Wentzville School District
Curriculum Development Template
Stage 1 – Desired Results

WSD Overarching Essential Question	WSD Overarching Enduring Understandings
Students will consider… ● How do I use the language of math (i.e. symbols, words) to make sense of/solve a problem? ● How does the math I am learning in the classroom relate to the real-world? ● What does a good problem solver do? ● What should I do if I get stuck solving a problem? ● How do I effectively communicate about math with others in verbal form? In written form? ● How do I explain my thinking to others, in written form? In verbal form? ● How do I construct an effective (mathematical) argument? ● How reliable are predictions? ● Why are patterns important to discover, use, and generalize in math? ● How do I create a mathematical model? ● How do I decide which is the best mathematical tool to use to solve a problem? ● How do I effectively represent quantities and relationships through mathematical notation? ● How accurate do I need to be? ● When is estimating the best solution to a problem?	*Students will understand that…* ● Mathematical skills and understandings are used to solve real-world problems. ● Problem solvers examine and critique arguments of others to determine validity. ● Mathematical models can be used to interpret and predict the behavior of real world phenomena. ● Recognizing the predictable patterns in mathematics allows the creation of functional relationships. ● Varieties of mathematical tools are used to analyze and solve problems and explore concepts. ● Estimating the answer to a problem helps predict and evaluate the reasonableness of a solution. ● Clear and precise notation and mathematical vocabulary enables effective communication and comprehension. ● Level of accuracy is determined based on the context/situation. ● Using prior knowledge of mathematical ideas can help discover more efficient problem solving strategies. ● Concrete understandings in math lead to more abstract understanding of math.

Unit 1 - Number Sense
Unit Title: Number Sense **Course:** 4th Grade Math **Brief Summary of Unit:** In this unit, students will develop an understanding of place value of whole numbers up to 1,000,000. Students will use this knowledge to add and subtract accurately. Students will also identify factors and multiples of numbers and use them to estimate products and quotients. **Textbook Correlation:** Chapter 1 & Chapter 2 as well as lessons 1.2a and 1.2b **Time Frame:** approximately 5 ½ weeks

Transfer
Students will be able to independently use their learning to… • Estimate quantities in order to make decisions about appropriate purchases, as an educated consumer. • Demonstrate their understanding of numbers to solve problems that arise at home or in the workplace.

Meaning	Meaning
Essential Questions	Understandings
Students will consider… ● What is the value of each individual digit? ● What is the best way to compare two numbers? ● When rounding to a given place value, what is the easiest/most efficient way to round a number? ● Based on this question/scenario, would it	*Students will understand that…* ● Our number system is based off of the number 10. It always takes ten of a given place value to increase to the next place value. ● When comparing numbers, students must look to the highest place value first. ● Rounding is changing a number to a

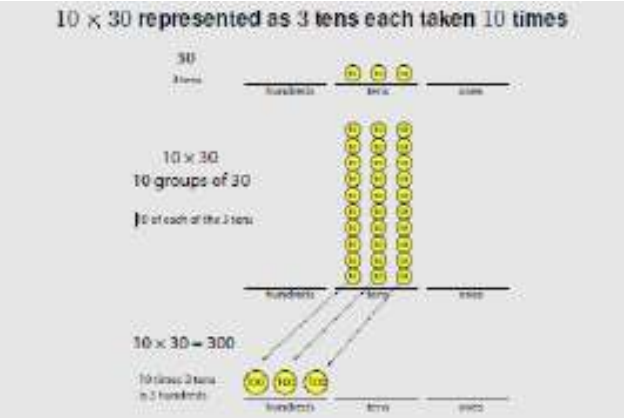
make more sense to round to the hundreds place or thousands place? Which is more specific? Why would you choose to round to that place value? ● Why do I need to be fluent? ● What is the most efficient strategy? ● In which situation would regrouping and trading be necessary? ● What key terms help you decide which mathematical operation to use to solve a given word problem? ● Is my answer reasonable? Does my answer make sense in reference to the given problem? ● What patterns would help you determine whether a number could be prime or composite? ● What is the significance of a number being prime? ● What's next in the pattern? ● How do you get from one number to the next? ● What is the constant change?	reasonable approximation. ● Sometimes having an answer close to the right answer is appropriate, but sometimes an exact number is necessary. ● Fluency means computing accurately, efficiently, and with flexibility. ● Word problems will need to be read carefully in order to decide what the problem is asking and what operation will be used to solve it. ● Assessing the reasonableness of a solution helps in determining if a solution is correct or incorrect. ● Prime numbers are numbers that only have the factors 1 and the number itself and composite numbers have more than two factors. ● Patterns are based on consistent changes or repetitions.

Acquisition	**Acquisition**
Key Knowledge	Key Skills **(Priority key skills are bolded.)**
Students will know… ● Place value up to one million. ● Value of a digit within a number up to a million. ● Each sequence of three digits made by commas is read as hundreds, tens, and ones, followed by the name of the appropriate base-thousand unit (thousand, million, billion, trillion, etc.). ● This symbol (>) means greater than. ● This symbol (<) means less than. ● This symbol (=) means equal to. The two sides of the equation are balanced.	*Students will be able to….* ● **Multiply by 10, 100, 1000.** ● **Divide by 10, 100, 1000.** *Example:* Represent problems like 30x10 using discs below:

- Rounding
- Estimation
- Key terms for the four basic operations
  sum, difference, product, quotient, total, all together, etc.
- Prime and composite numbers

- Factors
- Common Factors
- GCF (greatest common factor)
- Multiples
- Common Multiples
- LCM (least common multiple)

- Sequencing within a pattern



Each of the 3 tens becomes a hundred and moves to the left. In the product, the 3 in the tens place of 30 is shifted one place to the left to represent 3 hundreds. In 300 divided by 10 the 3 is shifted one place to the right in the quotient to represent 3 tens.

- **Write a given number in standard, expanded, and word form up to one million.**
- **Compare values of multi-digit numbers using >, =, and < symbols up to million.**
- **Ordering multi-digit numbers up to 1 million.**
- **Use number lines when rounding.**
- **Decide when it is appropriate to round.**
- **Decide what place value is appropriate to round to based on the question/situation.**
- **Round numbers up to the hundred thousand place.**
- **Round numbers to estimate sums, differences, products, and quotients.**

Example:
On a vacation, your family travels 267 miles on the first day, 194 miles on the second day and 34 miles on the third day. How many total miles did they travel? Some typical estimation strategies for this problem:

Student 1
I first thought about 267 and 34. I noticed that their sum is about 300. Then I knew that 194 is close to 200. When I put 300 and 200 together, I get 500.

Student 2
I first thought about 194. It is really close to 200. I also have 2 hundreds in 267. That gives me a total of 4 hundreds. Then I have 67 in 267 and the 34. When I put 67 and 34 together that is really close to 100.

	When I add that hundred to the 4 hundreds that I already had, I end up with 500. Student 3 I rounded 267 to 300. I rounded 194 to 200. I rounded 34 to 30. When I added 300, 200 and 30, I know my answer will be about 530. ● **Compute numbers up to the 100,000 place using the traditional algorithm for addition and subtraction.** ● **Use place value in describing and justifying the processes they use to add and subtract.** ● **Continue the process of the traditional algorithm for addition and subtraction regardless of the size of the number.** *Example:* 3892 + 1567 Student explanation for this problem continued on the next page: 1. Two ones plus seven ones is nine ones. 2. Nine tens plus six tens is 15 tens. 3. I am going to write down five tens and think of the 10 tens as one more hundred.(notates with a 1 above the hundreds column) 4. Eight hundreds plus five hundreds plus the extra hundred from adding the tens is 14 hundreds. 5. I am going to write the four hundreds and think of the 10 hundreds as one more 1000. (notates with a 1 above the thousands column) 6. Three thousands plus one thousand plus the extra thousand from the hundreds is five thousand --- 3546 - 928 Student explanation for this problem: 1. There are not enough ones to take 8 ones from 6 ones so I have to use one ten as 10 ones. Now I have 3 tens and 16 ones. (Marks through the 4 and notates with a 3 above the 4 and writes a 1 above the ones column to be represented as 16 ones.)

	2. Sixteen ones minus 8 ones is 8 ones. (Writes an 8 in the ones column of answer.) 3. Three tens minus 2 tens is one ten. (Writes a 1 in the tens column of answer.) 4. There are not enough hundreds to take 9 hundreds from 5 hundreds so I have to use one thousand as 10 hundreds. (Marks through the 3 and notates with a 2 above it. (Writes down a 1 above the hundreds column.) Now I have 2 thousand and 15 hundreds. 5. Fifteen hundreds minus 9 hundreds is 6 hundreds. (Writes a 6 in the hundreds column of the answer). 6. I have 2 thousands left since I did not have to take away any thousands. (Writes 2 in the thousands place of answer.) ● **Determine operations in given word problems.** ● **Determine the reasonableness of their answer.** ● **Solve multistep word problems representing these problems using equations with a letter standing for the unknown quantity** *Example:* Sara gave each of her dogs 3 treats. If she gave out 18 treats, how many dogs does she have? (3 x d =18) ● **Solve multistep word problems posed with whole numbers and having whole-number answers using model drawing and other problem solving strategies.** ● **Use a variable to represent an unknown quantity in a problem.** *Example:* On a vacation, your family travels 267 miles on the first day, 194 miles on the second day and 34 miles on the third day. How many miles did they travel total? Some typical estimation strategies for this problem: Student 1 I first thought about 267 and 34. I noticed that their sum is about 300. Then I knew that 194 is close to 200. When I put 300 and 200 together, I get 500.

	Student 2 I first thought about 194. It is really close to 200. I also have 2 hundreds in 267. That gives me a total of 4 hundreds. Then I have 67 in 267 and the 34. When I put 67 and 34 together that is really close to 100. When I add that hundred to the 4 hundreds that I already had, I end up with 500. Student 3 I rounded 267 to 300. I rounded 194 to 200. I rounded 34 to 30. When I added 300, 200 and 30, I know my answer will be about 530. The assessment of estimation strategies should only have one reasonable answer (500 or 530), or a range (between 500 and 550). Problems will be structured so that all acceptable estimation strategies will arrive at a reasonable answer. ● **Determine whether a number between 1 - 100 is prime or composite**. ● **Break a number down into its smaller factors.** ● **Find the greatest common factor for two whole numbers.** ● **Identify prime and composite numbers.** ● **Find multiples of whole numbers.** ● **Find common multiples and least common multiples for two or more whole numbers.** ● **Find all factor pairs for numbers 1-100.** *Example:* Students investigate whether numbers are prime or composite by: • building rectangles (arrays) with the given area and finding which numbers have more than two rectangles (e.g. 7 can be made into only 2 rectangles, 1 x 7 and 7 x 1, therefore it is a prime number) • finding factors of the number Factor pairs for 96: 1 and 96, 2 and 48, 3 and 32, 4 and 24, 6 and 16, 8 and 12. Multiples can be thought of as the result of skip counting by each of the factors. When skip counting, students should be able to identify the number of

	factors counted e.g., 5, 10, 15, 20 (there are 4 fives in 20). *Example:* Factors of 24: 1, 2, 3, 4, 6, 8,12, 24 Multiples: 1, 2, 3, 4, 5…24 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24 3, 6, 9, 12, 15, 18, 21, 24 4, 8, 12, 16, 20, 24 8, 16, 24 12, 24 24 To determine if a number between 1-100 is a multiple of a given one-digit number, some helpful hints include the following: • all even numbers are multiples of 2 • all even numbers that can be halved twice (with a whole number result) are multiples of 4 • all numbers ending in 0 or 5 are multiples of 5 ● **Identify features of a given pattern, discuss and explain the pattern.** ● **Continue a given pattern according to a rule and then create your own pattern following the rule.** *Example:* Rule: Starting at 1, create a pattern that starts at 1 and multiplies each number by 3. Stop when you have 6 numbers. Students write 1, 3, 9, 27, 81, 243. Students notice that all the numbers are odd and that the sums of the digits of the 2 digit numbers are each 9. Some students might investigate this beyond 6 numbers. Another feature to investigate is the patterns in the differences of the numbers (3 - 1 = 2, 9 - 3 = 6, 27 - 9 = 18, etc.)

Standards Alignment

MISSOURI LEARNING STANDARDS

MP.1 Make sense of problems and persevere in solving them.
MP.2 Reason abstractly and quantitatively.
MP.3 Construct viable arguments and critique the reasoning of others.
MP.4 Model with mathematics.
MP.5 Use appropriate tools strategically.
MP.6 Attend to precision.
MP.7 Look for and make use of structure.
MP.8 Look for and express regularity in repeated reasoning.

4.0A.3: Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

4.0A.4: Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite.

4.0A.5: Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*

4.NBT.1: Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700÷70 = 10 by applying concepts of place value and division.*

4.NBT.2: Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.

4.NTB.3: Use place value understanding to round multi-digit whole numbers to any place.

4.NBT.4: Fluently add and subtract multi-digit whole numbers using the standard algorithm.

Show Me-Standards

Goal 1: 1, 4, 5, 6, 7, 8
Goal 2: 2, 3, 7
Goal 3: 1, 2, 3, 4, 5, 6, 7, 8
Goal 4: 1, 4, 5, 6

Mathematics: 1, 5

Unit 2 - Multiplication and Division with Whole Numbers
Unit Title: Multiplication & Division with Whole Numbers **Course:** 4th Grade Math **Brief Summary of Unit:** Students will recognize how place value is used to multiply and divide multi-digit numbers. Students will use estimation to check the reasonableness of an answer. **Textbook Correlation:** Chapter 3 **Time Frame:** approximately 4 ½ weeks

Transfer
Students will be able to independently use their learning to… • Use multiplication and division properties in the future to solve real world problems.

Meaning	Meaning
Essential Questions	Understandings
Students will consider… ● Why is it more efficient to use mathematical symbols to represent a verbal statement? ● When reading a word problem, what information is essential in order to solve for an unknown amount? ● When is it better to use a pictorial representation or an equation to solve a problem? ● How is addition similar to multiplication? ● How are addition and multiplication different? ● What key terms help you decide which mathematical operation to use to solve a	*Students will understand that…* ● Using mathematical symbols makes solving quantitative problems easier. ● Multiplication equations allow you to find unknown products, unknown group sizes, or number of unknown groups. ● Multiplication equations allow you to compare groupings of objects. ● The order of a multiplication expression indicates the number of groups and the number of objects in each group. ● Word problems will need to be read carefully in order to decide what the problem is asking

given word problem? ● Is my answer reasonable? Does my answer make sense in reference to the given problem? How do I know? ● When is a remainder important in solving a problem? When can you ignore a remainder when solving a problem? ● What does this remainder mean? ● When do you use multiplication? ● Why does each multiplication strategy work with all yielding the same results? ● Which multiplication strategy is most efficient? ● When do we divide? ● Why does each division strategy work and yield the same answer? Which one is most efficient? ● For word problems, what does the remainder mean? Should I drop the remainder? Is the answer the remainder? Do I need to add onto the answer because of the remainder?	and what operation will be used to solve it. ● Assessing the reasonableness of a solution helps in determining if a solution is correct or incorrect. ● Sometimes remainders are important when solving a problem, other times remainders are not important when solving a problem. ● When multiplying, all digits must be multiplied by each digit of the other number taking into account the value of each digit. ● There are multiple ways to solve a multiplication problem. ● Multiplication strategies are based off of the place value of the digits being multiplied. ● Some methods of multiplying are more efficient than others. ● Division is the opposite of multiplication. ● Division is taking a number and splitting it into equal groups. ● There are multiple strategies that can be used to solve division problems. ● Knowing the factors of a number can help make division more efficient.

Acquisition	**Acquisition**
Key Knowledge	Key Skills **(Priority key skills are bolded.)**
Students will know… ● Commutative Property ● Fact Families (x and ÷ of single digit numbers 0-10) ● Factors ● Multiples ● **<u>multiplicative comparison</u>** is a situation in which one quantity is multiplied by a specified number to get another quantity (e.g., "a is n times as much as b"). ● Commutative Property of Multiplication ● Associative Property of Multiplication ● Identity Property of Multiplication	*Students will be able to….* ● **Multiply up to a 4-digit number by a 1-digit number with and without regrouping using a variety of multiplication strategies. (place value mats, arrays, partial product, area model, left to right/distributive, traditional).** ● **Multiply a 2-digit number by a 2-digit number with and without regrouping using a variety of multiplication strategies. (place value mats, arrays, partial product, area model, left to right/distributive, traditional).** ● **Break numbers apart to have a better understanding of the importance of place value and the distributive property in multi-digit multiplication.**

- Quotient
- Divisor
- Dividend
- Remainder=Fraction

- Model Drawing
- Variables

- Key terms for the four basic operations

Example:

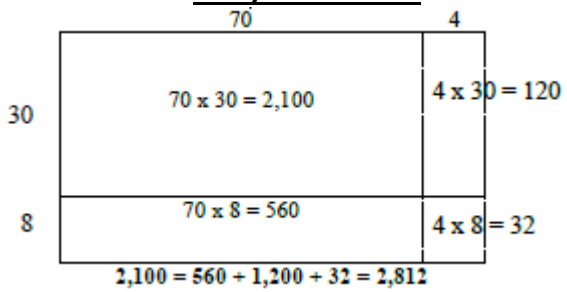
There are 25 dozen cookies in the bakery. What is the total number of cookies at the bakery?

Student 1
25 x12
I broke 12 up into 10 and 2
25 x 10 = 250
25 x 2 = 50
250 +50 = 300

Student 2
25 x 12
I broke 25 up into 5 groups of 5
5 x 12 = 60
I have 5 groups of 5 in 25
60 x 5 = 300

Student 3
25 x 12
I doubled 25 and cut 12 in half to get 50 x 6
50 x 6 = 300

What would an **array area model** of 74 x 38 look like?



To illustrate 154 x 6 students use **base 10 blocks** or use **drawings** to show 154 six times. Seeing 154 six times will lead them to understand the distributive property, 154 x 6 = (100 + 50 + 4) x 6 = (100 x 6) + (50 X 6) + (4 X 6) =
600 + 300 + 24 = 924.

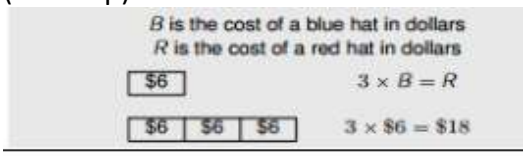
Partial Products

25
x24
400 (20 x 20)
100 (20 x 5)

	80 (4 x 20) 20 (4 x 5) 600 ● **Divide 4 digit numbers by a 1 digit number with and without remainders.** ● **Interpret the meaning behind a remainder.** ● **Write and explain remainders as fractions.** ● **Divide using various strategies. (place value discs, distributive property, arrays, partial quotient, traditional).** *Example:* A 4th grade teacher bought 4 new pencil boxes. She has 260 pencils. She wants to put the pencils in the boxes so that each box has the same number of pencils. How many pencils will there be in each box? •Using Base 10 Blocks: Students build 260 with base 10 blocks and distribute them into 4 equal groups. Some students may need to trade the 2 hundreds for tens but others may easily recognize that 200 divided by 4 is 50. Using Distributive Property: **260 ÷ 4 =** (200 ÷ 4) + (60 ÷ 4) Using Multiplication: **260 ÷ 4 =** 4 x 50 = 200, 4 x 10 = 40, 4 x 5 = 20; 50 + 10 + 5 = 65; so 260 ÷ 4 = 65 ● **Express (verbally, written, etc.) relationship between multiplication and division.** ● **Take information from a word problem and put it into an equation and solve the problem.** ● **Take information from an equation and write it into a word problem.** ● **Students should be able to identify and verbalize which quantity is being multiplied and which number tells how many times.** *Example:* Students should be given opportunities to write and identify equations and statements for multiplicative comparisons. Example:

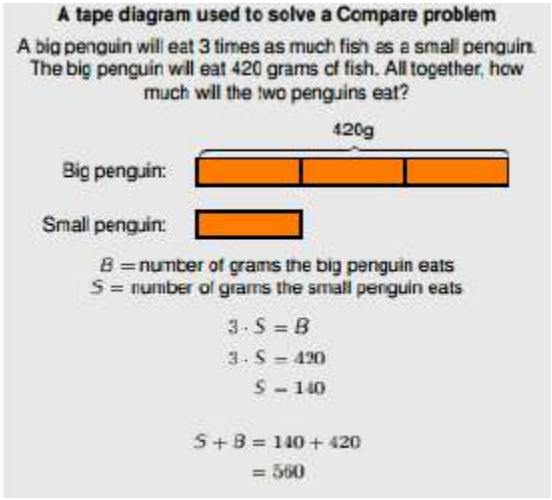
5 x 8 = 40.
Sally is five years old. Her mom is eight times older. How old is Sally's Mom?
5 x 5 = 25
Sally has five times as many pencils as Mary. If Sally has 5 pencils, how many does Mary have?

Example:
Unknown Product: A blue scarf costs $3. A red scarf costs 6 times as much. How much does the red scarf cost?
(3 x 6 = p).



Group Size Unknown: A book costs $18. That is 3 times more than a DVD. How much does a DVD cost? (18 ÷ p = 3 or 3 x p = 18).

Number of Groups Unknown: A red scarf costs $18. A blue scarf costs $6. How many times as much does the red
scarf cost compared to the blue scarf? (18 ÷ 6 = p or 6 x p = 18).



- **Determine operations in given word problems.**
- **Determine the reasonableness of their answer.**
- **Solve equations involving variables.**
- **Solve multistep word problems posed with**

	whole numbers and having whole-number answers using the four operations. • **Use a variable to represent an unknown quantity in a problem.**

Standards Alignment

MISSOURI LEARNING STANDARDS

MP.1 Make sense of problems and persevere in solving them.
MP.2 Reason abstractly and quantitatively.
MP.3 Construct viable arguments and critique the reasoning of others.
MP.4 Model with mathematics.
MP.5 Use appropriate tools strategically.
MP.6 Attend to precision.
MP.7 Look for and make use of structure.
MP.8 Look for and express regularity in repeated reasoning.

4.NBT.5: Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

4.NBT.6: Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

4.0A.1: Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

4.0A.2: Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison

4.0A.3: Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

Show Me-Standards

Goal 1: 1, 4, 5, 6, 7, 8
Goal 2: 2, 3, 7
Goal 3: 1, 2, 3, 4, 5, 6, 7, 8
Goal 4: 1, 4, 5, 6

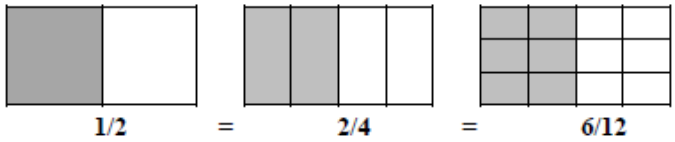
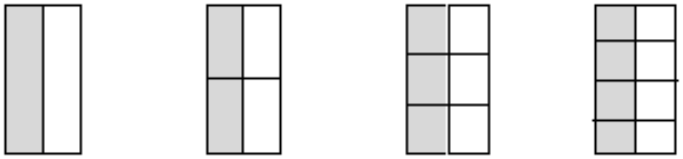
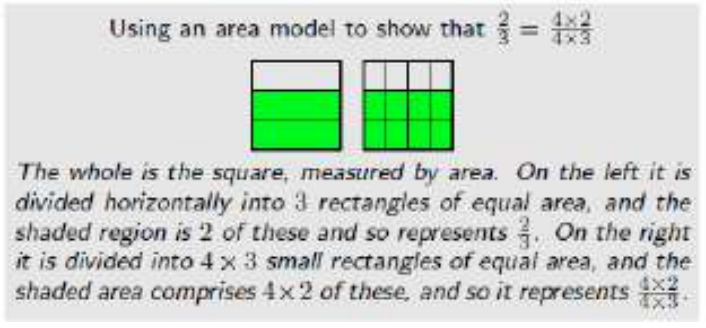
Mathematics: 1, 5

Unit 3 - Fractions
Unit Title: Fractions **Course:** 4th Grade **Brief Summary of Unit:** Students will understand that fractions and mixed numbers are used to name wholes and parts of a whole. Students will understand how to add and subtract fractions and mixed numbers as well as know how to multiply whole numbers by a fraction. **Textbook Correlation:** Chapter 6 and lesson 6.8.a (back of student book) -Supplement - Students will interpret and create line plots with fractions of a unit (Lesson 6.8.a) **Time Frame:** approximately 5 weeks

Transfer
Students will be able to independently use their learning to… • Accurately utilize measuring tools when cooking, building, planning, etc.

Meaning	Meaning
Essential Questions	Understandings
Students will consider… ● How can two equivalent fractions represent the same quantity? ● What are methods that you can use to show that two equivalent fractions have the same size? ● When comparing two fractions, what is the thought process in figuring out which one is larger and which one is smaller?	*Students will understand that…* ● Fractions are a part of a whole. ● Multiplication or division can be used to create equivalent fractions. ● Multiplying the numerator and denominator of a fraction by the same number is the same as multiplying by the number 1.

● Are the fractions referring to the same whole? How do you know? ● What can I do to create a common denominator? ● Why does finding a common denominator make it easier for us to compare fractions? ● When is it appropriate to use a mixed number instead of an improper fraction and vice versa? ● Why is it beneficial to be able to decompose fractions? When would you use it? Provide an example that shows how you can decompose a fraction to work a problem more easily. ● In what situations would you need to add or subtract fractions? ● What strategies can be used to multiply whole numbers by fractions? ● Why and when would you need to multiply whole numbers by fractions? ● What are the multiples of a given fraction? (The multiples of ⅛ are ⅛ ,2/8, ⅜ … ● What strategies can be used to find equivalent fractions? ● If 3/10 and 30/100 are equivalent, in what situations would it be more beneficial to use one instead of the other?	● Fractions can be compared more easily if common denominators are created. ● Fractions of a number can only be compared if they are referring to the same whole. ● Fractions can be easily compared if you visualize them based on benchmark fractions on a number line. ● Fractions can be more easily compared if they have a common numerator. ● Fractions with a common denominator can be compared because as the size of the numerator increases, the size of the part increases. ● Fractions with a common numerator can be compared because as the size of the denominator increases, the smaller the equal parts become. ● Fractions can be decomposed (i.e. ¾ = ¼+¼+¼). ● A whole number can be written as a fraction. ● Mixed numbers can be written as an improper fraction. ● Fractions can be multiplied by a whole number to find the fraction of a set. ● Multiplying a fraction by a whole number is simply finding that fraction a repeated number of times. ● Equivalent fractions are fractions that are written in multiple ways but represent the same value.

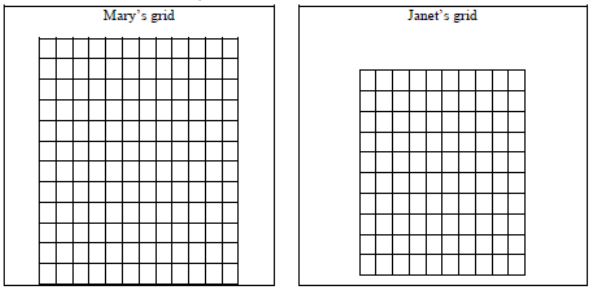
Acquisition	Acquisition
Key Knowledge	Key Skills **(Priority key skills are bolded.)**
Students will know… ● Numerator ● Denominator ● Equivalent Fraction ● Least Common Multiples ● Benchmark Fractions (0, ½, one whole) ● A fraction represents part of a whole ● Improper Fraction ● Mixed Number ● Multiplication ● Identify multiples of a fraction	*Students will be able to….* ● **Create at least 3 equivalent fractions when given a fraction using multiplication.** ● **Visually demonstrate multiple representations for why two fractions are equivalent.** ● **Determine when it is more efficient to use division to create equivalent fractions.** 1.  **1/2 = 2/4 = 6/12** 2.  $\frac{1}{2}$ $\frac{2}{4} = \frac{2 \times 1}{2 \times 2}$ $\frac{3}{6} = \frac{3 \times 1}{3 \times 2}$ $\frac{4}{8} = \frac{4 \times 1}{4 \times 2}$ 3.  Using an area model to show that $\frac{2}{3} = \frac{4\times2}{4\times3}$ *The whole is the square, measured by area. On the left it is divided horizontally into 3 rectangles of equal area, and the shaded region is 2 of these and so represents $\frac{2}{3}$. On the right it is divided into 4×3 small rectangles of equal area, and the shaded area comprises 4×2 of these, and so it represents $\frac{4\times2}{4\times3}$.* ● **Find a common denominator using least common multiple.** ● **Compare fractions against a familiar fraction like ½.** ● **Compare fractions that contain either a**

numerator or denominator that are the same size.

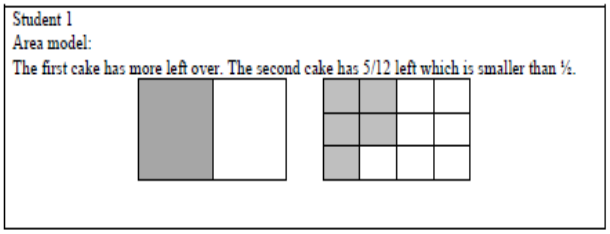
- **Use a visual model of two fractions to justify why one fraction is less than, greater than, or equal to another fraction.**
- **Construct a written or spoken explanation to justify why one fraction is less than, greater than, or equal to another fraction.**
- **Use a number line and benchmark fractions to be able to compare two fractions.**

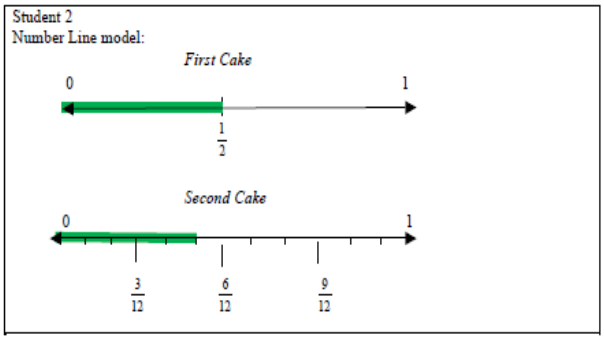
Examples

1. Mary used a 12 x 12 grid to represent 1 and Janet used a 10 x 10 grid to represent 1. Each girl shaded grid squares to show ¼.
How many grid squares did Mary shade? How many grid squares did Janet shade? Why did they need to shade different numbers of grid squares?
Possible solution: Mary shaded 36 grid squares; Janet shaded 25 grid squares. The total number of little squares is different in the two grids, so
¼ of each total number is different.

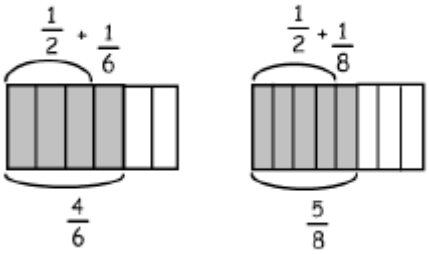


2. There are two cakes on the counter that are the same size. The first cake has ½ of it left. The second cake has 5/12 left. Which cake has more left?





When using the benchmark of 1/2 to compare 4/6 and 5/8, you could use diagrams such as these:



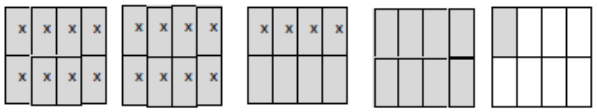
4/6 is ⅙ larger than 1/2, while ⅝ is ⅛ larger than 1/2. Since ⅙ is greater than 1/8, 4/6 is the greater fraction.

- **Decompose fractions in multiple methods and justify their equivalence.**
- **Add and subtract fractions with like denominators.**
- **Add and subtract fractions with unlike denominators.**
- **Represent mixed numbers as improper fractions and vice versa.**
- **Record the decomposition of a fraction as an addition equation.**
- **Justify the decomposition of a fraction using visual models, written explanations, and spoken explanations.**
- **Add or subtract mixed numbers with like denominators.**
- **Add and subtract fractions with unlike denominators.**

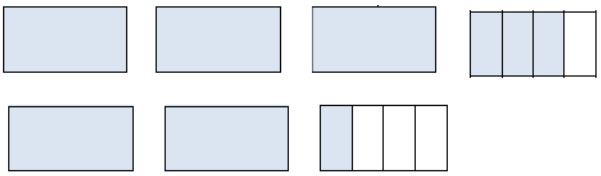
Word Problem

3. Mary and Lacey decide to share a pizza. Mary ate 3/6 and Lacey ate 2/6 of the pizza. How much of the pizza did the girls eat together?
Possible solution: The amount of pizza Mary ate can be thought of a 3/6 or 1/6 and 1/6 and 1/6. The amount of pizza Lacey ate can be thought of a 1/6 and 1/6. The total amount of pizza they ate is 1/6 + 1/6 + 1/6 + 1/6 + 1/6 or 5/6 of the whole pizza.

4. Trevor has 4 1/8 pizzas left over from his soccer party. After giving some pizza to his friend, he has 2 4/8 of a pizza left. How much pizza did Trevor give to his friend?
Possible solution: Trevor had 4 1/8 pizzas to start. This is 33/8 of a pizza. The x's show the pizza he has left which is 2 4/8 pizzas or 20/8 pizzas. The shaded rectangles without the x's are the pizza he gave to his friend which is 13/8 or 1 5/8 pizzas.



5. While solving the problem, 3 ¾ + 2 ¼ students could do the following:



Student 1
3 + 2 = 5, ¾ + ¼ = 1, 5 + 1 = 6

Student 2
3 ¾ + 2 = 5 ¾, so 5 ¾ + ¼ = 6

Student 3
3 ¾ = 15/4 and 2 ¼ = 9/4, so 24/4 = 6

- **Multiply a fraction by a whole number and demonstrate the problem visually using unit**

bars to represent fractions of a set.

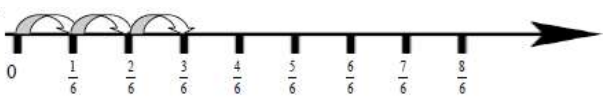
- **Read word problems and effectively multiply fractions by whole numbers. Demonstrate it using model drawing or another appropriate method.**

- **Use a number line to represent multiplying a fraction by a whole number.**
- **Given a multiplication sentence that contains a whole number and a fraction, construct a word problem that would solve using the given equation.**

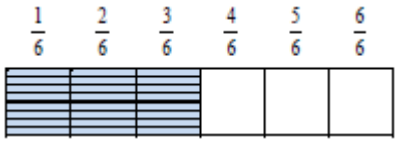
Example

3/6 = 1/6 + 1/6 + 1/6 = 3 x (1/6)

Number line:



Area model:



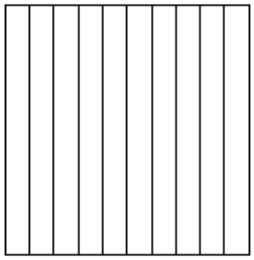
See a fraction as the numerator times the unit fraction with the same denominator.

$\frac{7}{5} = 7 \times \frac{1}{5}$, $\frac{11}{3} = 11 \times \frac{1}{3}$

- **Add two fractions with denominators of 10 and 100.**
- **Decompose a fraction.**
  (Ex. 47/100 = 40/100 + 7/100 = 4/10 + 7/100)

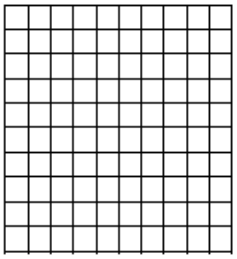
Ones	.	Tenths	Hundredths

Tenths Grid



.3 = 3 tenths = 3/10

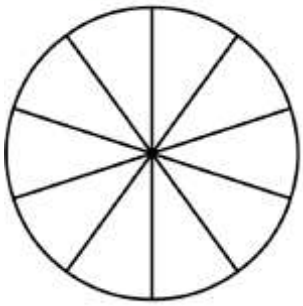
Hundredths Grid



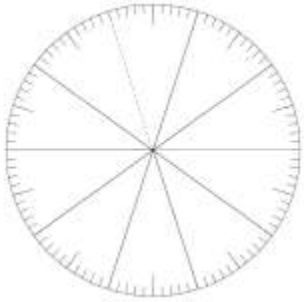
.30 = 30 hundredths = 30/100

Represent 3 tenths and 30 hundredths on the models below

10^{th}s circle



100^{th}s circle



Standards Alignment

MISSOURI LEARNING STANDARDS

MP.1 Make sense of problems and persevere in solving them.
MP.2 Reason abstractly and quantitatively.
MP.3 Construct viable arguments and critique the reasoning of others.
MP.4 Model with mathematics.
MP.5 Use appropriate tools strategically.
MP.6 Attend to precision.
MP.7 Look for and make use of structure.
MP.8 Look for and express regularity in repeated reasoning.

4.NF.1: Explain why a fraction a/b is equivalent to a fraction (n x a)/(n x b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.

4.NF.2: Compare two fractions with different numerators and different denominators, eg., by creating common denominators or numerators or by comparing to a benchmark fraction such as ½. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, <, or =, and justify the conclusions, e.g., by using a visual fraction model.

4.NF.3: Understand a fraction *a/b* with a > 1 as a sum of fractions 1/b.

a. Understand additions and subtractions of fractions as joining and separating parts referring to the same whole.
b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, eg., by using a visual fraction model. Examples: ⅜=⅛+⅛+⅛; ⅜=⅛+2/8; 2 ⅛=1+1+⅛=8/8+8/8+⅛.
c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
d. Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.

NF.5: Express a fraction with a denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.

4.MD.4: Make a line plot to display a data set of measurements in fractions of a unit (½, ¼, ⅛). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*

Show Me-Standards

Goal 1: 1, 4, 5, 6, 7, 8
Goal 2: 2, 3, 7
Goal 3: 1, 2, 3, 4, 5, 6, 7, 8
Goal 4: 1, 4, 5, 6

Mathematics: 1, 5

Unit 4- Decimals
Unit Title: Decimals **Course:** 4th Grade **Brief Summary of Unit:** Chapter 7: Students will understand that decimals are another way to show amounts that are parts of a whole. Students will understand that a decimal has a decimal point to the right of the ones place and digits to the right of the decimal point. Chapter 8: Students will recognize that decimals can be added and subtracted in the same ways as whole numbers. **Textbook Correlation:** Chapter 7 and Chapter 8 **Time Frame:** approximately 5 weeks

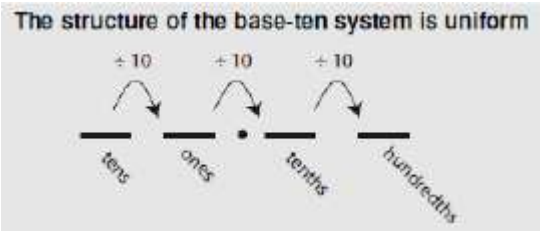
Transfer
Students will be able to independently use their learning to… • Understand personal and professional financial situations (money, interest rates, stocks, bonds, balancing checkbooks, etc.).

Meaning	Meaning
Essential Questions	Understandings
Students will consider… ● How big is a tenth? hundredth? ● Why is it important when comparing decimals that they must be referring to the same whole? ● What visual models can be used to order/compare decimals?	*Students will understand that…* ● Fractions can be represented in decimal form. ● Decimals must refer to the same whole to be compared. ● Decimals can be added and subtracted like whole numbers.

● In what real world situations would you add or subtract decimals? ● When is it best to use fractions? ● When is it best to use decimals?	● Tenths and hundredths are quantities that represent portions of a whole. ● Our number system is based on 10 even as you head to the right of the decimal, so ten hundredths equals one tenth. ● As you head to the right, the value of the digit is one tenth of the previous place value. ● As you head to the left, the value of the digit is ten times the previous place value.

Acquisition	**Acquisition**
Key Knowledge	Key Skills **(Priority key skills are bolded.)**
Students will know… ● fractions ● decimals ● equivalent fractions/decimals ● >, <, = symbols ● number lines ● tenth ● decimal form ● hundredth ● placeholder	*Students will be able to….* ● **Read and write tenths and hundredths in decimal and fractional forms.** ● **Represent and interpret tenths and hundredths models.** ● **Locate a decimal on a number line.** ● **Compare decimals up to the hundredths place.** ● **Order decimals up to the hundredths place.** ● **Round decimal numbers to the nearest tenth and whole number.** ● **Represent fractions as decimals, and decimals as fractions.** ● **Add decimals up to two decimal places with and without regrouping using place value boards and then traditional algorithm.** ● **Subtract decimals up to two decimal place with and without regrouping using place value boards and then traditional algorithm.** ● **Add and subtract real world problems involving decimals using model drawing and other problem solving strategies.**

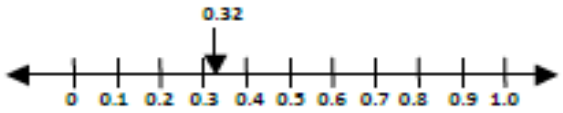
Examples:



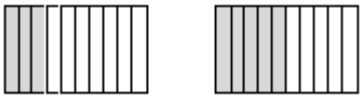
1. Students make connections between fractions with denominators of 10 and 100 and the place value chart. By reading fraction names, students say 32/100 as thirty-two hundredths and rewrite this as 0.32 or represent it on a place value model as shown below.

Hundreds	Tens	Ones	•	Tenths	Hundredths
			•	3	2

Students understand 32/100 can be expanded to 3/10 and 2/100
Students represent values such as 0.32 or 32/100 on a number line.
32/100 is more than 30/100 (or 3/10) and less than 40/100 (or 4/10).
It is closer to 30/100 so it would be placed on the number line near that value.



2. Draw a model to show that 0.3 < 0.5. (Students would sketch two models of approximately the same size to show the area that represents three-tenths is smaller than the area that represents five-tenths.



Standards Alignment

MISSOURI LEARNING STANDARDS

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MP.7 Look for and make use of structure.
MP.8 Look for and express regularity in repeated reasoning.

4.NF.6 Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line.*

4.NF.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, <, and justify the conclusions, e.g., by using a visual model.

Show Me-Standards

Goal 1: 1, 4, 5, 6, 7, 8
Goal 2: 2, 3, 7
Goal 3: 1, 2, 3, 4, 5, 6, 7, 8
Goal 4: 1, 4, 5, 6

Mathematics: 1, 5

Unit 5 - Angles and Lines
Unit Title: Angles and Lines **Course:** 4th Grade **Brief Summary of Unit:** Chapter 9**:** Students will understand that when two rays or sides of a shape meet angles are formed. Students will learn how to estimate and measure angles. Chapter 10: Students will distinguish between parallel and perpendicular lines. **Textbook Correlation:** Chapter 9 and Chapter 10 **Time Frame:** approximately 4 weeks

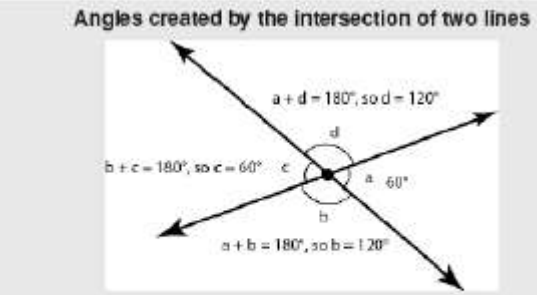
Transfer
Students will be able to independently use their learning to… • To use geometric terminology and make accurate measurements for real world projects.

Meaning	Meaning
Essential Questions	Understandings
Students will consider… ● What are some real life examples of parallel lines? Perpendicular lines? Angles? Rays? ● What characteristics determine if lines are parallel or perpendicular? ● How can I determine if an angle is right, obtuse, or acute? ● When is it important for us to be able to measure angles? ● What are strategies I can use to estimate the size of an angle?	*Students will understand that…* ● Points, lines, line segments, and angles can be used to represent real world objects. ● Parallel lines never meet. ● Perpendicular lines meet at a right angle. ● Angles are made up of two rays that start from the same vertex. ● Angles are measured using degrees. ● Protractors are a tool used to measure the size of an angle. ● 360 degrees is one complete revolution,

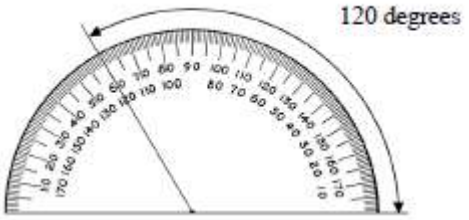
● When would it be ok to simply estimate the angle instead of measuring it? ● What are some situations where my measurement would need to be precise?	which means there are 360 degrees in a circle. ● The angle measure of the whole is the sum of the angle measures of the parts. (i.e. $n + 30^o = 90^o$)

Acquisition	**Acquisition**
Key Knowledge	Key Skills **(Priority key skills are bolded.)**
Students will know… ● ray ● point ● vertex ● angle ● degree ● line ● line segment ● protractor ● how to use protractors ● The difference between, right, straight, acute, obtuse, and reflex angles ● horizontal and vertical lines ● parallel and perpendicular lines	*Students will be able to….* ● **Recognize each geometrical term in real life objects or drawings.** ● **Draw points, rays, line segments, and angles using a ruler, protractor, and free hand.** ● **Identify the type of an angle by comparing it to a right angle. (acute, obtuse, right)** ● **Estimate the measure of an angle. (Very general: 30, 45, 60, 90, or 180)** ● **Relate ¼, ½, ¾ and full rotations to 90, 180, 270, and 360 degrees.** ● **Measure angles using protractors.** ● **Create angles to a given degree using a protractor.** ● **Find the measurement of a larger angle when given the measurement of two smaller angles that don't overlap.** ● **Use addition and subtraction of known angles to find the measurement of an unknown angle.** ● **Distinguish between parallel and perpendicular lines.** ● **Identify horizontal and vertical lines.** ● **Sort objects based on parallelism, perpendicularity, and angle types.** ● **Draw perpendicular line segments using a ruler and a protractor or a drawing triangle.** ● **Draw parallel line segments using a ruler or a drawing triangle.**

Example:

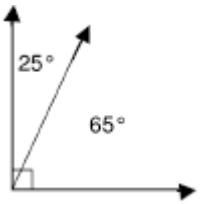


When two lines intersect, they form four angles. If the measurement of one is known (e.g., angle a is 60°), the measurement of the other three can be determined.



A lawn water sprinkler rotates 65 degrees and then pauses. It then rotates an additional 25 degrees. What is the total degree of the water sprinkler rotation? To cover a full 360 degrees how many times will the water sprinkler need to be moved?

If the water sprinkler rotates a total of 25 degrees then pauses. How many 25 degree cycles will it go through for the rotation to reach at least 90 degrees?



Joey knows that when a clock's hands are exactly on 12 and 1, the angle formed by the clock's hands measures 30º. What is the measure of the angle formed when a clock's hands are exactly on the 12 and 4?

Standards Alignment

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MP.7 Look for and make use of structure.
MP.8 Look for and express regularity in repeated reasoning.

4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.

4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:

a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle", and can be used to measure angles.
b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.

4.MD.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.

4.MD.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.

Show Me-Standards

Goal 1: 1, 4, 5, 6, 7, 8
Goal 2: 2, 3, 7
Goal 3: 1, 2, 3, 4, 5, 6, 7, 8
Goal 4: 1, 4, 5, 6

Mathematics: 1, 2, 5

Unit 6 - Area, Perimeter and Measurement

Unit Title: Area, Perimeter and Measurement

Course: 4th Grade

Brief Summary of Unit:

Chapter 11**:** Students will understand the properties of squares, rectangles, rhombuses, parallelograms, and right triangles.

Lessons 12.Oa, 12.Ob, 12.Oc, and 12.Od: Students will know relative sizes of measurement units and be able to convert the units. Students will apply knowledge of measurement units.

Chapter 12: Students will find the area and perimeter of a figure by counting squares or using a formula.

Textbook Correlation: Chapter 11 and Chapter 12 (lessons 12.Oa, 12.Ob, 12.Oc, 12.Od are found in the back of the student book)

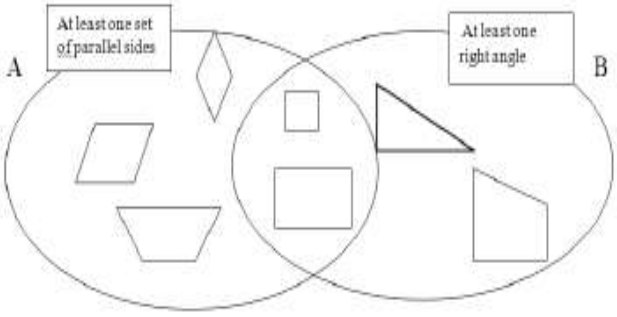
Time Frame: approximately 4 weeks

Transfer

Students will be able to independently use their learning to…

- Use area and perimeter to plan and complete real world projects. (Ex. fencing, flooring, building, etc.)
- Choose and utilize various measurement tools effectively. (Ex. measuring cups, framing square, tape measure, etc.)

Meaning	**Meaning**
Essential Questions	Understandings
Students will consider… ● What characteristics do specific two-dimensional shapes have? (Ex. What types of angles and lines make up a square, rectangle, rhombus, parallelogram, and right triangle?) ● What shape is next in the pattern? ● When is it appropriate to use a certain unit of measurement? Why would you use one type of measurement instead of another? ● What's the best measurement for…? ● Why would we need to convert measurements? When would we use it in the real world? ● What are strategies you can use to convert smaller units to larger units and vice versa? ● When would it be appropriate to find the area or perimeter? ● What kinds of things would you find the perimeter of? ● What kinds of things would be important to find the area? ● How can knowing the perimeter help you find the area and vice versa? • How can you find an unknown factor based on information given? (i.e. Area = 24 $in.^{2.}$ Length = 4in. What is the width?)	*Students will understand that…* ● Two dimensional polygons are made up of line segments and angles. ● Patterns are based on consistent changes or repetitions. ● There are different units of measurement to measure different types of things. ● Larger units can be represented in smaller units and vice versa. ● Using operations with measurements follows the same pattern as operations with whole numbers, decimals, and fractions. ● Area is an amount of flat space. ● Area is measured in square units. ● Perimeter is the distance around a space. ● Finding the area of a rectangle is similar to using an area model for finding the product of a multiplication equation.

Acquisition	Acquisition
Key Knowledge	Key Skills **(Priority key skills are bolded.)**
Students will know… ● Polygon ● Quadrilateral ● Square ● Rectangle ● Rhombus ● Parallelogram ● Trapezoid ● Right Triangles ● sequencing ● units of measurement ● mm, cm, m, km ● g, kg ● inches, feet, yards, miles ● ounces, pounds, tons ● cups, pints, quarts, gallons ● seconds, minutes, hours ● milliliters, liters ● measurement families (standard linear, capacity, weight, time, etc. and metric units) ● Length x width = area ● Perimeter=Sum of all the sides ● Perimeter formula for a rectangle: 2l + 2w ● composite figure	*Students will be able to….* ● **Identify features of a given pattern.** ● **Continue a given pattern according to a rule.** ● **Apply the properties of quadrilaterals and right triangles to solve problems.** ● **Find unknown angle measures and side lengths of squares, rectangles, rhombi, parallelograms, and right triangles.** ● **Create two-dimensional shapes.** *<u>Example:</u>* 1. Draw two different types of quadrilaterals that have two pairs of parallel sides. 2. Is it possible to have an acute right triangle? 3. How many acute, obtuse, and right angles are in this shape?  4. Draw and list the properties of a parallelogram. Draw and list the properties of a rectangle. How are your drawings and lists alike? How are they different? Be ready to share your thinking with the class. 5. Which figure in the Venn diagram below is in the wrong place, explain how do you know? 

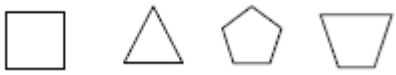
Do you agree with the label on each of the circles in the Venn diagram above? Describe why some shapes fall in the overlapping sections of the circles.

6. Draw and name a figure that has two parallel lines and exactly 2 right angles.

7. For each of the following, sketch an example if it is possible. If it is impossible, say so, and explain why or show a counterexample.

- a parallelogram with exactly one right angle
- a rectangle that is not a parallelogram
- every square is a quadrilateral
- every trapezoid is a parallelogram

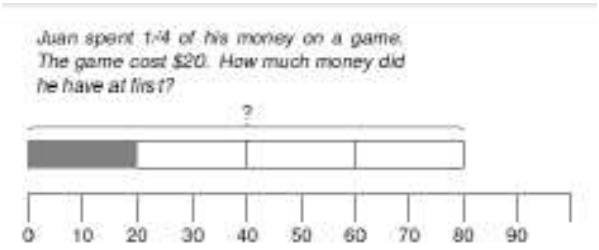
8. Identify which of these shapes have perpendicular and/or parallel sides and justify your selection.

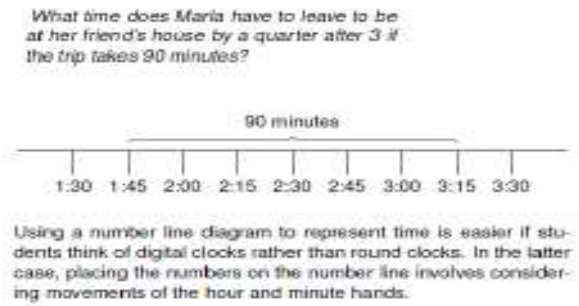


- **Choose appropriate unit of measurement for a given task and measure precisely.**
- **Convert smaller units to larger units and vice versa. Make sure to include both metric and customary units for length, mass, weight, and time.**
- **Record equivalent measurements in a two column table.**
- **Use the four operations to solve real world problems involving length, mass, weight, time and money using model drawing and other problem solving strategies.**
- **Represent measurement quantities using number line diagrams.**
- **Find the area of a rectangle by counting squares on grid paper.**
- **Estimate the area of a figure by counting squares on grid paper.**
- **Find the area of a rectangle using a formula.**
- **Solve problems involving perimeter and area of rectangles and squares using model drawing and other types of problem solving.**

	● **Find the area and perimeter of a composite figure.** ● **Solve word problems involving estimating the area of figures.** ● **Solve word problems involving area and perimeter of composite figures.** Charlie and 10 friends are planning for a pizza party. They purchased 3 quarts of milk. If each glass holds 8oz will everyone get at least one glass of milk? **possible solution**: Charlie plus 10 friends = 11 total people 11 people x 8 ounces (glass of milk) = 88 total ounces 1 quart = 2 pints = 4 cups = 32 ounces Therefore 1 quart = 2 pints = 4 cups = 32 ounces 2 quarts = 4 pints = 8 cups = 64 ounces 3 quarts = 6 pints = 12 cups = 96 ounces If Charlie purchased 3 quarts (6 pints) of milk there would be enough for everyone at his party to have at least one glass of milk. If each person drank 1 glass then he would have 1- 8 oz glass or 1 cup of milk left over. --- Susan has 2 feet of ribbon. She wants to give her ribbon to her 3 best friends so each friend gets the same amount. How much ribbon will each friend get? Students may record their solutions using fractions or inches. (The answer would be 2/3 of a foot or 8 inches. Students are able to express the answer in inches because they understand that 1/3 of a foot is 4 inches and 2/3 of a foot is 2 groups of 1/3.) --- Mason ran for an hour and 15 minutes on Monday, 25 minutes on Tuesday, and 40 minutes on Wednesday. What was the total number of minutes Mason ran? --- A pound of apples costs $1.20. Rachel bought a pound and a half of apples. If she gave the clerk a $5.00 bill, how much change will she get back? --- Mario and his 2 brothers are selling lemonade. Mario

brought one and a half liters, Javier brought 2 liters, and Ernesto brought 450 milliliters. How many total milliliters of lemonade did the boys have?

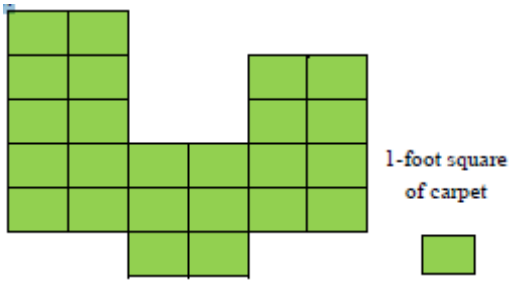




- **Calculate the perimeter and area of an actual real world space.**
- **Find the perimeter and area of irregular shaped objects that can be decomposed into rectangles.**

Examples

Mr. Rutherford is covering the miniature golf course with an artificial grass. How many 1-foot squares of carpet will he need to cover the entire course?



A rectangular garden has as an area of 80 square feet. It is 5 feet wide. How long is the garden?

Here, specifying the area and the width creates an unknown factor problem. Similarly, students could solve perimeter problems that give the perimeter and the length of one side and ask the length of the

	adjacent side. --- A plan for a house includes rectangular room with an area of 60 square meters and a perimeter of 32 meters. What are the length and the width of the room?

Standards Alignment
MISSOURI LEARNING STANDARDS **MP.1 Make sense of problems and persevere in solving them.** **MP.2 Reason abstractly and quantitatively.** **MP.3 Construct viable arguments and critique the reasoning of others.** **MP.4 Model with mathematics.** **MP.5 Use appropriate tools strategically.** **MP.6 Attend to precision.** **MP.7 Look for and make use of structure.** **MP.8 Look for and express regularity in repeated reasoning.** 4.G.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles. 4.0A.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.* 4.MD.1: Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1,12), (2,24), (3,36)...* 4.MD.2: Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. 4.MD.3: Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*

Show Me-Standards

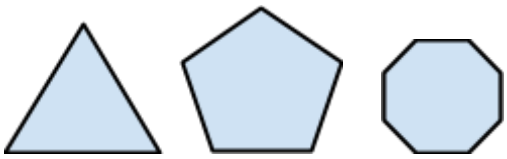
Goal 1: 1, 4, 5, 6, 7, 8
Goal 2: 2, 3, 7
Goal 3: 1, 2, 3, 4, 5, 6, 7, 8
Goal 4: 1, 4, 5, 6

Mathematics: 1, 2, 5

Unit 7 - Shapes and Symmetry
Unit Title: Shapes and Symmetry **Course:** 4th Grade Math **Brief Summary of Unit:** Chapter 13: Students will understand line symmetry and rotational symmetry. Students will also create symmetric shapes and patterns. **Textbook Correlation:** Chapter 13 **Time Frame:** approximately 1 ½ weeks

Transfer
Students will be able to independently use their learning to… • Use properties of shapes and symmetry to measure and describe real world objects.

Meaning	Meaning
Essential Questions	Understandings
Students will consider… ● What are some real world examples of symmetry? ● How many lines of symmetry does a circle have? Why? ● If I have rotated my object 180^{o} and haven't found a point of rotational symmetry yet, do I need to keep going? Why or why not? ● If an object is not symmetrical, what characteristics does it have that keep it from being symmetrical? ● How are lines of symmetry and congruency related?	*Students will understand that…* ● Lines of symmetry divide an object into two equal parts. ● Objects can have multiple lines of symmetry. ● An object that can be rotated less than 360^{o} and ends up looking exactly like the original object has rotational symmetry. ● Two-dimensional shapes that have a line of symmetry will always create congruent shapes.

Acquisition	Acquisition
Key Knowledge	Key Skills **(Priority key skills are bolded.)**
Students will know… ● Symmetry ● Rotation ● Line of Symmetry ● Symmetric Figure ● Center of Rotation ● Clockwise ● Counterclockwise ● Rotational Symmetry	*Students will be able to….* ● **Draw and identify lines of symmetry.** ● **Identify real life objects in the classroom that have symmetry.** ● Relate rotational symmetry to turns. (Optional) ● Trace a figure to determine if it has rotational symmetry. (Optional) ● Draw a shape or pattern about a line of symmetry and check for rotational symmetry. (Optional) ● **Complete a symmetric shape or picture.** ● **Create symmetric shapes or pictures on grid paper.** <u>*Example*</u>: For each figure, draw all of the lines of symmetry. What pattern do you notice? How many lines of symmetry do you think there would be for regular polygons with 9 and 11 sides? Sketch each figure and check your predictions.  Polygons with an odd number of sides have lines of symmetry that go from a midpoint of a side to a vertex.

Standards Alignment

MISSOURI LEARNING STANDARDS

MP.1 Make sense of problems and persevere in solving them.
MP.2 Reason abstractly and quantitatively.
MP.3 Construct viable arguments and critique the reasoning of others.
MP.4 Model with mathematics.
MP.5 Use appropriate tools strategically.
MP.6 Attend to precision.
MP.7 Look for and make use of structure.
MP.8 Look for and express regularity in repeated reasoning.

4.G.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Show Me-Standards

Goal 1: 1, 4, 5, 6, 7, 8
Goal 2: 2, 3, 7
Goal 3: 1, 2, 3, 4, 5, 6, 7, 8
Goal 4: 1, 4, 5, 6

Mathematics: 1, 2, 5

Unit 8 -Data Analysis
Unit Title: Data Analysis **Course:** 4th Grade Math **Brief Summary of Unit:** Chapter 4: Students will understand that graphs and tables are visual tools for showing and analyzing data. Chapter 5: Students will analyze information to find a typical value for a data set. (mean, median, mode, range) Students will also determine the probability of event. (likely, unlikely, certain, etc.) **Textbook Correlation:** Chapter 4 and Chapter 5 (lessons 1, 2, 4) **Time Frame:** approximately 3 weeks

Transfer
Students will be able to independently use their learning to… • Look at a graph, table, or chart in a newspaper or magazine and analyze the data, determine the validity of the information to be able to have discussions with others, and make rational decisions based on the information.

Meaning	Meaning
Essential Questions	Understandings
Students will consider… ● What is the best way to display this data? What is the advantage of using pictographs, line plots, bar graphs, or line graphs? ● When would you need to find the mean, median, mode, or range? ● What is the best increment for the scale of the axis? ● When would you need to determine the	*Students will understand that…* ● Graphs and tables are efficient ways to present a set of data. ● Based on the type of the data, different types of graphs will be used. ● Mean, median, and mode are used to describe the center of data set. ● Range is a measure of how spread out the data points are.

probability of an event? ● What information is needed to determine probability?	● Outliers may or may not impact the data. ● The same scale cannot be used for every graph. ● Probability is the likelihood of an event occurring.

Acquisition	**Acquisition**
Key Knowledge	Key Skills **(Priority key skills are bolded.)**
Students will know… ● axis ● scale ● title ● labels ● Bar graph ● Line graphs ● Pictographs ● Line plot ● tally chart ● table ● mean- average ● median ● mode ● range ● outlier ● probability	*Students will be able to….* ● **Collect, organize, and interpret data in a table.** ● **Create a table from data in a tally chart, pictographs, and a bar graph.** ● **Read and interpret data in a table, using rows, columns, and intersections.** ● **Make, read, and interpret line graphs, pictographs, and bar graphs.** ● **Appropriately scale a graph.** ● **Choose an appropriate graph to display a given data set.** ● **Describe a data set using the average or mean.** ● **Find mean, median, mode, range, and outlier of a set of data.** ● **Make and interpret line plots.** ● **Use a line plot to determine mean, median, mode, range, and outlier.** ● **Determine the probability of a given event.**

Standards Alignment

MISSOURI LEARNING STANDARDS

MP.1 Make sense of problems and persevere in solving them.
MP.2 Reason abstractly and quantitatively.
MP.3 Construct viable arguments and critique the reasoning of others.
MP.4 Model with mathematics.
MP.5 Use appropriate tools strategically.
MP.6 Attend to precision.
MP.7 Look for and make use of structure.
MP.8 Look for and express regularity in repeated reasoning.

4.MD.4: Make a line plot to display a data set of measurements in fractions of a unit (½, ¼, ⅛). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.*

Show Me-Standards

Goal 1: 1, 4, 5, 6, 7, 8
Goal 2: 2, 3, 7
Goal 3: 1, 2, 3, 4, 5, 6, 7, 8
Goal 4: 1, 4, 5, 6

Mathematics: 1, 3, 5