

NEW MILFORD PUBLIC SCHOOLS
New Milford, Connecticut



Grade Five Mathematics

September 2014

*Approved by the Board of Education
September 9, 2014*

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New Milford's Mission Statement

The mission of the New Milford Public Schools, a collaborative partnership of students, educators, family and community, is to prepare each and every student to compete and excel in an ever-changing world, embrace challenges with vigor, respect and appreciate the worth of every human being, and contribute to society by providing effective instruction and dynamic curriculum, offering a wide range of valuable experiences, and inspiring students to pursue their dreams and aspirations.

Pacing Guide

<u>Unit #</u>	<u>Weeks</u>	<u>Pages</u>
1	6	6-10
2	4	11-14
3	4	15-18
4	7	19-24
5	7	25-29
6	6	30-36
7	4	37-40
8	3	41-46
9	2	47-49

Key for Standards

MP 1 - Make sense of problems and persevere in solving them

MP 2 - Reason abstractly and quantitatively

MP 3 - Construct viable arguments and critique the reasoning of others

MP 4 - Model with mathematics

MP 5 - Use appropriate tools strategically

MP 6 - Attend to precision

MP 7 - Look for and make use of structure

MP 8 - Look for and express regularity in repeated reasoning.

New Milford Public Schools

Committee Member(s): Christine Cahalane, Corby Kennison, Lisa Montemurro, Stephanie Zappone Unit 1	Course/Subject: Mathematics Grade Level: 5 # of Weeks: 6
Identify Desired Results	
Common Core Standards	
<p>Standards in Unit</p> <ul style="list-style-type: none"> • (5.OA.1) Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. • (5.OA.2) Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation “add 8 and 7, then multiply by 2” as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product. • (5.NBT.2) Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10. (Only whole number standard applies.) • (5.NBT.5) Fluently multiply multi-digit whole numbers using the standard algorithm. • (5.NBT.6) Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on 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. <p>Standards Only in Ten-Minute Math</p> <ul style="list-style-type: none"> • (5.OA.3) Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. • (5.G.3) Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. 	
Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that ...)	Essential Questions Inquiry used to explore generalizations
<ul style="list-style-type: none"> • There is an order that every mathematician follows when evaluating expressions or solving equations. • Expressions represent quantities. • When one of the factors is a multiple of ten, you can use place 	<ul style="list-style-type: none"> • What is the order of operations for evaluating expressions? • What are grouping symbols in an expression and what do they mean? • What is an expression? • What is the order of operations for evaluating expressions?

<p>value patterns and basic facts to find the product.</p> <ul style="list-style-type: none"> • The standard algorithm is a consistent and efficient way to multiply numbers. • We use division to find equal groups or the number of things in a given amount of groups. • We can show division with equations, arrays, and area models. 	<ul style="list-style-type: none"> • How do you use multiples of ten to estimate and find products? • How are place value patterns repeated in numbers? • How can we multiply large numbers using the most efficient strategy? • What strategies can be used to divide multi-digit whole numbers?
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Expected Performances
What students should know and be able to do

<p>Students will know the following:</p> <ul style="list-style-type: none"> • Students continue to develop and practice efficient strategies to solve multiplication problems both in and out of a context. • Students refine and gain fluency in solving two-digit by two-digit multiplication problems, develop strategies for division problems with one- and two-digit divisors, and increase their knowledge of multiplication relationships by learning about prime factorization (e.g., $36 = 4 \times 9 = (2 \times 2) \times 9 = 2 \times 2 \times 3 \times 3$) <p>Students will be able to do the following:</p> <ul style="list-style-type: none"> • Students will find the factors of a number. • Students will solve multiplication problems efficiently. • Students will solve division problems with 1-digit and 2-digit divisors.

Character Attributes

<ul style="list-style-type: none"> • Cooperation • Respect • Responsibility • Perseverance
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Technology Competencies

<ul style="list-style-type: none"> • None
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Develop Teaching and Learning Plan

<p>Teaching Strategies:</p> <p>Use a math workshop model with teacher-directed mini-lesson</p> <ul style="list-style-type: none"> • to provide students with repeated experiences with concepts and skills • to provide time for teachers to work with small groups of students <p>Use games to develop concepts and practice skills</p> <p>Use student-centered activities and worthwhile math tasks</p>	<p>Learning Activities:</p> <ul style="list-style-type: none"> • Use arrays and number puzzles to learn about factors, multiples, and other properties of numbers. • Determine whether a number is a factor or multiple of a number by playing Number Puzzles: 1 Clue and 2 Clue. • Identify prime, square, even, and odd numbers using a 300 chart, color tiles, and calculators and clued from Number Puzzles: 4 Clues.
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Use a variety of grouping structures

- Collaborative groups, partners, individuals

Orchestrate class discussions

- Focus discussions on important mathematics and student strategies
- Elicit participation by all students over the course of several discussions
- Facilitate student to student discourse

Encourage students to represent and discuss their thinking strategies**Use Ten-Minute Math to provide on-going practice and review.**

- Number Puzzles
- Identifying prime, square, even, and odd numbers.
- Determining if one number is a factor or multiple of another.
- Quick Images
- Writing multiplication and division equations to represent the total number of shapes in a pattern.
- Decomposing images of 2-D shapes and then recombining them to make a given design

- Develop multiplication fluency by finding missing factors in factor pairs on Multiplication Combinations 1.
- Explore powers of ten to explain place value.
- Use known multiplication combinations to find equivalent place value relationships.
- Use multiplication fact pairs to develop equivalent multiplication combinations to explain prime factorization patterns.
- Develop a number of strategies for solving 2-digit by 2-digit multiplication problems, including breaking numbers apart, solving an equivalent problem, and related problems.
- Use arrays to represent different ways of breaking up a problem.
- Estimate and compare products involving multiples of 10 by playing Multiplication Compare.
- Solve multiplication problems by breaking up each one or by using related problems.
- Develop various strategies for solving division problems with 2-digit divisors and for interpreting the results
- Solve and represent a division problem with a picture or diagram, or by creating a story problem.
- Make Multiple Towers to compare and relate division and multiplication notation (e.g. $170 / 15 = \underline{\quad}$ and $\underline{\quad} \times 15 = 170$).
- Compare strategies for solving division problems and make sense of remainders in terms of problem contexts.
- Using Numbers off the Tower, use alternative division strategies to develop algorithms of division for use in problems with 2-digit divisors.

Assessments	
Performance Task(s)	Other Evidence
Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	Application that is functional in a classroom context to evaluate student achievement of desired results
<p>Goal:</p> <p>Role:</p> <p>Audience:</p> <p>Situation:</p> <p>Product or Performance:</p> <p>Standards for Success:</p>	<p>Ongoing Formative Assessments:</p> <p>Observing Students</p> <ul style="list-style-type: none"> • Model different multiplication arrangements using arrays and rectangles. • Use knowledge of prime, square, odd, even, factor, and multiple to identify a number with certain characteristics. • Apply multiple strategies to generate solutions when multiplying by powers of ten. • Solve 2-digit by 2-digit multiplication problems and in story context. • Solve a division problem with a 3-digit dividend and a 2-digit divisor. • Break division problems into manageable parts. • Solve division problems in context and communicate their reasoning to others. <p>Other Formative Assessments</p> <ul style="list-style-type: none"> • Using Assessment Checklist, record observations of how students use clues involving factors. • Each student determines all the ways to multiply for a specific product. • Each student evaluates the incorrect strategy and then efficiently and accurately solves the problem. <p>End-of-Unit Assessment</p> <ul style="list-style-type: none"> • Solve multiplication problems efficiently, find the factors of a number, and solve division problems with 1-digit and 2-digit divisors.

Suggested Resources

- Investigations: Unit 1, Number Puzzles and Multiple Towers.
- Teaching Student-Centered Mathematics, 3-5 by Van de Walle, et. al
- [K-5 Math Teaching Resources](#), online
- [Howard County Math Wiki](#), Grade 5

New Milford Public Schools

Committee Member(s): Christine Cahalane, Corby Kennison, Lisa Montemurro, Stephanie Zappone Unit 2	Course/Subject: Mathematics Grade Level: 5 # of Weeks: 4
Identify Desired Results	
Common Core Standards	
Standards in Unit	
<ul style="list-style-type: none">• (5.MD.3) Recognize volume as an attribute of solid figures and understand concepts of volume measurement. a. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume. b. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.• (5.MD.4) Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft. and improvised units.• (5.MD.5) Relate volume to the operations of multiplication and addition and solve real world and mathematical problems a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole number products as volumes, e.g., to represent the associative property of multiplication. b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems. c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.	
Standards Only in Ten-Minute Math	
<ul style="list-style-type: none">• (5.NBT.3) Read, write, and compare decimals to thousandths.• (5.NBT.5) Fluently multiply multi-digit whole numbers using the standard algorithm.• (5.NBT.6) Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on 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.• (5.NBT.7) Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.	

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that ...)	Essential Questions Inquiry used to explore generalizations
<ul style="list-style-type: none"> • Volume is the amount of space taken up by a rectangular solid. • We measure volume in cubic units that are based on linear measures. (Capacity generally refers to liquid measures.) • Formulas are more efficient ways to find volume. 	<ul style="list-style-type: none"> • Why does what we measure influence how we measure and what we use? • How do formulas help us solve problems?
<p style="text-align: center;">Expected Performances What students should know and be able to do</p>	
<p>Students will know the following:</p> <ul style="list-style-type: none"> • Students investigate concepts of volume by finding the volume of prisms, pyramids, cylinders, and cones. • Students use patterns of open boxes and build prisms from cubes to develop a strategy for finding the volume of any rectangular prism. • Using concrete materials, students examine the 3-to-1 volume relationship between related (having the same base and height) prisms and pyramids, and related cylinders and cones. Geometry work includes naming geometric solids and their attributes <p>Students will be able to do the following:</p> <ul style="list-style-type: none"> • Students will find the volume of rectangular prisms. • Students will use standard units to measure volume. • Students will identify how the dimensions of a box change when the volume is changed. • Students will explain the relationship between the volumes of prisms and pyramids with the same base and height 	
<p style="text-align: center;">Character Attributes</p>	
<ul style="list-style-type: none"> • Cooperation • Respect • Responsibility • Perseverance 	
<p style="text-align: center;">Technology Competencies</p>	
<ul style="list-style-type: none"> • None 	

Develop Teaching and Learning Plan

Teaching Strategies:

Use a math workshop model with teacher-directed mini-lesson

- to provide students with repeated experiences with concepts and skills
- to provide time for teachers to work with small groups of students

Use games to develop concepts and practice skills

Use student-centered activities and worthwhile math tasks

Use a variety of grouping structures

- Collaborative groups, partners, individuals

Orchestrate class discussions

- Focus discussions on important mathematics and student strategies
- Elicit participation by all students over the course of several discussions
- Facilitate student to student discourse

Encourage students to represent and discuss their thinking strategies

Use Ten-Minute Math to provide on-going practice and review.

- Estimation and Number Sense
 - Estimating solutions to 2-digit to 4-digit multiplication and division problems.
 - Estimating solutions to addition and subtraction problems with fractions and mixed numbers.
- Quick Images
 - Writing multiplication and division equations to represent the total number of shapes in a pattern.
 - Decomposing images of 2-D shapes and then recombining them to make a given design.

Learning Activities:

- Study the volume of rectangular prisms by looking at patterns of boxes and by building rectangular prisms from connecting cubes. (*Packaging Factory Activity*)
- Use understanding of volume to draw patterns of boxes.
- Write a strategy for finding the volume of any rectangular prism.
- Investigate how the dimensions of prisms change when the volume is doubled, halved or tripled.
- Organize rectangular packages (*connecting cubes from the packages*) to fit in rectangular boxes to understand the structure of rectangular prisms and the amount of space filled by the prism.
- Use formulas to find the volume of rectangular prisms and a solid composed of two rectangular prisms.
- Design (draw) a box that can be completely filled with several different-shaped rectangular packages. (*Packaging Factory Activity*)
- Use standard cubic unit of volume to measure the volume of a small rectangular prism.
- Build models of cubic inches, feet and yards and of cubic centimeters and meters.
- Measure using cubic meters, the space inside the classroom justifying their measurement methods and discussing discrepancies.

Assessments	
Performance Task(s) Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	Other Evidence Application that is functional in a classroom context to evaluate student achievement of desired results
<p>Goal:</p> <p>Role:</p> <p>Audience:</p> <p>Situation:</p> <p>Product or Performance:</p> <p>Standards for Success:</p>	<p>Ongoing Formative Assessments:</p> <p>Observing Students</p> <ul style="list-style-type: none"> • Use patterns to construct 3-D shapes. • Develop strategies for determining the volume of a rectangular prism. • Draw box patterns for rectangular prisms. • Understand the relationship between a change in one dimension of a box and the volume of the box (ex. Doubling one dimension doubles the volume) • Use strategies to find the number of rectangular packages (use connecting cubes, measure with the ruler) that will fill a box. • Build standard units of volume. • Plan and calculate the volume of their classroom. • Compare volumes of containers. • Construct geometric solids from patterns. <p>Other Formative Assessments</p> <ul style="list-style-type: none"> • Find the number of cubes that will fit in a given box pattern and the volume of a rectangular prism. <p>End of Unit Assessment</p> <ul style="list-style-type: none"> • Identify how the dimensions of a box changes when the volume is changed. • Explain the relationship between the volumes of prisms and pyramids with the same base and height.
Suggested Resources	
<ul style="list-style-type: none"> • Investigations: Unit 2, Prisms and Pyramids. • Teaching Student-Centered Mathematics, 3-5 by Van de Walle, et. al • K-5 Math Teaching Resources, online • Howard County Math Wiki, Grade 5 	

New Milford Public Schools

Committee Member(s): Christine Cahalane, Corby Kennison, Lisa Montemurro, Stephanie Zappone, Unit 3	Course/Subject: Mathematics Grade Level: 5 # of Weeks: 4
Identify Desired Results	
Common Core Standards	
Standards in the Unit <ul style="list-style-type: none"> • (5.NBT.1) Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. • (5.NBT.5) Fluently multiply multi-digit whole numbers using the standard algorithm. (Standards also in Ten-Minute Math) • (5.NBT.6) Find whole-number quotients of whole numbers with up to four-digit dividends and two-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. (Standards also in Ten-Minute Math) 	
Standards Only in Ten-Minute Math <ul style="list-style-type: none"> • (5.NBT.3) Read, write, and compare decimals to thousandths. • (5.NBT.7) Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. 	
Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that ...)	Essential Questions Inquiry used to explore generalizations
<ul style="list-style-type: none"> • Understanding place value leads to number sense and efficient strategies for computing with numbers. • Our number system is based on groups of ten. • The standard algorithm is a consistent and efficient way to multiply numbers. • We use division to find equal groups or the number of things in a given amount of groups. • We can show division with equations, arrays, and area models. 	<ul style="list-style-type: none"> • How does a digit's position affect its value? • How can we multiply large numbers using the most efficient strategy? • What strategies can be used to divide multi-digit whole numbers?

Expected Performances What students should know and be able to do	
<p>Students will know the following:</p> <ul style="list-style-type: none"> • Students study place value in large numbers by building a 10,000 chart and by adding multiples of 10 to and subtracting multiples of 10 from four- and five-digit numbers. • Students finalize their study of subtraction by refining and gaining fluency in solving subtraction problems, including a study of the U.S. algorithm for subtraction. • Using a context of the capacities of stadiums and arenas, students solve addition and subtraction problems involving four- and five-digit numbers. • Students also demonstrate fluency with the division facts up to $144 \div 12$. <p>Students will be able to do the following:</p> <ul style="list-style-type: none"> • Students will read, write and sequence numbers up to 100,000. • Students will solve subtraction problems accurately and efficiently, choosing from a variety of strategies. • Students will demonstrate fluency with division problems related to multiplication combinations to 12×12 (division facts). 	
Character Attributes	
<ul style="list-style-type: none"> • Cooperation • Respect • Responsibility • Perseverance 	
Technology Competencies	
<ul style="list-style-type: none"> • None 	
Develop Teaching and Learning Plan	
<p>Teaching Strategies:</p> <p>Use a math workshop model with teacher-directed mini-lesson</p> <ul style="list-style-type: none"> • to provide students with repeated experiences with concepts and skills • to provide time for teachers to work with small groups of students <p>Use games to develop concepts and practice skills</p> <p>Use student-centered activities and worthwhile math tasks</p> <p>Use a variety of grouping structures</p> <ul style="list-style-type: none"> • Collaborative groups, partners, individuals <p>Orchestrate class discussions</p> <ul style="list-style-type: none"> • Focus discussions on important mathematics and student strategies 	<p>Learning Activities:</p> <ul style="list-style-type: none"> • Use place-value relationships and multiples of 10, 100, and 1,000 to add and subtract large numbers. • Use a chart of 10,000 squares to study the place-value structure of numbers in the thousands. • Find the difference between a number and 10,000 using the 10,000 chart and activity: <i>How Many Steps to 10,000?</i> • Find combinations of 3-digit numbers that add to 1,000 by playing <i>Close to 1,000</i>. • Apply estimation skills and knowledge of adding and subtracting multiples of 10, 100, and 1,000 to solve addition and subtraction problems. • Learn the names of places larger than

<ul style="list-style-type: none"> Elicit participation by all students over the course of several discussions Facilitate student to student discourse <p>Encourage students to represent and discuss their thinking strategies Use Ten-Minute Math to provide on-going practice and review.</p> <ul style="list-style-type: none"> Estimation and Number Sense <ul style="list-style-type: none"> Estimating solutions to 2-digit to 4-digit multiplication and division problems. Estimating solutions to addition and subtraction problems with fractions and mixed numbers. Practicing Place Value <ul style="list-style-type: none"> Recognizing and interpreting the value of each digit in 4- and 5-digit numbers. Finding different combinations of a number, using only 1,000s, 100s, 10s, and 1s and recognizing their equivalence. Adding and subtracting multiples of 10 from a 4- and 5-digit number, adding and subtracting tenths of hundredths to decimal fractions and numbers. 	<p>100,000: million, billion, and trillion.</p> <ul style="list-style-type: none"> Practice and investigate various strategies for subtracting large numbers, including the U.S. Algorithm. Use clear and concise notation for recording addition and subtraction strategies. Develop arguments about how the difference represented by two subtraction expressions are related (e.g., $1,208 - 297$ and $1,208 - 300$). Solve addition and subtraction problems with large numbers by focusing on the place value of the digits by playing the game: <i>Close to 7,500</i>. Interpret and solve multi-step addition and subtraction problems using larger numbers (activity: <i>Stadium and Arena Capacities-T41</i>).
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Assessments	
Performance Task(s)	Other Evidence
<p>Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)</p> <p>Goal: Role: Audience: Situation: Product or Performance: Standards for Success:</p>	<p>Application that is functional in a classroom context to evaluate student achievement of desired results</p> <p>Ongoing Formative Assessments: Observing Students</p> <ul style="list-style-type: none"> Read and write large numbers correctly. Add and subtract multiples of 10, 100, 1,000. Locate and write numbers on the 10,000 chart. Find the difference between a given number and 10,000. Create two 3-digit numbers with a sum as close to 1,000 as possible.

- Solve sets of related addition and subtraction problems.
- Solve subtraction problems in two ways using clear and concise notation.
- Add two numbers together to get as close to 7,500 as possible.
- Demonstrate fluency with multiplication combinations.
- Add multiples of 100 and 1,000 to and subtract them from 5-digit numbers.

Other Formative Assessments

- Reads two or three numbers on the 10,000 chart and writes two or three numbers in the thousands.
- Demonstrate fluency with division problems related to the multiplication combinations to 12 x 12 (division facts). (30 division problems in about 2 minutes).
- Reads and writes two or three numbers up to 100,000. Then answer two or three questions: “What is the number that is 1 less than the one you just read?”, “What about 1 more?”, “What about 10 less?”, “What about 100 less?”

End-of-Unit Assessment

- Use at least one subtraction strategy efficiently, perform accurately, and notate clearly as well as apply to large numbers.

Suggested Resources

- Investigations: Unit 3, Thousands of Miles, Thousands of Seats.
- Teaching Student-Centered Mathematics, 3-5 by Van de Walle, et. al
- [K-5 Math Teaching Resources](#), online
- [Howard County Math Wiki](#), Grade 5

New Milford Public Schools

Committee Member(s): Christine Cahalane, Corby Kennison, Lisa Montemurro, Stephanie Zappone, Unit 4	Course/Subject: Mathematics Grade Level: 5 # of Weeks: 7
Identify Desired Results	
Common Core Standards	
Standards in Unit <ul style="list-style-type: none">• (5.NF.1) Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.• (5.NF.2) Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers.• (5.NF.4) Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. a. interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. b. find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. c. multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. (Standard also in Ten-Minute Math)• (5.NF.5) Interpret multiplication as scaling (resizing), by: a. comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication. B. explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n'a)/(n'b)$ to the effect of multiplying a/b by 1.• (5.NF.6) Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem.• (5.NF.7) Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. a. interpret division of a unit fraction by a non-zero whole number, and compute such quotients. b. interpret division of a whole number by a unit fraction, and compute such quotients. c. solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem.	

Standards Only in Ten-Minute Math

- (5.NBT.5) Fluently multiply multi-digit whole numbers using the standard algorithm.
- (5.NBT.6) Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on 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.

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that ...)	Essential Questions Inquiry used to explore generalizations
<ul style="list-style-type: none"> • Fractions express quantities with greater precision. Benchmark fractions help us estimate and determine if our calculations are reasonable. Benchmark fractions help us compare fractions. • Multiplying with fractions is similar to multiplying with whole numbers. • The size of a factor impacts the product. • We can use multiplication to solve problems with fractions and mixed numbers. • We can use division to solve problems with fractions. 	<ul style="list-style-type: none"> • How do we add and subtract fractions with unlike denominators? • How are benchmark fractions helpful to mathematicians? • What happens when we multiply a whole number by a fraction? • What happens when we multiply a fraction by a fraction? • How does the size of a factor influence the size of a product? • How can I use visual fraction models to solve multiplication problems? • How can we divide with fractions and what does our quotient represent?

Expected Performances

What students should know and be able to do

Students will know the following:

- Students study the relationship among fractions and between fractions and percents and use this knowledge to find equivalent fractions, order fractions, and add commonly used fractions.
- Students use a variety of contexts and models, including area, number lines, and rotation, to further understand the meaning of fractions and model their strategies.

Students will be able to do the following:

- How do we add and subtract fractions with unlike denominators?
- How are benchmark fractions helpful to mathematicians?
- What happens when we multiply a whole number by a fraction?
- What happens when we multiply a fraction by a fraction?
- How does the size of a factor influence the size of a product?
- How can I use visual fraction models to solve multiplication problems?
- How can we divide with fractions and what does our quotient represent?

Character Attributes	
<ul style="list-style-type: none"> • Cooperation • Respect • Responsibility • Perseverance 	
Technology Competencies	
<ul style="list-style-type: none"> • None 	
Develop Teaching and Learning Plan	
<p>Teaching Strategies:</p> <p>Use a math workshop model with teacher-directed mini-lesson</p> <ul style="list-style-type: none"> • to provide students with repeated experiences with concepts and skills • to provide time for teachers to work with small groups of students <p>Use games to develop concepts and practice skills</p> <p>Use student-centered activities and worthwhile math tasks</p> <p>Use a variety of grouping structures</p> <ul style="list-style-type: none"> • Collaborative groups, partners, individuals <p>Orchestrate class discussions</p> <ul style="list-style-type: none"> • Focus discussions on important mathematics and student strategies • Elicit participation by all students over the course of several discussions • Facilitate student to student discourse <p>Encourage students to represent and discuss their thinking strategies</p> <p>Use Ten-Minute Math to provide on-going practice and review.</p> <ul style="list-style-type: none"> • Estimation and Number Sense <ul style="list-style-type: none"> • Estimating solutions to 2-digit to 4-digit multiplication and division problems. • Estimating solutions to addition and subtraction problems with fractions and mixed numbers. • Guess My Rule <ul style="list-style-type: none"> • Identifying fractions of a group. • Using evidence and formulating 	<p>Learning Activities:</p> <ul style="list-style-type: none"> • Use 10 x 10 grids to identify equivalent fractions and percents. They solve real -world problems about finding fractional part of a whole or group. • Create a chart that lists how fractions, decimals, and percents are used in everyday situations • Represent fourths and eights of an area to find the equivalent percents. • Develop reasoning and strategies to find percent equivalents for thirds and sixths and justify their thinking • Compare fractions less than, greater than, and equal to $\frac{1}{2}$ • Use fraction equivalents, fraction-percent equivalents, and relationships of fractions to landmarks such as $\frac{1}{2}$ and 1 to compare fractions. Use equivalent fractions and percents to solve problems in real-world contexts • Create a fraction-percent equivalent strip and put fraction cards in order • Compare pairs of fractions using fraction equivalents, relationships of fractions to $\frac{1}{2}$ or 1, and fraction representations such as rectangles • Determine fraction-percent equivalents • Compare and order fractions by playing games like <i>In Between</i>. • Use rectangles, rotation on a clock, and a number line to represent and visualize addition and subtraction of fractions.

<p>questions to make hypotheses about the common characteristics in a group.</p>	<ul style="list-style-type: none"> • Add and subtract fractions while playing games such as <i>Fraction Track</i>. • Add and subtract fractions and mixed numbers by playing games such as <i>Roll Around the Clock</i>, <i>Fraction Problems</i>, and <i>Fraction Track</i>
Assessments	
<p style="text-align: center;">Performance Task(s) Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)</p>	<p style="text-align: center;">Other Evidence Application that is functional in a classroom context to evaluate student achievement of desired results</p>
<p>Goal: Role: Audience: Situation: Product or Performance: Standards for Success:</p>	<p>Ongoing Formative Assessments: Observing Students:</p> <ul style="list-style-type: none"> • Determine and answer in the proper form needed (percent, fraction, whole number) in response to a problem. • Represent a portion of a group of things (2 out of 5) as a fraction ($\frac{2}{5}$). • Determine the missing portion of a whole. • Apply understanding that fractions are equal parts of a whole. • Recognize that 100% is the whole amount and 50% is half the amount. • Compare related fractions using reasoning and representation. • Add familiar, related fractions ($\frac{1}{3} + \frac{1}{6}$). • Use strategies and models to determine the equivalent percent and identify fraction equivalents for percents. • Represent given fractional parts with fraction and percent models. • Use knowledge of thirds and sixths to determine percents using models. • Compare fraction equivalents using percent equivalent strips. • Compare fractions with related denominators. • Order fractions with the same numerator.

- Interpret information in a story problem and in a variety of contexts.
- Apply understanding of fractions to identify equivalent fractions, and add and subtract fractions.
- Use a clock face or rectangle to represent fractional parts to solve problems involving addition and subtraction of fractions.
- Identify half and relationships of other fractional parts to the half and whole.
- Recognize that spacing between fractionally equivalent parts must be the same.
- Label fractions appropriately.
- Break fractional parts into smaller pieces to enable addition and subtraction of parts.
- Recognize and use fraction equivalents effectively and efficiently.
- Use multiple strategies to add and subtract fractions and mixed numbers.
- Interpret fraction story problems and solve using representational models.

Other Formative Assessments

- Solve problems about the percentage of a quantity.
- Solve problems about a percentage of a quantity, order fractions with like and unlike denominators, and determine the relationship of a fraction or percent to the unit whole.
- Write related subtraction equations for any of the addition equations.

End-of-Unit Assessment

- Solve problems using fraction-percent equivalents, determines which of two fractions with unlike denominators is greater, and adds fractions using reasoning about fraction equivalents and relationships.

Suggested Resources

- Investigations: Unit 4, What's That Portion?
- Teaching Student-Centered Mathematics, 3-5 by Van de Walle, et. al
- [K-5 Math Teaching Resources](#), online
- [Howard County Math Wiki](#), Grade 5

New Milford Public Schools

Committee Member(s): Christine Cahalane, Corby Kennison, Lisa Montemurro, Stephanie Zappone, Unit 5	Course/Subject: Mathematics Grade Level: 5 # of Weeks: 4
Identify Desired Results	
Common Core Standards	
Standards in the Unit <ul style="list-style-type: none"> (5.G.3) Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles. (Standard also in Ten-Minute Math) (5.G.4) Classify two-dimensional figures in a hierarchy based on properties. 	
Standards Only in Ten-Minute Math <ul style="list-style-type: none"> (5.MD.2) Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$) Use operations on fractions for this grade to solve problems involving information presented in line plots. 	
Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that ...)	Essential Questions Inquiry used to explore generalizations
<ul style="list-style-type: none"> Two-dimensional figures have subcategories based on attributes. 	<ul style="list-style-type: none"> What do we consider when classifying categories of the same two-dimensional figure?
Expected Performances What students should know and be able to do	
Students will know the following: <ul style="list-style-type: none"> Students create polygons using “power polygon” pieces and discuss, apply, and evaluate definitions of these polygons. Students focus on properties of quadrilaterals and also study similarity of 2-D shapes. Measurement work includes finding measures of angles using known angles and finding perimeter and area of rectangles. LogoPaths, a Logo programming environment designed for Investigations students in Grades 3–5, is introduced in this unit. It allows students to explore geometrical relationships, especially focusing on angle, length and perimeter, patterns in sides and angles, and characteristics of specific shapes. 	
Students will be able to do the following: <ul style="list-style-type: none"> Students will identify different quadrilaterals by attribute, and know that some quadrilaterals can be classified in more than one way. Students will use known angle sizes to determine the sizes of other angles. Students will determine the perimeter and area of rectangles. Students will identify mathematically similar polygons. 	

Character Attributes	
<ul style="list-style-type: none"> • Cooperation • Respect • Responsibility • Perseverance 	
Technology Competencies	
<ul style="list-style-type: none"> • None 	
Develop Teaching and Learning Plan	
<p>Teaching Strategies:</p> <p>Use a math workshop model with teacher-directed mini-lesson</p> <ul style="list-style-type: none"> • to provide students with repeated experiences with concepts and skills • to provide time for teachers to work with small groups of students <p>Use games to develop concepts and practice skills</p> <p>Use student-centered activities and worthwhile math tasks</p> <p>Use a variety of grouping structures</p> <ul style="list-style-type: none"> • Collaborative groups, partners, individuals <p>Orchestrate class discussions</p> <ul style="list-style-type: none"> • Focus discussions on important mathematics and student strategies • Elicit participation by all students over the course of several discussions • Facilitate student to student discourse <p>Encourage students to represent and discuss their thinking strategies</p> <p>Use Ten-Minute Math to provide on-going practice and review.</p> <ul style="list-style-type: none"> • Quick Images <ul style="list-style-type: none"> • Writing multiplication and division equations to represent the total number of shapes in a pattern. • Decomposing images of 2-D shapes and then recombining them to make a given design. • Quick Survey <ul style="list-style-type: none"> • Describing important features of data. 	<p>Learning Activities:</p> <ul style="list-style-type: none"> • Use <i>Shape Cards</i> to sort and describe triangles and quadrilaterals by angle size, side length, and the number of parallel sides to identify attributes of polygons. • Use geometric vocabulary to describe different types of triangles. • Play <i>Angle and Turn Game</i>, and using <i>LogoPaths</i> software, to develop an understanding of supplementary relationships between turning angles and the interior angles formed by those turns. • Classify polygons and discuss relationships between quadrilaterals, parallelogram, rhombus, rectangle, and square. • Identify regular polygons as polygons that have all equal sides and all equal angles using <i>Power Polygons</i>. • Determine the sizes of the angles in <i>Power Polygons</i> using right angles and other known angle measurements as landmarks. • Discuss their strategies for finding angle measures, sort polygons based on attributes, find angle sizes and draw triangles using <i>LogoPaths</i> software. • Find and compare the perimeter and area of a series of related squares to discover how a change in the dimensions of a square changes the perimeter and the area. • Use representations to explain how areas and perimeters of squares change when dimensions are doubled.

<ul style="list-style-type: none"> • Interpreting and posing questions about the data. 	<ul style="list-style-type: none"> • Extend understandings of perimeter and area to non-square rectangles. • Use <i>LogoPaths</i> software to draw rhombuses and parallelograms. • Build figures that are mathematically similar to some of the <i>Power Polygon</i> pieces to discover how many of the same polygon pieces it takes to build the same, larger, similar figure. • Build similar hexagons and use <i>LogoPath</i> software to determine whether pairs of polygons are similar or not similar. • Develop and share <i>Similarity Posters</i> to discuss the relationship between side length and area of similar figures. • Discuss how the areas of similar hexagons change.
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Assessments

<p style="text-align: center;">Performance Task(s)</p> <p>Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)</p>	<p style="text-align: center;">Other Evidence</p> <p>Application that is functional in a classroom context to evaluate student achievement of desired results</p>
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<p>Goal:</p> <p>Role:</p> <p>Audience:</p> <p>Situation:</p> <p>Product or Performance:</p> <p>Standards for Success:</p>	<p>Ongoing Formative Assessments:</p> <p>Observing Students</p> <ul style="list-style-type: none"> • Use attributes to describe triangles and quadrilaterals and parallelograms • Use proper terms (acute, obtuse, equilateral, isosceles, scalene, regular) to describe polygon attributes • Apply understandings of polygon attributes to indicate overlapping definitions (a square is also a rhombus and a rectangle) • Use examples and non-examples to justify polygon definitions • Apply understanding of 180 degrees as a complete turn to point of origin • Identify supplementary angles • Define regular polygons as a polygon with all sides and all angles equal • Accurately determine dimensions and area of a rectangle and use measurements to verify angle sizes and side lengths
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- Use known angles to find measures of other angles
- Use multiple strategies to determine perimeter and area of different polygons
- Recognize patterns and changes in area and perimeter when side lengths are changed or when the polygon is doubled
- Recognize square units as a unit of measure and use proper labels for perimeter (inches) and area (square inches)
- Recognize a whole shape is composed of smaller shapes.
- Recognize that similar shapes have the same angles measures but different side lengths, perimeter, and area
- Compare angle measures and side lengths to determine similar shapes
- Accurately record the number and kind of shapes used to create a similar hexagon
- Identify pairs of similar shapes

Other Formative Assessments

- Determine the relationships among different types of quadrilateral and find the measures of the angles in an irregular polygon.
- Determine the perimeter and area of a given rectangle. Two new rectangles must be created so that one has a different area, and one has a different perimeter than the first.

End-of-Unit Assessment

- Find angle measures in a figure made from *Power Polygons*.
- Find the dimensions and areas of rectangles with the same perimeter.
- Determine the perimeter and area of rectangles.
- Determine whether two polygons are similar.

Suggested Resources

- Investigations: Unit 5, Measuring Polygons.
- Teaching Student-Centered Mathematics, 3-5 by Van de Walle, et. Al
[K-5 Math Teaching Resources](#), online
- [Howard County Math Wiki](#), Grade 5

New Milford Public Schools

Committee Member(s): Christine Cahalane, Corby Kennison, Lisa Montemurro, Stephanie Zappone, Unit 6	Course/Subject: Mathematics Grade Level: 5 # of Weeks: 6
Identify Desired Results	
Common Core Standards	
<p>Standards in the Unit</p> <ul style="list-style-type: none">• (5.NBT.3) Read, write, and compare decimals to thousandths. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$. Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.• (5.NBT.4) Use place value understanding to round decimals to any place.• (5.NBT.6) Find whole-number quotients of whole numbers with up to four-digit dividends and two-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. (Standard also in Ten-Minute Math)• (5.NBT.7) Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. (Standard also in Ten-Minute Math)• (5.NF.3) Apply and extend previous understandings of multiplication and division to multiply and divide fractions.• (5.MD.1) Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. <p>Standards Only in Ten-Minute Math</p> <ul style="list-style-type: none">• (5.NBT.3) Read, write, and compare decimals to thousandths.• (5.NBT.5) Fluently multiply multi-digit whole numbers using the standard algorithm.	

Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that ...)	Essential Questions Inquiry used to explore generalizations
<ul style="list-style-type: none"> • Understanding place value leads to number sense and efficient strategies for computing with numbers. • Our number system is based on groups of ten. • We use division to find equal groups or the number of things in a given amount of groups. • We can show division with equations, arrays, and area models. • Fractions can represent division. • Estimating helps us determine the reasonableness of our solutions. • We use measurement every day to solve problems in our world. • Different measurement units (within the same system) are used to provide a more precise measurement. • Calculating with decimals is similar to calculating with whole numbers. 	<ul style="list-style-type: none"> • How does a digit's position affect its value? • How do I round decimals? • What strategies can be used to divide multi-digit whole numbers? • How do we add, subtract, multiply, and divide decimals and what does our solution mean? • What do fractions represent? • Why is it helpful to consider a fraction as division? • How do we convert between units? • Why does what we measure influence how we measure and what we use?
Expected Performances What students should know and be able to do	
<p>Students will know the following:</p> <ul style="list-style-type: none"> • Students focus primarily on decimals and how the number system extends to numbers less than one. • Students use their understanding of fractions and percents and their relationship to decimals to solve computation problems involving decimals. • Students use contexts (time and precipitation) and models (area and number lines) to order and add decimals. <p>Students will be able to do the following:</p> <ul style="list-style-type: none"> • Students will read, write and interpret decimal fractions to the thousandths. • Students will order decimals to thousandths. • Students will add decimal fractions through reasoning about place value, equivalents, and representations. 	
Character Attributes	
<ul style="list-style-type: none"> • Cooperation • Respect • Responsibility • Perseverance 	

Technology Competencies

- None

Develop Teaching and Learning Plan

Teaching Strategies:

Use a math workshop model with teacher-directed mini-lesson

- to provide students with repeated experiences with concepts and skills
- to provide time for teachers to work with small groups of students

Use games to develop concepts and practice skills

Use student-centered activities and worthwhile math tasks

Use a variety of grouping structures

- Collaborative groups, partners, individuals

Orchestrate class discussions

- Focus discussions on important mathematics and student strategies
- Elicit participation by all students over the course of several discussions
- Facilitate student to student discourse

Encourage students to represent and discuss their thinking strategies

Use Ten-Minute Math to provide on-going practice and review.

- Estimation and Number Sense
 - Estimating solutions to 2-digit to 4-digit multiplication and division problems.
 - Estimating solutions to addition and subtraction problems with fractions and mixed numbers.
- Practicing Place Value
 - Recognizing and interpreting the value of each digit in 4- and 5-digit numbers.
 - Finding different combinations of a number, using only 1,000s, 100s, 10s, and 1s and recognizing their equivalence.

Learning Activities:

- Use understanding of fractions and the number system to order and compare decimals to the thousandths.
- Identify everyday uses of fractions and decimals.
- Use the visual aid of the grid to develop their sense of equivalent decimals.
- Represent decimals on 10 x 10 grids.
- Develop meaning for decimal notation for thousandths, using what they know about fraction equivalents. Students represent decimals on grids divided into hundredths and thousandths.
- Represent and order decimals by using a number line.
- Order decimals and justify their order through reasoning about decimal representation, equivalents, and relationships. (Use Decimal Cards, Set A (M11) for this activity).
- Compare decimals to the landmarks 0, $\frac{1}{2}$, and 1 by playing the *In Between Game (M15)*.
- Round decimals to the nearest one, tenth, and hundredth by playing *Smaller to Larger*.
- Interpret fractions as division and identify decimal and fractions by working with *Win/ Loss Statistics* and completing the *Fraction-to-Decimal Division Table*.
- Interpret the meaning of digits in a decimal number by analyzing patterns in the Fraction-to-Decimal Division table.
- Identify decimal, fraction, and percent equivalents by completing Activity 1B, "Who's Winning?".

<ul style="list-style-type: none"> • Adding and subtracting multiples of 10 from a 4- and 5-digit number, adding and subtracting tenths of hundredths to decimal fractions and numbers. 	<ul style="list-style-type: none"> • Add decimals, estimate, solve, and discuss their strategies for adding decimal fractions by playing games such as <i>Fill Two</i>. • Estimate sums of decimal numbers, use representations to add tenths, hundredths, and thousandths as well as adding decimals to the thousandths through reasoning about place value, equivalents and representations. (Activities: <i>The Jeweler's Gold and Decimals In Between</i>). • Practice adding decimals to the thousandths using Decimal Cards. • Compare decimal sums by playing <i>Decimal Double Compare</i>. • Use representations to subtract tenths and hundredths. • Estimate and add decimals to the thousandths through reasoning about place value, equivalents, and representations by playing a game such as <i>Close to 1</i>. • Use representations and reasoning to multiply whole numbers by powers of 10 (including 1, 0.1, and 0.01). • Explain the patterns in the placement of the decimal point when a decimal is multiplied by a power of 10. • Use various strategies to estimate products of decimal numbers. • Multiply decimals to hundredths through reasoning about place value and multiplication. • Write a rule for multiplying decimal numbers. • Use representations and reasoning to divide whole numbers by power of 10 (including 1, 0.1, and 0.01). • Explain the patterns in the placement of the decimal point when a decimal is divided by a power of 10. • Estimate quotients of decimal numbers.
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	<ul style="list-style-type: none"> • Divide decimals to the hundredths through reasoning about place value and division. • Solve multiplication and division decimal word problems.
Assessments	
Performance Task(s) Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	Other Evidence Application that is functional in a classroom context to evaluate student achievement of desired results
<p>Goal:</p> <p>Role:</p> <p>Audience:</p> <p>Situation:</p> <p>Product or Performance:</p> <p>Standards for Success:</p>	<p>Ongoing Formative Assessments:</p> <p>Observing Students</p> <ul style="list-style-type: none"> • Identify different fractional parts of a square and ways to represent them by using fractions, percents, and decimals. • Shade in parts of a square to represent decimal fractions in the hundredths and thousandths. • Place decimals in order on the number line. • Compare and order decimals. • Round decimals to the nearest one, tenth, and hundredth. • Place, compare, and order decimals on a game board. • Find decimal equivalents for fractions. • Apply knowledge of decimals to determine sports statistics. • Use hundredths grids, students combine decimals. • Explain strategies for adding decimal fractions. • Add tenths, hundredths, and thousandths. • Compare decimal pair sums. • Subtract numbers with tenths and hundredths. • Add decimals to get a sum as close to one as possible. • Solve addition problems involving tenths, hundredths, and thousandths. • Classify 10 numbers between landmarks and then order them from smallest to greatest.

- Add decimal fractions in the context of *Fill Two*.
- Multiply whole numbers by powers of 10 and look for patterns in their answers.
- Use multiplication strategies they already know, and reasoning, to solve multiplication problems with decimal numbers.
- Divide whole numbers by powers of ten and look for patterns in their answers.
- Use division strategies the students already know, and reasoning, to solve division problems with decimal numbers.
- Solve multiplication and division decimal word problems.

Other Formative Assessments

- Show how they know how to determine tenths, hundredths, and thousandths equivalent in both fraction and decimal form. (Use hundredths and thousandths grids to solve the problems).
- Read, write, interpret and order decimals to the thousandths.

End-of-Unit Assessment

- Order decimals to the thousandths and add decimals to the thousandths in the context of the game *Fill Two*.
- Choose the correct product or quotient by reasoning about the size of the numbers in the problems and using what they know about the operations of multiplication or division.
- Accurately solve multiplication and division problems involving decimals to hundredths.

Suggested Resources

- Investigations: Unit 6, Decimals on Grids and Number Lines.
- Teaching Student-Centered Mathematics, 3-5 by Van de Walle, et. al
- [K-5 Math Teaching Resources](#), online
- [Howard County Math Wiki](#), Grade 5

New Milford Public Schools

Committee Member(s): Christine Cahalane, Lisa Montemurro, Corby Kennison, Stephanie Zappone, Unit 7	Course/Subject: Mathematics Grade Level: 5 # of Weeks: 4
Identify Desired Results	
Common Core Standards	
<p>Standards in the Unit</p> <ul style="list-style-type: none"> • (5.OA.2) Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. • (5.NBT.5) Fluently multiply multi-digit whole numbers using the standard algorithm. (Standard also in Ten-Minute Math). • (5.NBT.6) Find whole-number quotients of whole numbers with up to four-digit dividends and two-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. (Standard also in Ten-Minute Math). • (5.NF.2) Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. <p>Standards Only in Ten-Minute Math</p> <ul style="list-style-type: none"> • (5.OA.3) Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. 	
Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that ...)	Essential Questions Inquiry used to explore generalizations
<ul style="list-style-type: none"> • Expressions represent quantities. • The standard algorithm is a consistent and efficient way to multiply numbers. • We use division to find equal groups or the number of things in a given amount of groups. 	<ul style="list-style-type: none"> • What is an expression? • How can we multiply large numbers using the most efficient strategy? • What strategies can be used to divide multi-digit whole numbers?

Expected Performances	
What students should know and be able to do	
<p>Students will know the following:</p> <ul style="list-style-type: none"> • Students find and study equivalent expressions for multiplication and division problems (e.g., $112 \div 8 = 28 \div 2$). • Students practice solving larger multiplication problems (3 digit x 2 digit) accurately and efficiently and study the U.S. algorithm for multiplication. • Students gain fluency solving division problems with one-, two-, and three-digit divisors. <p>Students will be able to do the following:</p> <ul style="list-style-type: none"> • Students will explain why doubling one factor in a multiplication expression and dividing the other by 2 results in an equivalent expression. • Students will solve multiplication problems efficiently. • Students will solve division problems efficiently. 	
Character Attributes	
<ul style="list-style-type: none"> • Cooperation • Respect • Responsibility • Perseverance 	
Technology Competencies	
<ul style="list-style-type: none"> • None 	
Develop Teaching and Learning Plan	
<p>Teaching Strategies:</p> <p>Use a math workshop model with teacher-directed mini-lesson</p> <ul style="list-style-type: none"> • to provide students with repeated experiences with concepts and skills • to provide time for teachers to work with small groups of students <p>Use games to develop concepts and practice skills</p> <p>Use student-centered activities and worthwhile math tasks</p> <p>Use a variety of grouping structures</p> <ul style="list-style-type: none"> • Collaborative groups, partners, individuals <p>Orchestrate class discussions</p> <ul style="list-style-type: none"> • Focus discussions on important mathematics and student strategies • Elicit participation by all students over the course of several discussions • Facilitate student to student discourse 	<p>Learning Activities:</p> <ul style="list-style-type: none"> • Find equivalent multiplication expressions and equivalent division expressions. • Represent what happens when one factor in a multiplication expression is doubled and the other is halved. • Use story contexts and representation to support explanations of the relationship between equivalent expressions. • Generate equivalent multiplication expressions by doubling (or tripling) one factor and dividing the other by 2 (or 3). • Use story contexts and representations to support explanations of the relationship between equivalent expressions. • Develop arguments about how to generate equivalent expression in multiplication. • Compare equivalent multiplication

<p>Encourage students to represent and discuss their thinking strategies Use Ten-Minute Math to provide on-going practice and review.</p> <ul style="list-style-type: none"> • Estimation and Number Sense <ul style="list-style-type: none"> • Estimating solutions to 2-digit to 4-digit multiplication and division problems. • Estimating solutions to addition and subtraction problems with fractions and mixed numbers. • Number Puzzles <ul style="list-style-type: none"> • Identifying prime, square, even, and odd numbers. • Determining if one number is a factor or multiple of another. 	<p>expressions to equivalent division expressions.</p> <ul style="list-style-type: none"> • Represent and generate equivalent expressions in division. • Solve 2-digit by 2-digit or 3-digit multiplication problems fluently. • Describe and compare strategies used to solve multi-digit multiplication problems. • Estimate answers to multiplication and division problems. • Solve division problems and make posters showing a story context, solution, and a representation using any strategy/math tools useful. • Solve multistep word problems using all four operations. • Solve a variety of programs to find the number of teams or number of team members in the activity <i>Field Day</i>.
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Assessments

<p style="text-align: center;">Performance Task(s)</p> <p>Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)</p>	<p style="text-align: center;">Other Evidence</p> <p>Application that is functional in a classroom context to evaluate student achievement of desired results</p>
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<p>Goal:</p> <p>Role:</p> <p>Audience:</p> <p>Situation:</p> <p>Product or Performance:</p> <p>Standards for Success:</p>	<p>Ongoing Formative Assessments: Observing Students</p> <ul style="list-style-type: none"> • Create a story problem that shows $6 \times 9 = 3 \times 18$ • Represent doubling and halving in a picture or diagram. • Create a story and a representing that shows that when one number in a multiplication expression is tripled and the other is divided into thirds, the product remains the same. • Create multiplication expressions that are equal to 40×32. • Create division expressions that are equivalent to $60 / 10$. • Solve 2-digit by 2-digit or 3-digit multiplication problems. • Solve a division problem with a 3-digit dividend and a 2-digit divisor.
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- Use clear and concise notation when dividing.
- Describe and compare strategies used to solve division problems.
- Refine division strategies used to solve self-chosen “challenge problems”.
- Solve a division problem accurately and record solutions clearly.
- Solve multiplication and division problems with large numbers.

Other Formative Assessments

- Solve the division problem $701 \div 27$ independently using clear and concise notation in their solutions.

End-of-Unit Assessment

- Solve division problems with a 2-digit divisor fluently.
- Solve 2-digit by 2-digit or 3-digit multiplication problems fluently.

Suggested Resources

- Investigations: Unit 7, How Many People? How Many Teams?
- Teaching Student-Centered Mathematics, 3-5 by Van de Walle, et. al
- [K-5 Math Teaching Resources](#), online
- [Howard County Math Wiki](#), Grade 5

New Milford Public Schools

Committee Member(s): Christine Cahalane, Corby Kennison, Lisa Montemurro, Stephanie Zappone, Unit 8	Course/Subject: Mathematics Grade Level: 5 # of Weeks: 3
Identify Desired Results	
Common Core Standards	
Standards in the Unit	
<ul style="list-style-type: none">• (5.OA.1) Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.• (5.OA.2) Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.• (5.OA.3) Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane• (5.NBT.3) Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$. b. Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons. (Standard also in Ten-Minute Math)• (5.MD.1) Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.• (5.G.1) Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).• (5.G.2) Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.	
Standards in Ten-Minute Math	
<ul style="list-style-type: none">• (5.NBT.5) Fluently multiply multi-digit whole numbers using the standard algorithm.• (5.NBT.6) Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on 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.	

<ul style="list-style-type: none"> (5.NBT.7) Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. 	
Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that ...)	Essential Questions Inquiry used to explore generalizations
<ul style="list-style-type: none"> Numerical patterns follow rules and can be graphed. Coordinate systems allow us to place points in space and compare them to other points. Understanding place value leads to number sense and efficient strategies for computing with numbers. 	<ul style="list-style-type: none"> How can we represent the relationship of patterns in numbers? What do coordinates mean and how do we use them? How are place value patterns repeated in numbers?
Expected Performances What students should know and be able to do	
<p>Students will know the following:</p> <ul style="list-style-type: none"> Students investigate situations in which two quantities change in relation to each other. Students describe data about functional relationships, develop an overall sense of change from a graph, and understand how the changes and totals are related. Students also compare two linear functions with different rates of change <p>Students will be able to do the following:</p> <ul style="list-style-type: none"> Students will create tables and graphs to represent the relationship between two variables. Students will use tables and graphs to compare two situations with constant rates of change. Students will use symbolic notation to represent the value of one variable in terms of another variable in situations with constant rates of change. 	
Character Attributes	
<ul style="list-style-type: none"> Cooperation Respect Responsibility Perseverance 	
Technology Competencies	
<ul style="list-style-type: none"> None 	

Develop Teaching and Learning Plan

Teaching Strategies:

Use a math workshop model with teacher-directed mini-lesson

- to provide students with repeated experiences with concepts and skills
- to provide time for teachers to work with small groups of students

Use games to develop concepts and practice skills

Use student-centered activities and worthwhile math tasks

Use a variety of grouping structures

- Collaborative groups, partners, individuals

Orchestrate class discussions

- Focus discussions on important mathematics and student strategies
- Elicit participation by all students over the course of several discussions
- Facilitate student to student discourse

Encourage students to represent and discuss their thinking strategies

Use Ten-Minute Math to provide on-going practice and review.

- Estimation and Number Sense
 - Estimating solutions to 2-digit to 4-digit multiplication and division problems.
 - Estimating solutions to addition and subtraction problems with fractions and mixed numbers.
- Practicing Place Value
 - Recognizing and interpreting the value of each digit in 4- and 5-digit numbers.
 - Finding different combinations of a number, using only 1,000s, 100s, 10s, and 1s and recognizing their equivalence.
 - Adding and subtracting multiples of 10 from a 4- and 5-digit number, adding and subtracting tenths of

Learning Activities:

- Investigate situations in which two quantities change in relation to each other.
- Describe data about functional relationships, develop an overall sense of change from a graph, and understand how the changes and totals are related.
- Compare two linear functions with different rates of change.
- Create tables and graphs to represent the relationship between two variables.
- Use tables and graphs to compare two situations with constant rates of change.
- Use symbolic notation to represent the value of one variable in terms of another variable in situations with constant rates of change.
- Represent growth patterns using tables and graphs by using fictitious animals that have different growth rates and initial heights progressing to representing changing growth rates.
- Measure in centimeters and meters to represent two children's growth over time on a table and graph.
- Plot points on a coordinate grid to represent growth stories over time in which one quantity is changing in relation to another to compare and describe the growth of two students.
- Identify points on graph which correspond to values in a table and interpret the situation the graph represents to describe constant change of a fictitious animal's height over time.
- Describe the relative steepness of graphs or parts of graphs to compare different rates of change in growth of three animals with similar and different growth rates.

hundredths to decimal fractions and numbers.

- Compare situations by describing differences in their graphs.
- Use tables to represent the relationship between two quantities.
- Describe and represent the relationship between two quantities of constant change.
- Determine the value of one quantity with a constant rate of change when given the value of the other quantity. (age, height, for example).
- Describe a situation in which the rate of change is not constant but can be determined.
- Compare tables, graphs and situations with a constant rate of change to those where the rate is not constant.
- Study rectangular arrays to continue their work with growth patterns.
- Find area and perimeter of a rectangle built with rows of three tiles to determine rules and relationships between the number of rows and the perimeter of the rectangle.
- Use graphs, tables, and rules to describe and predict the relationship between area and perimeter in rectangular tile arrangements.
- Use Penny Jar situations and staircase towers to compare different growth patterns and to represent these patterns using verbal and symbolic rules.
- Use tables and graphs to represent the total number of tiles in two different staircase arrangements.
- Identify points in a graph with corresponding values in a table and interpret the situation the graph represents.
- Compare situations by describing differences in their graphs.
- Use the relative steepness of a graph or part of a graph to describe different rates of change.
- Write arithmetic expressions for

	<p>finding the value of one quantity in terms of the other in a situation with a constant rate of change.</p> <ul style="list-style-type: none"> • Develop rules to relate one variable to another in situations with a constant rate of change. • Use symbolic letter notation to represent the value of one variable in terms of another variable. • Describe the relationship between two quantities in a situation of constant change with an understanding of a starting point and constant increase or decrease. • Describe how a graph represents a situation in which the rate of change is not constant.
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Assessments

Performance Task(s)	Other Evidence
Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	Application that is functional in a classroom context to evaluate student achievement of desired results
<p>Goal:</p> <p>Role:</p> <p>Audience:</p> <p>Situation:</p> <p>Product or Performance:</p> <p>Standards for Success:</p>	<p>Ongoing Formative Assessment:</p> <p>Observing Students</p> <ul style="list-style-type: none"> • Recognize how perimeter changes as additional rows are added. • Apply understanding of relationship between area and perimeter with rows of 10, 15, 20, and 100. • Write a rule for finding perimeter either in words or with symbols. • Recognize and the structure of the rectangular array to find the number of tiles in a given number of rows. • Plot grid points accurately. • Recognize how the pattern on the graph explains the constant relationship of the area to the perimeter. • Describe the relationship between their rules and shape of their graphs for area and perimeter. • Complete a table and graph to show the area for a sequence of squares. • Write arithmetic expressions to represent the sequence either with addition or multiplication.

- Use the arrangement of tiles to describe and explain the number patterns.
- Recognize patterns of increase (2 for each successive square).
- Predict the shape of the graph by the rate of change observed.

Other Formative Assessments

- Create tables and graphs to represent the relationships between two variables and to compare two situations with constant rates of change.

End of Unit Assessment

- Complete a table and graph to represent two related situations of constant change to compare and describe the two situations.
- Use variable notation to write a general rule representing one variable in terms of another variable.

Suggested Resources

- Investigations: Unit 8, Growth Patterns.
- Teaching Student-Centered Mathematics, 3-5 by Van de Walle, et. al
- [K-5 Math Teaching Resources](#), online
- [Howard County Math Wiki](#), Grade 5

New Milford Public Schools

Committee Member(s): Christine Cahalane, Corby Kennison, Lisa Montemurro, Stephanie Zappone Unit 9	Course/Subject: Mathematics Grade Level: 5 # of Weeks: 2
Identify Desired Results	
Common Core Standards	
Standards in the Unit <ul style="list-style-type: none"> (5.MD.2) Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). (Use operations on fractions for this grade to solve problems involving information presented in line plots). (Standard also in Ten-Minute Math) (5.NBT.5) Fluently multiply multi-digit whole numbers using the standard algorithm. (Standard also in Ten-Minute Math) (5.NBT.6) Find whole-number quotients of whole numbers with up to four-digit dividends and two-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. (Standard also in Ten-Minute Math) (5.NF.6) Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem. 	
Standards Only in Ten-Minute Math <ul style="list-style-type: none"> Standards in Ten-Minute Math are all included within the unit standards. 	
Enduring Understandings Generalizations of desired understanding via essential questions (Students will understand that ...)	Essential Questions Inquiry used to explore generalizations
<ul style="list-style-type: none"> Data can be displayed in various ways that help us understand and interpret it. 	<ul style="list-style-type: none"> Why display data in different ways?
Expected Performances What students should know and be able to do	
Students will know the following: <ul style="list-style-type: none"> Students describe major features of a set of data, represented in a line plot or bar graph, and quantify the description by using medians or fractional parts of the data. Students draw conclusions about how two groups compare based on summarizing the data for each group 	
Students will be able to do the following: <ul style="list-style-type: none"> Students will describe major features of a set of data represented in a line plot or bar graph, and quantify the description by using the median or fractional parts of the data? 	

- Students will draw conclusions about how two groups compare based on summarizing the data for each group?

Character Attributes

- Cooperation
- Respect
- Responsibility
- Perseverance

Technology Competencies

- None

Develop Teaching and Learning Plan

Teaching Strategies:

Use a math workshop model with teacher-directed mini-lesson

- to provide students with repeated experiences with concepts and skills
- to provide time for teachers to work with small groups of students

Use games to develop concepts and practice skills

Use student-centered activities and worthwhile math tasks

Use a variety of grouping structures

- Collaborative groups, partners, individuals

Orchestrate class discussions

- Focus discussions on important mathematics and student strategies
- Elicit participation by all students over the course of several discussions
- Facilitate student to student discourse

Encourage students to represent and discuss their thinking strategies

Use Ten-Minute Math to provide on-going practice and review.

- Estimation and Number Sense
 - Estimating solutions to 2-digit to 4-digit multiplication and division problems.
 - Estimating solutions to addition and subtraction problems with fractions and mixed numbers.
- Quick Survey

Learning Activities:

- Collect and represent data on how long they can balance on one foot to compare the data distributions for left foot and right foot.
- Compare sets of mystery balancing data and develop a hypothesis about the identity of the mystery balancers.
- Examine data collected about adults balancing on one foot and compare these data with their own.
- Draw conclusions about whether adults or Grade 5 students are better balancers, judging from the comparisons made between adult and student data.

<ul style="list-style-type: none"> • Describing important features of data. • Interpreting and posing questions about the data. 	
Assessments	
Performance Task(s) Authentic application to evaluate student achievement of desired results designed according to GRASPS (one per marking period)	Other Evidence Application that is functional in a classroom context to evaluate student achievement of desired results
<p>Goal:</p> <p>Role:</p> <p>Audience:</p> <p>Situation:</p> <p>Product or Performance:</p> <p>Standards for Success:</p>	<p>Ongoing Formative Assessments:</p> <p>Observing Students</p> <ul style="list-style-type: none"> • Use a line plot to represent ordered, numerical data. • Describe the shape of a set of data (where the data are concentrated, the median, what is typical, highest and lowest values, range and outliers). • Use medians to compare groups. • Develop arguments based on data. • Compare a variety of aspects of data. • Support hypotheses with evidence from the data. • Draw reasonable conclusions about data. <p>Other Formative Assessments N/A</p> <p>End of Unit Assessment</p> <ul style="list-style-type: none"> • Compare sets of data using the shape and spread of the data. • Drawing conclusions based on data. • Using operations on fractions to solve problems involving information given in line plots.
Suggested Resources	
<ul style="list-style-type: none"> • Investigations: Unit 9, How Long Can You Stand on One Foot? • Teaching Student-Centered Mathematics, 3-5 by Van de Walle, et. al • K-5 Math Teaching Resources, online • Howard County Math Wiki, Grade 5 	