Crook County School District # 1 Curriculum Guide

Grade 3 Mathematics

2011-2012

Standards for Mathematical Practices

The Common Core State Standards for Mathematical Practice are expected to be integrated into every mathematics lesson for all students Grades K-12. Below are a few examples of how these Practices may be integrated into tasks that students complete.

Mathematic Practices	Explanations and Examples
1. Make sense of problems and persevere in solving them.	In third grade, mathematically proficient students know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Third graders may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They listen to the strategies of others and will try different approaches. They often will use another method to check their answers.
2. Reason abstractly and quantitatively.	Mathematically proficient third graders should recognize that a number represents a specific quantity. They connect the quantity to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities.
3. Construct viable arguments and critique the reasoning of others.	In third grade, mathematically proficient students may construct arguments using concrete referents, such as objects, pictures, and drawings. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" They explain their thinking to others and respond to others' thinking
4. Model with mathematics.	Mathematically proficient students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart, list, or graph, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed. Third graders should evaluate their results in the context of the situation and reflect on whether the results make sense
5. Use appropriate tools strategically	Mathematically proficient third graders consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use graph paper to find all the possible rectangles that have a given perimeter. They compile the possibilities into an organized list or a table, and determine whether they have all the possible rectangles.
6. Attend to precision.	Mathematically proficient third graders develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, when figuring out the area of a rectangle they record their answers in square units.
7. Look for and make use of structure.	In third grade mathematically proficient students look closely to discover a pattern or structure. For instance, students use properties of operations as strategies to multiply and divide (commutative and distributive properties).

8. Look for and express regularity in repeated reasoning.	Mathematically proficient students in third grade should notice repetitive actions in computation and look for more shortcut methods. For example, students may use the distributive property as a strategy for using products they know to solve products that they don't know. For example, if students are asked to find the product of 7 x 8, they might decompose 7 into 5 and 2 and then multiply 5 x 8 and 2 x 8 to arrive at 40 + 16 or 56. In addition, third graders continually evaluate their work by asking themselves, "Does this make sense?"

MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Operations and Algebraic Thinking** **Know**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.OA.1 Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.*	This standard interprets products of whole numbers. Students recognize multiplication as a means to determine the total number of objects when there are a specific number of groups with the same number of objects in each group. Multiplication requires students to think in terms of groups of things rather than individual things. Students learn that the multiplication symbol 'x' means "groups of" and problems such as 5 x 7 refer to 5 groups of 7. Example: Jim purchased 5 packages of muffins. Each package contained 3 muffins. How many muffins did Jim purchase? 5 groups of 3, 5 x 3 = 15. Describe another situation where there would be 5 groups of 3 or 5 x 3.	Recall Skill/Concept	**adding to**, **taking from, putting together, taking apart,** and **comparing,** with **unknowns product factors**

MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Operations and Algebraic Thinking**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary

3.OA.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.*	This standard focuses on two distinct models of division: partition models and measurement (repeated subtraction) models. Partition models focus on the question, "How many in each group?" A context for partition models would be: There are 12 cookies on the counter. If you are sharing the cookies equally among three bags, how many cookies will go in each bag? ☐ ☐ ☐ Measurement (repeated subtraction) models focus on the question, "How many groups can you make?" A context for measurement models would be: There are 12 cookies on the counter. If you put 3 cookies in each bag, how many bags will you fill?	Recall Skill/Concept	quotient

CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem	This standard references various strategies that can be used to solve word problems involving multiplication & division. Students should apply their skills to solve word problems. Students should use a variety of representations for creating and solving **one-step word problems**, such as: If you divide 4 packs of 9 brownies among 6 people, how many brownies does each person receive? *(4 x 9 = 36, 36 ÷ 6 = 6).* Students should be given ample experiences to explore all of the different problem structures. Examples of multiplication: There are 24 desks in the classroom. If the teacher puts 6 desks in each row, how many rows are there? This task can be solved by drawing an array by putting 6 desks in each row. This is an array model. Determining the number of objects in each share, where the size of the groups is unknown: Example: The bag has 92 hair clips, and Laura and her three friends want to share them equally. How many hair clips will each person receive?	Level 2 (skill/concept)	Unknown array

MATHEMATICS COMMON CORE STATE STANDARDS
3rd Grade

Operations and Algebraic Thinking

Represent and solve problems involving multiplication and division.

CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary

3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?*	Problem structure includes Unknown Product (3 x 6 = ? or 18 ÷ 3 = 6). The more difficult problem structures include Group Size Unknown (3 x ? = 18 or 18 ÷ 3 = 6) or Number of Groups Unknown (? x 6 = 18, 18 ÷ 6 = 3). The focus of 3.OA.4 goes beyond the traditional notion of *fact families*, by having students explore **the inverse relationship** of multiplication and division. Students apply their understanding of the meaning of the equal sign as "the same as" to interpret an equation with an unknown. When given 4 x ? = 40, they might think: • 4 groups of some number is the same as 40 • 4 times some number is the same as 40 • I know that 4 groups of 10 is 40 so the unknown number is 10 • The missing factor is 10 because 4 times 10 equals 40. Equations in the form of a x b = c and c = a x b should be used interchangeably, with the unknown in different positions. Example: Solve the equations below: 24 = ? x 6 72 ÷? = 9 Rachel has 3 bags. There are 4 marbles in each bag. How many marbles does Rachel have altogether? 3 x 4 = *m*	Level 2 (skill/concept)	inverse

MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Operations and Algebraic Thinking** **Understand properties of multiplication and the relationship between multiplication and division.**			
CC STANDARD	Declarative Knowledge	Level of Rigor	Academic

	Procedural knowledge		Vocabulary
3.OA.5 Apply properties of operations as strategies to multiply and divide.2 *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.)* *3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.)* *Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) =(8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*	This standard references properties (rules about how numbers work) of multiplication. While students DO NOT need to not use the formal terms of these properties, student should understand that properties are rules about how numbers work, they need to be flexible and fluent applying each of them. Students represent expressions using various objects, pictures, words and symbols in order to develop their understanding of properties. They multiply by 1 and 0 and divide by 1. They change the order of numbers to determine that the order of numbers does not make a difference in multiplication (but does make a difference in division). Given three factors (*3 × 5 × 2 can be found by 3 × 5 = 15)*, they investigate changing the order of how they multiply the numbers to determine that changing the order does not change the product. The associative property states that the sum or product stays the same when the grouping of addends or factors is changed. For example, when a student multiplies 7 x 5 x 2, a student could rearrange the numbers to first multiply 5 x 2 = 10 and then multiply 10 x 7 = 70. The commutative property (order property) states that the order of numbers does not matter when you are adding or multiplying numbers. For example, if a student knows that 5 x 4 = 20, then they also know that 4 x 5 = 20. The array below could be described as a 5 x 4 array for 5 columns and 4 rows, or a 4 x 5 array for 4 rows and 5 columns. There is no “fixed” way to write the dimensions of an array as rows x columns or columns x rows. Students are introduced to the distributive property of multiplication over addition as a strategy for using products they know to solve products they don’t know. Students would be using mental math to determine a product. Here are ways that students could use the distributive property to determine the product of 7 x 6. Again, students should use the distributive property (or decomposing), but can refer to this in informal language such as “breaking numbers apart”. (34 X 2 is the same as 30 X 2 +4 X 2) The use of visual images (drawings) in the form of boxes, squares etc.. should be used to help explain the concept.	Level 2 (Skill/Concept)	Commutative property of multiplication Associative property of multiplication Distributive property

	To further develop understanding of properties related to multiplication and division, students use different representations and their understanding of the relationship between multiplication and division to determine if the following types of equations are true or false. □ 0 x 7 = 7 x 0 (Zero Property of Multiplication) □ 1 x 9 = 9 x 1 (Multiplicative Identity Property of 1) □ 3 x 6 = 6 x 3 (Commutative Property) □ 8 ÷ 2 = 2 ÷ 8 (Students are only to determine that these are not equal) □ 2 x 3 x 5 = 6 x 5 □ 10 x 2 < 5 x 2 x 2 □ 2 x 3 x 5 = 10 x 3 □ 0 x 6 > 3 x 0 x 2		

MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Operations and Algebraic Thinking** **Understand properties of multiplication and the relationship between multiplication and division.**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.OA.6 Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*	This standard refers the Glossary on page 89, Table 2 (table also included at the end of this document for your convenience) and the various problem structures. Since multiplication and division are inverse operations, students are expected to solve problems and **explain their processes of solving** division problems that can also be represented as unknown factor multiplication problems. Example: A student knows that 2 x 9 = 18. How can they use that fact to determine the answer to the following question: 18 people are divided into pairs in P.E. class. How many pairs are there? Write a division equation and explain your reasoning. Multiplication and division are inverse operations and that understanding can be used to find the unknown. Fact family triangles demonstrate the inverse operations of multiplication and division by showing the two factors and how those factors relate to the product and/or quotient. Examples: • 3 x 5 = 15 5 x 3 = 15 • 15 ÷ 3 = 5 15 ÷ 5 = 3	Level 3 (Strategic Thinking) Because of explain?	

MATHEMATICS COMMON CORE STATE STANDARDS **Operations and Algebraic Thinking** **Multiply and divide within 100.**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two, one-digit numbers.	This standard uses the word fluently, which means accuracy, efficiency (using a reasonable amount of steps and time), and flexibility (using strategies such as the distributive property). "Know from memory" should not focus only on timed tests and repetitive practice, but ample experiences working with manipulative, pictures, arrays, word problems, and numbers to internalize the basic facts. By studying patterns and relationships in multiplication facts and relating multiplication and division, students build a foundation for fluency with multiplication and division facts. Students demonstrate fluency with multiplication **facts through 10** and the related division facts. Multiplying and dividing fluently refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently. Strategies students may use to attain fluency include: • Multiplication by zeros and ones • Doubles (2s facts), Doubling twice (4s), Doubling three times (8s) • Tens facts (relating to place value, 5 x 10 is 5 tens or 50) • Five facts (half of tens) • Skip counting (counting groups of __ and knowing how many groups have been counted) • Square numbers (ex: 3 x 3) • Nines (10 groups less one group, e.g., 9 x 3 is 10 groups of 3 minus one group of 3) • Decomposing into known facts (6 x 7 is 6 x 6 plus one more group of 6) • Turn-around facts (Commutative Property) • Fact families (Ex: 6 x 4 = 24; 24 ÷ 6 = 4; 24 ÷ 4 = 6; 4 x 6 = 24) • Missing factors General Note: Students should have exposure to multiplication and division problems presented **in both vertical and horizontal forms**.	Level 1 (Recall)	operation, multiply, divide, factor, product, quotient, unknown, strategies, reasonableness, mental computation, property

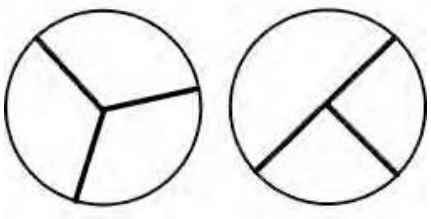
MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Operations and Algebraic Thinking** **Solve problems involving the four operations, and identify and explain patterns in arithmetic.**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.OA.8 Solve two-step word problems using the four operations. 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. This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order.	This standard refers **to two-step word problems** using the four operations. The size of the numbers should be limited to related 3rd grade standards (e.g., 3.OA.7 and 3.NBT.2). Adding and subtracting numbers should include numbers within 1,000, and multiplying and dividing numbers should include single-digit factors and products less than 100. This standard calls for students to represent problems using equations with a **letter to represent unknown quantities**. Example: Mike runs 2 miles a day. His goal is to run 25 miles. After 5 days, how many miles does Mike have left to run in order to meet his goal? Write an equation and find the solution (2 x 5 + m = 25). This standard refers to estimation strategies, including using compatible numbers (numbers that sum to 10, 50, or100) or rounding to check reasonableness of answer. The focus in this standard is to have students use and discuss various strategies. Students should estimate during problem solving, and then revisit their estimate to check for reasonableness.	Level 2 (Skill/Concept)	operation, multiply, divide, factor, product, quotient, subtract, add, addend, sum, difference, equation, unknown, strategies, reasonableness, mental computation, estimation, rounding, patterns, (properties)-rules about how numbers work order of operations

MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Operations and Algebraic Thinking** **Solve problems involving the four operations, and identify and explain patterns in arithmetic.**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.OA.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*	This standard calls for students to examine arithmetic patterns involving both addition and multiplication. Arithmetic patterns are patterns that change by the same rate, such as adding the same number. For example, the series 2, 4, 6, 8, 10 is an arithmetic pattern that increases by 2 between each term. This standard also mentions identifying patterns related to the properties of operations. Examples: • Even numbers are always divisible by 2. Even numbers can always be decomposed into 2 equal addends (14 = 7 + 7). • Multiples of even numbers (2, 4, 6, and 8) are always even numbers. • On a multiplication chart, the products in each row and column increase by the same amount (skip counting). • On an addition chart, the sums in each row and column increase by the same amount. Students need ample opportunities to observe and identify important numerical patterns related to operations. They should build on their previous experiences with properties related to addition and subtraction. Students investigate addition and multiplication tables in search of patterns and explain why these patterns make sense mathematically. Example: • Any sum of two even numbers is even. • Any sum of two odd numbers is even. • Any sum of an even number and an odd number is odd. • The multiples of 4, 6, 8, and 10 are all even because they can all be decomposed into two equal groups. • The doubles (2 addends the same) in an addition table fall on a diagonal while the	Level 3 (Strategic Thinking)	Odd/even

	doubles (multiples of 2) in a multiplication table fall on horizontal and vertical lines. • The multiples of any number fall on a horizontal and a vertical line due to the commutative property. • All the multiples of 5 end in a 0 or 5 while all the multiples of 10 end with 0. Every other multiple of 5 is a multiple of 10. Students also investigate a hundreds chart in search of addition and subtraction patterns. They record and organize all the different possible sums of a number and explain why the pattern makes sense.		

MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Number and Operations in Base 10** **Use place value understanding and properties of operations to perform multi-digit arithmetic.**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100..	This standard refers to place value understanding, which extends beyond an algorithm or procedure for rounding. The expectation is that students have a deep understanding of place value and number sense and can explain and reason about the answers they get when they round. Students should have numerous experiences using a number line and a hundreds chart as tools to support their work with rounding.	Level 1 (Recall)	**place value, round, addition, add, addend, sum, subtraction, subtract, difference, strategies, (properties)- rules about how numbers work** algorithm
3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. A range of algorithms may be used.	This standard refers to fluency, which means accuracy, efficiency (using a reasonable amount of steps and time), and flexibility (using strategies such as the distributive property). The word algorithm refers to a procedure or a series of steps. There are other algorithms other than the standard algorithm. Third grade students should have experiences beyond the standard algorithm. A variety of algorithms should be assessed. Problems should include both vertical and horizontal forms, including opportunities for students to apply the commutative and associative properties. Students explain their thinking and show their work by using strategies and algorithms, and verify that their answer is reasonable. Example: There are 178 fourth graders and 225 third graders on the playground. What is the total number of students on the playground?	Level 1 (Recall) Level 2 (Skill/Concept)	
3.NBT.3 Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60)using strategies based on place value and properties of operations.	This standard extends students' work in multiplication by having them apply their understanding of place value. This standard expects that students go beyond tricks that hinder understanding such as "just adding zeros" and **explain and reason about their products**. For example, for the problem 50 x 4, students should think of this as 4 groups of 5 tens or 20 tens. Twenty tens equals 200.	Level 2 (Skill/Concept)	

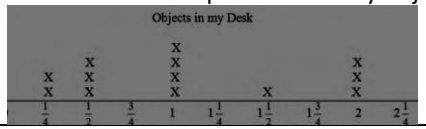
MATHEMATICS COMMON CORE STATE STANDARDS
3rd Grade
Number and Operations in Fractions
Develop understanding of fractions as numbers.
Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, 8.

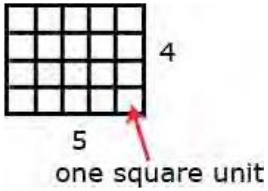
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.NF.1 Understand **a fraction** $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size $1/b$.	This standard refers to the sharing of a whole being partitioned or split. Fraction models in third grade include area (parts of a whole) models (circles, rectangles, squares) and number lines**. Set models (parts of a group) are not introduced in Third Grade.** In 3.NF.1 students should focus on the concept that a fraction is made up (composed) of many pieces of a unit fraction, which has a numerator of 1. For example, the fraction 3/5 is composed of 3 pieces that each have a size of 1/5. Some important concepts related to developing understanding of fractions include: Understand fractional parts must be **equal-sized**. Example Non-example  • The number of equal parts tell how many make a whole. • As the number of equal pieces in the whole increases, the size of the fractional pieces decreases.	Level 2 (skill/concept)	Fraction Numerator Denominator

MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Number and Operations in Fractions** **Develop understanding of fractions as numbers.**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line. b. Represent a fraction *a*/*b* on a number line diagram by marking off a lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line.	The number line diagram is the first time students work with a number line for **numbers that are between whole numbers** (e.g., that is between 0 and 1). For example an inch on a ruler is divided (partitioned) into 4 equal parts. The distance from 0 to the first segment is 1 of the 4 segments from 0 to 1 or 1/4th . (**3.NF.2a**). Similarly, the distance from 0 to the third segment is 3 segments that are each one-fourth long. Therefore, the distance of 3 segments from 0 is the fraction 3/4 (**3.NF.2b**).	Level 2 (Skill/Concept)	*above*, *below*, *beside*, *in front of*, *behind*, and *next to*.

MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Number and Operations in Fractions** **Develop understanding of fractions as numbers.**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.NF.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. **a.** Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. **b.** Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model. **c.** Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram* **d.** Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model	**3.NF.3a** and **3.NF.3b** These standards call for students to use visual fraction models (area models) and number lines to explore the idea of equivalent fractions. **Students should only explore equivalent fractions using models, rather than using algorithms or procedures.** This standard includes writing whole numbers as fractions. The concept relates to fractions as division problems, where the fraction 3/1 is 3 wholes divided into one group. This standard is the building block for later work where students divide a set of objects into a specific number of groups. Students must understand the meaning of a/1. Example: If 6 brownies are shared between 2 people, how many brownies would each person get? This standard involves comparing fractions with or without visual fraction models including number lines. Experiences should encourage students to reason about the size of pieces, the fact that 1/3 of a cake is larger than ¼ of the same cake. Since the same cake (the whole) is split into equal pieces, thirds are larger than fourths. In this standard, students should also reason that comparisons are only valid if the wholes are identical. For example, ½ of a large pizza is a different amount than 1/2 of a small pizza. Students should be given opportunities to discuss and reason about which 1/2 is larger.	Level 2 (Skill/Concept)	<, >, = Equivalence/equivalent

MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Measurement and Data** **Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.MD.1 Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.	This standard calls for students to solve elapsed time, including word problems. Students could use clock models or number lines to solve. On the number line, students should be given the opportunities to determine the intervals and size of jumps on their number line. Students could use pre-determined number lines (intervals every 5 or 15 minutes) or open number lines (intervals determined by students).	Level 2 (Skill/Concept)	**estimate, time, time intervals, minute, hour, elapsed time**
3.MD.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.2.	This standard asks for students to reason about the units of mass and volume. Students need multiple opportunities weighing classroom objects and filling containers to help them develop a basic understanding of the size and weight of a liter, a gram, and a kilogram. Milliliters may also be used to show amounts that are less than a liter. Word problems should only be **one-step and include the same units**. Example: Students identify 5 things that weigh about one gram. They record their findings with words and pictures. (Students can repeat this for 5 grams and 10 grams.) This activity helps develop gram benchmarks. One large paperclip weighs about one gram. A box of large paperclips (100 clips) weighs about 100 grams so 10 boxes would weigh one kilogram.	Level 2 (Skill/Concept)	**measure, liquid volume, mass, metric, gram (g), kilogram (kg), liter (L**

MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Measurement and Data** **Represent and interpret data..**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets*	Students should have opportunities reading and solving problems using scaled graphs before being asked to draw one. The following graphs all use five as the scale interval, but students should experience different intervals to further develop their understanding of scale graphs and number facts. While exploring data concepts, students should: • Pose a question • Collect data • Analyze data • Interpret data Students should be graphing data that is relevant to their lives. Example: Student should come up with a question. What is the typical genre read in our class? Collect and organize data: student survey. Single Bar Graphs: Students use both horizontal and vertical bar graphs. Bar graphs include a title, scale, scale label, categories, category label, and data.	Level 4 (Extended thinking)	**scale, scaled picture graph, scaled bar graph, data**
3.MD.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.	Students in second grade measured length in whole units using both metric and U.S. customary systems. It's important to review with students how to read and use a **standard ruler including details about halves and quarter marks on the ruler**. Students should connect their understanding of fractions to measuring to one-half and one quarter inch. Third graders need many opportunities measuring the length of various objects in their environment. This standard provides a context for students to work with fractions by measuring objects to a quarter of an inch. Example: Measure objects in your desk to the nearest 1/2 or 1/4 of an inch, display data collected on a line plot. How many objects measured 1/4? 1/2? etc… 	Level 2 (Skill/Concept)	**line plot**

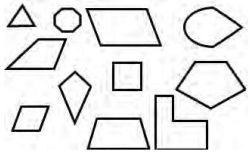
MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Measurement and Data** **Geometric measurement: understand concepts of area and relate area to multiplication and to addition**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.MD.5 Recognize area as an attribute of plane figures and understand concepts of area measurement. a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.	These standards call for students to explore the concept of covering a region with "unit squares," which could include square tiles or shading on grid or graph paper.  	Level 2 (Skill/Concept)	**area, square unit, square cm, square m , square in., square ft, nonstandard units, side length**
3.MD.6 Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	Students should be counting the square units to find the area that can be done in metric, customary, or non-standard square units. Using different sized graph paper, students can explore the areas measured in square centimeters and square inches.	Level 2 (Skill/Concept)	

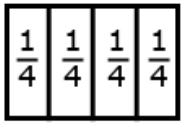
MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Measurement and Data** **Geometric measurement: understand concepts of area and relate area to multiplication and to addition**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.MD.7 Relate area to the operations of multiplication and addition. a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.	Students should tile the rectangle (or use grid paper) then multiply the side lengths to show it is the same. To find the area one could count the squares or multiply 3 x 4 = 12. Students should solve real world and mathematical problems Example: Drew wants to tile the bathroom floor using 1 foot tiles. How many square foot tiles will he need? This standard uses the word **rectilinear**. A rectilinear figure is a polygon that has all right angles.	Level 2 (Skill/Concept)	**area, square unit, plane figure, gap, overlap, square cm, square m , square in., square ft, nonstandard units, tiling, side length, decomposing, rectilinear**

d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.			

MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Measurement and Data** **Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.MD.8 Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	Students develop an understanding of the concept of perimeter by walking around the perimeter of a room, using rubber bands to represent the perimeter of a plane figure on a geoboard, or tracing around a shape on an interactive whiteboard. They find the perimeter of objects; use addition to find perimeters; and recognize the patterns that exist when finding the sum of the lengths and widths of rectangles. Students use geoboards, tiles, and graph paper to find all the possible rectangles that have a given perimeter (e.g., find the rectangles with a perimeter of 14 cm.) They record all the possibilities using dot or graph paper, compile the possibilities into an organized list or a table, and determine whether they have all the possible rectangles (organized list). Given a perimeter and a length or width, students use objects or pictures to find the missing length or width. They justify and communicate their solutions using words, diagrams, pictures, numbers, and/or an interactive whiteboard. Students use geoboards, tiles, graph paper, or technology to find all the possible rectangles with a given area (e.g. find the rectangles that have an area of 12 square units.) They record all the possibilities using dot or graph paper, compile the possibilities into an organized list or a table, and determine whether they have all the possible rectangles. Students then investigate the perimeter of the rectangles with an area of 12. Area Length Width Perimeter 12 sq. in. 1 in. 12 in. 26 in. 12 sq. in. 2 in. 6 in. 16 in. 12 sq. in 3 in. 4 in. 14 in. 12 sq. in 4 in. 3 in. 14 in. 12 sq. in 6 in. 2 in. 16 in. 12 sq. in 12 in. 1 in. 26 in. The patterns in the chart allow the students to identify the factors of 12, connect the results to the commutative property, and discuss the differences in perimeter within the same area. This chart can also be used to investigate rectangles with the same	Level 3 (Strategic Thinking)	**perimeter, linear, area, polygon, side length**

	perimeter. It is important to include squares in the investigation		

MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Geometry** **Reason with shapes and their attributes.**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.G.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories	In second grade, students identify and draw triangles, quadrilaterals, pentagons, and hexagons. Third graders build on this experience and further investigate quadrilaterals (technology may be used during this exploration). Students recognize shapes that are and are not quadrilaterals by examining the properties of the geometric figures. They conceptualize that a quadrilateral must be a closed figure with four straight sides and begin to notice characteristics of the angles and the relationship between opposite sides. Students should be encouraged to provide details and use proper vocabulary when describing the properties of quadrilaterals. They sort geometric figures (see examples below) and identify squares, rectangles, and rhombuses as quadrilaterals.  Students should classify shapes by attributes and drawing shapes that fit specific categories. For example, parallelograms include: squares, rectangles, rhombi, or other shapes that have two pairs of parallel sides. Also, the broad category quadrilaterals include all types of parallelograms, trapezoids and other four-sided figures.	Level 3 (Strategic Thinking)	attributes, properties, quadrilateral, open figure, closed figure, polygon, three-sided, 2-dimensional, 3-dimensional, rhombi, rectangles, and squares, horizontal, vertical, skewed, perpendicular, parallel, right angle, 90◦ angle, acute, obtuse, intersecting, sphere, rectangular prism, triangular prism, equilateral

MATHEMATICS COMMON CORE STATE STANDARDS 3rd Grade **Geometry** **Reason with shapes and their attributes.**			
CC STANDARD	Declarative Knowledge Procedural knowledge	Level of Rigor	Academic Vocabulary
3.G.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape*	This standard builds on students' work with fractions and area. Students are responsible for partitioning shapes into halves, thirds, fourths, sixths and eighths. Given a shape, students partition it into equal parts, recognizing that these parts all have the same area. They identify the fractional name of each part and are able to partition a shape into parts with equal areas in several different ways   	Level 2 (Skill/Concept)	

The properties of operations

Here a, b and c stand for arbitrary numbers in a given number system. The properties of operations apply to the rational number system, the real number system, and the complex number system.

Associative property of addition	$(a + b) + c = a + (b + c)$
Commutative property of addition	$a + b = b + a$
Additive identity property of 0	$a + 0 = 0 + a = a$
Associative property of multiplication	$(a \times b) \times c = a \times (b \times c)$
Commutative property of multiplication	$a \times b = b \times a$
Multiplicative identity property of 1	$a \times 1 = 1 \times a = a$
Distributive property of multiplication over addition	$a \times (b + c) = a \times b + a \times c$

Common Core Student Math Vocabulary

2012-2013 Version

Kindergarten	1st Grade	2nd Grade	3rd Grade	4th Grade	5th Grade	6th Grade
Zero One Hundred Greater More Less fewer equal same amount join add separate subtract and same amount as equal less more number words left over length weight heavy long more of less of longer taller shorter color words descriptive words	adding to taking from putting together taking apart comparing unknowns addition equal shares *halves* *fourths* *quarters* *half of* *fourth of* *quarter of*	Standard units of measurement Inch centimeter number of angles number of equal faces triangles quadrilaterals pentagons hexagons cubes columns trapezoid	products groups of quotients partitioned equally multiplication division equal groups arrays equations unknown operation multiply divide factor product quotient strategies properties mental computation addend sum place value partition(ed) equal parts fraction equal distance (intervals), equivalent equivalence reasonable denominator	factor pairs factor multiple prime composite convert/conversion relative size liquid volume mass length distance kilometer (km) meter (m) centimeter (cm) kilogram (kg) gram (g), liter (L), milliliter (mL) inch (in), foot (ft), yard (yd), mile (mi), ounce (oz), pound (lb), cup (c), pint (pt), quart (qt), gallon (gal) line plot graph ray angle circle fraction intersect	parentheses brackets braces numerical expressions numerical patterns rules ordered pairs coordinate plane **right rectangular prism** **unit** **unit cube** **cubic units (cubic cm, cubic in. cubic ft)** coordinate system coordinate plane first quadrant points lines axis/axes, x-axis, y-axis horizontal vertical intersection of lines, origin ordered pairs coordinates x-coordinate y-coordinate	one-variable equations inequalities dependent and independent variables statistical variability histogram box plot

Update on: November 12, 2011

squares circles triangles rectangles hexagons cubes cones cylinders spheres analyze compare create compose			numerator comparison compare justify greater than >
less than < estimate time time intervals minute hour elapsed time measure liquid volume mass standard units metric gram (g) kilogram (kg) liter (L) scale scaled picture graph scaled bar graph line plot data attribute area square unit plane figure gap overlap square cm square m square in., square ft, nonstandard units tiling side length decomposing perimeter	one-degree angle protractor vertex/vertices right angle acute obtuse perpendicular parallel right triangle isosceles triangle equilateral triangle scalene triangle line of symmetry symmetric figures	attribute category subcategory hierarchy	

			plane figure linear area polygon quadrilateral open figure closed figure three sided 2-dimensional 3-dimensional rhombi			