Grade 5

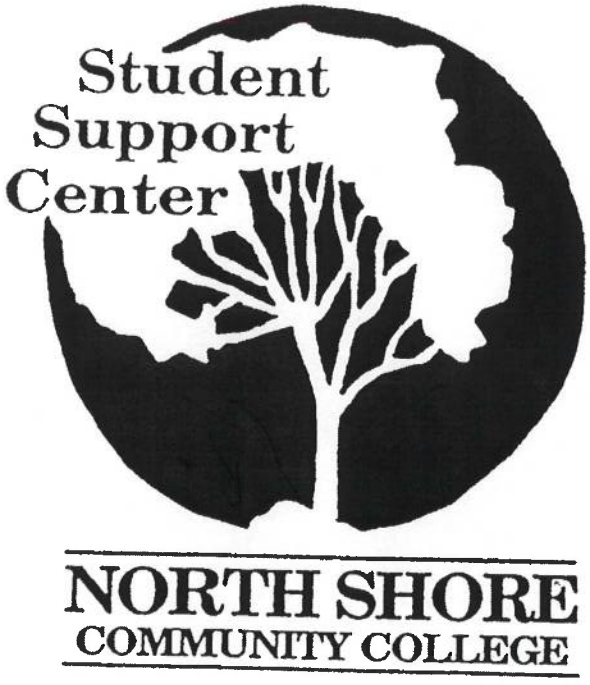
Entering

Grade 6

Summer Math Packet

Grade 6 MASTER

Fraction Competency Packet



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To use this booklet, review the glossary, study the examples, then work through the exercises. The answers are at the end of the booklet. When you find an unfamiliar word, check the glossary for a definition or explanation.

Calculators are not allowed when taking the Computerized Placement Test (CPT), nor in Fundamentals of Mathematics, Pre-Algebra, and Elementary Algebra; therefore, do not rely on a calculator when working the problems in this booklet.

If you have difficulty understanding any of the concepts, come to one of the Tutoring Centers located on the Lynn, Danvers Main and Danvers Hathorne Campuses. Hours are available at (978) 762-4000 x 5410. Additional Tutoring Center information can be found on the NSCC website at www.northshore.edu/services/tutoring. The Centers are closed when school is not in session, and Summer hours are limited.

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Glossary

Boosting: Rewriting a fraction as an equivalent fraction with a higher denominator.

Denominator: Bottom number of a fraction indicating how many parts make a whole.

Difference: The result when two numbers are subtracted.

Divisor: The number after the division sign in a division problem, (i.e. $12 \div 7$); or the bottom number of a fraction, (i.e. $\frac{12}{7}$); the number "outside" the division house (i.e. $7\overline{)12}$).

Equivalent Fraction: Fractions that are found by multiplying the numerators and denominators by the same number.

Factor: Numbers equal to or less than a given number that divides the number evenly. For example, the factors of 12 are 1, 2, 3, 4, 6, 12.

Fraction: Any number written in the form of one whole number over another, $\left(\frac{3}{5}\right)$, indicating number of parts being considered over the number of parts that make one whole.

Fraction Bar: The line separating the numerator and denominator in a fraction, and it indicates division.

Greatest Common Factor (GCF): The largest matching factor of two or more given numbers. It is used to reduce fractions.

Improper Fraction: Any fraction with the numerator larger than the denominator.

Least Common Denominator (LCD): The smallest matching multiple of two or more given numbers. It is used to "boost" fractions. (Also called Least Common Multiple, LCM)

Mixed Number: A whole number and a fraction. (It implies addition of wholes and parts; that is, $3\frac{5}{7}$ is read "three and five sevenths".)

Multiple: (Similar to the "times table.") A multiple of a given number is equal to the given number or greater. Multiples are found by multiplying the given number in turn by 1, 2, 3,... For example, multiples of 4 are 4, 8, 12, 16, ...

Numerator: The top number of a fraction. It indicates how many parts of a certain size are represented.

Prime Factor: Factors of a number that are only divisible by 1 and the given number. For example, prime factors of 12 are 1 x 2 x 2 x 3. Some frequently used Prime Numbers are 2, 3, 5, 7, 11, 13.

Product: The result when two numbers are multiplied.

Proper Fraction: Any fraction when the numerator is less than the denominator.

Quotient: The solution to a division problem.

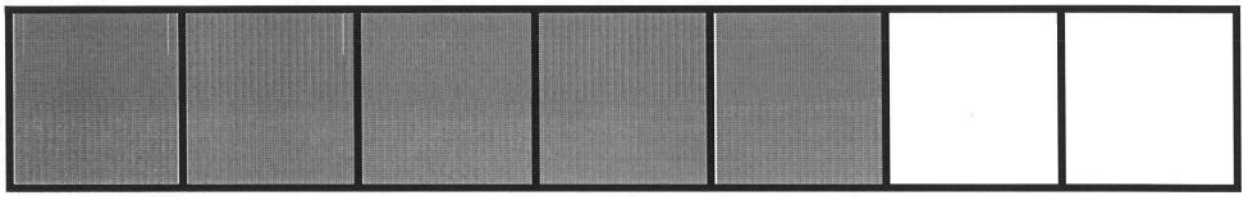
Reducing: Dividing the numerator and the denominator by the same number to get an equivalent fraction. Final answers of most fraction problems should be expressed reduced to "simplest terms"; in other words, the numerator and denominator have no more common factors.

Remainder: The number left after a whole number division problem is complete. When converting an improper fraction to a mixed number, the remainder is the numerator of the fraction.

Sum: the result when two numbers are added.

Whole Number: The Numbers system including 0, 1, 2, 3,….

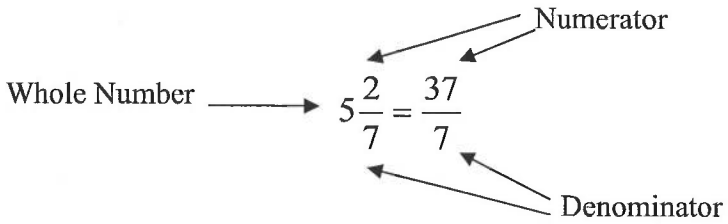
General Fraction Information



- The fraction that represents the above picture is $\frac{5}{7}$ and is read "five sevenths". That means that five of the parts are shaded, and it would take seven parts of that size to make a whole.
- One whole can be "cut up" into equal size parts; therefore, $1 = \frac{13}{13} = \frac{9}{9} = \frac{123}{123}$, etc.
- A whole number can be written as a fraction with a denominator of 1; for example, $2 = \frac{2}{1}$. Zero can be written as a fraction using zero as the numerator and any whole number as the denominator, for example, $\frac{0}{23}$.
- Any whole number may be written as a mixed number by using a zero fraction. For example, $3 = 3\frac{0}{42}$.

Mixed Numbers

To convert a mixed number, $5\frac{2}{7}$, to an improper fraction, $\frac{37}{7}$:



$5\frac{2}{7}$	Work in a clockwise direction, beginning with the denominator, (7).
$5 \times 7 = 35$	Multiply the denominator (7) by the whole number, (5)
$35 + 2 = 37$	Add that product, (35), to the numerator (2) of the fraction.
$\frac{(5\times7)+2}{7} = \frac{37}{7}$	The denominator remains the same for the mixed number and the improper fraction.

Convert to Improper Fractions:

1) $4\frac{2}{5} =$

2) $5\frac{3}{8} =$

3) $2\frac{4}{9} =$

4) $5\frac{6}{7} =$

5) $8\frac{1}{8} =$

6) $14\frac{3}{4} =$

7) $6\frac{3}{5} =$

8) $9\frac{1}{10} =$

9) $16\frac{1}{2} =$

10) $8\frac{0}{1} =$

11) $9 =$
Hint: See #10

12) $7\frac{3}{4} =$

13) $12\frac{5}{9} =$

14) $10\frac{3}{8} =$

15) $28\frac{2}{3} =$

Finding Equivalent Fractions with Larger Denominators

This process is sometimes called "**Boosting**"

$$Example: \frac{5}{8} = \frac{?}{56}$$

$56 \div 8 = 7$ Divide the larger denominator by the smaller to find the factor used to multiply the denominator. (Note: The product of the smaller denominator and the factor is the larger denominator)

$\frac{5}{8} \times \frac{7}{7} = \frac{5 \times 7}{8 \times 7}$ Use this factor to multiply the numerator.

$\frac{5}{8} = \frac{35}{56}$ The result is two equivalent fractions.

Note: Equal denominators are required for addition and subtraction of fractions.

Find the equivalent fractions as indicated:

1) $\frac{2}{5} = \frac{\quad}{15}$

2) $\frac{3}{8} = \frac{\quad}{32}$

3) $\frac{4}{9} = \frac{\quad}{54}$

4) $\frac{6}{7} = \frac{\quad}{49}$

5) $\frac{1}{8} = \frac{\quad}{48}$

6) $\frac{3}{4} = \frac{\quad}{44}$

7) $\frac{3}{5} = \frac{\quad}{45}$

8) $\frac{1}{10} = \frac{\quad}{60}$

9) $\frac{1}{2} = \frac{\quad}{28}$

10) $\frac{10}{100} = \frac{\quad}{700}$

11) $\frac{8}{9} = \frac{\quad}{81}$

12) $\frac{3}{4} = \frac{\quad}{68}$

13) $\frac{5}{9} = \frac{\quad}{108}$

14) $\frac{3}{8} = \frac{\quad}{112}$

15) $\frac{2}{3} = \frac{\quad}{462}$

Equivalent Fractions with Smaller Denominators

Reducing Fractions

Example: Reduce the following fraction to lowest terms

$$\frac{90}{105}$$

There are **three** common **methods,** DO NOT mix steps of the methods!

Method 1:

$\frac{90 \div 15}{105 \div 15} = \frac{6}{7}$ The Greatest Common Factor for 90 and 105 is 15. Divide the numerator and the denominator by the GCF, 15.

Method 2:

$\frac{90 \div 5}{105 \div 5} = \frac{18}{21}$ Examine the numerator and denominator for any common factors, divide both numerator and denominator by that common factor. Repeat as needed.

- Both 90 and 105 are divisible by 5.

$\frac{18 \div 3}{21 \div 3} = \frac{6}{7}$

- Both 18 and 21 are divisible by 3.

Method 3:

$\frac{90}{105} = \frac{2 \times 3 \times 3 \times 5}{7 \times 3 \times 5}$ Express the numerator and denominator as a product of prime factors.

$\frac{90}{105} = \frac{2 \times 3 \times (3 \times 5)}{7 \times (3 \times 5)}$ Divide numerator and denominator by common factors, (3x5)

$= \frac{2 \times 3}{7} = \frac{6}{7}$ Multiply remaining factors.

Reduce these fractions.

1) $\frac{28}{50} =$

2) $\frac{8}{24} =$

3) $\frac{30}{54} =$

4) $\frac{18}{42} =$

5) $\frac{32}{48} =$

6) $\frac{36}{54} =$

7) $\frac{14}{56} =$

8) $\frac{18}{28} =$

9) $\frac{36}{216} =$

10) $\frac{35}{42} =$

11) $12\frac{54}{99} =$

12) $15\frac{280}{320} =$

Improper Fractions

Example: Convert $\frac{14}{3}$ to an Improper Fraction

$14 \div 3 = 4$ Remember: Dividend $\div$ Divisor = Quotient

Remainder 2 Divide the numerator (14) by the denominator (3).

$\frac{14}{3} = 4\frac{2}{3}$ Write the mixed number in the form: $Quotient\frac{remainder}{divisor}$

Note: Check you answer to see if you can reduce the fraction.

Convert these improper fractions to mixed numbers. ***Be sure to reduce when it's possible.***

#11, 12 Hint: how many wholes will there be?

1) $\frac{8}{5} =$

2) $\frac{18}{7} =$

3) $\frac{37}{9} =$

4) $\frac{127}{5} =$

5) $\frac{32}{9} =$

6) $\frac{114}{5} =$

7) $\frac{128}{3} =$

8) $\frac{401}{3} =$

9) $\frac{36}{6} =$

10) $\frac{235}{2} =$

11) $15\frac{280}{6} =$

12) $8\frac{315}{3} =$

13) $\frac{54}{8} =$

14) $\frac{26}{8} =$

15) $\frac{258}{9} =$

Least Common Multiple (LCM)

Used to find the Least Common Denominator (LCD)

Example: Find the LCM of 30 and 45

Note: There are **four** common **methods**; DO NOT mix the steps of the methods!

Method 1

Remember that multiples are equal to or larger than the given number.

30, 60, **90**, 120, …
45, **90**, 135, …

List the multiples of each of the given numbers, in ascending order.

LCM = 90

The LCM is the first multiple common to both lists.

Method 2

45, 90, 135, …

List the multiples of the larger number.

$45 \div 30$ remainder

Divide each in turn by the smaller.

$90 \div 30$ no remainder
LCM = 90

The LCM is the multiple that the smaller number divides without leaving a remainder.

Method 3

$30 \div 5 = 6$; $45 \div 5 = 9$
$6 \div 3 = 2$; $9 \div 3 = 3$

Divide both numbers by any common factor, (5 then 3). Continue until there are no more common factors.

Note: 2 and 3, the results of the last division have no common factors.

LCM = $5 \times 3 \times 2 \times 3$
= 90

The LCM equals the product of the factors, (5 and 3) and the remaining quotients, (2 and 3).

Method 4

30	45
5 x 6	5 x 9
5 x 2 x 3	5 x 3 x 3

Find the prime factors of each the given numbers.

$30 = 5 \times 2 \times 3$
$45 = 5 \times 3 \times 3$ **Or** $45 = 5 \times 3^2$

Write each number as a product of primes using exponents, if required.

LCM = $2 \times 3^2 \times 5$
= 90

LCM equals the product of all the factors to the highest power.

In each exercise, find the LCM of the given numbers.

1) 4 and 18

2) 16 and 40

3) 20 and 28

4) 5 and 8

5) 12 and 18

6) 12 and 16

7) 50 and 75

8) 24 and 30

9) 36 and 45

10) 8 and 20

11) 16 and 20

12) 28, 35, and 21

Addition and Subtraction of Fractions with the Same Denominator

To add or subtract fractions, the denominators MUST be the same.

Example 1:

$$\frac{3}{5}-\frac{1}{5}=?$$

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

Because both fractions have the same denominator, you may subtract the numerators and keep the denominator.

$$=\frac{2}{5}$$

Example 2:

$$\frac{5}{9}+\frac{7}{9}=?$$

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

Because both fractions have the same denominator, you may add the numerators and keep the denominator.

$$=\frac{12}{9}$$

$$=1\frac{3}{9}$$

Always change improper fractions to a mixed number.

$$=1\frac{1}{3}$$

Reduce, when possible.

Add or Subtract as indicated.

1. $\frac{4}{8}+\frac{3}{8}$
2. $\frac{7}{10}-\frac{1}{10}$
3. $\frac{7}{48}+\frac{9}{48}+\frac{4}{48}$
4. $\frac{40}{37}-\frac{3}{37}$
5. $\frac{10}{13}+\frac{4}{13}$
6. $\frac{9}{17}+\frac{11}{17}+\frac{17}{17}$
7. $\frac{2}{3}+\frac{4}{3}-\frac{6}{3}$
8. $\frac{7}{6}-\frac{5}{6}+\frac{1}{6}$
9. $\frac{7}{13}+\frac{9}{13}$

Addition and Subtraction of Fractions with Different Denominators

Remember: In order to add or subtract fractions, the denominators MUST be the same.

Example:

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

LCM = 24 — Find the LCM

$$\begin{array}{r} \frac{2}{3}\times\frac{8}{8}=\frac{16}{24} \\ +\ \frac{3}{8}\times\frac{3}{3}=\frac{9}{24} \\ \hline \end{array}$$

Write the problem vertically.

Find the equivalent fractions with the LCM as a denominator.

$$\frac{25}{24}$$

Add the fractions with the same denominator.

$$\frac{25}{24}=1\frac{1}{24}$$

Remember to write as a mixed number and reduce when possible!

Add or Subtract:

1) $\frac{7}{8} + \frac{3}{4}$

2) $\frac{7}{8} - \frac{3}{4}$

3) $\frac{11}{12} + \frac{17}{18}$

4) $\frac{3}{7} + \frac{2}{5}$

5) $\frac{15}{24} - \frac{10}{27}$

6) $\frac{7}{12} + \frac{5}{16}$

7) $\frac{16}{27} - \frac{5}{24}$

8) $1\frac{1}{4} + \frac{3}{8}$

9) $\frac{11}{4} + \frac{23}{18}$

10) $\frac{29}{8} + \frac{9}{7}$

11) $2\frac{13}{35} - 1\frac{5}{14}$

12) $\frac{2}{3} + \frac{1}{21} - \frac{2}{7}$

Subtraction of Fractions with Borrowing

Example 1: $7 - 1\frac{1}{3} = ?$

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

Note: There are two common methods; DO NOT mix the steps of the methods!

Method 1 *Example 1*

$$\begin{array}{r} 7 \;\; = 6\frac{3}{3} \\ -\; 1\frac{1}{3} = 1\frac{1}{3} \\ \hline 5\frac{2}{3} \end{array}$$

Subtraction with Borrowing

Write problem vertically
Cannot subtract fraction from whole without finding common denominator.
Borrow one whole from 7 and express as $\frac{LCD}{LCD}$. $\left(1 = \frac{3}{3}\right)$
Subtract numerators and whole numbers.

Example 2

$$\begin{array}{r} 5\frac{1}{3} = 5\frac{2}{6} = 4\frac{8}{6} \\ -\; 2\frac{5}{6} = 2\frac{5}{6} = 2\frac{5}{6} \\ \hline 2\frac{3}{6} = 2\frac{1}{2} \end{array}$$

Write problem vertically and find LCD
Cannot subtract 5 from 2.
Borrow one whole from 5, $\left(4\frac{6}{6}\right)$ and add $\left(5\frac{2}{6} = 4\frac{6+2}{6}\right)$.
Subtract numerators and whole numbers; reduce as needed.

Method 2 *Example 1:*

$$\begin{array}{r} 7 \;\; = \frac{21}{3} \\ -\; 1\frac{1}{3} = \frac{4}{3} \\ \hline \frac{17}{3} = 5\frac{2}{3} \end{array}$$

Subtraction Using Improper Fractions
Write the problem vertically.
Convert the whole numbers and mixed numbers to improper fractions using the LCD.
Subtract $\left(\frac{21-4}{3}\right)$ and convert improper fraction to mixed number.

Example 2:

$$\begin{array}{r} 5\frac{1}{3} = 5\frac{2}{6} = \frac{32}{6} \\ -\; 2\frac{5}{6} = 2\frac{5}{6} = \frac{17}{6} \\ \hline \frac{15}{6} = 2\frac{3}{2} \\ 2\frac{3}{2} = 2\frac{1}{2} \end{array}$$

Write problem vertically and find the LCD.
Change the mixed numbers to improper fractions.
Subtract the numerators.
Convert to a mixed number.
Reduce.

Subtract:

1) $5 - 2\frac{1}{3}$

2) $7 - 1\frac{1}{6}$

3) $10 - 4\frac{5}{6}$

4) $3\frac{5}{8} - 2\frac{7}{8}$

5) $1\frac{1}{8} - \frac{3}{4}$

6) $3\frac{5}{12} - 1\frac{15}{16}$

7) $8 - 6\frac{4}{5}$

8) $4\frac{3}{8} - 3\frac{5}{6}$

9) $17 - 4\frac{5}{9}$

10) $5\frac{5}{18} - 1\frac{3}{4}$

11) $5\frac{2}{7} - 3\frac{3}{8}$

12) $18 - 1\frac{7}{16} - \frac{7}{12}$

Multiplication of Fractions

Example:

$$\frac{3}{10}\times 3\frac{5}{6}$$

Note: LCD is not needed to multiply fractions.

$3\frac{5}{6}=\frac{(6\times 3)+5}{6}$ Change mixed numbers to improper fractions

$\frac{3}{10}\times\frac{23}{6}=\frac{1\times 23}{10\times 2}$ Before multiplying, reduce by dividing any numerator with any denominator with a common factor. (3 and 6 have a common factor of 3)

$\frac{1\times 23}{10\times 2}=\frac{23}{20}$ Multiply numerators and denominators

$\frac{23}{20}=1\frac{3}{20}$ Convert improper fractions to mixed numbers.

Multiply:

1) $4\frac{1}{2}\times\frac{2}{3}$

2) $3\frac{1}{5}\times 1\frac{1}{4}$

3) $6\times 1\frac{1}{9}$

4) $2\frac{1}{6}\times 1\frac{1}{2}$

5) $\frac{10}{11}\times 1\frac{7}{15}$

6) $4\frac{3}{5}\times 15$

7) $3\frac{3}{8}\times 2\frac{2}{9}$

8) $34\times 2\frac{3}{17}$

9) $9\frac{7}{8}\times\frac{4}{5}$

10) $7\frac{9}{10}\times 1\frac{1}{4}$

11) $18\times 1\frac{3}{7}\times\frac{4}{15}$

12) $3\frac{1}{5}\times 1\frac{5}{6}\times\frac{3}{8}$

Division of Fractions

Example:

$$2\frac{3}{4} \div 2\frac{3}{8} \qquad \textbf{OR} \qquad \frac{2\frac{3}{4}}{2\frac{3}{8}}$$

Note: One fraction divided by another may be expressed in either way shown above. Also, LCD is not needed to divide fractions.

$2\frac{3}{4} = \frac{11}{4}$ and $2\frac{3}{8} = \frac{19}{8}$ Convert mixed numbers to improper fractions

$\frac{11}{4} \div \frac{19}{8} = \frac{11}{4} \times \frac{8}{19}$ Invert the divisor $\left(\frac{19}{8}\right)$. (Turn the fraction after the division sign upside down)

$\frac{11 \times 8}{4 \times 19} = \frac{11 \times 2}{1 \times 19}$ Reduce if possible. (4 and 8 have a common factor)

$\frac{11 \times 2}{1 \times 19} = \frac{22}{19}$ Multiply numerators and denominators

$\frac{22}{19} = 1\frac{3}{19}$ Convert to a mixed number and reduce if needed.

Divide these fractions. Reduce to lowest terms!

1) $\frac{5}{6} \div \frac{1}{2}$

2) $\frac{3}{4} \div \frac{3}{7} =$

3) $3 \div 1\frac{2}{5} =$

4) $\frac{\frac{1}{2}}{\frac{1}{3}} =$

5) $\frac{1}{2} \div 6 =$

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

7) $3\frac{1}{7} \div 2\frac{5}{14} =$

8) $\frac{2\frac{5}{8}}{1\frac{7}{8}}$

9) $4\frac{1}{2} \div 1\frac{3}{4} =$

Some Fraction Word Problems

Example 1:

One day Ashley biked $\frac{3}{4}$ of a mile before lunch and $\frac{7}{8}$ of a mile after lunch. How far did she cycle that day?

Note: this problem is asking you to add the distances traveled.

$\frac{3}{4}+\frac{7}{8}$

To add fractions, find a LCD (8).

Add the numerators; keep the denominators.

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

Convert improper fraction to a mixed number; reduce if needed.

$\frac{13}{8}=1\frac{5}{8}$

Ashley cycled $1\frac{5}{8}$ miles that day.

Example 2:

A tailor needs $3\frac{1}{4}$ yards of fabric to make a jacket. How many jackets can he make with $19\frac{1}{2}$ yards of fabric?

Note: this problem is asking you to divide.

$19\frac{1}{2}\div 3\frac{1}{4}$

To divide fractions, convert mixed numbers to improper fractions.

$\frac{39}{2}\div\frac{13}{4}$

Invert the divisor and reduce if possible, (39 and 13 have a common factor, as do 2 and 4).

$\frac{39}{2}\times\frac{4}{13}=\frac{3\times 2}{1\times 1}$

Multiply numerators and denominators.

$\frac{3}{1}=3$

The tailor can make 3 jackets from $19\frac{1}{2}$ yards of fabric.

Solve the following problems.

1. An empty box weighs $2\frac{1}{4}$ pounds. It is then filled with $16\frac{2}{3}$ pounds of fruit. What is the weight of the box when it is full?

2. Yanni is making formula for the baby. Each bottle contains $6\frac{2}{5}$ scoops of formula. The formula container holds 320 scoops of formula. How many bottles of formula can Yanni make?

3. Miguel bought $2\frac{1}{4}$ pounds of hamburger, $1\frac{1}{5}$ pounds of sliced turkey, and 2 pounds of cheese. What was the total weight of all of his purchases?

4. Sheila had 8 yards of fabric. She used $2\frac{1}{4}$ yards to make a dress. How much fabric does she have left?

5. A father leaves his money to his four children. The first received $\frac{1}{3}$, the second received $\frac{1}{6}$, and the third received $\frac{2}{5}$. How much did the remaining child receive? (Hint: You can think of father's money as one whole.)

6. Find the total perimeter (sum of the sides) of an equilateral triangle, (triangle with equal sides), if each side measures $2\frac{1}{4}$ inches.

DECIMAL COMPETENCY PACKET

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In this booklet arithmetic operations involving decimal numbers are explained. If you have not already reviewed the Fraction booklet, please do so before working through this one.

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Glossary

Decimal or Decimal Number	Any number that includes place value to the right of a decimal point.
Decimal Point	A dot or point that separates the decimal value from the integral value of a number.
Denominator	The bottom number of a fraction. It represents the number of pieces needed to make one whole. (See Fraction booklet for more information.)
Difference	The result when two numbers are subtracted. The order of subtraction is important. A – B means that the number represented by B is subtracted from A, that is A is the "top number" in a vertical subtraction.
Digit	The symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 are the digits of the Base ten number system.
Division	Arithmetic operation: $Dividend \div Divisor = Quotient$ Expressed as a fraction: $\frac{Dividend}{Divisor} = Quotient$ or using a "division house" $divisor \overline{)dividend}^{quotient}$
Factor	Each of the numbers that are multiplied, i.e. in the product 7 x 9=63 the numbers 7 and 9 are factors.
Multiple	A number which is the product of a given number and another factor; Multiples are equal to or larger than the given number, i.e. the multiples of 3 are: 3,6,9,12,15, ...
Non-Repeating Decimal	A decimal representation that has no pattern of repetition in the digits after the decimal point.
Numerator	The top number of a fraction. It represents the number of pieces of a certain size considered for the expression. (See fraction booklet for more information)
Place Value	The position a digit holds in a number. It tells us the

	value of the digit. (See chart page 7)
Product	The result when two numbers are multiplied.
Quotient	The result when two numbers are divided.
Repeating Decimal	A numerical representation that has a pattern of digits that repeats to infinity. 0.323232... is a repeating decimal, and can be written as $0.\overline{32}$
Sum	The result when two numbers are added.
Terminating Decimal	Every fraction can be written as a decimal by dividing the denominator into the numerator if there no remainder, the decimal will terminate.
Whole Numbers	Positive numbers with no fractional or decimal portion.

General Decimal Information

- Our number system is a decimal system using the digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9, called the Base Ten Number System.
- Only positive numbers will be used in this booklet.
- Whole numbers are decimal numbers with no fractional part; a decimal point is assumed to be to the right of the whole number. (i.e., 15 = 15.0)
- Numbers with no whole number component will be written with a zero preceding the decimal point. (i.e., 0.23)
- Digits to the right of a decimal point represent fractional parts with a denominator of a multiple of ten.
- Digits to the left of the decimal point are separated into groups of three using commas.

Place Value

The position of a digit in a number reflects the "place value" of that digit. In the following table, the number represented has value according to the place the digit "1" holds in each case. (Note the use of commas.)

In the following chart, note the similarity of place value names on both sides of the decimal. Those places to the right of the decimal end in "ths" indicating that they are fractional.

Whole Numbers										Decimal Fractions							
Etc.	Ten Millions	Millions,	Hundred Thousands	Ten Thousands	Thousands,	Hundreds	Tens	Units (Ones)	Decimal Point (and)	Tenths	Hundredths	Thousandths	Ten-Thousandths	Hundred-Thousandths	Millionths	Ten Millionths	Etc.
		1,	0	0	0,	0	0	0	.	0	0	0	0	0	1		
			1	0	0,	0	0	0	.	0	0	0	0	1			
				1	0,	0	0	0	.	0	0	0	1				
					1,	0	0	0	.	0	0	1					
						1	0	0	.	0	1						
							1	0	.	1							
								1	.	0							
								0	.	1							

In a spoken or written number, the word "**and**" reflects placement of a decimal point. Although each number uses the same digits, (ones and zeros), the value of each number in the chart above is very different. The numbers, in order of the chart, are read:

one million **and** one millionth
one hundred thousand **and** one hundred-thousandth
ten thousand **and** one ten-thousandth
one thousand **and** one thousandth
one hundred **and** one hundredth
ten **and** one tenth
one **and** no tenths, or more commonly, one
one tenth

Writing Decimals

Place value is reflected when writing and reading decimal numbers in words. In writing the decimal is represented by the word "and."

Example:

4.7	is written	"four **and** seven tenths."
70.024	is written	"seventy **and** twenty-four thousandths."

Write the following in words as you would write the number. (Use the chart at the end of the booklet to aid with number placement.)

1) 20.15

2) 45.21

3) 15.196

4) 2,049.009

5) 0.005

6) 4.05

7) 278.54

8) 7.0007

9) 1.1

10) 1928.07

Translating Numerical Expressions

To translate written numerical expressions, place the last written number in the correct place value.	
Example: Twenty and ninety-**six** thousandths 20.09**6**	Six, (6) the last digit belongs in the thousandths place. (Third place to the right from the decimal point.)
20.**0**96	Zero must be entered in the tenths place.

Write the following using digits. (Use a chart if needed)

1) four and five tenths

2) fourteen hundredths

3) one thousand nine hundred seventy-two ten thousandths

4) four hundred seven and three hundred twenty-eight thousandths

5) one tenth

6) seven and nine hundredths

7) one hundred seventy-two ten-thousandths

8) twenty-two and five tenths

9) twenty and four hundred ninety-six thousandths

10) three hundred and three hundredths

Decimal Fractions

A decimal number is another way to write a fraction with a denominator of a multiple of ten, (i.e., denominators equal to 10; 100; 1,000; 10,000; etc.) To convert a fraction with a denominator of a multiple of ten to a decimal, read the fraction and write as a decimal number.

Example:	
$3\frac{7}{10}$	is read " three and seven tenths"
3.7	expressed with digits
Example:	
$15\frac{234}{1000}$	is read " fifteen and two hundred thirty-four thousandths"
15.234	expressed with digits
Example:	
$\frac{5}{100}$	is read " five hundredths"
0.05	expressed with digits. Note the zero placement.

Write as a decimal number.

1) $72\frac{19}{100}$

2) $301\frac{7}{1000}$

3) $\frac{17}{100}$

4) $1276\frac{3}{10}$

5) $1\frac{6}{100}$

6) $\frac{24}{1000}$

Comparing Decimals

To compare decimals, write the decimal numbers with the same number of decimal places and decide which is larger.	
Example: Which is greater: 0.9 or 0.91? 0.90 ? 0.91	To compare write both numbers with two decimal places. Note zeros may be added or deleted from the right and after the decimal point. Compare digits in hundredths place. 1 is greater than 0; therefore, 0.91 is greater. (hint: Consider money)
Example: Write the following from smallest to largest: 0.78006, 0.7845, 0.7851, 0.785, 0.78 0.78006, 0.78450, 0.78510, 0.78500, 0.78000 0.78000, 0.78006, 0.78450, 0.78500, 0.78510	Write the list adding zeros to hundred thousandths place as needed. Since the digits in the tenths and hundredths places are the same, compare the digits in the thousandths place first. Then compare the digits in the remaining places. Re-write the list from smallest to largest.

Write from smallest to largest:

1) 12.34, 1.234, 0.1234

2) 0.1, 0.01, 1.001

3) 3.1, 0.031, 0.331

4) 0.06, 0.4, 0.9

5) 0.935, 1.2, 0.6, 0.56

6) 0.12, 0.16, 0.2, 0.48, 0.054

7) 5.038, 5.0382, 50.382, 0.5382

8) 0.08, 8.08, 8.808, 8.888, 0.088, 0.8

Rounding

To round numbers for estimation:

1. Identify the place value to be rounded. All digits to the left of that place remain the same.
2. Check the number to the **immediate right** of the place to be rounded:
   a. If the digit in that place is **5 or greater**, **add one** to the digit in the place to be rounded.

   OR

   b. If the digit in that place is **4 or less**, **do not change** the digit in the place to be rounded.
3. Fill in the remaining place values to the right of the place to be rounded with zeros, or drop the digits after the decimal point.

Example: Round 1792 to the **hundreds** place.	Identify the place value to be rounded, (7 hundred). Write the digit(s) to the left (1). Identify the number to the right (9).
1<u>8</u> _ _	9 is greater than 5; add one to 7, (7+1=8), enter 8 in the hundreds place.
18 <u>0</u> <u>0</u>	Fill in all the places to the right with zeros.
Example: Round 73.64 to the **tenths** place.	Identify the place value to be rounded, (6 tenths). Write the digits to the left (73). Identify the number to the right (4).
73.<u>6</u> _	4 is less than 5, 6 remains in the tenths place.
73.<u>60</u> = 73.6	It is not need to fill in all the places to the right with zeros; rounding to tenths place.
Example: Round 49.897 to the **hundredths** place.	Identify the place value to be rounded, (9 hundredths). Write the digits to the left (49.8). Identify the number to the right, (7).
49. 8 ^{1}<u>0</u> _	7 is greater than 5, add one to 9. Since 9 + 1 = 10, a zero is entered in the hundredths place, and the 1 is carried to the tenths place.
49.(8+1) <u>0</u> _	The 1 is added to 8.
49.90	The zero is needed to represent the hundredths place.

Round these numbers as indicated.

1)	Tenths	62.87	9)	Units	33.97
2)	Units	14.45	10)	Hundredths	49.995
3)	Ten thousandths	3.56906	11)	Thousandths	5.0074
4)	Tenths	3.1416	12)	Thousandths	0.6739
5)	Hundreds	459.326	13)	Tenths	1.98
6)	Tenths	19.77	14)	Ten thousandths	0.01704
7)	Thousandths	0.0067	15)	Hundredths	0.01011
8)	Tens	389.88	16)	Thousandths	0.0007

Addition

To add decimals, write the numbers vertically with the decimal points directly under each other, then add the digits.
Note: When the decimal points are lined up, the digits are automatically lined up in the correct place value.

Example: 13.2 + 1.57 13.2**0** + 1.57 14.77	Write the problem vertically. Line up the decimal points. Note the additional zero. Adding zeros to the right of the final digit after the decimal does not change the value of the number.
Example: $437 + $41.56 + $0.18 $437.**00** 41.56 + 0.18 $478.74	Dollar values are the most familiar decimal values. Write the problem vertically. Line up the decimal points. The additional zeros are optional, but help with placement. Note dollar sign use.

Find the Sum (Add):

1) 0.03 + 0.4

2) 0.3 + 0.03 + 0.003

3) 2.05 + 0.561 + 43.9 + 17.32

4) $4 + $14.01

5) 8.0632 + 0.234 + 0.81 + 0.064

6) 48 + 0.84

7) 10 + 9.6 + 3.76 + 8.451

8) $3.06 + $2.13 + $4.89

9) 2,134.07 + 306.5 + 2.109

10) 56.3701 + 0.268 + 4.2

Subtraction

To subtract decimals, write the numbers vertically with decimal points directly under each other, and add zeros when needed, then subtract the digits.
Note: When the decimal points are lined up, the digits are automatically lined up in the correct place value.

Example: 42.63 - 18.275	Write the problem vertically. Line up the decimals.
42.630 - 18.275 24.355	Remember: always write the first number on the top. Add zeros to the number with fewer places to the right of the decimal point. Subtract.
Example: $23 - $0.13	Write the problem vertically. Line up the decimals.
$23.00 - 0.13 $22.87	Insert the decimal point and two zeros. Subtract; borrow if necessary.

Find the Difference (Subtract):

1) 8.4 - 7.35

2) 12.5 - 8.7

3) $17.50 - $6.25

4) $18 - $5.63

5) 4.355 - 1.647

6) 60.54 - 0.928

7) 89. - 58.46

8) 104.003 - 21.78

Find the Sum and Difference as indicated, (in the order indicated):

9) 14.6 - 1.98 + 3.7

10) 5.67 + 0.34 - 2.05

11) 0.19 + 2.34 - 1.003

12) $21.90 - $0.45 - $ 2.34

Multiplication

To multiply decimals, write the problem and multiply as you would a whole number multiplication problem. The product (answer) of two decimal numbers has the same number of decimal places after the decimal point as the total number of decimal places in the two numbers being multiplied.

Example:

0.19 x 0.4

0.19
x 0.4
0.076

Write vertically. (The decimal points do not have to line up.)

2 decimal places (Decimal points not lined up.)
+ 1 decimal place
3 decimal places

Count from right to left; add a zero before the decimal point.

Example:

708
x 0.32
1416
21240
226.56

0 decimal places (Decimal points not lined up.)
+ 2 decimal places
2 decimal places

Count from right to left to place decimal point.

Find the Product (multiply):

1) 0.32 x 0.6

2) 1.9 x 0.05

3) 400 x 0.17

4) 5.048 x 2.03

5) 0.15 x 0.15

6) 2.4 x .013

7) 0.075 x 5.4

8) 99 x 1.1

9) 2.029 x 10.8

Multiplication by Multiples of 10

To multiply by a multiple of ten, move the decimal point **RIGHT** as many places as there are zeros in the multiplier.	
Example: 24.6 x 10 = 246.0	There is **one zero** in the multiplier (10); therefore, the decimal point moves **right one** place.
Example: 0.048 7 x 1000 = 48.7	There are **three zeros** in the multiplier (1000); therefore, the decimal point movers **right three** places.
Example: 24.6 x 100 = 2,460.0	There are **two zeros** in the multiplier, (100); therefore, the decimal point moves **right two** places. Note the additional zeros.

Multiply:

1) 4.83 x 10 =

2) 83.5 x 1000 =

3) 90.2 x 100 =

4) 10.37 x 10 =

5) 0.76 x 1000 =

6) 0.08 x 10 =

7) 35.961 x 100 =

8) 82.6 x 1000 =

9) 7.007 x 100 =

10) 72.953 x 10 =

11) 0.987 x 1000 =

12) 476.098 x 10,000 =

Division by Multiples of 10

To divide by a multiple of ten, (10; 100; 1,000; etc.), move the decimal point to the **LEFT** as many places as there are zeros in the divisor.

Example:

There is **one zero** in the divisor (10), therefore the decimal point moves **left one place**.

Example:

There are **three zeros** in the divisor (1000), therefore the decimal point moves **left three places**. Note the additional zeros.

Divide:

1) 82.5 ÷ 100 =

2) 923.8 ÷ 1000 =

3) 0.754 ÷ 10 =

4) 0.845 ÷ 100 =

5) 63.8 ÷ 100 =

6) 78.567 ÷ 10 =

7) 54.87 ÷ 1000 =

8) 20.35 ÷ 10 =

9) 540.8 ÷ 100 =

10) 6200 ÷ 10,000 =

Division by Whole Numbers

To divide a decimal by a whole number, place the decimal point in the quotient directly above the decimal point in the dividend to ensure the correct place value. Divide as with whole numbers.

Example:

$5.5 \div 5 = 5\overline{)5.5}$

$$5\overline{)5.5}$$
$$\underline{5}$$
$$5$$
$$\underline{5}$$
$$0$$

Write the problem with a "division house," placing the quotient's (answer's) decimal point directly over the decimal point of the dividend.

Example:

$\frac{22.5}{3} = 3\overline{)22.5}$

$$3\overline{)22.5}$$
$$\underline{21}$$
$$15$$
$$\underline{15}$$
$$0$$

A fraction is another way to express a division problem. The divisor is the denominator and the dividend is the numerator.

Write the problem with a "division house," placing the quotient's (answer's) decimal point directly over the decimal point of the dividend.

Divide:

1) $1.8 \div 6 =$

2) $\frac{0.84}{4}$

3) $\frac{0.096}{8}$

4) $0.264 \div 4 =$

5) $\frac{3.96}{9}$

6) $0.016 \div 2 =$

7) $0.32 \div 5 =$

8) $\frac{34.5}{5}$

9) $\frac{1.49}{2}$

Division by Decimals

In division, the divisor must be a whole number. To convert a decimal divisor to a whole number, multiply the divisor and the dividend by a multiple of ten. Then divide as usual.

Example:

$4.9 \div 0.7$

$(4.9 \times 10) \div (0.7 \times 10)$

$49 \div 7 = 7$

The divisor (0.7) has **one decimal place**. To change the divisor to a whole number, **multiply** the **divisor and the dividend** by **10**.
Divide as usual.

Example:

$$\frac{8.505}{0.05} \times \frac{100}{100} = \frac{850.5}{5}$$

$$5\overline{)850.5} = 170.1$$

5

35

35

$00\ 5$

5

0

The divisor (0.05) has **two decimal places**. To change the divisor to a whole number, **multiply** the **divisor and the dividend** by **100**.

Divide as usual. Place the decimal point for the quotient (170.1) directly above the decimal point in the dividend (850.5)

Divide:

1) $574.0 \div 0.7$

2) $0.4\overline{)6.988}$

3) $\frac{0.0144}{1.2}$

4) $35.1 \div 2.7$

5) $2.4\overline{)77.04}$

6) $\frac{0.132}{0.011}$

7) $82.8 \div 0.03$

8) $0.41\overline{)205}$

9) $\frac{0.6832}{0.004}$

Converting Fractions to Terminating Decimals

To convert a fraction to a decimal, divide. Some fractions will convert to a decimal representation with a remainder of zero, called a terminating decimal.

Example:
Convert to a Decimal

$$\frac{3}{12} = 12\overline{)3.00}\ \begin{array}{r}0.25\\ \underline{24}\\ 60\\ \underline{60}\\ 0\end{array}$$

$$\frac{3}{12} = 0.25$$

Divide 3 by 12.

The decimal equivalent to three twelfths is twenty-five hundredths.

Example:
Convert to a Decimal

$$11\frac{5}{25} = 11 + 25\overline{)5.00}\ \begin{array}{r}0.20\\ \underline{50}\\ 0\end{array}$$

$$11\frac{5}{25} = 11.20$$

The whole number portion of the number will remain the same. The fraction will convert to a decimal.

Divide 5 by 25.

The decimal equivalent to eleven and five twenty-fifths is eleven and two tenths.

Convert to a Decimal:

1) $\frac{9}{18}$

2) $\frac{15}{30}$

3) $\frac{6}{16}$

4) $\frac{9}{20}$

5) $\frac{13}{50}$

6) $\frac{19}{40}$

7) $\frac{48}{32}$

8) $5\frac{2}{20}$

9) $77\frac{7}{40}$

10) $47\frac{37}{50}$

Converting to Repeating Decimals

To convert a fraction to a decimal, divide. Some fractions will convert to a decimal representation with pattern, called a repeating decimal.

Example:

$$\frac{2}{3} = 3\overline{)2.000\ldots}\quad \begin{array}{r} 0.666\ldots \\ \underline{18} \\ 20 \\ \underline{20} \\ 20 \end{array}$$

Divide two by three. Note that the remainder will continue to be two; therefore, the decimal answer is a repeating decimal.

$0.666\ldots = 0.\overline{6}$

Repeating decimals are written with a bar over the repeating digits in the pattern.

Example:

$$\frac{34}{11} = 11\overline{)34.0000\ldots}\quad \begin{array}{r} 3.0909\ldots \\ \underline{33} \\ 100 \\ \underline{99} \\ 100 \\ \underline{99} \\ 1 \end{array}$$

Divide 34 by 11. Since 11 does not divide 10, there is a need to bring down an additional zero. Note that there is a portion of the quotient that does not repeat.

$3.0909\ldots = 3.\overline{09}$

The bar indicates that only the 09 repeats.

Convert:

1) $\frac{1}{11}$

2) $\frac{1}{33}$

3) $\frac{4}{9}$

4) $\frac{1}{3}$

5) $\frac{3}{22}$

6) $1\frac{1}{3}$

7) $8\frac{1}{6}$

8) $\frac{7}{33}$

9) $\frac{7}{42}$

10) $4\frac{2}{3}$

Converting Decimals to Fractions

To convert a terminating decimal to a fraction, write the decimal with the place value multiple of ten as a denominator and reduce to simplest terms.	
Example: $3.2 = 3\frac{2}{10}$	The decimal fraction portion of the number terminates in the tenths place; therefore the denominator will be 10.
$3\frac{2}{10} = 3\frac{1}{5}$	This fraction is not in lowest terms, therefore must be reduced. Divide numerator and denominator by 2.
To convert a repeating decimal to a fraction, use a value of 9 as the denominator.	
Example: $3.\overline{09} = 3\frac{9}{99}$	The repeating pattern ends in the hundredths place, therefore the denominator will have two nines, or be 99.
$3\frac{9}{99} = 3\frac{1}{11}$	This fraction is not in lowest terms, therefore must be reduced. Divide numerator and denominator by 9

Convert:

1) 7.85

2) $10.\overline{3}$

3) 2.08

4) $0.\overline{45}$

5) 0.360

6) $34.0\overline{102}$

7) $7.\overline{7}$

8) 10.425

9) 0.006

10) $2.\overline{360}$

Word Problems

To solve a word problem, read the problem and express what you are trying to learn in your own words. Identify the operation to be used, (addition, subtraction, multiplication, or division). Translate the problem from words to math symbols, (i.e. write an equation). Solve the equation.

Example:
Carlos bought one pair of shoes for $19.95, two neckties for $3.95 each, three pairs of socks for $1.25 a pair, and one suit for $89.95. What was the total cost?

Trying to learn total cost of the items.	Total cost usually implies addition.
$ 19.95	One pair of shoes
7.90	3.95 x 2 Two neckties
3.75	1.25 x 3 Three pair of socks
+ 89.95	One suit
$121.55	Add with decimal points lined up.

Example:
Nora made 18 equal monthly payments on her new stereo set. If the total cost of the set was $355.00, what was her monthly payment? (Round off to the nearest cent.)

Trying to learn Nora's monthly payment.	Total and number of months are given. Division is implied
$355.00 ÷ 18	
$\begin{array}{r} 19.72 \\ 18\overline{)355.00} \\ \underline{18} \\ 175 \\ \underline{162} \\ 130 \\ \underline{126} \\ 40 \\ \underline{36} \\ 4 \end{array}$	Total divided by number of months gives each month's payment. The answer must be to the nearest cent; that is rounded to the hundredths place. Divisor is a whole number. To continue the division, another zero may be added. However, the next digit in the quotient will be a 2 and by the rules of rounding, will not effect the current quotient.
The monthly payment is $19.72.	

Solve the following.

1) The $146.35 cost of a party was shared by 10 people. How much did each person have to pay? (Be sure to round your answer to the nearest cent.)

2) 537 people attended a $100 dollar a plate fund raising dinner for the NSCC Foundation. How much money did this dinner raise?

3) At the beginning of the month, Jim's bank balance was $275.38. During the month he wrote the following checks: $174.89, $68, and $57.76. He made deposits of $250 and $350. Find his bank balance at the end of the month.

4) Rudy drove his car 9,600 miles last year. His total car expenses were $625 for the year. Find the average cost per mile. (Round off your answer to the nearest hundredth)

5) A garden is 33.75 feet long and 21.6 feet wide. Draw a diagram of the garden with the lengths written on all four sides. What is the total distance around the garden?

6) A car traveled at 50 miles an hour for 2.5 hours. How far did it go?

7) A can of ham weighing 7.75 pounds costs $ 11.86. What does the ham cost per pound? (Round to the nearest cent.)

8) A park is 4.6 miles long and 2.7 miles wide.
   a. What is the total distance around the park?
   b. If a racecar drove 50 times around the park, how far will it have to go?

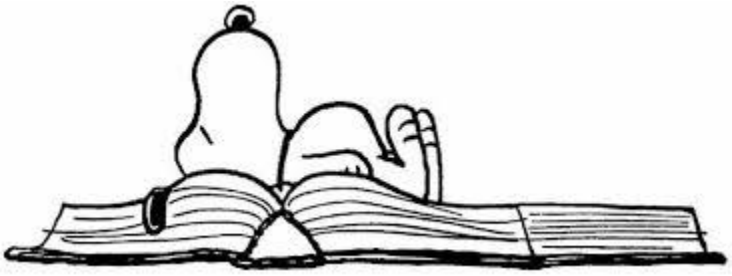
Grade 6 and 7 Summer Reading

Summer is a time of fun and a time of rest. We also need to make sure you continue to read during the summer as this is a wonderful way to work on your reading skills. You have been assigned a book based upon your reading ability. The attached packet will make sure that you are reading with a purpose. This packet is due the first week of school and will be a test grade.

We also want to you read for pleasure so make sure you pick up at least one other book and read for fun!! Take a trip to the library often. I look forward to hearing about your reading when we return to school.

If you have any questions about this packet, please feel free to email me - yes, even during the summer, and I will try and be helpful.

Mrs. Griffin
sjgriffin@saintpatricklowell.org



Incoming sixth grade: *City of Ember* by Jeanne DePrau

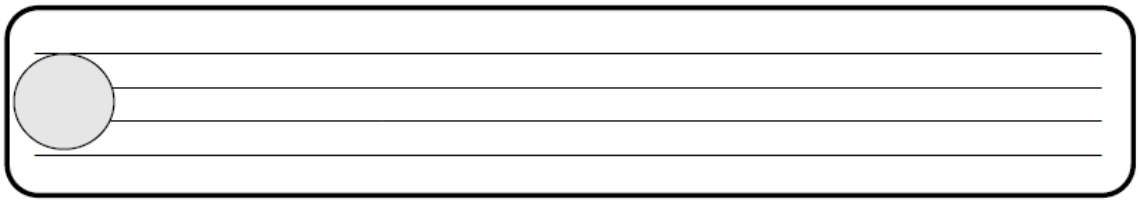
Incoming seventh grade: *Diary of A Young Girl* by Ann Frank

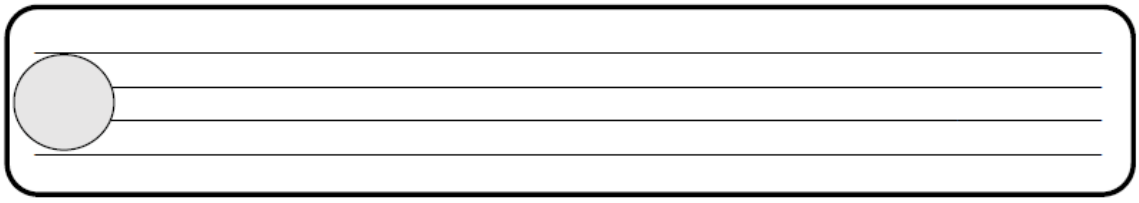
As you read your book choose fifteen (15) words that either you needed to look up - or you think other students in your class would need to look up. Write the definition for that word. This sheet is to be handed in with the rest of the worksheets.

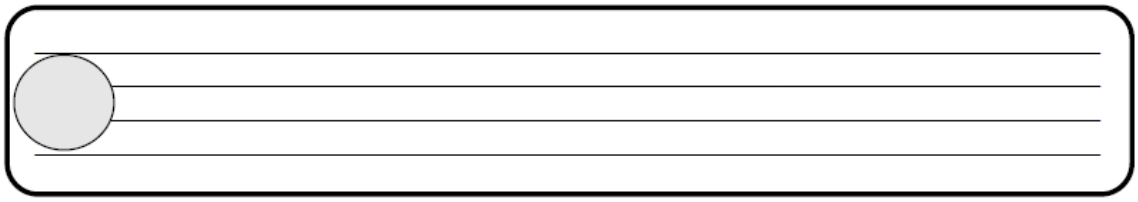
Word: Definition:

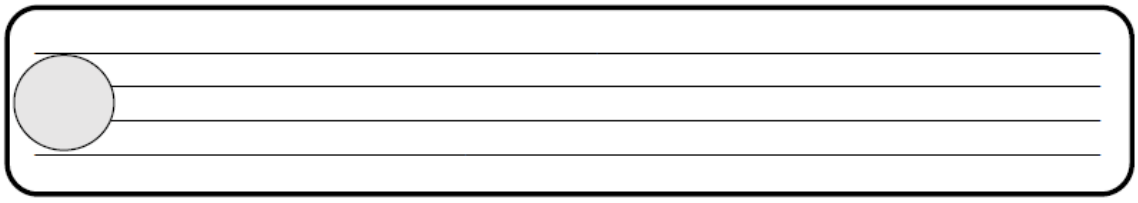
Gist Statements

DIRECTIONS: After you finish a chapter in the novel, write the chapter number in the circle and write a brief summary of that chapter in the space provided. You must be brief and include only the essential information. Your summary gist statement must be no more than **2 sentences**.









Quote It

DIRECTIONS: Copy 5 significant quotes from the book. Write the chapter and page number where you found the quote and explain why you feel it is important to the story, main character, theme, conflict, etc.

Ch./Page	Quote	Significance