \text{ foot}}{12 \text{ inches}}$. This fraction is equivalent to one because 1 foot equals 12 inches.

Name: Key Date: ________ Period: ______

Identity Property of Multiplication

To decide how to write the fraction you use to convert units, you want to choose the fraction that will make the units we want to convert from divide out of the expression. Let's look at an example. Say you want to convert 48 inches to feet:

$$48 \text{ inches} \cdot \frac{1 \text{ foot}}{12 \text{ inches}}$$

We use this form because the inches will cancel out and leave you with feet, which is our goal unit.

Example

Lily is 90 inches tall. Convert that height to feet. $90 \text{ in} \cdot \frac{1 \text{ ft}}{12 \text{ in}} = 7.5 \text{ ft}$ OR $7 \text{ ft. } 6 \text{ in}$	Ellie, an elephant in the zoo, weights almost 3.2 tons. Convert her weight to pounds. $3.2 \text{ tons} \cdot \frac{2000 \text{ lbs}}{1 \text{ tons}} = 6{,}400 \text{ lbs}$
Julie is going with her family to their summer home. She will be away from her friends for 9 weeks. Convert that time to minutes. $9 \text{ wk} \cdot \frac{7 \text{ day}}{1 \text{ wks}} \cdot \frac{24 \text{ hr}}{1 \text{ day}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = 90{,}720 \text{ min}$	How many ounces are in 1 gallon? $1 \text{ gal} \cdot \frac{4 \text{ qt}}{1 \text{ gal}} \cdot \frac{2 \text{ pt}}{1 \text{ qt}} \cdot \frac{2 \text{ cups}}{1 \text{ pt}} \cdot \frac{8 \text{ oz}}{1 \text{ cup}}$ $= 128 \text{ oz}$
Your Turn!	
Leslie is 30 inches tall. Convert her height to feet. $30 \text{ in} \cdot \frac{1 \text{ ft}}{12 \text{ in}} = 2.5 \text{ ft}$	Riley bought a hose that is 18 yards long. Convert the length to feet. $18 \text{ yd} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} = 54 \text{ ft}$
Archie's car weighs about 4.3 tons. How much is that in pounds? $4.3 \text{ tons} \cdot \frac{2000 \text{ lbs}}{1 \text{ tons}} = 8{,}600 \text{ lbs}$	The distance between the earth and the moon is about 250,000 miles. How many yards is that? $250{,}000 \text{ miles} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{1 \text{ yds}}{3 \text{ ft}}$ $= 440{,}000{,}000 \text{ yds}$

Name: Key Date: _________ Period: ______

Use Mixed Units of Measurement in the U.S. System notes

Mixed Measurements

We often use mixed units of measurement in everyday situations, like work, cooking, or creating. Suppose that Jim is 5 feet 11 inches tall, stays at work for 8 hours and 32 minutes, and then eats a 1 pound 4-ounce steak for dinner. All of those measurements were **mixed units.**

You can perform arithmetic operations on measurements with mixed units, you just have to be really careful!

Example

Jack bought three steaks for a barbecue. Their weights were 15 ounces, 1 pound 2 ounces, and 1 pound 6 ounces. How many total pounds of steak did he buy?

1 lb 2 oz
+1 lb 6 oz
15 oz
2 lb 23 oz

23 oz = 16 oz + 7 oz
= 1 lb + 7 oz
2 lb + 1 lb + 7 oz = 3 lb 7 oz

Tim bought four planks of wood that were each 6 feet 4 inches long. What was the total length of the wood he purchased?

6 ft 4 in
× 4
24 ft 16 in = 24 ft + 1 ft 4 in
= 25 ft 4 in

Your Turn!

Laura had 3 bags of carrots. Their weight was 3 pounds 3 ounces, 3 pounds 4 ounces, and 2 pounds 7 ounces. What was the total weight of the potatoes.

3 lb 3 oz
3 lb 4 oz
+ 2 lb 7 oz
8 lb 14 oz

Jimmy cut two pieces of crown molding for his family room that were 8 feet 7 inches and 12 feet 11 inches. What was the total length of the molding?

8 ft 7 in
+ 12 ft 11 in
20 ft 18 in = 21 ft 6 in

Jackie wants to triple a solution of 6 gallons 3 quarts. How many gallons of solution will she have in all?

6 gal 3 qt
× 3
18 gal 9 qt

18 gal + 2 gal 1 qt
20 gal 1 qt

Name: Key Date: ________ Period: ______

Unit Conversions in the Metric System notes

Metric System

In the metric system, units are related by powers of 10. The roots of their names reflect this relation. For example, the basic unit for measuring length is a meter. One kilometer is 1,000 meters; the prefix *kilo* means *thousand.* One centimeter is 1/100 of a meter, just like one cent is 1/100 of one dollar.

Metric System of Measurement		
Length	Mass	Capacity
1 kilometer (km) = 1,000 m	1 kilogram (kg) = 1,000 g	1 kiloliter (kL) = 1,000L
1 hectometer (hm) = 100 m	1 hectogram (hg) = 100 g	1 hectoliter (hL) = 100L
1 dekameter (dam) = 10m	1 dekagram (dag) = 10g	1 dekaliter (daL) = 10L
1 meter = 1m	1 gram = 1g	1 liter = 1L
1 decimeter (dm) = 0.1 m	1 decigram (dg) = 0.1 g	1 deciliter (dL) = 0.1 L
1 centimeter (cm) = 0.01m	1 centigram (cg) = 0.01g	1 centiliter (cL) = 0.01L
1 millimeter (mm) = 0.001m	1 milligram (mg) = 0.001g	1 milliliter (mL) = 0.001L
1 meter = 100 centimeters	1 gram = 100 centigrams	1 liter = 100 centiliters
1 meter = 1,000 millimeters	1 gram = 1,000 milligrams	1 liter = 1,000 milliliters

To make conversions in the metric system, we will use the same technique we did for U.S. system and use the identity property of multiplication.

Example

John ran a 10K race. How many meters did he run?

10k = 10,000 m

Lily's baby sister weighed 3,200 grams. How many kilograms did the baby weigh?

3,200 g = 3.2 kg

350 L to kiloliters

350 L = 0.35 kL

4.2 L to milliliters

4.2 L = 4,200 mL

Name: Icer Date: ________ Period: ______

Metric Unit Conversions Practice

Your Turn

1) Sally completed her first 5k race. How many meters did she run? 5k = 5,000 m	2) Hugo bought a rug 2.5 meters in length. How many centimeters is the length? 2.5 m = 250 cm
3) Carly's newborn baby weighed 2,900 grams. How many kilograms did the baby weight? 2,900 g = 2.9 kg	4) Andy received a package that was marked 5,400 grams. How many kilograms did this package weigh? 5,400 g = 5.4 kg
5) 735 L to kiloliters 735 L = 0.735 kL	6) 6.7 L to milliliters 6.7 L = 6,700 mL
7) 4.2 L to centiliters 4.2 L = 420 cL	8) 4.6 g to centigrams 4.6 g = 460 cg

Name: Key Date: ________ Period: ______

Mixed Metric Unit Conversions Practice

Example

1) Riley is 1.7 meters tall. His brother is 85 centimeters tall. How much taller is Riley than his brother?

1.7m = 170cm

85 cm

$\overset{16}{\cancel{1}\cancel{7}}\overset{10}{0}$
- 85
85cm

2) Diana's recipe for lentil soup calls for 130 milliliters of olive oil. Diana wants to triple the recipe. How many liters of olive oil will she need?

130 ml
x 3
390 ml = 0.39 L

Your Turn!

3) Mary is 1.57 meters tall. Her daughter is 74 centimeters tall. How much taller is Mary than her daughter? Write your answer in centimeters.

1.57m = 157cm
- 74
83 cm

4) The fence around Joe's yard is 2 meters high. Hank is 97 centimeters tall. How much shorter than the fence is Joe? Write the answer in meters.

2m = 200cm
- 97cm
103 cm = 1.03m

5) A recipe for a sauce calls for 250 mL of milk. Rena is making pasta with sauce for a big party and needs to multiply the recipe amounts by 8. How many liters of milk will she need?

4
250 mL
x 8
2000 mL = 2L

6) To make a pan of baklava, Dorothy needs 400 grams of filo pastry. If Dorothy plans to make 6 pans of baklava, how many kilograms of filo pastry will she need?

400
x 6
2400 g
2.4 kg

Name: Key Date: ________ Period: ______

Convert Between Systems of Measurement notes

Converting Between Systems of Measurement

Many measurements in the United States are made in metric units. Our soda may come in 2-liter bottles, and our supplements may come in 500-mg capsules, or we may run a 5K race. To work easily in both systems, we need to be able to convert between the two systems.

Conversion Factors Between U.S. and Metric Systems		
Length	Mass	Capacity
1 in. = 2.54 cm 1 ft. = 0.305 m 1 yd. = 0.914 m 1 mi. = 1.61 km 1 m = 3.28 ft.	1 lb. = 0.45 kg 1 oz. = 28 g 1 kg = 2.2 lb.	1 qt. = 0.95 L 1 fl.0z. = 30 mL 1 L = 1.06 qt.

We can convert between the systems the same way we do between units – by multiplying using unit conversion factors.

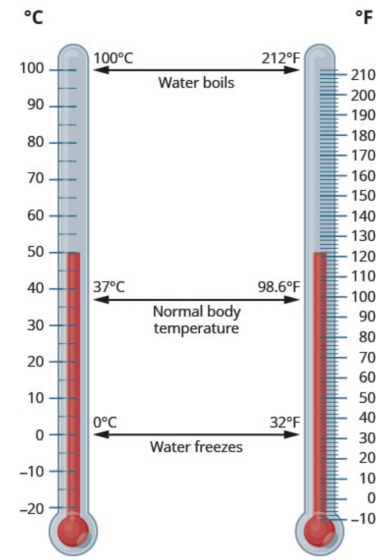
Example

George's water bottle holds 500 mL of water. How many ounces are in the bottle? Round to the nearest tenth of an ounce. $500 \text{ mL} \cdot \frac{1 \text{ oz}}{30 \text{ mL}} \approx 16.7 \text{ oz}$	Stan was on a road trip and saw a sign that said the next gas station was in 100 kilometers. How many miles until the gas station? $100 \text{ km} \cdot \frac{1 \text{ mi}}{1.6 \text{ km}} = 62.5 \text{ miles}$
Your Turn!	
How many quarts of soda are in a 2L bottle? $2L \cdot \frac{1 qt}{0.95 L} \approx 2.1 \text{ qts}$	How many liters are in 4 quarts of milk? $4 qt \cdot \frac{1 L}{1.06 qt} \approx 3.8 \text{ liters}$
5,895 m = _________ ft. $5{,}895 m \cdot \frac{3.28 \text{ ft.}}{1 \text{ m}} = 19{,}335.6 \text{ ft}$	5,586 km = _____________ miles $5586 \text{ km} \cdot \frac{1 \text{ miles}}{1.61 \text{ km}} \approx 3469.6 \text{ miles}$

Name: Key Date: ________ Period: ______

Convert Between Fahrenheit & Celsius Temperatures notes

Fahrenheit to Celsius



Have you ever been to a foreign country and heard the weather forecast? If the forecast is for 22°C, what does that mean?

The U.S. and metric systems use difference scales to measure temperature. The U.S. system uses degrees Fahrenheit, written °F, while the metric system uses degrees Celsius, or °C.

The image to the right shows the relationship between the two systems.

To convert from Fahrenheit to Celsius, use this formula:

$$C = \frac{5}{9}(F - 32)$$

To convert from Celsius to Fahrenheit, use this formula:

$$F = \frac{9}{5}C + 32$$

Example

<table>
<tr><td>Convert 50°F to degrees Celsius
$C^\circ = \frac{5}{9}(50-32)$
$= \frac{5}{\cancel{9}_1}(\cancel{18}^2) = 10^\circ C$</td><td>Convert 20°C to degrees Fahrenheit.
$F = \frac{9}{\cancel{5}}(\cancel{20})^4 + 32$
$F = 36 + 32 = 68^\circ F$</td></tr>
<tr><td colspan="2">Your Turn!</td></tr>
<tr><td>Convert 59°F to degrees Celsius
$C^\circ = \frac{5}{9}(59-32)$
$= \frac{5}{\cancel{9}_1}(\cancel{27}^3) = 15^\circ C$</td><td>Convert 42°F to degrees Celsius
$C = \frac{5}{9}(42-32)$
$= \frac{5}{9}(10) = \frac{50}{9} \approx 5.6^\circ C$</td></tr>
<tr><td>Convert 25°C to degrees Fahrenheit.
$F = \frac{9}{\cancel{5}}(\cancel{25}^5) + 32$
$= 45 + 32 = 77^\circ F$</td><td>Convert 10°C to degrees Fahrenheit.
$F = \frac{9}{\cancel{5}_1}(\cancel{10}^2) + 32$
$= 18 + 32 = 50^\circ F$</td></tr>
</table>

Name: Key Date: ________ Period: ______

Unit 1.10: Systems of Measurement Practice

Convert the units.

1. 6 ft = 36 in.

6×12

2. 18 in. = 1.5 ft.

3. 160 ft. = 53.3 yds.

$160 \text{ ft} \cdot \frac{1 \text{ yd}}{3 \text{ ft}}$

4. 1.5 miles = 7,920 ft.

$1.5 \text{ mi} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} = 7920$

5. 4.6 tons = 9,200 lbs.

4.6×2000

6. 35,000 lbs. = 17.5 tons

$35{,}000 \cdot \frac{1 \text{ tons}}{2000 \text{ lbs}}$

7. How many teaspoons are in a pint?

$1 \text{ pt} \cdot \frac{2 \text{ cups}}{1 \text{ pt}} \cdot \frac{8 \text{ oz}}{1 \text{ cups}} \cdot \frac{2 \text{ tbsp}}{1 \text{ oz}} \cdot \frac{3 \text{ tsp}}{1 \text{ tbsp}}$

$= 96$

8. 14 lbs. = 224 oz.

$14 \text{ lbs.} \cdot \frac{16 \text{ oz}}{1 \text{ lbs}}$

9. 6 feet 4 in. = 76 in.

$6 \times 12 = 72 \text{ in} + 4 \text{ in}$

10. 7 lbs. 4 oz. = 116 oz.

$7 \times 16 = 112 \text{ oz} + 4 \text{ oz}$

11. Eli caught three fish. They weighed 2 lbs. 4 oz., 1 lb. 11 oz., and 4 lbs. 14 oz. What was the total weight of the three fish?

2 lbs 4 oz
1 lb 11 oz
4 lbs 14 oz
7 lbs 29 oz

7 lbs + 1 lb 13 oz

8 lbs 13 oz

12. 6 ft. 7 in. + 3 ft. 8 in. = 10 ft. 3 in

9 ft. 15 in
9 ft + 1 ft 3 in

13. Lily wants to make 8 placemats. For each placemat she needs 18 inches of fabric. How many yards of fabric will she need for the 8 placemats?

$18 \times 8 = 144 \text{ in}$

$144 \text{ in} \cdot \frac{1 \text{ yd}}{36 \text{ in}} = 4 \text{ yds}$

Name: Key Date: ________ Period: ______

Unit 1.10: Systems of Measurement Practice

Convert the units.

14. 5km = 5000 m

15. 2.45m = 245 cm

16. 91.6g = 91,600 mg

17. 750 mL = 0.75 L

18. Matthew is 1.8 meters tall. His son is 89 cm tall. How much taller is Matthew than his son?

$1.8\text{m} = 180\text{ cm}$
$-\ 89\text{ cm}$
91 cm

19. Bill is 75 inches tall. How tall is that in centimeters?

$75\text{ in} \cdot \frac{2.54\text{ cm}}{1\text{ in}} = 190.5\text{ cm}$

20. 42 in. = 106.68 cm

$42 \cdot 2.54$

21. 1,650 lbs. = 742.5 kg

$1650\text{ lbs} \cdot \frac{0.45\text{ kg}}{\text{lbs}}$

22. 5K = 3.1 miles

$5\text{ km} \cdot \frac{1\text{ miles}}{1.61\text{ km}}$

23. 14 gallons = 53.2 liters

$14\text{ gal} \cdot \frac{4\text{ qt}}{1\text{ gal}} \cdot \frac{0.95\text{ L}}{1\text{ qt}}$

24. 86° F = 30 °C

$C = \frac{5}{9}(86-32)$

$C = \frac{5}{\cancel{9}_1}(\cancel{54}^6)$

$C = 30$

25. 72° F = 22.2 °C

$C = \frac{5}{9}(72-32)$

$= \frac{5}{9}(40)$

$= 22.2$

26. 5° C = 41 °F

$F = \frac{9}{5}(5) + 32$

$= 9 + 32$

$= 41$

27. -10° C = 14 °F

$F = \frac{9}{\cancel{5}_1}(-\cancel{10}^2) + 32$

$= -18 + 32$

$= 14$

Name: Key Date: ________ Period: ______

Algebra I Unit 1 Review

Find the place value of each digit.

1. 26,915

ⓐ 1 Tens
ⓑ 2 ten thousand
ⓒ 9 hundred
ⓓ 5 ones
ⓔ 6 thousand

2. 58,129,304

ⓐ 5 ten millions
ⓑ 0 tens
ⓒ 1 hundred thousands
ⓓ 8 millions
ⓔ 2 ten thousands

Name each number using words.

3. 3,975,284

three million, nine hundred seventy-five thousand, two hundred eighty-four

Write each number as a whole number using digits.

4. Three hundred sixteen

316

5. Ninety million, twenty thousand, seven

90,020,007

Round each number to the nearest ⓐ ten, ⓑ hundred, and ⓒ thousand.

6. 26,846

a) 26,850
b) 26,800
c) 27,000

7. 3,972,849

a) 3,972,850
b) 3,972,800
c) 3,973,000

Find the prime factorization.

8. 420

420
42 10
6 7 5 2
2 3

$2 \cdot 2 \cdot 3 \cdot 5 \cdot 7$

9. 1560

1560
156 10
3 52 5 2
2 26
2 13

$2 \cdot 2 \cdot 2 \cdot 3 \cdot 5 \cdot 13$

Find the least common multiple.

10. 24, 30

$$\begin{array}{r|rr} & 4 & 5 \\ 6 & 24 & 30 \end{array}$$

$6 \cdot 4 \cdot 5 = 6 \cdot 20 = 120$

11. 60, 75

$$\begin{array}{r|rr} & 4 & 5 \\ 3 & 12 & 15 \\ 5 & 60 & 75 \end{array}$$

$5 \cdot 3 \cdot 4 \cdot 5 = 15 \cdot 20 = 300$

Name: Key Date: ________ Period: ______

Algebra I Unit I Review

Translate from algebra to English.

12. $25 - 7$ The difference of 25 and 7	13. $5 \cdot 7$ The product of 5 and 7
14. $42 \geq 28$ 42 is greater than or equal to 28	15. $3 \leq 20 \div 4$ 3 is less than or equal to the quotient of 20 and 4

Determine if each is an expression or equation.

16. $6 \cdot 6 + 9x$ expression	17. $x - 9 = 45$ equation

Simplify each expression.

18. $6 + 10/2 + 3$ $6 + 5 + 3$ 14	19. 3^5 $3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$ $9 \cdot 9 \cdot 3$ $81 \cdot 3 = 243$
20. $20 \div (4 + 6) \cdot 8$ $20 \div 10 \cdot 8$ $2 \cdot 8$ 16	21. $(4 + 3)^2$ 7^2 49

Evaluate the expressions.

22. $9x + 8$ when $x = 2$ $9(2) + 8$ $18 + 8$ 26	23. x^4 when $x = 4$ $4^4 = 4 \cdot 4 \cdot 4 \cdot 4$ $16 \cdot 16$ 256
24. 3^x when $x = 3$ $3^3 = 27$	25. $2x + 4y - 9$ when $x = 7$, $y = 8$ $2(7) + 4(8) - 9$ $14 + 32 - 9$ 37

Name: Key Date: ________ Period: ______

Algebra I Unit I Review

Identify the coefficient of each term.	
26. 14n 14	27. -y -1

Identify the like terms.	
28. 3n, n^2, 19, $12m^2$, 4, $3n^2$ 3n 19, 4 n^2, $3n^2$ $12m^2$	29. 6, $18d^4$, 9g, $9d^4$, 5g, 10g 6 $18d^4$, $9d^4$ 9g, 5g, 10g

Simplify the expressions by combining like terms.	
30. 17z + 10z 27z	31. 9x + 4x + 12 13x + 12
32. 7y – 5 + 4y – 9 11y – 14	

Translate the following phrases into algebraic expressions		
33. the sum of nine and five 9 + 5	34. the difference of x and 10 x – 10	35. the product of 6 and k 6k

36. Allie bought a skirt and a blouse. The skirt cost $16 more than the blouse. Let b represent the cost of the blouse. Write an expression for the cost of the skirt.

skirt = b + 16

Order each of the following pairs of numbers using < or >.			
37. 6 _>_ 2	38. -7 _<_ 8	39. -9 _<_ -4	40. 3 _>_ -10

Find the opposite of each number.	
41. -8 8	42. 9 -9

Name: Key Date: ________ Period: ______

Algebra I Unit I Review

Simplify.

43. -(-28) 28	44. -(-54) 54
45. -x when x = -3 $-(-3) = 3$	46. -p when p = 4 -4

47. |-8| 8	48. -|-25| -25	49. |4| 4	50. |0| 0

Fill in <, >, or = for each of the following pairs of numbers.

51. -9 __<__ |-9| 9	52. -|-34| __<__ |-34| -34 34	53. 11 __>__ -|-11| -11

Simplify.

54. 8(14 – 2 |-2|) 8(14-2(2)) 8(14-4) 8(10) → 80	55. 140 + (-75) + 67 65 + 67 132
56. -5 – (-1) -5+1 -4	57. -15 – (-28) + 5 -15 + 28 + 5 18
58. -16 – (-4 + 1) - 7 -16 - (-3) - 7 -16 + 3 - 7 -20	59. -8(-2) – 3(-9) 16 + 27 43
60. -4 · 2 · 11 -8 · 11 -88	61. -10(-5) ÷ (-25) 50 ÷ (-25) -2
62. 24 – 3(2 – 10) 24 - 3(-8) 24 + 24 48	63. 6x – 5y + 15 when x = 3 and y = -1 6(3) - 5(-1) + 15 18 + 5 + 15 38

Name: Key Date: ________ Period: ______

Algebra I Unit I Review

Simplify each fraction.

64. 7/21	65. -168/192	66. 11x/11y
$\frac{1}{3}$	$-\frac{7}{8}$	$\frac{x}{y}$

Multiply or divide.

67. $\frac{\cancel{7}^{1}}{\cancel{12}_{3}}\left(-\frac{\cancel{8}}{\cancel{21}_{3}}\right)^2$ $-\frac{2}{9}$

68. $-\cancel{28}^{7}b\left(-\frac{1}{\cancel{4}}\right)$ $7b$

69. $-\frac{4}{5}\div\frac{4}{7}$

$-\frac{4}{5}\cdot\frac{7}{4} = -\frac{7}{5}$

70. $\frac{7x}{12}\div\frac{21x}{8}$

$\frac{\cancel{7x}^{1}}{\cancel{12}_{\cancel{6}_{3}}}\cdot\frac{\cancel{8}^{\cancel{4}^{2}}}{\cancel{21x}_{3}} = \frac{2}{9}$

71. $-\frac{\frac{x}{6}}{-\frac{8}{9}}$ $-\frac{x}{\cancel{6}_{2}}\cdot-\frac{\cancel{9}^{3}}{8} = \frac{3x}{16}$

72. $\frac{15+9}{18+12}$ $\frac{24}{30} = \frac{4}{5}$

73. $\frac{12\cdot 9 - 3^2}{3\cdot 18}$ $\frac{108-9}{54} = \frac{99}{54}$ $\frac{11}{6}$

74. $\frac{7+3(5)}{-2-3^2}$ $\frac{7+15}{-2-9} = \frac{22}{-11} = -2$

Add or subtract.

$4\overline{)8\quad 20}$ $.2\ .5$ $=40$

75. $-\frac{1}{8}+\left(-\frac{5}{8}\right)$	76. $-\frac{8}{d}-\frac{3}{d}$	77. $-\frac{7}{20}-\left(-\frac{5}{8}\right)$
$-\frac{6}{8} = -\frac{3}{4}$	$-\frac{12}{d}$	$-\frac{7}{20}+\frac{5}{8}$ $-\frac{14}{40}+\frac{25}{40} = \frac{11}{40}$

Write as a decimal.

78. Eight and three hundredths	79. nine thousandths
8.03	0.009

Name: Key Date: ________ Period: ______

Algebra I Unit I Review

Name the decimal.	
80. 0.005 five thousandths	81. 1.45 One and forty-five hundredths

Simplify.	
82. -4.2 + (-9.3) -13.5	83. 100 – 65.89 34.11

Simplify.		
84. 0.3(3.14) 0.942	85. (0.09)(24.78) 2.2302	86. 12/0.08 $\frac{12}{0.08} = \frac{1200}{8} = 150$

Write each as a decimal, fraction, and percent.	
87. 0.08 $\frac{8}{100} = \frac{2}{25}$ 8%	88. 0.425 42.5% $\frac{425}{1000} = \frac{17}{40}$
89. $-\frac{4}{5}$ -0.8 -80%	90. $\frac{5}{9}$ $0.\overline{5}$ $55\frac{5}{9}\%$
91. 5% $\frac{5}{100}$ 0.05	92. 115% 1.15 $\frac{115}{100} = \frac{23}{20}$
93. 0.009 $\frac{9}{1000}$ 0.9%	94. 1.5 150% $\frac{15}{10} = \frac{3}{2}$

Simplify	
95. $\sqrt{64}$ 8	96. $-\sqrt{25}$ -5

Name:____ Date: _________ Period: ______

Algebra I Unit I Review

Classify each number as rational, irrational, whole, natural, real, not real, or integer

97. -4, 0, $\sqrt{16}$, 5.432..., 13/3, 10.5

rational : -4, 0, $\sqrt{16}$, 13/3, 10.5

irrational : 5.432...

Whole : 0, $\sqrt{16}$

natural : $\sqrt{16}$

Integer : -4, 0, $\sqrt{16}$

real : all of them

Not real : none of them

Order each of the following pairs of numbers using <, >, or =:

98. -1 __<__ -1/8	99. -7/9 _<_ -4/9	100. 0.9 _>_ 0.61
101. -0.27 _>_ -0.3	102. 0.7 _>_ -3/4 -0.75	103. 0.8 _>_ 0.43

Simplify.

104. $\left(\frac{7}{12}+\frac{4}{5}\right)+\frac{1}{5}$

$\frac{7}{12}+\frac{5}{5}$

$1\frac{7}{12}$

105. 11x + 8y + 16x + 15y

27x + 23y

106. -18 · 15 · (2/9)

$\cancel{-18}^{2} \cdot 15 \cdot \frac{2}{\cancel{9}_{1}}$

-30 · 2

-60

Find the additive inverse:

107. 1/4

$-\frac{1}{4}$

108. -14

14

Name: Key Date: ________ Period: ______

Algebra I Unit I Review

Find the multiplicative inverse:	
109. -10 $-\frac{1}{10}$	110. 4/9 $\frac{9}{4}$
111. 2.1 $\frac{21}{10} \rightarrow \frac{10}{21}$	112. 0.9 $\frac{9}{10} \rightarrow \frac{10}{9}$
Simplify.	
113. $7(c + 8)$ $7c+56$	114. $-8(-6w - 13)$ $48w+104$
115. $(y - 4) - (6a + 9)$ $y-4-6a-9$ $-6a+y-13$	116. $4(x - 3) - 8(x - 7)$ $4x-12-8x+56$ $-4x+44$
Convert the measurements.	
117. 5 ft. 4 inches = 64 in. 5 ft = 5×12 in = 60 in	118. 14,179 ft = 2.7 miles 14,179 ÷ 5,280
119. 1.7 m = 170 cm	120. 13g = 13,000 mg

1 Name: Key Date:__________ Period:______

Algebra Chapter One Practice Test

Directions: Show all work. Circle your final answer.

1. Write as a whole number using digits: three hundred five thousand, six hundred sixteen

   305,616

2. Find the prime factorization of 504

   $504 \to 2, 252 \to 2, 126 \to 2, 63 \to 7, 9 \to 3, 3$

   $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3 \cdot 7$

3. Find the LCM of 18 and 24

   $6 \,|\, 18 \quad 24$ → $3 \quad 4$

   $6 \cdot 3 \cdot 4 = 72$

4. Combine the like terms:

   $5n + 8 + 3n - 2$

   $8n + 6$

5. Evaluate:

   $-|x|$ when $x = -2$

   $-|-2| = -2$

6. Evaluate:

   $11 - b$ when $b = -4$

   $11-(-4)$

   $11+4$

   15

7. Translate to an algebraic expression and simplify: thirty less than negative eight.

   $-8 - 30$

   -38

8. Molly has a balance of -$19 in her checking account. She deposits $153 to the account. What is the new balance?

   $-19 + 153$

   $134

 Name: Key Date:____________ Period:_______

Directions: Show all work. Circle your final answer.

9. Round 687.134 to the nearest hundredth. 687.13	10. Convert 4/5 to a decimal. $5\overline{)4.0}$ = 0.8
11. Convert 1.87 to a percent. A. 1.87% B. 18.7% C. 187% D. 1870%	12. Simplify: $5 + 10(3 + 9) - 5^2$ $5 + 10(12) - 25$ $5 + 120 - 25$ $125 - 25$ 100
13. Simplify: $-86 + 43$ -43	14. Simplify: $-19 - 26$ -45
15. Simplify: $(-2)^4$ 16	16. Simplify: $-4(-9) \div 15$ $36 \div 15$ 2.4

 Name: Key Date:____________ Period:_______

Directions: Show all work. Circle your final answer.

17. Simplify:

$$\frac{\cancel{3}^{1}}{8} \cdot \frac{11}{\cancel{12}_{4}}$$

$$\frac{11}{16}$$

18. Simplify:

$$\frac{4}{5} \div \frac{8}{25}$$

$$\frac{\cancel{4}^{1}}{\cancel{5}_{1}} \cdot \frac{\cancel{25}^{5}}{\cancel{8}_{2}} = \frac{5}{2}$$

19. Simplify:

$$\frac{12 + 4 \cdot 5}{15 - 7}$$

$$\frac{12+20}{8} = \frac{22}{8} = \frac{11}{4}$$

20. Simplify:

$$\frac{x}{7} + \frac{10}{7}$$

$$\frac{x+10}{7}$$

21. Simplify:

$$\frac{5}{12} - \frac{3}{8}$$

$$\frac{10}{24} - \frac{9}{24}$$

$$\frac{1}{24}$$

22. Simplify:

$$-5.9 + (-4.7)$$

$$-10.6$$

23. Simplify:

$$100 - 64.24$$

$$35.76$$

24. Simplify:

$$(0.07)(31.95)$$

$$2.2365$$

25. Simplify:

$$9 \div 0.05$$

$$\frac{9}{0.05} = \frac{900}{5} = 180$$

 Name: Keri Date:____________ Period:_______

Directions: Show all work. Circle your final answer.

26. Simplify:

$$-\overset{2}{\cancel{14}}\left(\frac{5}{\underset{3}{\cancel{21}}}x\right)$$

$-\frac{10}{3}x$

27. Simplify:

$$(c+9) - 8$$

$c+1$

28. Simplify:

$$6w + (-4x) + 9w + 8x$$

$15w + 4x$

29. Simplify:

$$\frac{0}{55}$$

zero

30. Simplify:

$$\frac{78}{0}$$

undefined

31. Simplify:

$$-3(13x - 5)$$

$-39x + 15$

32. $1\frac{2}{3}$ hours = 100 minutes

1 hour = 60 min

$\frac{2}{3}$ of 60 = 40 min

33. 2.8 miles = 4.508 kilometers.

$2.8\text{ mi} \cdot \frac{1.61\text{ km}}{1\text{ mi}}$

34. Max's car is 5 feet 11 inches tall. He wants to put a rooftop cargo bag on the car. The cargo bag is 1 foot 6 inches tall. What will be the total height of the car with the cargo bag on the roof?

5 ft 11 in
1 ft 6 in

6 ft 17 in

7 ft 5 in

 Name: Key Date:____________ Period:_______

Algebra Unit One Test

Directions: Show all work. Circle your final answer.

1. Write as a whole number using digits: five hundred four thousand, twelve

504,012

2. Find the prime factorization of 614

614

$\boxed{2 \cdot 307}$

3. Find the LCM of 35 and 75

$5 \,\overline{)\,35 \quad 75}$ → $\cdot\ 7 \cdot 15$

$5 \cdot 7 \cdot 15 =$ 3,675

4. Combine the like terms:

$9n + 7 + 4n - 3$

$13n + 4$

5. Evaluate:

$-|w|$ when $w = -5$

$-|-5|$

-5

6. Evaluate:

$15 - c$ when $c = -5$

$15 - (-5)$

$15 + 5$

20

7. Translate to an algebraic expression and simplify: fifty-two less than negative fifteen.

$-15 - 52$

-67

8. Max has a balance of -\$18 in his checking account. He deposits \$134 to the account. What is the new balance?

$-18 + 134$

\$116

Key
2 Directions: Show all work. Circle your final answer.

9. Round 987.984 to the nearest hundredth. 987.98	10. Convert 7/8 to a decimal. 0.875 $8\overline{)7.000}$ -64 60 -56 40
11. Convert 2.37 to a percent. A. 2.37% B. 23.7% C. 237% D. 2370%	12. Simplify: $4 + 10(7 + 8) - 4^2$ 4+10(15)-16 4+150-16 154-16 138
13. Simplify: $-64 + 37$ -27	14. Simplify: $-64 - 37$ -101
15. Simplify: $(-2)^6$ 64	16. Simplify: $-7(-4) \div 2$ 28÷2 14

 key

Directions: Show all work. Circle your final answer.

17. Simplify:

$$\frac{\cancel{3}^{1}}{8} \cdot \frac{11}{\cancel{12}_{4}}$$

$$\frac{11}{32}$$

18. Simplify:

$$\frac{4}{5} \div \frac{8}{25}$$

$$\frac{\cancel{4}^{1}}{\cancel{5}_{1}} \cdot \frac{\cancel{25}^{5}}{\cancel{8}_{2}} = \frac{5}{2}$$

19. Simplify:

$$\frac{14 + 3 \cdot 6}{13 - 3}$$

$$\frac{14+18}{10} = \frac{32}{10} = \frac{16}{5}$$

20. Simplify:

$$\frac{k}{8} + \frac{17}{8}$$

$$\frac{k+17}{8}$$

21. Simplify:

$$\frac{5}{14} - \frac{5}{8}$$

$$\frac{20}{56} - \frac{35}{56} = -\frac{15}{56}$$

2) 14 8 → 7 4 = 56

22. Simplify:

$$-9.9 + (-7.9)$$

$$-17.8$$

23. Simplify:

$$100 - 77.26$$

$$22.74$$

24. Simplify:

$$(0.09)(34.96)$$

$$3.1464$$

25. Simplify:

$$11 \div 0.08$$

$$\frac{11}{0.08} = \frac{1100}{8}$$

$$137.5$$

Key
4 Directions: Show all work. Circle your final answer.

26. Simplify: $-\cancel{58}^{\,2}\left(\frac{7}{\cancel{29}_{1}}x\right)$ $-14x$	27. Simplify: $(p + 11) - 9$ $p+2$
28. Simplify: $8n + (-9h) + 7n + 9h$ $15n$	29. Simplify: $\frac{0}{9}$ zero
30. Simplify: $\frac{79}{0}$ undefined	31. Simplify: $-7(14x-3)$ $-98x + 21$
32. $2\frac{1}{3}$ hours = 140 minutes 2 hours = 120 min $\frac{1}{3}$ hour = $\frac{1}{3} \cdot 60$ = 20min	33. 3.8 miles = 6.118 kilometers $3.8 \text{ mi} \cdot \frac{1.61 \text{ km}}{1 \text{ mi}}$

34. Laken's car is 4 feet 11 inches tall. He wants to put a rooftop cargo bag on the car. The cargo bag is 2 foot 4 inches tall. What will be the total height of the car with the cargo bag on the roof?

4 ft 11in
2 ft 4in

6 ft 13in

7ft 1in