

# Roscommon Area Public Schools – Curriculum Framework

Course: 5th Grade Math

Unit Number: module 2

Unit Title: Multi-Digit Whole Number and Decimal Fraction Operations

Timeframe: 35 days



## [Unit 2 Tuning Notes](#)

### Stage 1: Identify Desired Results

#### Essential Question:

*What thought-provoking questions will foster inquiry, meaning making and transfer?*

- *An essential question is open ended; has no simple "right answer."*
- *Is meant to be investigated, argued, looked at from different points of view*
- *Encourages active "meaning making" by the learner about important ideas.*
- *Raises other important questions.*
- *Naturally arises*

- How can my understanding and efficiency in multiplication and division help me solve problems in my everyday life?

#### Scaffold Questions:

*What questions can we ask students that break the essential question into smaller pieces of content?*

- Should the product or quotient be smaller or larger based on the factors?
- Which of the following (area model, number line, or drawing) would best answer the question?
- Which of the following is larger  $\frac{3}{4}$  of 4 or  $\frac{3}{4}$  of 3?
- How does factor size effect products and quotients?
- How can multiplication or division of fractions be represented using a visual model, such as the area model, a number line, or drawing?
- When would  $\frac{1}{2}$  and  $\frac{1}{2}$  be the same amount? When would it be different? (e.g.  $\frac{1}{2}$  of a large pizza will be more than  $\frac{1}{2}$  of a small pizza)

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	<ul style="list-style-type: none"><li>• What is fluency?</li><li>• What does it mean to be fluent?</li><li>• What is efficiency?</li></ul>
<b>Brief Summary of Unit:</b>	<p>Students apply the patterns of the base ten system to mental strategies and the multiplication and division algorithms.</p> <p>Topics A through D provide a sequential study of multiplication. To link to prior learning and set the foundation for understanding the standard multiplication algorithm, students begin at the concrete–pictorial level in Topic A. They use place value disks to model multi-digit multiplication of place value units, for example, <math>42 \times 10</math>, <math>42 \times 100</math>, <math>42 \times 1,000</math>, leading to problems such as <math>42 \times 30</math>, <math>42 \times 300</math>, and <math>42 \times 3,000</math> (5.NBT.1, 5.NBT.2). They then round factors in Lesson 2 and discuss the reasonableness of their products.</p> <p>Throughout Topic A, students evaluate and write simple expressions to record their calculations using the associative property and parentheses to record the relevant order of calculations (5.OA.1).</p> <p>Topic B, place value understanding moves toward understanding the distributive property via area models, which are used to generate and record the partial products (5.OA.1, 5.OA.2) of the standard algorithm (5.NBT.5).</p> <p>Topic C moves students from whole numbers to multiplication with decimals, again using place value as a guide to reason and make estimations about products (5.NBT.7).</p>

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	<p>Topic D, students explore multiplication as a method for expressing equivalent measures. For example, they multiply to convert between meters and centimeters or ounces and cups with measurements in both whole number and decimal form (5.MD.1).</p> <p>Topics E through H provide a similar sequence for division. Topic E begins concretely with place value disks as an introduction to division with multi-digit whole numbers (5.NBT.6). In the same lesson, <math>420 \div 60</math> is interpreted as <math>420 \div 10 \div 6</math>. Next, students round dividends and two-digit divisors to nearby multiples of 10 in order to estimate single-digit quotients (e.g., <math>431 \div 58 \approx 420 \div 60 = 7</math>) and then multi-digit quotients. This work is done horizontally, outside the context of the written vertical method.</p> <p>The series of lessons in Topic F lead students to divide multi-digit dividends by two-digit divisors using the written vertical method. Each lesson moves to a new level of difficulty with a sequence beginning with divisors that are multiples of 10 to non-multiples of 10. Two instructional days are devoted to single-digit quotients with and without remainders before progressing to two- and three-digit quotients (5.NBT.6).</p> <p>In Topic G, students use their understanding to divide decimals by two-digit divisors in a sequence similar to that of Topic F with whole numbers (5.NBT.7).</p> <p>In Topic H, students apply the work of the module to solve multi-step word problems using multi-digit division with unknowns representing either the group size or number of groups. In this topic, an emphasis on checking the reasonableness of their answers draws on skills learned throughout the module, including refining their knowledge of place value, rounding, and estimation.</p>
<b>Desired Understanding:</b>	<ul style="list-style-type: none"><li>• Use what they know about multiplication to multiply a fraction by a fraction or a fraction by a whole number.</li><li>• Use what they know about division to divide unit fractions by whole numbers and whole numbers</li></ul>

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<p><i>The long-term accomplishments that students should be able to do with knowledge and skill, on their own. Frames Standards as long-term performance accomplishments. Answers the questions Why? And What can you do with this?</i></p>	<p>by unit fractions.</p> <ul style="list-style-type: none"><li>• Explain the relationship of division and multiplication problems that include fractions.</li><li>• Interpret a fraction as division of the numerator by the denominator (<math>a/b = a \div b</math>).</li><li>• Use visual models to represent multiplying and dividing fractions.</li></ul>
<p><b>Common Core State Standards (CCSS) - Mathematics</b></p> <p><i>List all of the standards in this unit.</i></p>	<p><b>5.OA.1</b> Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.</p> <p><b>5.OA.2</b> 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 <math>2 \times (8 + 7)</math>. Recognize that <math>3 \times (18932 + 921)</math> is three times as large as <math>18932 + 921</math>, without having to calculate the indicated sum or product.</p> <p><b>5.NBT.1</b> 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.</p> <p><b>5.NBT.2</b> 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 power of 10.</p> <p><b>5.NBT.5</b> Fluently multiply multi-digit whole numbers using the standard algorithm.</p> <p><b>5.NBT.6</b> 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</p>

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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.

**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.

**4.OA.1** Interpret a multiplication equation as a comparison, e.g., interpret  $35 = 5 \times 7$  as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

**4.OA.3** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.

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

**4.NBT.5** Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

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	<b>4.NBT.6</b> 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.
<b>Mathematical Practices</b> <i>Which of the mathematical practices will be focused on during this unit?</i>	<p><b>MP.1 Make sense of problems and persevere in solving them.</b> Students make sense of problems when they use place value disks and area models to conceptualize and solve multiplication and division problems.</p> <p><b>MP.2 Reason abstractly and quantitatively.</b> Students make sense of quantities and their relationships when they use both mental strategies and the standard algorithms to multiply and divide multi-digit whole numbers. Students also decontextualize when they represent problems symbolically and contextualize when they consider the value of the units used and understand the meaning of the quantities as they compute.</p> <p><b>MP.7 Look for and make use of structure.</b> Students apply the times 10, 100, 1,000 and the divide by 10 patterns of the base ten system to mental strategies and the multiplication and division algorithms as they multiply and divide whole numbers and decimals.</p> <p><b>MP.8 Look for and express regularity in repeated reasoning.</b> Students express the regularity they notice in repeated reasoning when they apply the partial quotients algorithm to divide two-, three-, and four-digit dividends by two-digit divisors. Students also check the reasonableness of the intermediate results of their division algorithms as they solve multi-digit division word problems.</p>
<b>Essential Standards*</b>	<b>5.OA.2</b> 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

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*List the Essential Standards that will be taught and assessed in this unit.*

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.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.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 power of 10.

**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 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.

**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.

**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.

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## Crossover standards\*

*Connection to other content areas  
(Option)*

**5. S.L. 1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 5 topics and texts*, building on others' ideas and expressing their own clearly.

**5. S.L. 1 B** Follow agreed-upon rules for discussions and carry out assigned roles.

**5.S.L. 1 C** Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others

**5. S.L. 1 D** Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

**5.W.1.A** Introduce a topic or text clearly, state an opinion, and create an organizational structure in which ideas are logically grouped to support the writer's purpose.

**5.W.1B** Provide logically ordered reasons that are supported by facts and details.

**5.W.1.C** Link opinion and reasons using words, phrases, and clauses (e.g., *consequently*, *specifically*).

**5.W.1.D** Provide a concluding statement or section related to the opinion presented.

**5.W.10** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.



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## **Alignment to the Vision of High Quality Instruction in Mathematics**

*(How do the instructional targets in this unit align to the district's vision of high quality instruction?)*

- Teacher establishes clear goals for the mathematics that students are learning, situates targets within learning progressions, and uses the targets to guide instructional decisions.
- Teacher engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allows multiple entry points and varied solution strategies.
- Teacher engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.
- Teacher facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.
- Teacher uses purposeful questions to assess and advance students' reasoning and sense making about important mathematical ideas and relationships.
- Teacher builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.
- Teacher consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.
- Teacher uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.
- Teacher provides instructional scaffolding with the gradual release model of instruction to ensure students are able to construct meaning of mathematics.
- Students solve problems without giving up.
- Students think about numbers in many different ways.

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- Students explain and justify their thinking and understand the thinking of others.
- Students show, analyze and revise their work in many different ways.
- Students use math tools and explain why they chose them.
- Students calculate accurately and efficiently, evaluate their work, and clearly communicate their thinking.
- Students use what they know to solve new problems.
- Students solve problems by looking for rules and patterns and evaluate their results.
- Students apply the mathematics they know to solve problems arising in everyday life, society, and the workplace.

## Stage 2: Determine Acceptable Evidence

(With the exception of formative assessments, all assessments listed in this section are required elements of the district's curriculum and the data associated will be collected in the district's performance management driver system.)

**Measure of  
Understanding  
(Performance Task)**

*(How will students demonstrate*

End of Module 2 test and answer essential question.

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their attainment of the desired understanding?)	
<b>Assessing the Performance Task</b> (How will we evaluate quality student work in the performance task? How will we determine that students can use their learning independently?)	End of Module 2 test and answer essential questions. <a href="#">2-7 RACES Rubric</a>  W.5.4 W.5.9 (a-b) W.5.10 RL.5.1
<b>Summative Assessments</b> (How will we know if students can demonstrate mastery of the unit's content, skills, and common core state standards?) Can overlap the performance-based evidence, thereby increasing the reliability of the overall assessment (especially if the performance task was done by a group)	<a href="#">End of Module 2 test with rubric</a>  <a href="#">Topic A</a>  <a href="#">Topic B</a>  <a href="#">Topic C</a>  <a href="#">Topic D</a>  <a href="#">Mid-module</a>

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	<a href="#">Topic E</a> <a href="#">Topic F</a> <a href="#">Topic G</a> <a href="#">Topic H</a> <a href="#">End of Module</a>
<b>Interim Assessments</b>	<a href="#">Mid Module 2 test with rubric</a>
<b>Formative Assessments</b>	<a href="#">All of Module 2 with sprints, exit tickets, etc.</a> <ul style="list-style-type: none"><li>● Exit Tickets</li><li>● Problem set questions</li><li>● Homework questions</li><li>● Sprints</li></ul>
<b>Student Self-Reflection and Self-Regulation</b> (Student-Centered) <i>(How will we measure students'</i>	What are my strengths and weaknesses about multiplication and division? What do I need to learn more about?

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ability to think meta-cognitively?)	What are some of my misunderstandings? What other questions do I have?
<b>State Assessment Practice</b> <i>(How will we measure students' ability to interact with content and skills in an MSTEP-like or SAT-like format?)</i>	Use Illuminate common assessments as a forum to practice computerized testing.
<b>Stage 3: Learning Plan</b> (Summary of Key Learning Events and Instruction)	
<b>What activities, experiences and</b>	Lesson 1: Multiply multi-digit whole numbers and multiples of 10 using place value patterns and the distributive and associative properties.  Lesson 2: Estimate multi-digit products by rounding factors to a basic fact and using place value patterns.

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## Lessons will lead to achievement of the desired results and success at the assessments?

The learning events –

- should be derived from the goals of Stage 1 and the assessments of Stage 2 to ensure alignment and effectiveness of the activities.
- should match the level of rigor within the standard
- support student Acquisition, Meaning Making, and Transfer.

Lesson 3: Write and interpret numerical expressions, and compare expressions using a visual model.

Lesson 4: Convert numerical expressions into unit form as a mental strategy for multi-digit multiplication.

Lesson 5: Connect visual models and the distributive property to partial products of the standard algorithm without renaming.

Lessons 6–7: Connect area models and the distributive property to partial products of the standard algorithm with renaming.

Lesson 8: Fluently multiply multi-digit whole numbers using the standard algorithm and using estimation to check for reasonableness of the product.

Lesson 9: Fluently multiply multi-digit whole numbers using the standard algorithm to solve multi-step word problems.

Lesson 10: Multiply decimal fractions with tenths by multi-digit whole numbers using place value understanding to record partial products.

Lesson 11: Multiply decimal fractions by multi-digit whole numbers through conversion to a whole number problem and reasoning about the placement of the decimal.

Lesson 12: Reason about the product of a whole number and a decimal with hundredths using place value understanding and estimation.

Lesson 13: Use whole number multiplication to express equivalent measurements.

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Lesson 14: Use fraction and decimal multiplication to express equivalent measurements.

Lesson 15: Solve two-step word problems involving measurement conversions.

Lesson 16: Use divide by 10 patterns for multi-digit whole number division.

Lessons 17–18: Use basic facts to approximate quotients with two-digit divisors.

Lesson 19: Divide two- and three-digit dividends by multiples of 10 with single-digit quotients, and make connections to a written method.

Lessons 20–21: Divide two- and three-digit dividends by two-digit divisors with single-digit quotients, and make connections to a written method.

Lessons 22–23: Divide three- and four-digit dividends by two-digit divisors resulting in two- and three-digit quotients, reasoning about the decomposition of successive remainders in each place value.

Lesson 24: Divide decimal dividends by multiples of 10, reasoning about the placement of the decimal point and making connections to a written method.

Lesson 25: Use basic facts to approximate decimal quotients with two-digit divisors, reasoning about the placement of the decimal point.

Lessons 26–27: Divide decimal dividends by two-digit divisors, estimating quotients, reasoning about the placement of the decimal point, and making connections to a written method.

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<b>Learning Targets</b> <i>What will students be taught? What should they know? What should they be able to do?</i>	Lessons 28–29: Solve division word problems involving multi-digit division with group size unknown and the number of groups unknown.			
	Lesson	Learning Target	Purpose	Success Criteria
	Lesson 3 and 4	I can use parentheses and brackets in expressions.	So I can understand and become efficient in multiplication and division to help me solve problems in my everyday life.	I can use parentheses and brackets in expressions on my problem set and homework.
	Lesson 3 Lesson 13,14,15 -Parentheses	I can evaluate expressions that involve parentheses, brackets, and/or braces.	So I can understand and become efficient in multiplication and division to help me solve problems in my everyday life.	I can evaluate expressions that involve parentheses, brackets, and/or braces on my problem set and homework.
	Lesson 3 and 4	I can translate words into expressions and I can explain the relationship between numbers in expressions	So I can understand and become efficient in multiplication and division to help me solve problems in my	I can translate words into expressions and I can explain the relationship between numbers in expressions



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		(without calculations).	everyday life.	(without calculations) on my problem set and homework.
	Lesson 6 uses area model Lesson 9 -Word problems	I can explain the value and relationship of digits using base ten thinking.	So I can understand and become efficient in multiplication and division to help me solve problems in my everyday life.	I can explain the value and relationship of digits using base ten thinking on my problem set and homework.
	Lesson 11 Lesson 12 Lesson 13	I can explain patterns when a decimal is multiplied or divided by a power of 10.	So I can understand and become efficient in multiplication and division to help me solve problems in my everyday life.	I can explain patterns when a decimal is multiplied or divided by a power of 10 on my problem set and homework.
	Lesson 5,6,7,8	I can fluently multiply multi-digit whole numbers using the standard algorithm.	So I can understand and become efficient in multiplication and division to help me solve problems in my everyday life.	I can fluently multiply multi-digit whole numbers using the standard algorithm on my problem set and homework.
	Lesson 16	I can divide four-digit	So I can understand and	I can divide four-digit

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	Lesson 17,18,19,20,21,22,23,24 ,25,26	dividends by two-digit divisors using strategies based on place value properties, and/or relationships between multiplication and division.	become efficient in multiplication and division to help me solve problems in my everyday life.	dividends by two-digit divisors using strategies based on place value properties, and/or relationships between multiplication and division on my problem set and homework.
<b>How will the unit be sequenced and differentiated to optimize achievement for all learners?</b> <i>Teaching -</i> <ul style="list-style-type: none"><li>• <i>should reflect the instructional approaches most appropriate to the goals (not what is easiest or most comfortable for the teacher).</i></li><li>• <i>should employ resources most appropriate to the goals (not simply march</i></li></ul>	<p>Consolidate lesson 5 and lesson 6 depending on your student's strengths, omitting Problem 1 of lesson5, move directly into re-namings with the algorithm after Problem 2 and use the Problem Set from Lesson 6.</p> <p>Consolidate lesson 7 and lesson 8 depending on your students' strengths, using estimation from the offset. Use the Problem Set from lesson 8.</p> <p>Consolidate lesson 11 and lesson 12 using estimation from the offset. Use the Problem Set from Lesson 12.</p> <p>Note: Do not omit Topic D as it is foundational to later work in the year. Students convert both from small to large and large to small measurement units using multiplication. This expedites their understanding of and fluency with conversion and fraction multiplication significantly as the year continues.</p>			

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*through a textbook or commercial program).*

- *be responsive to differences in learners' readiness, interests, and preferred ways of learning.*

## Key Vocabulary

### New or Recently Introduced Terms

- Conversion factor (the factor in a multiplication sentence that renames one measurement unit as another equivalent unit, e.g.,  $14 \times (1 \text{ in}) = 14 \times (1/12 \text{ ft})$ ; 1 in and  $1/12 \text{ ft}$  are the conversion factors)
- Decimal fraction (a proper fraction whose denominator is a power of 10)
- Multiplier (a quantity by which a given number—a multiplicand—is to be multiplied)
- Parentheses (the symbols used to relate order of operations)

### Familiar Terms and Symbols

- Decimal (a fraction whose denominator is a power of ten and whose numerator is expressed by figures placed to the right of a decimal point)
- Digit (a symbol used to make numbers: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9)
- Divisor (the number by which another number is divided)
- Equation (a statement that the values of two mathematical expressions are equal)
- Equivalence (a state of being equal or equivalent)
- Equivalent measures (e.g., 12 inches = 1 foot; 16 ounces = 1 pound)
- Estimate (approximation of the value of a quantity or number)
- Exponent (the number of times a number is to be used as a factor in a multiplication expression)

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	<ul style="list-style-type: none"><li>• Multiple (a number that can be divided by another number without a remainder like 15, 20, or any multiple of 5)</li><li>• Pattern (a systematically consistent and recurring trait within a sequence)</li><li>• Product (the result of multiplying numbers together)</li><li>• Quotient (the answer of dividing one quantity by another)</li><li>• Remainder (the number left over when one integer is divided by another)</li><li>• Renaming (decomposing or composing a number or units within a number)</li><li>• Rounding (approximating the value of a given number)</li><li>• Unit form (place value counting, e.g., 34 stated as 3 tens 4 ones)</li></ul>
<b>Resources</b> <i>Description or link to resources</i>	<ul style="list-style-type: none"><li>• <a href="#">EMBARC.Online</a></li><li>• <a href="#">Welcome to EngageNY   EngageNY</a></li><li>• <a href="#">Zearn Math: Top-rated K-5 Curriculum and Classroom Model</a></li><li>• <a href="#">Khan Academy   Free Online Courses, Lessons &amp; Practice</a></li><li>• <a href="http://greatminds.org">http://greatminds.org</a></li><li>• <a href="#">Multiplying by Multiples of 10</a></li><li>• <a href="#">Use the Area Model to Multiply</a></li><li>• <a href="#">Multiplication of Multi-digit Whole Numbers</a> (with array/area models)</li><li>• <a href="#">Multiplication Algorithm</a></li><li>• <a href="#">Multiplication of Whole Number &amp; Decimal Fraction Using Area Model</a></li><li>• <a href="#">Converting Feet to Inches</a></li><li>• <a href="#">Converting in a Real-life Problem</a></li><li>• <a href="#">Estimation</a></li><li>• <a href="#">Adding zero(s) to Dividend</a></li><li>• <a href="#">Multiplying Decimals as Repeated Addition in a Model</a></li></ul>

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