TABLE OF CONTENTS

Introduction 5

Chapter 1: The Math GNOMe 10

About the Math GNOMe 10
Implementing the Math GNOMe 11

Chapter 2: The Common Core 4 23

About the Common Core 4 23
Implementing the Common Core 4 23
Math Fluency 24
Math Games 31
Mathematical Practice 37
Technology 43
Teacher Conferences 50

Chapter 3: Preparing Your Classroom 57

Bulletin Boards 57
Math Games Binder 58
Math Boxes 58
Manipulatives 59

Chapter 4: Putting It All Together 60

Chapter 5: Assessment 67

Chapter 6: Home Connection 69

Common Core State Standards for Mathematical Practice 76

Common Core State Standards for Third Grade 77

References 80

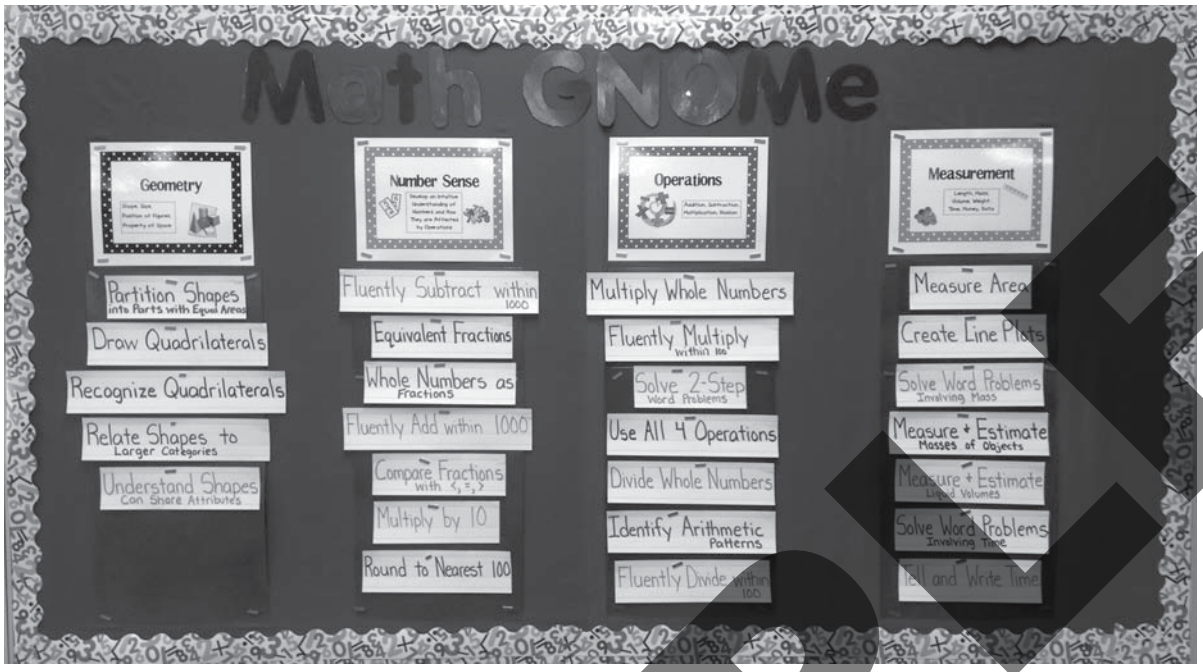
INTRODUCTION

Did you panic when you heard that your state was adopting the Common Core Standards?

If you are anything like us, you probably found yourself moving through the stages of panic, fear, curiosity, and, eventually, acceptance. At first we thought we were going to have to completely overhaul our entire curriculum and instruction. However, after exploring the Common Core Standards through professional development provided by our district, as well as on our own initiative, we came to the realization that we already had all of the tools needed to become a Common Core classroom.

After a few planning periods and lunch chats, we finally experienced our "aha" moment. What we would need to do is change the way we think about math instruction. The shift would come in the presentation of our lessons and in the way we ask our students to respond to math. The Common Core Standards mention shifts in the direction in which math is approached, so we needed to rethink the way in which we incorporated these standards into our math lessons and the level in which we allowed students to experience the content. The Common Core Standards take a constructivist approach to math learning. Therefore, students should be using their math knowledge to solve novel, real-world problems.

What we would need to do is change the way we think about math instruction.



We really wanted our students to take ownership of their learning and be aware of the high expectations that are placed on them. In order to do this in a student-friendly way, we came up with the acronym GNOMe, which stands for geometry, number sense, operations, and measurement. These are the domains that the Common Core Standards use in organizing the standards. We then rewrote the standards in short, student-friendly phrases by highlighting the core math concepts addressed.

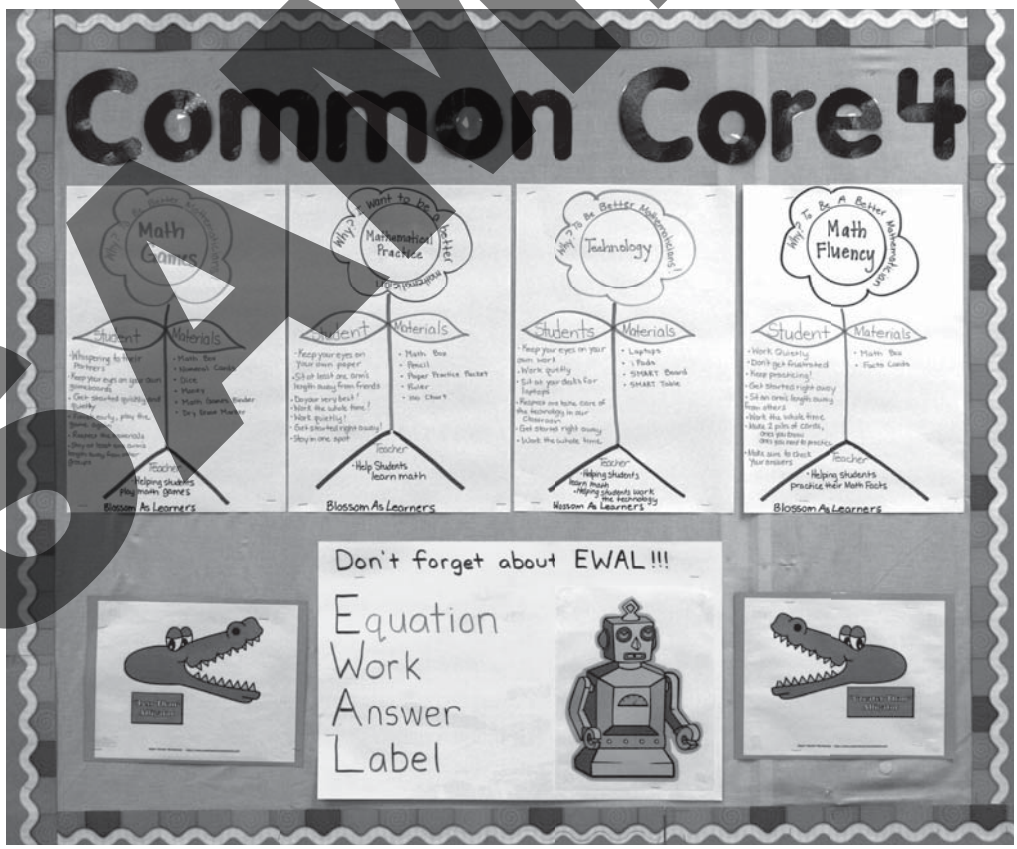
We couldn't think of a better way for students to grasp what they were expected to learn than by displaying the concepts to refer to throughout the day. Throughout the school year, as we introduce and teach the standards, we place each standard's core concepts under the corresponding domain (see Chapter 1 for more details). This is also a great way for us to make sure we are consistently teaching to the standards and are able to refer back to standards that were previously taught.

Next, we turned our attention to the setup of our math time. With the current emphasis on differentiation and individualized learning plans, we wanted to make sure our math block allowed us to work both one-on-one with individual students and in small groups with students who are all working on the same math skills. We decided that a mini-lesson followed by independent practice would work best. Marzano, Pickering, and Pollock (2001) discuss the

importance of helping students set high expectations and objectives for themselves as well as having teachers provide immediate feedback. The independent practice time allows teachers to conduct a conference and provide meaningful feedback to individual students while the rest of the class is working on a task.

How do we meet with students individually and not lose meaningful instruction time with those working independently?

This format posed another obstacle. How do we meet with students individually and not lose meaningful instruction time with those working independently? We did not want to assign "busy work" to our students. We want our students to be engaged in meaningful activities that support their learning. We also want to spend most of our time working with students, not making copies and grading papers. This led to the birth of the Common Core 4, which is based on the Common Core State Standards for Mathematical Practice (page 76). We decided that there are four main activities that students should experience on a regular, consistent basis



in order to support their math learning and growth. The Common Core 4 is composed of four kinds of activities: math fluency, math games, mathematical practice, and technology. (See Chapter 2 for more details.)

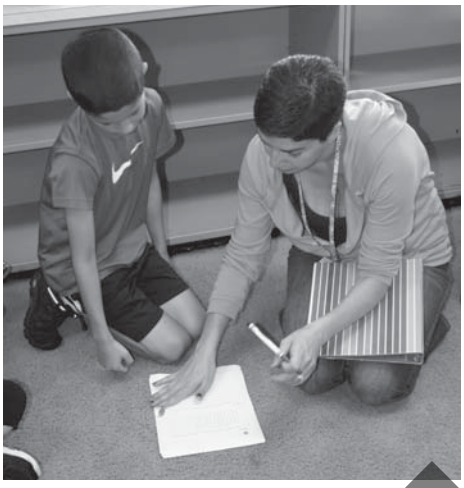
We also agreed that student choice needed to play a role in our math instruction. There is much research that shows students are more invested in their learning when they are interested in it. Katz and Assor (2007) discuss the impact that student choice can have on motivation, well-being, and achievement. What better way to appeal to the interest of students than by giving them choice when it comes to their learning. We decided to give students the opportunity to choose which one of the Common Core 4 they would like to work on and when.

Putting it all together, our math day eventually ended up looking like this: We teach a mini-lesson about a concept on the GNOMe board. That is followed by students choosing which one of the Common Core 4 activities they would like to work on independently. While students work independently, we meet with individuals or small groups to reinforce skills. We repeat this two to three times within our math block, resulting in two to three mini-lessons and two to three rounds of the Common Core 4 every day.

The Common Core 4 is composed of math fluency, math games, mathematical practice, and technology.

While we chose for the Common Core 4 to be the independent practice part of our math block, there are many other great math programs out there that would work equally as well in its place. If your school has a math series that you are required to use, the activities and lessons found in your series could take the place of the independent practice. Chapter 4 provides details and examples of how to set up your math block using the Math GNOMe with the Common Core 4, as well as with a variety of other options in place of the Common Core 4. The Math GNOMe and Common Core 4 helped to align our

instruction to the Common Core Standards with a simple shift in how we think about and present math. It is evident to anyone who walks into our classroom what standards we have taught and what standards students are working on. Our students are able to discuss math concepts and explain why they are learning a particular skill. We, as well as students, are able to refer back to the Math GNOMe board throughout the school year. The Math GNOMe has focused our attention on the expectations the standards place on our students, while the Common Core 4 allows us time to work with students individually in areas where they are struggling. It is amazing to be able to find the time to work one-on-one with students on a regular basis. Because of this individualized attention and ongoing formative assessment, students' growth is astounding.



The Math GNOMe and Common Core 4 work in conjunction with one another to allow you to have a truly Common Core classroom that addresses the six shifts in mathematics instruction—focus, coherence, fluency, deep understanding, application, and dual intensity. Through the Math GNOMe mini-lessons, teachers are able to provide instruction that has focus, coherence, and depth for greater understanding, while the Common Core 4 provides students with the opportunity to achieve fluency, application, and dual intensity. Your students will participate in independent, self-selected math activities while allowing you to provide individual and small-group instruction and assessment through conferences.

The Math GNOMe and Common Core 4 helped to align our instruction to the Common Core Standards with a simple shift in how we think about and present math.

Geometry *I Can...* Statements

STANDARD NUMBER	BULLETIN BOARD PHRASE(S)	I CAN STATEMENT(S)
3.G.A.1	Understand shapes can share attributes	I can understand that shapes in different categories may share attributes.
	Relate shapes to larger categories	I can understand that the shared attributes can define a larger category of shapes.
	Recognize quadrilaterals	I can recognize that rhombuses, rectangles, and squares are examples of quadrilaterals.
	Draw quadrilaterals	I can draw quadrilaterals that are not squares, rectangles, or rhombuses.
3.G.A.2	Partition shapes into parts with equal areas	I can divide shapes into parts with equal areas. I can express the area of each part as a fraction of the whole shape.

Number Sense *I Can...* Statements

STANDARD NUMBER	BULLETIN BOARD PHRASE(S)	I CAN STATEMENT(S)
3.NBT.A.1	Round to the nearest 10 Round to the nearest 100	I can identify the two multiples of 10 that a given number falls between. I can identify the halfway point between two multiples of 10. I can round whole numbers to the nearest 10. I can identify the two multiples of 100 that a given number falls between. I can identify the halfway point between two multiples of 100. I can round whole numbers to the nearest 100.
3.NBT.A.2	Fluently add within 1,000 Fluently subtract within 1,000	I can fluently add within 1,000 using strategies and algorithms (place value, properties of operations, relationship between addition and subtraction). I can fluently subtract within 1,000 using strategies and algorithms (place value, properties of operations, relationship between addition and subtraction).
3.NBT.A.3	Multiply by 10	I can multiply one-digit numbers by multiples of ten in the range 10-90 using strategies such as place value and properties of operations.
3.NF.A.1	Understand fractions as the division of a whole into equal parts	I can understand that when a whole is cut into equal parts, the denominator of the fraction represents the number of parts. I can understand that when a whole is cut into equal parts, the numerator of the fraction is the count of how many parts are being considered.
3.NF.A.2, 3.NF.A.2a, 3.NF.A.2b	Identify and represent fractions on a number line	I can identify a point between two whole numbers on a number line as a fraction. I can plot a fractional number on its correct location between two numbers on a number line. I can represent fraction 1/*b* on the number line by: • Defining the interval from 0 to 1 as the whole being divided into *b* equal parts. • Recognizing that each part is equal in size with a size 1/*b*. I can represent fraction *a/b* on the number line by: • Marking a number of lengths from 0, each 1/*b* in size. • Recognizing that this segment on the number line has a size of *a/b*.
3.NF.A.3, 3.NF.A.3a, 3.NF.A.3b	Understand equivalent fractions	I can compare fractions by looking at the size of the parts and the number of parts. I can show two fractions as equivalent (equal) if they are the same size. I can show two fractions as equivalent (equal) if they are on the same point on a number line. I can recognize and create fractions. I can explain why fractions are equivalent.
3.NF.A.3c	Express whole numbers as fractions	I can write whole numbers as fractions. I can recognize fractions that are equivalent to whole numbers.
3.NF.A.3d	Compare fractions with <, =, >	I can compare two fractions with the same numerator but different denominator and understand that each fraction has the same number of equal parts but the size of the parts are different. I can compare two fractions with the same denominator and understand that the fraction with the larger numerator has the larger number of parts. I can record the results of my comparison with the symbols <, =, > and justify the conclusions.

Operations *I Can...* Statements

STANDARD NUMBER	BULLETIN BOARD PHRASE(S)	I CAN STATEMENT(S)
3.OA.A.1	Multiply whole numbers	I can interpret products of whole numbers as X many groups of X many objects in each.
3.OA.A.2	Divide whole numbers	I can interpret quotients of whole numbers as the number of objects in each group when the objects are partitioned equally.
3.OA.A.3	Use multiplication to solve word problems	I can decide when to use multiplication in word problems within 100.
		I can solve multiplication word problems involving equal groups, arrays, and measurement quantities by using drawings and equations with a symbol for the unknown number.
	Use division to solve word problems	I can decide when to use division in word problems within 100.
		I can solve division word problems involving equal groups, arrays, and measurement quantities by using drawings and equations with a symbol for the unknown number.
3.OA.A.4	Determine unknown whole numbers in multiplication equations	I can find the unknown whole number in any part of a multiplication equation.
	Determine unknown whole numbers in division equations	I can find the unknown whole number in any part of a division equation.
3.OA.B.5	Apply properties of operations as strategies to multiply and divide	I can show that changing the order of the factors in a multiplication problem does not affect the product (Commutative property).
		I can show that changing the grouping of three or more factors in a multiplication problem does not affect the product (Associative property).
		I can show that multiplying a sum by a number is the same as multiplying each of its addends by the number and then adding the products (Distributive property).
3.OA.B.6	Understand division as an unknown-factor problem	I can use multiplication fact families to find the unknown number in a division problem.
3.OA.C.7	Fluently multiply within 100	I can fluently multiply within 100 using a variety of strategies (relationship between multiplication and division, properties of operation).
		I can recall products of two one-digit numbers from memory.
	Fluently divide within 100	I can fluently divide within 100 using a variety of strategies (relationship between multiplication and division, properties of operation).
3.OA.D.8	Solve two-step word problems	I can use +, –, x, ÷ to solve two-step word problems.
		I can use a letter to stand for the unknown number in the equations.
		I can use mental and estimation strategies to decide if the answer is reasonable.
3.OA.D.9	Identify arithmetic patterns	I can identify patterns related to arithmetic.
		I can identify patterns in addition and multiplication.
		I can explain the pattern using addition, subtraction, multiplication, and division.

Measurement *I Can...* Statements

STANDARD NUMBER	BULLETIN BOARD PHRASE(S)	I CAN STATEMENT(S)
3.MD.A.1	Tell and write time	I can tell and write time to the minute.
	Solve word problems involving time	I can solve word problems involving adding and subtracting time intervals in minutes.
3.MD.A.2	Measure and estimate liquid volumes	I can measure and estimate liquid volumes using standard units of liters (l).
	Measure and estimate masses of objects	I can measure and estimate masses of objects using standard units of grams (g) and kilograms (kg).
	Solve word problems involving volume	I can solve one-step word problems involving volumes given the same unit.
	Solve word problems involving mass	I can solve one-step word problems involving masses given the same unit.
3.MD.B.3	Draw scaled picture graphs	I can draw a scaled picture graph to represent a data set with several categories.
	Draw scaled bar graphs	I can draw a scaled bar graph to represent a data set with several categories.
	Solve word problems involving bar graph data	I can solve one- and two-step problems using data from the scaled bar graph.
3.MD.B.4	Use rulers to measure length	I can use a ruler to measure lengths in wholes, halves, and quarters of an inch.
		I can generate and record measurement data using wholes, halves, and quarters of an inch.
	Create line plots	I can create a line plot with a horizontal scale marked off in whole, half, and quarter units to represent a set of measurement data.
3.MD.C.5, 3.MD.C.5a, 3.MD.C.5b,	Understand concepts of area measurement	I can define area as the measure of space within a plane figure.
		I can understand that unit squares can be used to measure the area of plane figures.
		I can understand that a plane figure covered without gaps or overlaps by a certain number of unit squares has an area that is equal to the number of unit squares used to cover it.
3.MD.C.6	Measure area	I can count unit squares to measure area.
		I can record the area in square cm, m, in, ft, and other units.
3.MD.C.7, 3.MD.C.7a	Relate area to multiplication and addition	I can use multiplication and addition to find area.
		I can 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.
		I can divide a rectangle into equal-size squares and count the squares to find the area.
		I can divide a rectangle into equal-size squares and multiply the number of squares across the long side by the number of squares across the short side to find the area.
3.MD.C.7b	Solve word problems involving area	I can solve real-world problems by multiplying a rectangle's lengths to find the area.
3.MD.C.7c	Represent the distributive property using area models	I can divide a rectangle into equal-sized squares to show that the area of the rectangle with side lengths *a* and *b+c* is the sum of *a x b* and *a x c*.
		I can represent the distributive property using area models.
3.MD.C.7d	Recognize area as additive	I can find the area of a polygon that is made of two rectangles. • I can divide a polygon into two rectangles along the shared side. • I can add the areas of the two rectangles to find the area of the entire polygon.
3.MD.D.8	Solve problems involving perimeter	I can solve real-world problems involving perimeters of polygons.
		I can find the perimeter of a polygon given the side lengths.
		I can find an unknown side length.
		I can create rectangles with the same perimeter and different areas.
		I can create rectangles with the same area and different perimeters.

COMMON CORE STATE STANDARDS

for Third Grade

Operations and Algebraic Thinking

REPRESENT AND SOLVE PROBLEMS INVOLVING MULTIPLICATION AND DIVISION.

CCSS.Math.Content.3.OA.A.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.*

CCSS.Math.Content.3.OA.A.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 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.*

CCSS.Math.Content.3.OA.A.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.[1]

CCSS.Math.Content.3.OA.A.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 = ?*

UNDERSTAND PROPERTIES OF MULTIPLICATION AND THE RELATIONSHIP BETWEEN MULTIPLICATION AND DIVISION.

CCSS.Math.Content.3.OA.B.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.)*

CCSS.Math.Content.3.CC.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.*

MULTIPLY AND DIVIDE WITHIN 100.

CCSS.Math.Content.3.OA.C.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.

SOLVE PROBLEMS INVOLVING THE FOUR OPERATIONS, AND IDENTIFY AND EXPLAIN PATTERNS IN ARITHMETIC.

CCSS.Math.Content.3.OA.D.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.[3]

CCSS.Math.Content.3.OA.D.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.*

1 See Common Core Standards Glossary, Table 2.
2 Students need not use formal terms for these properties.
3 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.

Number & Operations in Base Ten

USE PLACE VALUE UNDERSTANDING AND PROPERTIES OF OPERATIONS TO PERFORM MULTI-DIGIT ARITHMETIC.[4]

CCSS.Math.Content.3.NBT.A.1

Use place value understanding to round whole numbers to the nearest 10 or 100.

CCSS.Math.Content.3.NBT.A.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.

CCSS.Math.Content.3.NBT.A.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.

Number & Operations—Fractions[5]

DEVELOP UNDERSTANDING OF FRACTIONS AS NUMBERS.

CCSS.Math.Content.3.NF.A.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*.

CCSS.Math.Content.3.NF.A.2

Understand a fraction as a number on the number line; represent fractions on a number line diagram.

CCSS.Math.Content.3.NF.A.2a

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.

CCSS.Math.Content.3.NF.A.2b

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.

CCSS.Math.Content.3.NF.A.3

Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

CCSS.Math.Content.3.NF.A.3a

Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.

CCSS.Math.Content.3.NF.A.3b

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.

CCSS.Math.Content.3.NF.A.3c

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.*

CCSS.Math.Content.3.NF.A.3d

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.

Measurement & Data

SOLVE PROBLEMS INVOLVING MEASUREMENT AND ESTIMATION.

CCSS.Math.Content.3.MD.A.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.

CCSS.Math.Content.3.MD.A.2

Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).[6] 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.[7]

4 A range of algorithms may be used.
5 Grade 3 expectations in this domain
6 Excludes compound units such as cm3 and finding the geometric volume of a container.
7 Excludes multiplicative comparison problems (problems involving notions of "times as much"; see Common Core Standards Glossary, Table 2).

REPRESENT AND INTERPRET DATA.

CCSS.Math.Content.3.MD.B.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.*

CCSS.Math.Content.3.MD.B.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.

GEOMETRIC MEASUREMENT: UNDERSTAND CONCEPTS OF AREA AND RELATE AREA TO MULTIPLICATION AND TO ADDITION.

CCSS.Math.Content.3.MD.C.5
Recognize area as an attribute of plane figures and understand concepts of area measurement.

CCSS.Math.Content.3.MD.C.5a
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.

CCSS.Math.Content.3.MD.C.5b
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.

CCSS.Math.Content.3.MD.C.6
Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).

CCSS.Math.Content.3.MD.C.7
Relate area to the operations of multiplication and addition.

CCSS.Math.Content.3.MD.C.7a
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.

CCSS.Math.Content.3.MD.C.7b
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.

CCSS.Math.Content.3.MD.C.7c
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.

CCSS.Math.Content.3.MD.C.7d
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.

GEOMETRIC MEASUREMENT: RECOGNIZE PERIMETER.

CCSS.Math.Content.3.MD.D.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.

Geometry

REASON WITH SHAPES AND THEIR ATTRIBUTES.

CCSS.Math.Content.3.G.A.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.

CCSS.Math.Content.3.G.A.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.*