

Westside Consolidated School District  
*Common Core State Standards*  
Curriculum Guide for Grade 4 Mathematics

**DRAFT June, 2014**

### Grade 4 Overview

- **Operations and Algebraic Thinking**
  - Use the four operations with whole numbers to solve problems.
  - Gain familiarity with factors and multiples – *factor pairs for whole numbers 1-100; multiples of 1-digit numbers; prime or composite numbers from 1-100.*
  - Generate and analyze patterns – *number or shape patterns.*
- **Number and Operations in Base Ten**
  - Generalize place value understanding for multi-digit whole numbers – *whole numbers less than or equal to 1,000,000.*
  - Use place value understanding and properties of operations to perform multi-digit arithmetic.
- **Number and Operations – Fractions – with Denominators: 2, 3, 4, 5, 6, 8, 10, 12, 100**
  - Extend understanding of fraction equivalence and ordering.
  - Build fractions from *unit fractions* by applying and extending previous understandings of operations on whole numbers – *add or subtract with like denominators; multiply a fraction by a whole number.*
  - Understand decimal notation for fractions *with denominators of 10 or 100*, and compare decimal fractions.
- **Measurement and Data**
  - Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit – *know relative size of measurement units within one system of units.*
  - Represent and interpret data – *make a line plot to display a data set of measurements using fractions of a unit ( $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ ).*
  - Geometric measurement: Understand concepts of angle and measure angles – *measure angles in whole number degrees using a protractor.*
- **Geometry**
  - Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

### Resources:

Textbook Series: enVision Math, © 2009, Scott Foresman-Addison Wesley

#### Investigations in Number, Data, and Space, Pearson Publishing

*Investigations and the Common Core State Standards in Math* Home Page: <http://investigations.terc.edu/components/CCSS/CommonCore.cfm>

*Math Common Core State Standards* Kindergarten Correlation: [http://investigations.terc.edu/library/common\\_core/GK\\_InvCCSS\\_Corr.pdf](http://investigations.terc.edu/library/common_core/GK_InvCCSS_Corr.pdf)

The Common Core State Standards Home Page: <http://www.corestandards.org/>

The Common Core State Standards for Mathematics: [http://www.corestandards.org/assets/CCSSI\\_Math%20Standards.pdf](http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf)

Common Core Unpacking resource: C2 Collaborative, Inc.: <http://ccstudio.org/Home.aspx>

## **CCSS: Standards for Mathematical Practice**

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

# CCSS: Mathematics

# K – 8 Domains

Domains		K	1	2	3	4	5	6	7	8
Counting and Cardinality	<b>CC</b>									
Operations and Algebraic Thinking	<b>OA</b>				30-35%	12-17%	5-10%			
Number and Operations in Base Ten	<b>NBT</b>				5-10%	22-27%	22-27%			
Measurement and Data	<b>MD</b>				22-27%	12-17%	10-15%			
Geometry	<b>G</b>				10-15%	12-17%	2-7%	12-17%	22-27%	20-25%
Number and Operations -- Fractions	<b>NF</b>				20-25%	27-32%	47-52%			
Ratios and Proportional Relationships	<b>RP</b>							12-17%	22-27%	
The Number System	<b>NS</b>							27-32%	7-12%	2-7%
Expressions and Equations	<b>EE</b>							27-32%	22-27%	27-32%
Statistics and Probability	<b>SP</b>							7-12%	12-17%	15-20%
Functions	<b>F</b>									22-27%

**At A Glance:** Comparing the new *Common Core State Standards* to the old *Arkansas frameworks*.

**This page provides a snapshot of the mathematical concepts that are NEW or have been MOVED from this grade level.**

**NEW to 4<sup>th</sup> Grade:**

Factors and multiples (4.OA.4)

Multiply a fraction by a whole number (4.NF.4)

Conversions of measurements within the same system (4.MD.1, 4.MD.2)

Angles and angle measurements (4.MD.5, 4.MD.6, 4.MD.7)

Lines of symmetry (4.G.3)

**MOVED from 4<sup>th</sup> Grade:**

Coordinate system

Transformations

Line graphs and bar graphs

Data - median, range, mode, comparing sets data

Probability

Number relationships

**Note:**

**For more information on deconstructed standards and performance based assessments visit [ccstudio.org](http://ccstudio.org)**

## Directions:

**This is a live document that will be the foundation for math instruction. The next four pages outline what should be taught during each nine-week period for Common Core Standards and vocabulary as a pacing guide. The fifth page is all of the nine-week periods on one page for all the information at-a-glance.**

**The Pacing Guide- In the last columns write in the Topic and lesson number from envisionMATH 2011 edition. This will allow you to decide what Topics best fit the standard. You can also add the Big Ideas if you would like to. Add any more information as necessary. Since this is a working document, feel free to make comments for adjustments in the future.**

**The At-A-Glance - Add page numbers, Topics, or lesson numbers next to the standard listed. At the bottom of each nine-weeks section list any projects, resources, or manipulatives to supplement the text.**

Westside Consolidated School District *Common Core State Standards – Mathematics* 4<sup>th</sup> Grade Pacing Guide

1<sup>st</sup> Nine Weeks

Unit	Common Core Standards	Major Topics/Concepts from <i>DPI's Unpacking Documents</i>	Textbook Alignment <i>enVision Math Common Core ©2011</i>	Resources/ Lit Connections
Place Value	4.NBT.1 4.NBT.2 4.NBT.3  4.OA.3	<p><b>Generalize place value understanding for multi-digit whole numbers.</b></p> <ul style="list-style-type: none"> <li>4. NBT.1 - Place Value – recognize that a digit in one place represents ten times what it represents in the place to its right.</li> <li>4. NBT.2 – Read/ 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 <math>&gt;</math>, <math>=</math>, <math>&lt;</math> symbols to record results of comparisons.</li> <li>4. NBT.3 - Use place value understanding <i>to round</i> multi-digit whole numbers to any place.</li> </ul> <p><b>Use the 4 operations with whole numbers to solve problems.</b></p> <ul style="list-style-type: none"> <li>4. OA.3 - Solve multi-step word problems using the 4 operations.</li> </ul>	<p><b>Topic 3</b> <i>Place Value</i></p>	
Adding and Subtracting Whole Numbers	* 4.NBT.3 4.NBT.4  4.OA.3	<p><b>Generalize place value understanding for multi-digit whole numbers.</b></p> <ul style="list-style-type: none"> <li>*4.NBT.3 - Use place value <i>to round</i> multi-digit whole numbers.</li> </ul> <p><b>Use place value understanding &amp; properties of operations to perform multi-digit arithmetic.</b></p> <ul style="list-style-type: none"> <li>4. NBT.4 – Fluently add and subtract multi-digit whole numbers using the standard algorithm.</li> </ul> <p><b>Use the 4 operations with whole numbers to solve problems.</b></p> <ul style="list-style-type: none"> <li>4. OA.3 - Solve multi-step word problems using the 4 operations.</li> </ul>	<p><b>Topic 4</b> <i>Addition and Subtraction of Whole Numbers</i></p>	
Introduction to Multiplying Whole Numbers	* 4.NBT.3 4.NBT.5  4.OA.1 * 4.OA.2 4.OA.3 4.OA.4 * 4.OA.5	<p><b>Generalize place value understanding for multi-digit whole numbers.</b></p> <ul style="list-style-type: none"> <li>*4.NBT.3 - Use place value <i>to round</i> multi-digit whole numbers.</li> </ul> <p><b>Use place value understanding &amp; properties of operations to perform multi-digit arithmetic.</b></p> <ul style="list-style-type: none"> <li>4. NBT.5 - Multiply up to 4 digits by a 1- digit whole number. - <i>Fact families of multiplication and division</i></li> </ul> <p><b>Use the 4 operations with whole numbers to solve problems.</b></p> <ul style="list-style-type: none"> <li>4. OA.1 – Interpret a multiplication equation as a comparison..</li> <li>* 4. OA.2 – Multiply or divide to solve word problems involving <i>multiplicative comparison</i> by using symbols to represent the unknown number.</li> <li>4. OA.3 - Solve multi-step word problems using the 4 operations.</li> </ul> <p><b>Gain familiarity with factors and multiples.</b></p> <ul style="list-style-type: none"> <li>4. OA.4 – Find factor pairs; recognize multiples of a 1-digit number; determine if a given whole number is prime or composite (1-100).</li> </ul>	<p><b>Topic 1</b> <i>Multiplication and Division: Meanings and Facts</i></p> <p><b>Topic 5</b> <i>Number Sense: Multiplying by 1-Digit Numbers</i></p> <p><b>Topic 6</b> <i>Developing Fluency: Multiplying by</i></p>	

		<b>Generalize and analyze patterns.</b> <ul style="list-style-type: none"> <li>*4.OA.5 - Generate a number or shape pattern using a given rule.</li> </ul>	<i>2-Digit Numbers</i>	
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**Westside Consolidated School District    *Common Core State Standards – Mathematics*    4<sup>th</sup> Grade Pacing Guide**

**2<sup>nd</sup> Nine Weeks**

<b>Unit</b>	<b><i>Common Core Standards</i></b>	<b>Major Topics/Concepts from <i>DPI's Unpacking Documents</i></b>	<b>Textbook Alignment <i>enVision Math Common Core ©2011</i></b>	<b>Resources/ Lit Connections</b>
<b>Multiplication and Division of Whole Numbers</b>	* 4.NBT.1 * 4.NBT.3 4.NBT.5 4.NBT.6  4.OA.4 4.OA.3 4.OA.1 4.OA.2	<b>Generalize place value understanding for multi-digit whole numbers.</b> <ul style="list-style-type: none"> <li>*4.NBT.1 - Recognize that a digit in one place represents ten times what it represents in the place to its right.</li> <li>*4.NBT.3 – Use place value <i>to round</i> multi-digit whole numbers.</li> </ul> <b>Use place value understanding and properties of operations to perform multi-digit arithmetic.</b> <ul style="list-style-type: none"> <li>4. NBT.5 - Multiply a whole number of up to four digits by a 1-digit whole number, and multiply two 2-digit numbers using equations, rectangular arrays, and/or area models.</li> <li>4. NBT.6 - Find whole number quotients and remainders with up to four-digit dividends and one-digit divisors using equations, rectangular arrays, and/or area models.</li> </ul> <b>Gain familiarity with factors and multiples.</b> <ul style="list-style-type: none"> <li>4. OA.4 - Find factor pairs; recognize multiples of a 1-digit number; determine if a given whole number is <i>prime</i> or <i>composite</i> (1-100).</li> </ul> <b>Use the 4 operations with whole numbers to solve problems.</b> <ul style="list-style-type: none"> <li>4. OA.3 - Solve multi-step word problems using the 4 operations. Represent these problems using equations with a letter standing for the unknown quantity.</li> <li>4. OA.1- Interpret a multiplication equation as a comparison.</li> <li>4. OA.2 – Multiply/divide to solve word problems involving multiplicative comparison by using equations and symbols for unknowns.</li> </ul>	<b>Topic 7</b> <i>Number Sense: Multiplying by 2-Digit Numbers</i>  <b>Topic 8</b> <i>Developing Fluency: Multiplying by 2-Digit Numbers</i>  <b>Topic 9</b> <i>Number Sense: Dividing by 1-Digit Divisors</i>  <b>Topic 10</b> <i>Developing Fluency: Dividing by 1-Digit Divisors</i>	
<b>PATTERNS –INPUT &amp; OUTPUT</b>	4.OA.4 4.OA.5	<b>Gain familiarity with factors and multiples.</b> <ul style="list-style-type: none"> <li>4. OA.4 - Find factor pairs; recognize multiples of a 1-digit number; determine if a given whole number is <i>prime</i> or <i>composite</i> (1-100).</li> </ul> <b>Generate and analyze patterns.</b> <ul style="list-style-type: none"> <li>*4.OA.5 – Generate a number or shape pattern using a given rule.</li> </ul> <p><i>Use NC DPI Crosswalks to help develop higher-level problems.</i></p>	<b>Topic 2</b> <i>Generate and Analyze Patterns</i>	

**3<sup>rd</sup> Nine Weeks**

Unit	Common Core Standards	Major Topics/Concepts from DPI's Unpacking Documents	Textbook Alignment <i>enVision Math Common Core ©2011</i>	Resources/ Lit Connections
<p><b>Fractions</b></p> <p><i>Limited to Fractions with Denominators of: 2, 3, 4, 5, 6, 8, 10, 12, 100</i></p>	<p>4.NF.1 4.NF.2</p> <p>* 4.OA.4 * 4.OA.5</p>	<p><b>Extend understanding of fraction equivalence and ordering.</b></p> <ul style="list-style-type: none"> <li>● <b>4. NF.1</b> – Explain equivalent fractions by using visual fraction models, with attention to how the number and size of the parts differ.</li> <li>● <b>4. NF.2</b> – Compare 2 fractions with <i>different numerators &amp; different denominators</i>.</li> </ul> <p><b>Gain familiarity with factors and multiples.</b></p> <ul style="list-style-type: none"> <li>● <b>*4.OA.4</b> - Find factor pairs; recognize multiples of a 1-digit number; determine if a given whole number is <i>prime</i> or <i>composite</i> (1-100).</li> </ul> <p><b>Generate and analyze patterns.</b></p> <ul style="list-style-type: none"> <li>● <b>*4.OA.5</b> - Generate a number or shape pattern using a given rule.</li> </ul>	<p><b>Topic 11</b> <i>Fraction Equivalence and Ordering</i></p>	
<p><b>Adding and Subtracting Fractions</b></p> <p><i>-- With Like Denominators</i></p>	<p>4.NF.3 4.NF.3a 4.NF.3b 4.NF.3c 4.NF.3d</p> <p>* 4.OA.4</p>	<p><b>Build fractions from <i>unit fractions</i> by applying and extending previous understandings of operations on whole numbers.</b></p> <ul style="list-style-type: none"> <li>● <b>4. NF.3</b> – Understand a fraction <math>a/b</math>, <math>a \leq 1</math>, as a sum of fractions <math>1/b</math>.</li> <li>● <b>4. NF.3a</b> – Understand addition/ subtraction of fractions as <i>joining &amp; separating parts</i> referring to the same whole.</li> <li>● <b>4. NF.3b</b> - <i>Decompose</i> a fraction into a sum of fractions with the <i>same</i> denominator.</li> <li>● <b>4. NF.3c</b> – Add/subtract mixed numbers with <i>like</i> denominators.</li> <li>● <b>4. NF.3d</b> - Solve word problems with add/subtract fractions with <i>like</i> denominators.</li> </ul> <p><b>Gain familiarity with factors and multiples.</b></p> <ul style="list-style-type: none"> <li>● <b>*4.OA.4</b> - Find factor pairs; recognize multiples of a 1-digit number; determine if a given whole number is <i>prime</i> or <i>composite</i> (1-100).</li> </ul>	<p><b>Topic 12</b> <i>Adding &amp; Subtracting Fractions &amp; Mixed Numbers with Like Denominators</i></p>	

Continue on next page...



<p><b>Multiplying Fractions and Understanding Decimals</b></p> <p><i>-- Multiply a fraction by a whole number.</i></p>	<p>4.NF.4 4.NF.4a 4.NF.4b 4.NF.4c 4.NF.5 4.NF.6 4.NF.7</p> <p>* 4.MD.1 * 4.MD.2</p>	<p><b>Build fractions from <i>unit fractions</i> by applying and extending previous understandings of operations on whole numbers.</b></p> <ul style="list-style-type: none"> <li>● 4. NF.4 – Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. <ul style="list-style-type: none"> <li>● 4. NF.4a – Understand a fraction <math>a/b</math> as a multiple of <math>1/b</math>.</li> <li>● 4. NF.4b – Multiply a fraction by a whole number.</li> </ul> </li> <li>● 4. NF.4c - Solve word problems involving multiplying a fraction by a whole number.</li> </ul> <p><b>Understand decimal notation for fractions and compare decimal fractions.</b></p> <p>4. NF.5 - Express a fraction with a denominator 10 as an equivalent fraction with a denominator 100; add fractions with denominators of 10 and 100.</p> <ul style="list-style-type: none"> <li>● 4. NF.6 - Use decimal notation for fractions with denominators 10 or 100.</li> <li>● 4. NF.7 – Compare 2 decimals to hundredths by reasoning about their size.</li> </ul> <p><b>Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.</b></p> <ul style="list-style-type: none"> <li>● *4.MD.1 – Know relative sizes of measurement units within one system of units, record measurement equivalents in a two-column table.</li> <li>● *4.MD.2 – Solve word problems involving distances, intervals or time, liquid volumes, etc, to include simple fractions or decimals.</li> </ul>	<p><b>Topic 13</b> <i>Extending Fraction Concepts</i></p>	
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Westside Consolidated School District *Common Core State Standards – Mathematics* 4<sup>th</sup> Grade Pacing Guide  
**4<sup>th</sup> Nine Weeks**

Unit	Common Core Standards	Major Topics/Concepts from DPI's Unpacking Documents	Textbook Alignment <i>enVision Math Common Core</i> ©2011	Resources/ Lit Connections
<b>Measurement and Conversion</b>  <i>- measurement within one system of measurement</i>  <i>- area and perimeter formulas</i>	4.MD.1 4.MD.2 4.MD.3 4.MD.4	<b>Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.</b> <ul style="list-style-type: none"> <li>● <b>4. MD.1</b> - Know relative sizes of <u>measurement within one system</u> of measurement (yards to feet, meter to centimeter, kilograms to grams, hours to minutes to seconds). Generate a conversion table.</li> <li>● <b>4. MD.2</b> - Use the 4 operations to solve problems involving distances, intervals of time, liquid volumes, masses of object, &amp; 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.</li> <li>● <b>4. MD.3</b> – Apply the <i>area and perimeter formulas</i> for rectangles and shapes formed from multiple rectangles. Students need to know the formulas for area and perimeter.</li> </ul> <b>Represent and interpret data.</b> <ul style="list-style-type: none"> <li>● <b>4. MD.4</b> – Make a line plot to display a data set of measurements in fractions of a unit -- <math>\frac{1}{2}</math>, <math>\frac{1}{4}</math> and <math>\frac{1}{8}</math>.</li> </ul>	<b>Topic 14</b> <i>Measurement Units and Conversions</i>  <b>Topic 15</b> <i>Solving Measurement Problems</i>	
<b>Angles and Measurement -- 1</b>  <i>- draw lines of symmetry</i>	4.G.1 4.G.2 4.G.3	<b>Draw and identify lines and angles and classify shapes by properties of their lines and angles.</b> <ul style="list-style-type: none"> <li>● <b>4. G.1</b> - Draw points, lines, line segments, rays, angles, and parallel &amp; perpendicular lines. Identify 2-dimensional figures.</li> <li>● <b>4. G.2</b> – Classify 2-dimensional figures based on the presence or absence of parallel or perpendicular lines. Recognize types of triangles --- identify right triangles.</li> <li>● <b>4. G.3</b> - Recognize a line of symmetry for a 2-D figure. Identify line-symmetric figures and draw lines of symmetry.</li> </ul>	<b>Topic 16</b> <i>Lines, Angles, and Shapes</i>	
<b>Angles and Measurement -- 2</b>  <i>- measure angles with a protractor</i>	4.MD.5 4.MD.5a 4.MD.5b 4.MD.6 4.MD.7  * 4.OA.5	<b>Geometric measurement: understand concepts of angle &amp; measure angles.</b> <ul style="list-style-type: none"> <li>● <b>4. MD.5</b> - Recognize angles are formed by two rays with a common endpoint and understand concepts of angle measurement.</li> <li>● <b>4. MD.5a</b> – An angle is measured by considering the fraction of the circular arc between the points where the 2 rays intersect the circle. An angle that turns through <math>\frac{1}{360}</math> of a circle is a <i>1-degree angle</i>.</li> <li>● <b>4. MD.5b</b> – An angle that turns through a <i>1-degree angle</i> is said to have an angle measure of <i>n degrees</i>.</li> <li>● <b>4. MD.6</b> - Measure angles with a protractor.</li> <li>● <b>4. MD.7</b> - Recognize angle measurement as <i>additive</i>. <math>25^\circ + 65^\circ = 90^\circ</math></li> </ul> <b>Generate and analyze patterns.</b>	<b>Topic 16</b> <i>Lines, Angles, and Shapes</i>	

- \*4.OA.5 - Generate a number or shape pattern using a given rule

## Westside Consolidated School District *Common Core State Standards* – Mathematics 4<sup>th</sup> Grade At-A-Glance-Guide

*Essential Questions should be incorporated into daily math activities in order to engage students in real life problem solving.*

Domain	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
<b>Number and Operations in Base Ten</b>	4.NBT.1 4.NBT.2 4.NBT.3 4.NBT.4 4.NBT.5	4.NBT.1 4.NBT.3 4.NBT.5 4.NBT.6		
<b>Operations and Algebraic thinking</b>	4.OA.1 4.OA.3 4.OA.4 4.OA.5	4.OA.1 4.OA.2 4.OA.3 4.OA.4 4.OA.5	4.OA.4 4.OA.5	4.OA.5
<b>Measurement and Data</b>			4.MD.1 4.MD.2	4.MD.1 4.MD.2 4.MD.3 4.MD.4 4.MD.5 4.MD.5a 4.MD.5b 4.MD.6 4.MD.7
<b>Geometry</b>				4.G.1 4.G.2 4.G.3
<b>Number and Operations - Fractions</b>			4.NF.1 4.NF.2 4.NF.3 a,b,c,d 4.NF.4 a,b,c 4.NF.5 4.NF.6 4.NF.7	

Document resources/ Page numbers in textbooks/ links to sites/ projects				
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Westside Consolidated School District *Common Core State Standards – Mathematics* 4<sup>th</sup> Grade Pacing Guide

Textbook Resource: Grade 4 enVision Math Common Core, © 2011, Scott Foresman- Addison Wesley, Pearson Education, Inc.

Alignment of Textbook Topic Content to the *Math CCSS*:

**NOTE: Not all sections of each Topic are aligned to the *Math CCSS* – be sure to use *ONLY* the sections that are aligned to the *Math CCSS*.**

**Table of Topics**

Topic Number	Topic Description	CCSS Domain
1	Multiplication and Division: Meanings and Facts	Operations & Algebraic Thinking
2	Generate and Analyze Patterns	Operations & Algebraic Thinking
3	Place Value	Number & Operations in Base Ten
4	Addition and Subtraction of Whole Numbers	Number & Operations in Base Ten
5	Number Sense: Multiplying by 1-Digit Numbers	Number & Operations in Base Ten
6	Developing Fluency: Multiplying by 2-Digit Numbers	Number & Operations in Base Ten
7	Number Sense: Multiplying by 2-Digit Numbers	Number & Operations in Base Ten
8	Developing Fluency: Multiplying by 2-Digit Numbers	Number & Operations in Base Ten
9	Number Sense: Dividing by 1-Digit Divisors	Number & Operations in Base Ten

10	Developing Fluency: Dividing by 1-Digit Divisors	Number & Operations in Base Ten
11	Fraction Equivalence and Ordering	Number & Operations -- Fractions
12	Adding & Subtracting Fractions & Mixed Numbers w/ Like Denominators	Number & Operations -- Fractions
13	Extending Fraction Concepts	Number & Operations -- Fractions
14	Measurement Units and Conversions	Measurement and Data
15	Solving Measurement Problems	Measurement and Data
16	Lines, Angles, and Shapes	Geometry

## Fourth Grade – *Common Core State Standards*-- MATH

### Critical Areas

1. **Developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends** – Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.
2. **Developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of**

**fractions by whole numbers** – Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g.,  $15/9 = 5/3$ ), and they develop methods for generating and recognizing equivalent fractions. Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.

- 3. Understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry** – Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

## **Mathematical Practices**

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

## **Operations and Algebraic Thinking (Weight of Standard: 12 – 17%) 4.OA**

**Use the four operations with whole numbers to solve problems.**

- 4.OA.1** Interpret a multiplication equation as a comparison, e.g., interpret  $35 = 5 \times 7$  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.OA.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. (Note: See CCSS Glossary & Table 2.)
- 4.OA.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.

**Gain familiarity with factors and multiples.**

- 4.OA.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.

**Generate and analyze patterns.**

- 4.OA.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.*

## **Number and Operations in Base Ten (Weight of Standard: 22 – 27%) 4.NBT**

Note: Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.

### **Generalize place value understanding for multi-digit whole numbers.**

- 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  $700 \div 70 = 10$  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.NBT.3** Use place value understanding to round multi-digit whole numbers to any place.

### **Use place value understanding and properties of operations to perform multi-digit arithmetic.**

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

## **Number and Operations – Fractions (Weight of Standard: 27 – 32%) 4.NF**

Note: Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, & 100.

### **Extend understanding of fraction equivalence and ordering.**

- 4.NF.1** Explain why a fraction  $a/b$  is equivalent to a fraction  $(n \times a)/(n \times b)$  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, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as  $1/2$ . 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.

### **Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.**

- 4.NF.3** Understand a fraction  $a/b$  with  $a > 1$  as a sum of fractions  $1/b$ .
- Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
  - 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, e.g., by using a visual fraction model. *Examples:*  $3/8 = 1/8 + 1/8 + 1/8$ ;  $3/8 = 1/8 + 2/8$ ;  $2\ 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8$ .
  - 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.
  - 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.

- 4.NF.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.
- Understand a fraction  $a/b$  as a multiple of  $1/b$ . For example, use a visual fraction model to represent  $5/4$  as the product  $5 \times (1/4)$ , recording the conclusion by the equation  $5/4 = 5 \times (1/4)$ .
  - Understand a multiple of  $a/b$  as a multiple of  $1/b$ , and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express  $3 \times (2/5)$  as  $6 \times (1/5)$ , recognizing this product as  $6/5$ .  
In general,  $n \times (a/b) = (n \times a)/b$ .
  - Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. For example, if each person at a party will eat  $3/8$  of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between which two whole numbers does your answer lie?

**Understand decimal notation for fractions, and compare decimal fractions.**

- 4.NF.5** Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.  
(Note: Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. *But addition and subtraction with unlike denominators in general is not a requirement at this grade.*) For example, express  $3/10$  as  $30/100$ , and add  $3/10 + 4/100 = 34/100$ .
- 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 diagram.
- 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  $>$ ,  $=$ , or  $<$ , and justify the conclusions, e.g., by using a visual model.

**Measurement and Data (Weight of Standard: 12 – 17%)** **4.MD**

**Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.**

- 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.



**Represent and interpret data.**

- 4.MD.4** Make a line plot to display a data set of measurements in fractions of a unit ( $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ ). 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.*

**Geometric measurement: understand concepts of angle and measure angles.**

- 4.MD.5** Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:
- 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  $\frac{1}{360}$  of a circle is called a “one-degree angle,” and can be used to measure angles.
  - 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.

**Geometry (Weight of Standard: 12 – 17%)**

**4.G**

**Draw and identify lines and angles, and classify shapes by properties of their lines and angles.**

- 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.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.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.