

## **Incoming 6th Grade Advanced Math Summer Assignments**

The purpose of these assignments is to review skills that you were previously taught. These are the most important skills and concepts needed to be successful in 6th grade advanced math. Make sure that you have *instant recall* of all addition, subtraction, multiplication (through  $12 \times 12$ ), and division facts.

Please be aware that no time is spent reviewing at the beginning of the school year. Advanced 6th grade math will include 6th and 7th grade math curriculum, taught simultaneously. By selecting advanced math, you have expressed motivation and willingness to be prepared for the pace and rigor of the class.

The first 11 pages of this packet contain notes and examples. To receive credit, you must use the format and methods shown on these pages.

***You are required to show all work neatly inside the packet, unless the directions state the problems should be solved mentally.***

***The packet is due, in entirety, on the second day of school. You will also be tested on these concepts during the first week of school.***

### **Supplies Needed for Intensive Math**

wide-ruled composition book (100-page minimum) with plastic cover (Mead Five Star is preferred.)

wide-ruled notebook paper

pencils (minimum of 4 at all times)

red pens (4)

colored pencils (12)

jumbo glue sticks (4)

yellow highlighters (2)

I am excited that you accepted the challenge that advanced math offers. If you have any questions, please e-mail me at [lbiediger@g-pisd.org](mailto:lbiediger@g-pisd.org). Have a great summer, and I look forward to meeting you in August.

Mrs. Biediger

## PLACE VALUE

hundred millions	ten millions	millions	hundred thousands	ten thousands	thousands	hundreds	tens	units	• decimal	tenths	hundredths	thousandths	ten thousandths

### Examples:

WORD FORM	DECIMAL FORM	FRACTION FORM	LOCATION Between ___ and ___	CLOSER TO
three <i>and</i> two tenths	3.2	$3\frac{2}{10} = 3\frac{1}{5}$	3 and 4	3
fifty-four hundredths	0.54	$\frac{54}{100} = \frac{27}{50}$	0 and 1	1
ninety-eight and four thousandths	98.004	$98\frac{4}{1000} = 98\frac{1}{250}$	98 and 99	98
four hundred eight thousandths	0.408	$\frac{408}{1000} = \frac{51}{125}$	0 and 1	0

## ADDING AND SUBTRACTING DECIMALS

When adding and subtracting decimals, always line up the digits according to place value. When subtracting, regroup ONE PLACE AT A TIME.

$$4.57 + 0.655 + 12$$

$$\begin{array}{r} \textcircled{1} \quad \textcircled{1} \\ 4.570 \\ 0.655 \\ + \underline{12.000} \\ 17.225 \end{array}$$

$$600 - 249.7$$

$$\begin{array}{r} 5 \quad 99 \\ \cancel{6} \cancel{0} \cancel{0} . 10 \\ - \underline{249.7} \\ 350.3 \end{array}$$

## MULTIPLYING WHOLE NUMBERS AND DECIMALS

When multiplying whole numbers or decimals, DO NOT line up the digits by place value.

$$\begin{array}{r} 654 \times 239 \\ \underline{\phantom{654} \times 239} \\ 5886 \\ 19620 \leftarrow \\ + \underline{130800} \leftarrow \\ 156306 \end{array}$$

$$\begin{array}{r} 34.9 \times 0.73 \\ \underline{\phantom{34.9} \times .73} \\ 1047 \\ + \underline{24430} \\ 25.477 \end{array}$$

(1 decimal place)  
(2 decimal places)  
(3 decimal places)

## DIVISION OF WHOLE NUMBERS AND DECIMAL DIVISORS

When dividing by a whole number that results in a remainder, write the remainder as a fraction. Place the remainder over the divisor and reduce to simplest form.

$$\begin{array}{r} 46 \\ 8 \overline{) 374} \\ \underline{-32} \phantom{0} \\ 54 \\ \underline{-48} \\ 6 \end{array} \quad \frac{6}{8} = 46 \frac{3}{4}$$

When dividing a decimal dividend by a whole number divisor, bring the decimal point straight up into the quotient. Be sure to line up the digits carefully.

$$\begin{array}{r} 2.04 \\ 18 \overline{) 36.72} \\ \underline{-36} \phantom{0} \\ 07 \\ \underline{00} \\ 72 \\ \underline{-72} \\ 0 \end{array}$$

## DIVISIBILITY RULES

A number is divisible by a given number if it can be divided by that number with no remainder.

***A number is divisible by***

<b>2</b>	If the last digit is an even number	<b>346 7.58 3.4</b>
<b>3</b>	If the sum of the digits is divisible by 3	<b>237 <math>2 + 3 + 7 = 12</math></b>
<b>4</b>	If the last two digits are divisible by 4.	<b>528 6.36</b>
<b>5</b>	If the last digit is a 0 or 5.	<b>3470 7.85</b>
<b>6</b>	If the number is even AND divisible by 3.	<b>324 and <math>3 + 2 + 4 = 9</math></b>
<b>9</b>	If the sum of the digits is divisible by 9.	<b>459 <math>4 + 5 + 9 = 18</math></b>
<b>10</b>	If the last digit is a 0.	<b>6390</b>

## PRIME AND COMPOSITE NUMBERS

A ***prime number*** is a number with exactly two factors, one and itself.

Ex:  $2 = 1 \times 2$                        $19 = 1 \times 19$                        $37 = 1 \times 37$

A ***composite number*** is a number with more than two factors.

Ex:  $9 = 1 \times 9$  and  $3 \times 3$                        $12 = 1 \times 12$  and  $2 \times 6$  and  $3 \times 4$

$39 = 1 \times 39$  and  $3 \times 13$                        $51 = 1 \times 51$  and  $3 \times 17$

There are 15 prime numbers between 1 and 50.

There are 10 prime numbers between 50 and 100.

## REDUCING FRACTIONS TO LOWEST TERMS (SIMPLIFYING FRACTIONS)

Writing a fraction in its simplest form, or lowest terms, means writing the fraction using the fewest number of pieces.

### Recognizing Simplified Fractions

Is it a unit fraction? In other words, is the numerator 1?

Ex:  $\frac{1}{4}$

Are the numerator and denominator both prime numbers?

Ex:  $\frac{3}{5}$

Is the denominator prime?

Ex:  $\frac{4}{7}$

Is the numerator prime but not a factor of the denominator?

Ex:  $\frac{5}{8}$

Are the numerator and denominator consecutive numbers? In other words, is the difference between the numerator and denominator 1?

Ex:  $\frac{5}{6}$

*There are some exceptions such as  $\frac{12}{25}$  and  $\frac{8}{35}$ .*

# HOW TO SIMPLIFY FRACTIONS

To simplify a fraction, divide the numerator and the denominator by their **G**reatest **C**ommon **F**actor.

## How to Simplify Fractions in One Step

Divide the numerator and the denominator by their Greatest Common Factor (GCF).

$$\frac{12}{18} \div \frac{6}{6} = \frac{2}{3} \qquad \frac{24}{40} \div \frac{8}{8} = \frac{3}{5}$$

Always check to see if the numerator is a factor of the denominator. If so, then divide by the numerator. *These fractions will always reduce to unit fractions.*

## Recognizing Sight Fractions

*The fractions below are what I call sight fractions. Like sight words, you must recognize them instantly as a unit fraction. Be sure you can recognize fractions equal to  $\frac{1}{2}$ ,  $\frac{1}{3}$ ,  $\frac{1}{4}$ ,  $\frac{1}{5}$ , etc. instantly.*

Examples:

$$\frac{8}{24} = \frac{1}{3} \text{ because } 8 \times 3 = 24.$$

$$\frac{15}{30} = \frac{1}{2} \text{ because } 15 \times 2 = 30.$$

$$\frac{25}{100} = \frac{1}{4} \text{ because } 25 \times 4 = 100.$$

# ADDING FRACTIONS

To add fractions, a common denominator is necessary. This is the same as the least common multiple.

## ***Like Denominators***

To add fractions with the same (common) denominator, add the numerators ONLY. Simplify the resulting proper or improper fraction if needed.

$$\begin{array}{r} \frac{3}{7} \\ + \frac{5}{7} \\ \hline \frac{8}{7} = 1\frac{1}{7} \end{array}$$

## ***Unlike Denominators***

First, change each fraction to a fraction with the Least Common Denominator (LCD). Then add the numerators and put that sum over the common denominator. Simplify the resulting proper or improper fraction if needed.

$$\begin{array}{r} \frac{3}{4} \times \frac{2}{2} = \frac{6}{8} \\ + \frac{5}{8} \\ \hline \frac{11}{8} = 1\frac{3}{8} \end{array}$$

$$\begin{array}{r} 2\frac{3}{8} \times \frac{3}{3} = 2\frac{9}{24} \\ + 4\frac{11}{12} \times \frac{2}{2} = 4\frac{22}{24} \\ \hline 6\frac{31}{24} = 7\frac{7}{24} \end{array}$$

## SUBTRACTING FRACTIONS

To subtract fractions, a common denominator is necessary. This is the same as the least common multiple.

### ***Like Denominators***

To subtract fractions with the same (common) denominator, subtract the numerators ONLY. Simplify the resulting proper fraction if needed.

$$\begin{array}{r} \frac{5}{6} \\ - \frac{3}{6} \\ \hline \end{array}$$

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

### ***Unlike Denominators***

First, change each fraction to a fraction with the LCD. Then subtract the numerators (regroup if necessary) and put that difference over the common denominator. Simplify the resulting proper or improper fraction if needed.

$$\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$$

$$7 = 6\frac{8}{8}$$

$$\begin{array}{r} - \frac{5}{12} \quad \frac{5}{12} \\ \hline \end{array}$$

$$\begin{array}{r} - 4\frac{3}{8} \quad 4\frac{3}{8} \\ \hline \end{array}$$

$$\frac{4}{12} \div \frac{4}{4} = \frac{1}{3}$$

$$2\frac{5}{8}$$

$$4\frac{3}{8} = 3\frac{8}{8} + \frac{3}{8} = 3\frac{11}{8}$$

$$\begin{array}{r} - 1\frac{7}{8} \quad 1\frac{7}{8} \\ \hline \end{array}$$

$$2\frac{4}{8} \div \frac{4}{4} = 2\frac{1}{2}$$

# MULTIPLYING WHOLE NUMBERS AND FRACTIONS

Remember that multiplication is repeated addition. For example,  $4 \times \frac{2}{3}$  means "four groups of  $\frac{2}{3}$ ".

$$\frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} = \frac{8}{3} = 2\frac{2}{3}$$

Place the whole number over 1. Multiply the numerators. Multiply the denominators. Then simplify the resulting fraction. Convert to a whole number or mixed number if the resulting fraction is improper.

$$6 \times \frac{3}{4}$$

$$\frac{6}{1} \times \frac{3}{4} = \frac{18}{4} = 4\frac{2}{4} = 4\frac{1}{2}$$

$$\frac{5}{8} \times 9$$

$$\frac{5}{8} \times \frac{9}{1} = \frac{45}{8} = 5\frac{5}{8}$$

## DIVIDING WHOLE NUMBERS AND UNIT FRACTIONS

Remember that division means separating into equal groups or how many of one number are in another number.

For example,  $3 \div \frac{1}{2}$  means "How many halves are in 3 wholes?"

$\frac{1}{2}$	$\frac{1}{2}$
---------------	---------------

$\frac{1}{2}$	$\frac{1}{2}$
---------------	---------------

$\frac{1}{2}$	$\frac{1}{2}$
---------------	---------------

There are 6 halves in 3 wholes, so  $3 \div \frac{1}{2} = 6$ .

$\frac{1}{2} \div 3$  means "How many groups of 3 are in  $\frac{1}{2}$ ?"

If 3 people share  $\frac{1}{2}$  of a candy bar equally, what part of a whole candy bar will each person receive?

<b>Person 1</b>	<b>Person 2</b>	<b>Person 3</b>	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
-----------------	-----------------	-----------------	---------------	---------------	---------------

Each person will receive  $\frac{1}{6}$  of a candy bar.

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

# ORDER OF OPERATIONS

When an expression contains more than one operation, it must be simplified using the order of operations.

**G** – grouping symbols (parentheses and brackets)

**E** – exponents (you will learn what these are in 6<sup>th</sup> grade)

**M & D** – multiplication & division LEFT TO RIGHT

**A & S** – addition & subtraction LEFT TO RIGHT

*Simplify one step at a time. Each step must be written horizontally.*

$$64 - (3 + 9) \times 2$$

$$64 - 12 \times 2$$

$$64 - 24$$

$$40$$

$$72 \div 6 \times 3 - 19$$

$$12 \times 3 - 19$$

$$36 - 19$$

$$17$$

$$\frac{39 - 14 + 3(9)}{13}$$

$$13$$

$$\frac{39 - 14 + 27}{13}$$

$$13$$

$$\frac{25 + 27}{13}$$

$$13$$

$$52$$

$$13$$

$$4$$

# PLACE VALUE

Complete the table below. Refer to page 1.

<b>WORD FORM</b>	<b>DECIMAL FORM</b>	<b>FRACTION FORM</b>	<b>LOCATION</b> Between ___ and ___	<b>CLOSER TO</b>
sixteen thousandths				
nine and one hundredth				
six hundred two thousandths				
two and eight tenths				
one hundred four thousandths				
twenty-one and thirty-six hundredths				
forty-eight and nine thousandths				

## ADDING AND SUBTRACTING DECIMALS

Refer to page 2.

$3.97 + 47 + 11.6$	$394.2 - 58.19$	$8.14 + 19$
$18 - 0.57$	$601 - 48.6$	$31.9 - 24.675$

# MULTIPLYING WHOLE NUMBERS AND DECIMALS

Refer to page 2.

$328 \times 94$	$243 \times 175$	$3475 \times 68$
$519 \times 6.3$	$2.9 \times 4.6$	$7.31 \times 0.9$

## DIVIDING WHOLE NUMBERS AND DECIMALS

Refer to page 3. Remainders must be written as a fraction of the divisor in simplest form.

$637 \div 14$	$2348 \div 6$	$\frac{8190}{25}$
$48.32 \div 16$	$243.09 \div 37$	$5.76 \div 64$

## DIVISIBILITY

Circle each number by which the number on the left is divisible. Refer to page 4.

78                    2    3    4    5    6    9    10

57                    2    3    4    5    6    9    10

348                   2    3    4    5    6    9    10

113                   2    3    4    5    6    9    10

612                   2    3    4    5    6    9    10

9,724                2    3    4    5    6    9    10

## PRIME & COMPOSITE NUMBERS

Refer to page 4.

List all the prime numbers between 1 and 50.

List all the prime numbers between 50 and 100.

*All the prime numbers between 1 and 100 should be memorized! Knowing divisibility rules and prime numbers is critical for success in reducing fractions containing larger terms.*

# REDUCING FRACTIONS TO SIMPLEST FORM (LOWEST TERMS)

Refer to page 5.

$$\frac{8}{12}$$

$$\frac{16}{20}$$

$$\frac{12}{30}$$

$$\frac{18}{36}$$

$$\frac{24}{40}$$

$$\frac{28}{42}$$

$$\frac{26}{39}$$

$$\frac{75}{100}$$

$$\frac{32}{80}$$

$$\frac{18}{24}$$

$$\frac{45}{60}$$

$$\frac{30}{75}$$

$$\frac{36}{90}$$

$$\frac{24}{84}$$

$$\frac{32}{60}$$

$$\frac{48}{160}$$

$$\frac{51}{85}$$

$$\frac{375}{1000}$$

# RECOGNIZING SIGHT FRACTIONS

Refer to page 6.

***THIS PAGE MUST BE COMPLETED MENTALLY! Please be sure that you can recognize unit fractions instantly. A speed test during the first week of school is likely.***

*Circle all the fractions equivalent to  $\frac{1}{2}$ .*

$\frac{8}{18}$        $\frac{16}{32}$        $\frac{12}{24}$        $\frac{15}{25}$        $\frac{7}{15}$        $\frac{75}{150}$        $\frac{6}{12}$

*Circle all the fractions equivalent to  $\frac{1}{3}$ .*

$\frac{6}{18}$        $\frac{3}{12}$        $\frac{8}{24}$        $\frac{15}{45}$        $\frac{25}{75}$        $\frac{10}{15}$        $\frac{12}{36}$

*Circle all the fractions equivalent to  $\frac{1}{4}$ .*

$\frac{6}{24}$        $\frac{8}{32}$        $\frac{12}{44}$        $\frac{15}{60}$        $\frac{25}{100}$        $\frac{9}{30}$        $\frac{4}{8}$

*Circle all the fractions equivalent to  $\frac{1}{5}$ .*

$\frac{8}{45}$        $\frac{3}{15}$        $\frac{20}{100}$        $\frac{12}{60}$        $\frac{8}{20}$        $\frac{5}{25}$        $\frac{6}{35}$

# FRACTION OPERATIONS

Refer to pages 7-10.

$\frac{1}{2} + \frac{5}{6}$	$\frac{3}{4} + \frac{5}{6}$	$\frac{2}{3} + \frac{1}{8}$
$2\frac{1}{2} + 3\frac{3}{4}$	$5\frac{7}{8} + 2\frac{3}{4}$	$\frac{15}{16} - \frac{3}{8}$
$7\frac{9}{10} - 4\frac{3}{4}$	$5\frac{1}{4} - 3\frac{2}{3}$	$12 - 4\frac{5}{6}$

Refer to pages 7-10.

$6\frac{1}{3} - 2\frac{5}{6}$	$12 \times \frac{2}{3}$	$5 \times \frac{3}{4}$
$\frac{5}{8} \times 4$	$\frac{3}{5} \times 10$	$8 \div \frac{1}{3}$
$6 \div \frac{1}{4}$	$\frac{1}{2} \div 6$	$\frac{1}{3} \div 4$

# ORDER OF OPERATIONS

Refer to page 11.

$48 \div 3 \times 2 - 7$	$15 \times (3 + 9) - 40$
$54 - 19 + 12 \times 2$	$\frac{6(15) - 3 + 4}{7}$
$\frac{74 + 16 - 5 \times 9}{3}$	$\left(\frac{11}{12} - \frac{1}{3}\right) + \frac{1}{6}$

**PLEASE MAKE SURE THAT YOU COMPLETED EVERY PROBLEM IN THIS PACKET ACCORDING TO THE INSTRUCTIONS AND EXAMPLES GIVEN. ALL WORK MUST BE SHOWN. YOU WILL BE TESTED ON THESE SKILLS DURING THE FIRST WEEK OF SCHOOL.**