Verona Public School District
Curriculum Overview

4th Grade Math

Curriculum Committee Members:
Lou Waibel

Supervisor:
Glen Stevenson

Curriculum Developed:
January 2012
Summer 2015
May 2016

Board Approval Date:
February 14, 2012
September 25, 2012
March 24, 2015
June 14, 2016

Verona Public Schools
121 Fairview Ave., Verona, NJ 07044
www.veronaschools.org

Verona Public Schools Mission Statement:

The mission of the Verona Public Schools, the center of an engaged and supportive community, is to empower students to achieve their potential as active learners and productive citizens through rigorous curricula and meaningful, enriching experiences.

Course Description:

The major work of fourth grade extends the meanings students developed for multiplication and division in third grade. This understanding is the foundation for the fluency with multi-digit multiplication and division that is major work in fourth grade. Students now generalize their understanding of place value to 1,000,000. They recognize the structure of the number system and can reason about the magnitude of the digits in a number.

Prerequisite(s):

3rd Grade Math

Standard 8: Technology Standards

8.1: Educational Technology: *All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.*	**8.2: Technology Education, Engineering, Design, and Computational Thinking - Programming:** *All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.*
X A. Technology Operations and Concepts B. Creativity and Innovation **X** C. Communication and Collaboration D. Digital Citizenship E. Research and Information Fluency **X** F. Critical thinking, problem solving, and decision making	A. The Nature of Technology: Creativity and Innovation B. Technology and Society C. Design D. Abilities for a Technological World E. Computational Thinking: Programming

SEL Competencies and Career Ready Practices

Social and Emotional Learning Core Competencies: *These competencies are identified as five interrelated sets of cognitive, affective, and behavioral capabilities*	**Career Ready Practices:** *These practices outline the skills that all individuals need to have to truly be adaptable, reflective, and proactive in life and careers. These are researched practices that are essential to career readiness.*
Self-awareness: The ability to accurately recognize one's emotions and thoughts and their influence on behavior. This includes accurately assessing one's strengths and limitations and possessing a well-grounded sense of confidence and optimism.	**X** CRP2. Apply appropriate academic and technical skills. CRP9. Model integrity, ethical leadership, and effective management. CRP10. Plan education and career paths aligned to personal goals.
Self-management: The ability to regulate one's emotions, thoughts, and behaviors effectively in different situations. This includes managing stress, controlling impulses, motivating oneself, and setting and working toward achieving personal and academic goals.	CRP3. Attend to personal health and financial well-being. CRP6. Demonstrate creativity and innovation. **X** CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity.
Social awareness: The ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports.	CRP1. Act as a responsible and contributing citizen and employee. CRP9. Model integrity, ethical leadership, and effective management.
Relationship skills: The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.	**X** CRP4. Communicate clearly and effectively and with reason. CRP9. Model integrity, ethical leadership, and effective management. CRP12. Work productively in teams while using cultural global competence.
Responsible decision making: The ability to make constructive and respectful choices about personal behavior and social interactions based on consideration of ethical standards, safety concerns, social norms, the realistic evaluation of consequences of various actions, and the well-being of self and others.	CRP5. Consider the environmental, social, and economic impact of decisions. CRP7. Employ valid and reliable research strategies. **X** CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP9. Model integrity, ethical leadership, and effective management.

Standard 9: 21st Century Life and Careers

9.1: Personal Financial Literacy: *This standard outlines the important fiscal knowledge, habits, and skills that must be mastered in order for students to make informed decisions about personal finance. Financial literacy is an integral component of a student's college and career readiness, enabling students to achieve fulfilling, financially-secure, and successful careers.*	**9.2: Career Awareness, Exploration & Preparation:** *This standard outlines the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.*	**9.3: Career and Technical Education:** *This standard outlines what students should know and be able to do upon completion of a CTE Program of Study.*
A. Income and Careers B. Money Management C. Credit and Debt Management D. Planning, Saving, and Investing **X** E. Becoming a Critical Consumer F. Civic Financial Responsibility G. Insuring and Protecting	**X** A. Career Awareness (K-4) B. Career Exploration (5-8) C. Career Preparation (9-12)	A. Agriculture, Food & Natural Res. B. Architecture & Construction C. Arts, A/V Technology & Comm. D. Business Management & Admin. E. Education & Training F. Finance G. Government & Public Admin. H. Health Science I. Hospital & Tourism J. Human Services K. Information Technology L. Law, Public, Safety, Corrections & Security M. Manufacturing N. Marketing **X** O. Science, Technology, Engineering & Math P. Transportation, Distribution & Log.

Course Materials

Core Instructional Materials: *These are the board adopted and approved materials to support the curriculum, instruction, and assessment of this course.*	**Differentiated Resources**: *These are teacher and department found materials, and also approved support materials that facilitate differentiation of curriculum, instruction, and assessment of this course.*
• EnVision Math Common Core 2015 ed.	• Eureka Math http://greatminds.net/maps/math/module-pdfs-v3 • Building Conceptual Understanding and Fluency Through Games Grade 4 http://www.chariho.k12.ri.us/sites/default/files/4thgrade_games_4.1.14.pdf • Common Core State Standards http://www.corestandards.org/Math/Content/4/introduction/ • Howard County MD Grade 4 Mathematics https://hcpss.instructure.com/courses/107 • Khan Academy 4th Grade Math https://www.khanacademy.org/**math**/cc-fourth-**grade-math** • Extension Activities for Gifted Math Learners http://ncaigirp.ncdpi.wikispaces.net/Mathematics+3-5

Verona Public Schools — 4th Grade Math

Unit 1: Base Ten & Operations	Unit Duration: 36 days

Stage 1: Desired Results

Established Goals:

4.OA.A.1 Interpret a multiplication equation as a comparison, e.g., interpret 35=5x7 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. (1-1,1-5)

4.OA.A.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 (1-6,1-7,1-10)

4.OA.A.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 or the unknown quantity. Assess the reasonableness of answers using mental computations and estimation strategies including rounding. (1-3,1-4,1-8,1-9) (2-6) (4-1)

4.OA.C.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. (1-2) (2-1,2-2,2-3,2-4,2-5)

4.NBT.A.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents to its right. For example, recognize that 700 divided 70 =10 by applying concepts of place value and division. (3-2, 3-6)

4.NBT.A.2 Read and write multi-digit whole numbers using base ten numerals, number names and expanded form. Compare two multi-digit numbers based on meaning of the digits in each place, using >, =, < symbols to record the results of comparison. (3-1, 3-3, 3-4)

4.NBT.A.3 Use place value understanding to round multi-digit whole numbers to any place. (3-5) (4-2)

4.NBT.B.4 Fluently add and subtract multi digit whole numbers using the standard algorithm (4-3, 4-4, 4-5, 4-6)

Transfer Goal:

Students will be able to independently use their learning to apply basic facts (multiplication, division, addition & subtraction), place value and to solve multi-digit arithmetic and analyze mathematical patterns.

Students will understand that:

1. Numbers, patterns and objects can repeat in predictable ways
2. For a given set of numbers there are patterns that are always true called properties.
3. Numbers and expressions can be compared to other numbers and expressions using place value
4. To find answers we round / estimate before solving the problem.
5. Numbers can be added and subtracted mentally by breaking them up into easier calculations.

Essential Questions:

1. How can we use basic math operations and place value to better solve daily tasks?
2. How can finding out the mathematical patterns help me find solutions?
3. How can we use Math content and knowledge to make math problems easier to solve?

Students will know:

Critical Vocabulary

1. **Commutative Property of Multiplication:** Factors can be multiplied in any order and the product remains the same.
2. **Zero Property of Multiplication:** Any factor multiplied by zero is zero.
3. **Distributive Property of Multiplication:** Breaking apart problems into two simpler problems, for example: (3 × 21) = (3 × 20) + (3 × 1)
4. **Identity Property of Multiplication:** The product of any number and one is that number.
5. **Standard form:** A number written in a way that shows only its digits *Example:* 385
6. **Expanded form:** A number written as the sum of the values of its digits *Example:* 2,476 = 2,000 + 400 + 70 + 6
7. **Word form:** A number written in words. *Example:* 125 = one hundred twenty-five
8. **Compensation:** Adding and subtracting the same number to make the sum or difference easier to find.
9. **Counting On:** Counting up from the smaller number to find the difference of two numbers.
10. **Associative Property of Addition:** Addends can be regrouped and the sum remains the same.
11. **Commutative Property of Addition:** Numbers can be added in any order and the sum remains the same.
12. **Identity Property of Addition:** The sum of any number and zero is that number.
13. **Inverse Operations:** Two operations that undo each other, for example: Addition and subtraction are inverse operations. Multiplication and division are inverse operations.

1. Addition/subtraction algorithms involve breaking numbers apart and adding/subtracting according to place value.
2. Place value can be used to round multi digit numbers.
3. Bar diagrams can be used to show the relationship between quantities.
4. A numbers' reasonableness can be found using estimation.
5. Place value is way to compare and order numbers.
6. The Standard addition and subtraction algorithm involves breaking apart numbers and adding or subtracting according to place value.

Students will be able to:

1. Recognize multiplication as repeated addition of equal groups.
2. Use patterns to find the products of 2,5,.9
3. Use properties of multiplication and division to simplify calculations.
4. Use and draw models to solve division problems.
5. Determine when to use division and multiplication appropriately.
6. Find and use a rule to extend multiplication, addition, and subtraction problems of numbers, tiles or cubes.
7. Read and write up to four digit numbers.
8. Explain how digits relate to a numbers' place value.
9. Compare numbers through the hundred thousands.
10. Use Place value to round numbers.
11. Add and subtract whole numbers mentally.
12. Round whole numbers to estimate their sums or differences.
13. Add whole numbers to the hundred thousands with and without regrouping.
14. Subtract whole numbers to the hundred thousands with and without regrouping.
15. Subtract numbers with zeros to the thousands.
16. Draw a picture or diagram to represent an addition or subtractions problem into a sentence.

Stage 2: Acceptable Evidence

Transfer Task

Topic Pre Assessment (1-4)
Topic Tests (1-4)
Topic 1 Performance Assessment (page 36 of Topic 1 TE): TSW multiply or divide to find total cost of total amounts of objects.
Topic 2 Performance Assessment (page 62 of Topic 2 TE): TSW make a geometric pattern and complete a table showing relationships in their pattern. They will create a numeric pattern and write the corresponding rule.
Topic 3 Performance Assessment (page 86 of Topic 3 TE): TSW write and compare whole numbers in standard and expanded form.
Topic 4 Performance Assessment (page 112 of Topic 4 TE): TSW plan routes for 25 campers with 1 minibus and 4 vans.
Benchmark Test Topics 1-4 Master (page 112 A of Topic 4 TE)
Verona Unit Assessment

Reference Materials

EnVision Support Materials
Common Core State Standards http://www.corestandards.org/Math/Content/4/introduction/
Howard County MD Grade 4 Mathematics https://hcpss.instructure.com/courses/107
Khan Academy 4th Grade Math https://www.khanacademy.org/**math**/cc-fourth-**grade-math**
Eureka Math Sprint pack
Fluency Practice Pack

Verona Public Schools — 4th Grade Math

Unit 2: Multiplication & Division (5-10)	Unit Duration: 30 days

Stage 1: Desired Results

Established Goals:

4.OA.A.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. (6-4, 6-6)

4.OA.A.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 or the unknown quantity. Assess the reasonableness of answers using mental computations and estimation strategies including rounding. (5-4, 5-5,5-6) (6-2, 6-3, 6-5) (7-2, 7-6) (9-1) (10-7)

4.NBT.A.3 Use place value understanding to round multi-digit whole numbers to any place. (5-4, 5-5, 5-6) (6-5) (7-4)

4.NBT.B.5 Multiply a whole number of up to four by a one digit number and multiply a two digit number, using strategies based on place value and the properties of operations. Illustrate and explains the calculation by using equations, rectangular arrays, and /or area models**.** (5-1, 5-2, 5-3, 5-5, 5-6) (6-1, 6-2, 6-3, 6-4, 6-5, 6-6) (7-1, 7-2, 7-3, 7-4, 7-5) (9-5) (10-7)

4.NBT.B.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. (9-1, 9-2, 9-3, 9-4, 9-5, 9-6) (10-1, 10-2, 10-3, 10-4, 10-5, 10-6)

Transfer Goal:

Students will be able to <u>independently</u> use their learning to apply multiplication & division facts/properties and place value to solve multiplication and division scenarios.

Students will understand that:

1. There is more than one way to solve an operation. (breaking apart, rounding, partial product, standard / expanded algorithm)
2. Challenging multiplication and division problems can be broken down into simpler calculations
3. Number patterns are repeated in predictable ways and the operations are related to one another. Example Division is inverse to multiplication, addition is inverse to subtraction, division is repeated subtraction, multiplication is repeated addition.
4. Many math problems involve multiple steps. Math students may have to find one answer to solve another part of the problem.

Essential/Central Questions:

1. How does multiplication work?
2. How does division work?
3. How can we model multiplication?
4. How can we model division?

Students will know:

Critical Vocabulary

Partial Product: Parts of a product, *Example*: 4 × 26 =(4 × 20) + (4 × 6) =80 + 24 = 104. **Compensation:** Choosing numbers close to the numbers in the problem to make computation easier, and then adjusting the answer for the numbers chosen.

Compatible numbers: Numbers that are easy to compute mentally.

Remainder: The number that remains after the division is complete

1. There is more than one way to solve a multiplication or division problem. It involves changing the numbers or expression to solve them mentally.
2. To solve multiplication / division mentally, numbers can be rounded for easier calculations.
3. Regrouping when multiplying represents the expanded form's partial products.
4. The multiplication process is the same regardless of the size of the factors.
5. Any number can be represented in a number of ways.
6. Expanded multiplication is based on breaking apart the problem according to each digit's place value.
7. Standard multiplication is a shortened way to represent the partial products to the multiplication problem.
8. Arrays can be used to find the product of two 2 digit numbers.
9. Multiplication involves breaking apart numbers using place value, finding partial products, and then adding partial products to get the final product.
10. Multiplication can be drawn using a picture or diagram
11. Multiple digit numbers can be represented using multiples of 10,100, and 1000.
12. Estimation can be used by: (1) rounding one of more of the factors or (2) by changing one or more of the factors to a number that is close (compatible numbers).
13. The product of two 2 digit numbers can be represented as four simpler calculations called partial products. Partial products can be used find the product of larger multiplication algorithms.
14. The product of a 2 digit number and a multiple of 10 can be found using basic facts and place value.
15. The division process is the same no matter the size of the dividend or divisor.
16. basic facts and place value patterns can be used to divide multiples of 10 and 100 by one-digit numbers.
17. substituting compatible numbers is an efficient technique for estimating quotients.
18. mental math will help you arrive at an estimate for a quotient of a multi-digit division problem (multiplying by different powers of ten).
19. the remainder when dividing must be less than the divisor.
20. multiplication and division can be used to solve real world problems involving joining groups, separating equal groups, or comparing objects.
21. division can be represented using a picture or diagram.
22. repeated subtraction situations can be solved using a division algorithm different than the standard algorithm.
23. the sharing interpretation (equal groups) of division can be used to model the standard division algorithm.
24. the standard division algorithm breaks the calculation into simpler calculations using basic facts, place value, the relationship between multiplication and division.
25. the relationship between multiplication, division can help determine the place value of the largest digit in a quotient.

Students will be able to:

1. use arrays and patterns to multiply by 10 and 100.
2. use basic facts and number patterns to multiply by 10 and 100.
3. break apart numbers and arrays to multiply.
4. use compensation to multiply numbers.
5. check reasonableness of an answer by using estimation.
6. record 2 digit x 1 digit multiplication using standard algorithm.
7. record 2 digit x 1 digit multiplication using expanded algorithm.
8. record 3 and 4 digit x 1 digit multiplication using the standard algorithm.
9. record 3 and 4 digit x 1 digit multiplication using the expanded algorithm.
10. identify missing or unnecessary information in a word problem.
11. use compatible numbers to estimate 2 digit multiplication problems.
12. use rounding to estimate 2 digit multiplication problems.
13. identify and answer hidden questions within multi-step word problems.
14. use arrays to multiply 2 digit x 2 digit numbers.
15. use partial products to multiply 2 digit x 2 digit numbers.
16. solve 2 part problems.
17. use basic facts and patterns of zero to solve division problems with 3-digit dividends and 1-digit divisors.
18. accurately estimate quotients using compatible numbers and rounding.
19. estimate quotients of multi-digit division problems using multiplication facts and place value concepts.
20. divide whole numbers by one-digit divisors resulting in quotients with remainders.
21. use words and models to represent multiplication and division problems accurately.
22. draw pictures and write related number sentences to solve problems.
23. record division as repeated subtraction.
24. use place value to understand the algorithm of long division.
25. use the standard algorithm to divide a 2-digit number by a 1-digit number.
26. use the standard algorithm to divide a 3-digit number by a 1-digit number.
27. use the standard algorithm to divide a 3-digit number by a 1-digit number and properly decide where to begin dividing.
28. estimate and find quotients for 4-digit dividends and 1-digit divisors.
29. find the hidden question within a multi-step multiplication problem and use the answer to solve the original problem.

Stage 2: Acceptable Evidence

Transfer Task

Topic Readiness (5-10)
Topic Tests (5-10)
Topic 5 Performance Assessment (page 134 of Topic 5 TE): TSW figure out the cost of a family vacation by solving multi step problems using multiplication.
Topic 6 Performance Assessment (page 162 of Topic 6 TE): TSW estimate prices using multiplication.
Topic 7 Performance Assessment (page 182 of Topic 7 TE): TSW use mental math to multiply two digit numbers, estimate products, and solve two step problems.
Topic 8 Performance Assessment (page 202 of Topic 8 TE): TSW use multiplication, addition, and subtraction facts and the use of the standard multiplication algorithm with two digit numbers to find and compare total costs of objects.
Topic 9 Performance Assessment (page 224 of Topic 9 TE): TSW use division to divide a group of apples.
Topic 10 Performance Assessment (page 252 of Topic 10 TE): TSW divide 2-digit and 3-digit numbers by 1-digit numbers.
Benchmark Test Topics 5-8 Master (page 202A of Topic TE)

Reference Materials

EnVision Support Materials
Common Core State Standards http://www.corestandards.org/Math/Content/4/introduction/
Howard County MD Grade 4 Mathematics https://hcpss.instructure.com/courses/107
Khan Academy 4th Grade Math https://www.khanacademy.org/**math**/cc-fourth-**grade-math**

Verona Public Schools — 4th Grade Math

Unit 3: Fractions (Topics 11-13)	Time Frame/Duration: 34 days

Stage 1: Desired Results

Established Goals:

4.OA.A.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 or the unknown quantity. Assess the reasonableness of answers using mental computations and estimation strategies including rounding.

4.NF.A.1 Explain why a fraction a/b is equivalent to a fraction (n x a) / (n x b) by using visual fraction models, with attention to how the number an size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. (11-4, 11-5, 11-8)

4.NF.A.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. (11-5, 11-6, 11-7, 11-8)

4.NF.B.3a 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. (12-1, 12-2, 12-3, 12-4, 12-5, 12-11)

4.NF.B.3b Understand a fraction a/b with a>1 as a sum of fractions 1/b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, 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. (12-6, 12-7, 12-10)

4.NF.B.3c Understand a fraction a/b with a>1 as a sum of fractions 1/b. 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. (12-7, 12-8, 12-9)

4.NF.B.3d Understand a fraction a/b with a>1 as a sum of fractions 1/b. Solve word problems involving addition and subtractions of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. (12-2, 12-3, 12-4, 12-5, 12-11)

4.NF.B.4a 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 of 5 x (1/4), recording the conclusion by the equation 5/4 = 5 x (1/4). (13-1)

4.NF.B.4b 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, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 x (2/5) as 6 x (1/5), recognizing this product as 6/5. In general, n x (a/b) = (n x a)/b. (13-2, 13-3)

4.NF.B.4c Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. Solve word problems involving multiplication of a fractions 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 what two whole numbers does your answer lie? (13-2, 13-3)

4.NF.C.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. *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.* (13-5)

4.NF.C.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.* (13-4, 13-5, 13-5)

4.NF.C.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. (13-8)

4.MD.A.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. (13-9, 13-10) (14-5, 14-8, 14-11)

Transfer Goal:

Students will be able to <u>independently</u> use their learning to compare, add, and subtract fractions through the standard algorithm, equivalent fractions, and number lines.

Students will understand:

1. Fractions are a way to represent parts of wholes.
2. Fractional parts can be represented in many ways. (equivalence, mixed numbers, decimals)
3. Multiplication patterns are necessary to solve problems involving fractions. (LCD)
4. Fractions and decimals are related. (benchmark fractions & decimals. Decimals are tenths and hundredths)
5. Fractions aren't scary and operations with fractions don't have to be hard.

Essential/Central Questions:

1. How are fractions and decimals alike?
2. How do I add fractions that look the same or different? (like or unlike denominators)

Students will know:

Critical Vocabulary

<u>Fraction:</u> A symbol, such as ½, ¾, or 1 2/7 used to name a part of a whole, a part of a set, a location on a number line, or a division of whole numbers

<u>Denominator:</u> The number below the fraction bar in a fraction;the number of equal parts in all

<u>Numerator:</u> The number above the fraction bar in a fraction the number of equal parts that the fraction describes.

<u>benchmark fraction:</u> Fractions that are commonly used for estimation, for example, 1/3, 1/2 , 2/3, 3/4.

<u>equivalent fraction:</u> Fractions that name the same part of a whole

<u>prime number:</u> A whole number greater than 1 that has exactly two factors, 1 and itself

<u>composite number:</u> A whole number greater than 1 that has more than two factors

<u>mixed number:</u> A number that has a whole number and a fraction

<u>improper fraction</u> A fraction in which the numerator is greater than or equal to the denominator**<u>:</u>**

<u>decimal point:</u> A dot used to separate dollars from cents or ones from tenths in a number

<u>hundredth:</u> One part of 100 equal parts of a whole

<u>tenth:</u> One of ten equal parts of a whole

1. whole numbers greater than 2 have either 2 factors (1 and that number) or more than two factors. (prime & composite #s)
2. the same point on a number line can be named with an infinite number of fractions.
3. some fractions can be compared and ordered by reasoning about their size relative to 0, ½, and 1.
4. models can be used to add or subtract fractions.
5. when fractions have the same denominators, you can add or subtract the numerator and leave the denominator alone.
6. When adding mixed numbers, first add the fractions (rename if needed) and then add the whole numbers.
7. When subtracting mixed numbers, first subtract the fractions (rename if needed) and then subtract the whole numbers.
8. Positive fractions can be added or subtracted by locating a fraction on the number line and then moving to the right to add or to the left to subtract.
9. Fractional amounts greater than 1 can be represented using a whole number and a fraction (mixed number), A whole number can be represented by a fraction. When the numerator and denominator are the same it is = 1.
10. Fractions can be decomposed (simplified).
11. understand the algorithm of multiplying a whole fraction by a fraction
12. Fractions and decimals can be represented on a number line.
13. Some fractions can be written as equivalent fractions with denominators of 10 or 100 and then written as a decimal.
14. Place value can be used to compare and order decimals.
15. Most money can be represented in equivalent ways (decimals and place value)

Students will be able to:

1. identify factors and multiples of a whole number.
2. identify prime and composite numbers.
3. use models and a number line to show equivalent fractions.
4. use benchmark fractions to compare and order fractions with unlike denominators.
5. use common denominators and equivalent fractions to order fractions with unlike denominators.
6. explain in writing whether a fractional problem is correct or not.
7. use models and computational procedures to add and subtract fractions with like denominators.
8. use a number line to add and subtract fractions with like denominators.
9. identify and write mixed numbers as improper fractions and improper fractions as mixed numbers.
10. use models and computational procedures to add and subtract mixed numbers.
11. decompose fractions.
12. use multiplication to describe fractions.
13. multiply a fraction by a whole number.
14. write fractions as decimals.
15. write decimals as fractions.
16. locate and name fractions on a number line.
17. locate and name decimals on a number line.
18. use equivalent fractions to write fractions as decimals.
19. read and write decimals in expanded, word, and standard form.
20. Order decimals using place value charts and models.
21. Use place value charts to read, write, and compare decimals in tenths and hundredths using money.

Stage 2: Acceptable Evidence

Transfer Task

Topic Readiness Assessments (11-13)
Topic Tests (11-13)
Topic 11 Performance Assessment (page 284 of Topic 11 TE): TSW write fractions for parts of a region in simplest form an estimate fractional amounts..
Topic 12 Performance Assessment (page 324 of Topic 12 TE): TSW use the information in the problem to determine the operation that is necessary to solve and compute with mixed numbers.
Topic 13 Performance Assessment (page 360 of Topic 13 TE): TSW find how much fractional amounts clay is used to make a coaster.

Reference Materials

EnVision Support Materials
Common Core State Standards http://www.corestandards.org/Math/Content/4/introduction/
Howard County MD Grade 4 Mathematics https://hcpss.instructure.com/courses/107
Khan Academy 4th Grade Math https://www.khanacademy.org/**math**/cc-fourth-**grade-math**

Verona Public Schools — 4th Grade Math

Unit Title: Measurement and Geometry (14-16)	Time Frame/Duration: 34 days

Stage 1: Desired Results

Established Goals:

4.MD.A.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), ...(14-1, 14-2, 14-3, 14-4, 14-6 thru 14-10)*

4.MD.A.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. (14-5, 14-11, 15-4, 15-5, 15-6)

4.MD.A.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*. (15-3)

4.MD.B.4 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 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*. (15-1, 15-2)

4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. (16-1, 16-2)

4.G.A.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. 16-7, 16-8, 16-9, 16-11)

4.G.A.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. (16-10)

4.MD.C.5a An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. (16-3)

4.MD.C.5b An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. (16-4)

4.MD.C.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. (16-5)

4.MD.C.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. (16-6)

Transfer Goal:

1. Students will be able to <u>independently</u> use their learning to solve measurement and data problems related to standard and metric units of measurement.
2. Students will be able to <u>independently</u> use their learning solve, draw, measure, and describe geometric objects with angles, points, rays, lines, and line segments.

Students will understand that:

1. Some attributes of objects are measurable and can be quantified using unit amounts.
2. Some measurements can be approximated using known referents as the units in the measurement process.
3. Math problems with an starting unknown point can be solved by using the end result and reversing the steps to find the starting point.
4. Some questions can be answered by collecting and analyzing data. Data can be represented visually using tables, charts, and graphs.
5. Two and three-dimensional objects can be described, classified, and analyzed by their attributes. (angles ,number of sides)

Essential/Central Questions:

1. How is data collected and used?
2. How can I accurately describe, classify and analyze geometric shapes?

Students will know:

<u>Capacity:</u>, The amount a container can hold
<u>Weight:</u>, Weight is a measure of the heaviness of an object.
<u>Mass:</u> The amount of matter that something contains
<u>Perimeter:</u> The distance around a figure
<u>Area:</u> The amount of surface covered by a figure
<u>Line plots</u> A graph that shows the frequency of data along a number line
<u>Degree:</u> The measurement used for angles
<u>Vertex:</u> :The point where two rays meet to form an angle. The point where the sides of a polygon meet.
<u>Line of Symmetry:</u> A line on which a figure can be folded so that both halves are equal.

1. Length can be estimated and measured in different systems (customary, metric) and using different units in each system that are related to each other.
2. Weight and mass are different measures.
3. Time can be expressed using different units that are related to each other.
4. Line plots can be used to organize and represent data generated by measuring lengths.
5. Some data can be represented using a line plot and the line plot can be used to answer certain questions about the data.
6. Some problems can be solved by applying the formula for the perimeter of a rectangle of the formula for the area of a rectangle.
7. Some measurement problems can be represented and solved using models.
8. Making change is often easiest by counting from the smaller amount to the larger amount.
9. Some problems can be solved by breaking them apart into smaller ones. Recording information in a table can help one understand and solve some problems.
10. Numbers or objects repeat in predictable ways. Expressions and equations can be used to describe how members of one set related to members of a second set.
11. Line segment and rays are sets of points that describe parts of lines, shapes and solids.
12. Angles are formed by two intersecting lines of by rays with a common endpoint and are classified by size.
13. Polygons can be described and classified by their sides and angle.
14. Some shapes can be reflected across one or more lines passing through the shape so the shape folds onto itself exactly. (symmetry)
15. The unit for measuring the size of the opening of an angle is 1 degree.
16. Angle measures can be added or subtracted.

Students will be able to:

1. Identify and use standard and metric units of measurement correctly for capacity, weight and mass.
2. Estimate and measure length (customary & metric) by selecting the most appropriate unit of length.
3. Estimate and measure capacity (customary & metric) by selecting the most appropriate unit of capacity.
4. Estimate and measure weight (customary & metric) by selecting the most appropriate unit of weight.
5. Convert between customary and metric units.
6. Compare several different units of time and convert from one unit of time to another.
7. Make line plots to organize data and draw conclusions using given data.
8. Use formulas for the perimeter and area of rectangles.
9. Use diagrams to show data and analyze how the quantities are related to solve real world measurement problems.
10. Solve real world money problems and give change by counting.
11. Break a problem into smaller, more manageable pieces and find a pattern to fit.
12. Identify and describe points, lines and planes.
13. Describe parts of lines and types of angles.
14. Use unit angles and fractions of a circle to find angle measures.
15. Use a smaller angle to measure a larger angle by repeating the unit.
16. Measure and draw angles.
17. Find an unknown angle by adding and subtracting.
18. Identify and classify polygons, triangles, and quadrilaterals.
19. Determine line of symmetry in a plane figure and how many it has.
20. Make and test generalizations in geometric problems.

Stage 2: Acceptable Evidence

Transfer Task

Topic Readiness (14-16)Topic Tests (14-16)
Topic 14 Performance Assessment (page 396 of Topic 14 TE): TSW figure out the cost of a family vacation by solving multi step problems using multiplication.
Topic 15 Performance Assessment (page 418 of Topic 15 TE): TSW estimate prices using multiplication.
Topic 15 Performance Assessment (page 450 of Topic 16 TE): TSW use mental math to multiply two digit numbers, estimate products, and solve two step problems.

Reference Materials

EnVision Support Materials
Common Core State Standards http://www.corestandards.org/Math/Content/4/introduction/
Howard County MD Grade 4 Mathematics https://hcpss.instructure.com/courses/107
Khan Academy 4th Grade Math https://www.khanacademy.org/**math**/cc-fourth-**grade-math**