

Name \_\_\_\_\_

Math Course 2, Lesson 1

- **Arithmetic with Whole Numbers and Money**
- **Variables and Evaluation**

- **Addition**      addend + addend = sum

**Example:**  $\begin{array}{r} \$77.35 \\ + 4.00 \\ \hline \$81.35 \end{array}$

- **Subtraction**      minuend – subtrahend = difference  
Before adding or subtracting, write the numbers in a column and align the digits in the ones place. To add or subtract money, write zeros as needed to include two digits to the right of each decimal point.

**Example:**  $\begin{array}{r} 619 \\ - 39 \\ \hline 570 \end{array}$

- **Multiplication**      factor  $\times$  factor = product  
Find each partial product. Then add to find the final product. When multiplying money, place a decimal point in the product to denote cents.

**Example:**  $\begin{array}{r} \$1.43 \\ \times 73 \\ \hline 429 \\ 901 \\ \hline \$94.39 \end{array}$

- **Division**      dividend  $\div$  divisor = quotient  
When dividing money, place the decimal point in the quotient above the decimal point in the dividend.

**Example:**  $\begin{array}{r} \$7.60 \\ 8 \overline{) \$60.80} \end{array}$

- A mathematical **expression** uses numbers, operations, and variables to represent value. A **variable** is a letter that stands for any unknown number.
- To **evaluate** an expression with variables, substitute the given values for the variables and perform the calculations.

**Practice:**

1. Which is greater, the quotient of 16 divided by 4 or the difference when the minuend is 16 and the subtrahend is 12? \_\_\_\_\_

Solve 2–4.

2.  $1758 + 32 + 128 =$  \_\_\_\_\_      3.  $\$32.45 \cdot 6 =$  \_\_\_\_\_

4.  $13(19) =$  \_\_\_\_\_

Evaluate each expression for  $x = 20$  and  $y = 5$ .

5.  $x + y =$  \_\_\_\_\_

6.  $x - y =$  \_\_\_\_\_

7.  $xy =$  \_\_\_\_\_

8.  $\frac{x}{y} =$  \_\_\_\_\_

## • Properties of Operations

Property	Definition	Example
Commutative Property of Addition	Changing the order of the addends does not change the sum.	$2 + 3 = 5$ $3 + 2 = 5$
Commutative Property of Multiplication	Changing the order of the factors does not change the product.	$4 \times 5 = 20$ $5 \times 4 = 20$
Identity Property of Addition	When zero is added to a number, the sum is equal to the given number. Zero is the <b>additive identity</b> .	$a + 0 = a$
Identity Property of Multiplication	When a number is multiplied by one, the product is equal to the given number. One is the <b>multiplicative identity</b> .	$a \times 1 = a$
Property of Zero for Multiplication	When a number is multiplied by zero, the product is zero.	$a \times 0 = 0$
Associative Property of Addition	How the addends are grouped does not affect the sum.	$(a + b) + c = a + (b + c)$
Associative Property of Multiplication	How the factors are grouped does not affect the product.	$(a \times b) \times c = a \times (b \times c)$

### • Inverse operations “undo” each other.

To “undo” addition, subtract.  $\longrightarrow 6 + 4 = 10$     $10 - 6 = 4$     $10 - 4 = 6$

To “undo” multiplication, divide.  $\longrightarrow 6 \times 4 = 24$     $24 \div 4 = 6$     $24 \div 6 = 4$

### **Practice:**

Name the property that justifies each statement.

1.  $x + y = y + x$  \_\_\_\_\_

2.  $xy = yx$  \_\_\_\_\_

Use the numbers 2, 5, and 10 to illustrate each property.

3. Associative Property of Addition

4. Associative Property of Multiplication

\_\_\_\_\_

\_\_\_\_\_

Simplify each expression.

5.  $(20 \div 5) \div 2$

6.  $68 \times 5 \times 2$

7.  $(5 \times 28) \times 0$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Name \_\_\_\_\_

Math Course 2, Lesson 3

• **Unknown Numbers in Addition, Subtraction, Multiplication, and Division**

- An **equation** is a statement that two quantities are equal.

**Example:**  $3 + 4 = 7$

- A **variable** is a letter that stands for any unknown number.

**Example:**  $5 + n = 9$

- **Unknown numbers** in problems can be found by using opposite operations.

**Addition:** To find the unknown **addend** → **subtract**

**Example:**  $n + 13 = 20 \longrightarrow 20 - 13 = n$

**Subtraction:** To find the unknown **minuend** → **add**

**Example:**  $n - 3 = 2 \longrightarrow 2 + 3 = n$

To find the unknown **subtrahend** → **subtract**

**Example:**  $5 - n = 2 \longrightarrow 5 - 2 = n$

**Multiplication:** To find the unknown **factor** → **divide**

**Examples:**  $3n = 6 \longrightarrow 6 \div 3 = n$

$3 \times 4n = 24 \longrightarrow 24 \div (3 \times 4) = n$

**Division:** To find the unknown **dividend** → **multiply**

**Example:**  $n \div 2 = 8 \longrightarrow 8 \times 2 = n$

**Division:** To find the unknown **divisor** → **divide**

**Example:**  $8 \div n = 2 \longrightarrow 8 \div 2 = n$

**Practice:**

Find the value of each unknown number.

1.  $39 + z = 47$

$z = \underline{\hspace{2cm}}$

2.  $x + 25 = 374$

$x = \underline{\hspace{2cm}}$

3.  $26 - w = 12$

$w = \underline{\hspace{2cm}}$

4.  $316 - m = 187$

$m = \underline{\hspace{2cm}}$

5.  $12c = 144$

$c = \underline{\hspace{2cm}}$

6.  $15f = 375$

$f = \underline{\hspace{2cm}}$

7.  $\frac{d}{3} = 27$

$d = \underline{\hspace{2cm}}$

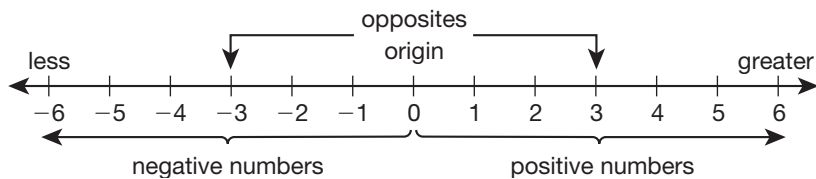
8.  $\frac{66}{t} = 6$

$t = \underline{\hspace{2cm}}$

9.  $\frac{y}{7} = 49$

$y = \underline{\hspace{2cm}}$

- **Number Line**
- **Sequences**

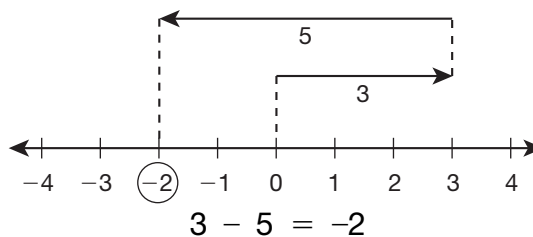


- **Integers** are the numbers {..., -3, -2, -1, 0, 1, 2, 3, ...}.
- **Opposites** are numbers the same distance to the right and left of the origin.
- **Comparison symbols** show equals (=), less than (<), and greater than (>).

**Examples:**      $3 + 2 = 5$               $-5 < 4$               $5 > -6$   
                          3 plus 2 equals 5     -5 is less than 4     5 is greater than -6

**Example:** Use a number line to subtract integers. Simplify  $3 - 5$ .

1. Always start at the origin.
2. Go to the right (+) 3.
3. Go to the left (-) 5.
4. The answer is -2.



- When a larger number is to be subtracted from a smaller one, reverse the order of the numbers and write the difference as a **negative** number.

**Example:**  $840 - 376 = 464$               $376 - 840 = -464$

- A **sequence** is an ordered list of numbers that follow a pattern.

**Example:** Find the next number in this sequence:     1, 3, 5, 7, 9, ...

Find the pattern.      $\overset{+2}{\curvearrowright} 1, \overset{+2}{\curvearrowright} 3, \overset{+2}{\curvearrowright} 5, \overset{+2}{\curvearrowright} 7, 9$   
 The pattern is +2.      $9 + 2 = 11$

**Practice:**

Find the next three numbers in each sequence.

1. 1, 3, 9, 27, ...     \_\_\_\_\_     2. 1, 3, 7, 13, ...     \_\_\_\_\_

Replace each circle with the proper comparison symbol in problems 3–4.

3.  $17 \bigcirc -17$      4.  $6 - 8 \bigcirc 8 - 6$      5. Simplify:  $316 - 500$ .     \_\_\_\_\_

Use digits and comparison symbols to write the statement.

6. The sum of 2 and 8 is greater than the quotient of 8 divided by 2.

Name \_\_\_\_\_

- **Place Value through Hundred Trillions**
- **Reading and Writing Whole Numbers**

Whole Number Place Values

hundred trillions	hundred billions	hundred millions	hundred thousands	hundreds
ten trillions	ten billions	ten millions	ten thousands	tens
trillions	billions	millions	thousands	ones
trillions	billions	millions	thousands	units

- To change from standard numbers to **expanded notation**:  
Name the **place value** of each nonzero digit.

**Example:**  $3256 = (3 \times 1000) + (2 \times 100) + (5 \times 10) + (6 \times 1)$

- To change from expanded notation to standard numbers:
  1. Count the places in the first parentheses.
  2. Draw digit lines for each place.
  3. Fill in the digit lines.

**Example:**  $(4 \times 1000) + (6 \times 10) + (2 \times 1) \longrightarrow \underline{\quad}, \underline{\quad} \underline{\quad} \underline{\quad} \longrightarrow$   
 $\underline{4}, \underline{0} \underline{6} \underline{2}$

- To write numbers with words:
  1. Put a **comma** after the words trillion, billion, million, and thousand.
  2. Always put **three digits** after a comma.

**Practice:**

Write each number in expanded notation.

1. 37,523 \_\_\_\_\_
2. 468,090 \_\_\_\_\_

Use digits to write each number.

3. Seven hundred thirty-one billion forty \_\_\_\_\_
4. Twelve thousand six hundred one \_\_\_\_\_
5. Subtract thirty-nine thousand from fifty million. Write the difference in words.  
 \_\_\_\_\_

- **Factors**
- **Divisibility**

- A **factor** is a whole number that divides another number without a remainder.
- To list the factors of a whole number:
  1. *Start* with the number 1.
  2. *End* with the number given.
  3. Then find all the other factors of the given number.
  4. List the factors *in order*. Write each factor only *once*.

**Examples:** Factors of 9: 1, 3, 9    Factors of 12: 1, 2, 3, 4, 6, 12

- To find the greatest common factor (GCF) of two numbers:
  1. List (in order) the factors of the smaller number.
  2. Starting with the greatest factor, cross off factors that are NOT factors of the larger number.
  3. The greatest remaining factor is the GCF.

**Example:** Find the greatest common factor of 18 and 30.

1. Factors of 18: 1, 2, 3, 6, 9, 18
2. Cross off 18 and 9 because they are *not* factors of 30: 1, 2, 3, 6, ~~9~~, ~~18~~
3. GCF is 6.

<b>Tests for Divisibility</b>	
A number is able to be divided by ...	
2 if the last digit is even.	3 if the <b>sum of the digits</b> can be divided by 3.
4 if the last two digits can be divided by 4.	6 if the number can be divided by 2 <b>and</b> by 3.
8 if the last three digits can be divided by 8.	9 if the <b>sum of the digits</b> can be divided by 9.
5 if the last digit is 0 or 5.	
10 if the last digit is 0.	

**Practice:**

List the factors of each number.

1. 24 \_\_\_\_\_                      2. 36 \_\_\_\_\_

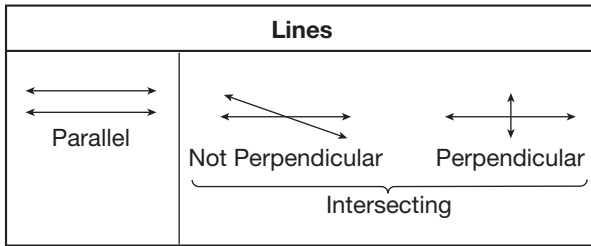
3. Which numbers are factors of both 24 and 36?

\_\_\_\_\_

4. What is the greatest common factor of 24 and 36? \_\_\_\_\_

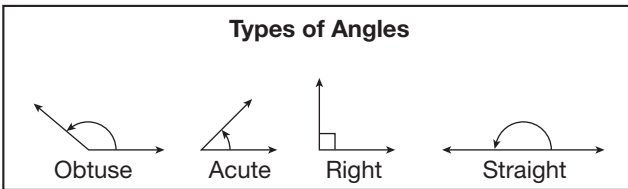
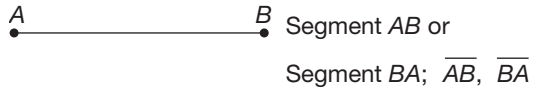
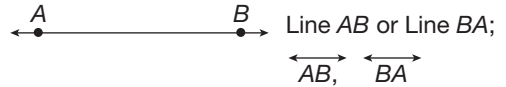
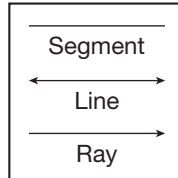
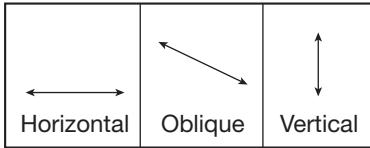
Name \_\_\_\_\_

**• Lines, Angles, and Planes**



A **plane** is a flat surface without end.

Lines in a plane either intersect at one point or never intersect.



**Practice:**

Use figure  $ABCD$  for 1–4.

1. Which angle is obtuse? \_\_\_\_\_

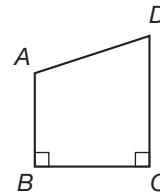
2. Which angle is acute? \_\_\_\_\_

3. Which side of the figure is perpendicular to side  $DC$ ?

\_\_\_\_\_

4. Which side of the figure is NOT parallel or perpendicular to any other side?

\_\_\_\_\_



Use line  $AD$  for 5 and 6.



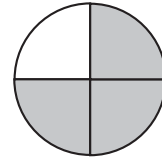
5. Name a ray on line  $AD$  that intersects ray  $CB$  in exactly one point. \_\_\_\_\_

6. What type of angle is formed by line  $AD$ ? \_\_\_\_\_

- **Fractions and Percents**
- **Inch Ruler**

• **Fractions and percents** are used to name parts of a whole. A fraction is written with two numbers and a division bar.

**Example:** numerator →  $\frac{1}{4}$  ← division bar  
 denominator →



$\frac{3}{4}$  is shaded.

The “denominator” of a percent is always 100.

**Example:** 25 percent means  $\frac{25}{100}$

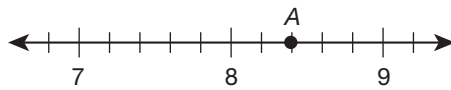
4 parts equal 100%.

$$\frac{1}{4} = 100\% \div 4 = 25\%$$

A mixed number is a whole number plus a fraction.

$$\frac{3}{4} = 3 \times 25\% = 75\%$$

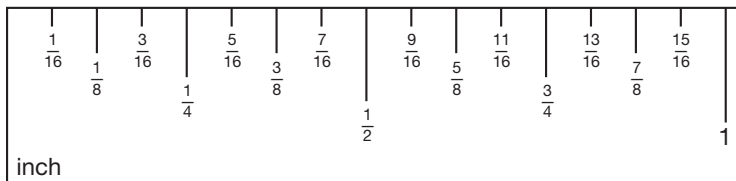
**Example:** Point A represents what mixed number?



The whole number is 8. To find the fraction count the spaces (not the marks) between 8 and 9. This is the denominator (5). Count the spaces to point A. This is the numerator (2).

Point A represents the mixed number  $8\frac{2}{5}$ .

- Here is a magnified view of an **inch ruler** with divisions to  $\frac{1}{16}$  of an inch.



**Practice:**

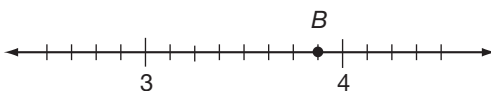
1. Three quarters is what fraction of a dollar? \_\_\_\_\_

2. What fraction of the circle on the right is shaded? \_\_\_\_\_

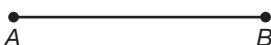


3. What percent of the circle is NOT shaded? \_\_\_\_\_

4. Point B represents what mixed number? \_\_\_\_\_



5. Measure  $\overline{AB}$  to the nearest sixteenth of an inch. \_\_\_\_\_





Name \_\_\_\_\_

Math Course 2, Lesson 9

### • Adding, Subtracting, and Multiplying Fractions • Reciprocals

- To **add** fractions that have the same denominators, add the numerators. The denominator does not change.

**Example:**  $\frac{3}{5} + \frac{2}{5} = \frac{5}{5} = 1$

- To **subtract** fractions that have the same denominators, subtract the numerators. The denominator does not change.

**Example:**  $\frac{5}{9} - \frac{1}{9} = \frac{4}{9}$

- To **multiply** fractions, multiply across both numerators and denominators.

**Example:**  $\frac{1}{2} \cdot \frac{3}{4} = \frac{3}{8}$

- To find the **reciprocal**, “flip” (reverse the terms of) the fraction.

**Example:**  $\frac{3}{4} \rightarrow \frac{4}{3}$      $\frac{a}{1} \rightarrow \frac{1}{a}$

**The product of a fraction and its reciprocal is 1.**

**Example:**  $\frac{3}{4} \cdot \frac{4}{3} = \frac{12}{12} = 1$

- The **Inverse Property of Multiplication** says that  $a \cdot \frac{1}{a} = 1$  if  $a$  is not 0.

#### **Practice:**

Simplify 1–3.

1.  $\frac{7}{8} + \frac{1}{8}$

\_\_\_\_\_

2.  $\frac{3}{4} \cdot \frac{1}{3} \cdot \frac{2}{5}$

\_\_\_\_\_

3.  $\frac{5}{7} - \frac{1}{7}$

\_\_\_\_\_

Write the reciprocal of each fraction.

4.  $\frac{3}{10}$

\_\_\_\_\_

5. 6

\_\_\_\_\_

6.  $\frac{9}{5}$

\_\_\_\_\_

Find the value of each unknown number.

7.  $\frac{9}{12}a = 1$

\_\_\_\_\_

8.  $\frac{6}{5}b = 1$

\_\_\_\_\_

9.  $12c = 1$

\_\_\_\_\_

- **Writing Division Answers as Mixed Numbers**
- **Improper Fractions**

- To write an answer as a mixed number, show the remainder as the numerator and the divisor as the denominator of the fraction.

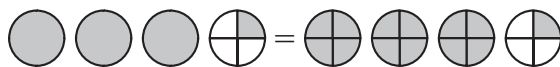
**Example:**  $4 \overline{)25} \begin{matrix} 6 \text{ R } 1 \\ \hline \end{matrix} \rightarrow 6 \frac{1}{4}$

- To change an improper fraction to a mixed number, divide the numerator by the denominator.

**Example:**  $\frac{5}{3} \rightarrow 3 \overline{)5} \begin{matrix} 1 \text{ R } 2 \\ \hline \end{matrix} \rightarrow 1 \frac{2}{3}$

- To change a mixed number to an improper fraction:
  1. Multiply the whole number and the denominator.
  2. Then add that product and the numerator.
  3. Keep the same denominator.

**Example:**  $3 \frac{1}{4} \rightarrow 3 \frac{1}{4} = \frac{(4 \times 3) + 1}{4} = \frac{13}{4}$



$3 \frac{1}{4} = \frac{13}{4}$  Notice each circle has been divided into 4 equal parts, and 13 parts have been shaded.

**Practice:**

Write each quotient as a mixed number.

1.  $39 \div 8$  \_\_\_\_\_      2.  $13 \div 4$  \_\_\_\_\_      3.  $68 \div 9$  \_\_\_\_\_

Write each improper fraction as either a whole number or a mixed number.

4.  $\frac{13}{9}$  \_\_\_\_\_      5.  $\frac{54}{6}$  \_\_\_\_\_      6.  $\frac{38}{10}$  \_\_\_\_\_

Write each number as an improper fraction.

7.  $12 \frac{3}{4}$  \_\_\_\_\_      8.  $1 \frac{8}{9}$  \_\_\_\_\_      9.  $6 \frac{2}{3}$  \_\_\_\_\_