Curriculum Management System

MONROE TOWNSHIP SCHOOLS

Course Name:Mathematics
Grade: 5

For adoption by all regular education programs as specified and for adoption or adaptation by all Special Education Programs in accordance with Board of Education Policy # 2220.

Board Approved: <Type Date Here>

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WRITERS NAME

Melissa Lordi

CURRICULUM SUPERVISOR

<Type Name Here>

Mission, Vision, Beliefs, and Goals

Mission Statement

The Monroe Public Schools in collaboration with the members of the community shall ensure that all children receive an exemplary education by well-trained committed staff in a safe and orderly environment.

Vision Statement

The Monroe Township Board of Education commits itself to all children by preparing them to reach their full potential and to function in a global society through a preeminent education.

Beliefs

1. All decisions are made on the premise that children must come first.
2. All district decisions are made to ensure that practices and policies are developed to be inclusive, sensitive and meaningful to our diverse population.
3. We believe there is a sense of urgency about improving rigor and student achievement.
4. All members of our community are responsible for building capacity to reach excellence.
5. We are committed to a process for continuous improvement based on collecting, analyzing, and reflecting on data to guide our decisions.
6. We believe that collaboration maximizes the potential for improved outcomes.
7. We act with integrity, respect, and honesty with recognition that the schools serves as the social core of the community.
8. We believe that resources must be committed to address the population expansion in the community.
9. We believe that there are no disposable students in our community and every child means every child.

Board of Education Goals

1. Raise achievement for all students paying particular attention to disparities between subgroups.
2. Systematically collect, analyze, and evaluate available data to inform all decisions.
3. Improve business efficiencies where possible to reduce overall operating costs.
4. Provide support programs for students across the continuum of academic achievement with an emphasis on those who are in the middle.
5. Provide early interventions for all students who are at risk of not reaching their full potential.
6. To Create a 21st Century Environment of Learning that Promotes Inspiration, Motivation, Exploration, and Innovation.

Common Core State Standards (CSSS)

The Common Core State Standards provide a consistent, clear understanding of what students are expected to learn, so teachers and parents know what they need to do to help them. The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills that our young people need for success in college and careers. With American students fully prepared for the future, our communities will be best positioned to compete successfully in the global economy.

Links:
1. CCSS Home Page: http://www.corestandards.org
2. CCSS FAQ: http://www.corestandards.org/frequently-asked-questions
3. CCSS The Standards: http://www.corestandards.org/the-standards
4. NJDOE Link to CCSS: http://www.state.nj.us/education/sca
5. Partnership for Assessment of Readiness for College and Careers (PARCC): http://parcconline.org

*Pearson has created supplemental lessons to help align envisions to the new Common Core Standards.

Lessons with A or B after the lesson topic number can be found on www.pearsonsuccessnet.com.

Log into your account and then click on ***Teacher Resources*** located by the Premium, TE, SE links.

Click on the link - ***Transitioning to Common Core with enVisions Math***.

Click on the lesson you need and you will see teacher black line masters, Student work page, and teacher edition plans.

Quarter 1	
Unit Topics(s)	
Prerequisite Knowledge (may need review/remediation): CCSS assumes prerequisite knowledge of dividing by 1-digit divisors from Grade 4, decimals through the hundredths from 4th grade (not including operations with decimals) and multiplying whole numbers (4 digits by 1 digit and 2 digits by 2 digits) from 4th grade.	
Unit	**Topic & Standard**
UNIT 1: Numbers and Operations in Base Ten	**I. Number and Operations in Base Ten – *Understand the place value system.*** 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.3 – Read, write, and compare decimals to thousandths. a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form. b. 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.2 – Explain in 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. ***II.* Number and Operations in Base Ten – *Perform operations with multi-digit whole numbers and with decimals to hundredths.*** 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. ***III.* Operations and Algebraic Thinking – *Write and interpret numerical expressions.*** 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.

Quarter 2	
Unit Topics(s)	
Prerequisite Knowledge (may need review/remediation): CCSS assumes prerequisite knowledge taught in 4th grade, of parallel lines, perpendicular lines, angles, and measuring angles taught in 4th grade as well as area, perimeter, and classifying polygons from 3rd and 4th grade. Vocabulary: polygon, rhombus/rhombi, rectangle, square, triangle, quadrilateral, pentagon, hexagon, cube, trapezoid, half/quarter circle, circle.	
Unit	**Topic & Standard**
UNIT 2: Geometry and Measurement	**I. Geometry – *Classify two-dimensional figures into categories based on their properties.*** 5.G.3 – Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. 5.G.4 – Classify two-dimensional figures in a hierarchy based on properties. **II. Measurement and Data – *Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition*** 5.MD.3 – Recognize volume as an attribute of solid figures and understand concept 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 involving volume. 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, equivalent 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 word problems.

UNIT 3: Operations with Rational Numbers	**I. Number and Operations in Base Ten – *Perform operations with multi-digit whole numbers and with decimals to hundredths.*** 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. **II. Measurement and Data – *Convert like measurement units within a given measurement system.*** 5.MD.1 – Convert among different-sized standard measurement units within a given measurement system, and use these conversions in solving multi-step, real world problems.

Quarter 3	
Unit Topics(s)	
Prerequisite Knowledge (may need review/remediation): • CCSS assumes prerequisite knowledge of area and perimeter taught during grades 3 and 4. • CCSS assumes some knowledge of simplifying fractions and equivalent fractions from Grade 4. • CCSS assumes prerequisite knowledge of adding/subtracting fractions and mixed numbers with like denominators from Grade 4. • Vocabulary: relative size, liquid volume, mass, length, kilometer, meter, centimeter, kilogram, gram, liter, milliliter, inch, foot, yard, mile, ounce, pound, cup, pint, quart, gallon, hour, minute, second	
Unit	**Topic & Standard**
UNIT 3: Operations with Rational Numbers	**III. Number and Operations – Fractions –** ***Use equivalent fractions as a strategy to add and subtract fractions.*** 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. **IV. Number and Operations – Fractions –** ***Apply and extend previous understandings of multiplication and division to multiply and divide fractions.*** 5.NF.3 – Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. **V. Spiral Review- Number and Operations in Base Ten** **A.** ***Understand the place value system.*** 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. ***B. Perform operations with multi-digit whole numbers and with decimals to hundredths.*** 5.NBT.5 – Fluently multiply multi-digit whole numbers using the standard algorithm.

UNIT 4: Operations with Fractions	**I. Number and Operations – Fractions – *Apply and extend previous understandings of multiplication and division to multiply and divide fractions.*** 5.NF.4 – Apply and extend previous understandings of multiplication to multiply a fraction or a whole number by a fraction. a. Interpret the product (a/b) x q as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a x q ÷ 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. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas. 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.

Quarter 4	
Unit Topics(s)	
Prerequisite Knowledge (may need review/remediation): CCSS assumes some prerequisite knowledge of using a ruler to measure to the nearest ¼, ½, or 1/8 inch, creating and reading a line plot also done in 4th grade, and generating numerical patterns with one rule .	
Unit	**Topic & Standard**
UNIT 5: Patterns and Geometry on the Coordinate Plane	**I. Geometry – *Graph points on the coordinate plane to solve real-world and mathematical 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. **II. Operations and Algebraic Thinking – *Analyze patterns and relationships.*** 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. Measurement and Data – *Represent and interpret data.* 5.MD.2 – Make a line plot to display a data set of measurements in fractions of a unit (1/2, ¼, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. **III. Geometry – *Classify two-dimensional figures into categories based on their properties.*** 5.G.3 – Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. 5.G.4 – Classify two-dimensional figures in a hierarchy based on properties. **IV. Spiral Review - Number and Operations in Base Ten** ***A. Perform operations with multi-digit whole numbers and with decimals to hundredths.*** 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.NBT.5 – Fluently multiply multi-digit whole numbers using the standard algorithm.

UNIT 1

Stage 1 Desired Results

ESTABLISHED GOALS

Common Core Math Standards

Understand the place value system.
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 powers of 10.

Perform operations with multi-digit whole numbers and with decimals to hundredths.
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.

Write and interpret numerical expressions.
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.

Transfer

Students will be able to independently use their learning to…
write, interpret, and understand numerical expressions, the place value system, and operations with multi-digit whole numbers as they model the real-world.

Meaning

UNDERSTANDINGS
Students will understand that…

1. Numerical expressions can be used to represent different values and real-life situations.
2. Patterns in the place value system can make it easier to interpret and operate with numbers.
3. There are many ways to multiply and divide whole numbers.

ESSENTIAL QUESTIONS

1. How can we represent numbers?
2. What makes a computation strategy effective and efficient?
3. How do operations affect numbers?

Acquisition

Students will know…

1. A digit's position in a number determines its value.
2. Multiplication and division are inverse operations.
3. Numerical expressions can be simplified using number properties.
4. Vocabulary: value, place value, exponent, base, power of ten, divisor, dividend, parenthesis, numerical expression, evaluate, decimal, decimal point, rectangular array, multiply, divide, round, greater than, less than, equal to, compare/comparison, product, quotient, area models, tenths, hundredths, Commutative

Students will be skilled at…

1. Identifying the value of a digit in a whole or decimal number.
2. Recognizing the 1/10 relationship between places of digits in a number.
3. Reading, writing, and comparing decimals to the thousandths.
4. Writing decimals using base-ten numerals, number names, and expanded form.
5. Rounding decimal numbers to a given place.
6. Using number lines to represent decimals and round.
7. Using whole number exponents to

Understand the place value system. 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. b. 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. Mathematical Practices 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	Property, Associative Property, Distributive Property, expanded form, word form, standard form	denote powers of 10. 8. Multiplying and dividingwhole numbers and decimals by powers of 10. 9. Estimating products. 10. Multiplying 3-digit by 2-digit whole numbers. 11. Using properties of operations to operate with numbers. (i.e. Commutative Property, Associative Property, Distributive Property) 12. Estimating quotients. 13. Dividing whole numbers by two-digit divisors (up to 4 –digit dividends). 14. Modeling division using equations, rectangular arrays, and area models. 15. Evaluating numerical expressions using order of operations. 16. Writing numerical expressions to represent word phrases.

Stage 2 - Evidence

Evaluative Criteria	**Assessment Evidence**
GOAL: Students will understandthat place value of digits and operations affect the magnitude of numbers.	PERFORMANCE TASK: The following problem(s) can be used in addition with other Summative assessments, including **projects**, **unit tests,** and **benchmarks**: **DIGIT DETECTIVES.**Two number cubes were rolled and the numbers 5 and 7 were displayed. The cubes were then rolled two more times each and the numbers 3, 4, 8, and 6 were displayed. A. Using all 6 digits, arrange them to create a division problem with a 2-digit divisor that

3 **Advanced Proficient** – ***Knowledge Utilization*** –I understand how place value and operations affect the magnitude of numbers. I can justify my answer by using place value and/or models.	has the least possible quotient. Show your work and prove your answer. B. Again using all 6 digits, arrange the digits to create a multiplication problem with the largest possible product. Show your work and prove your answer. C. Using the unit goals, write an explanation how you addressed the understandings and "essential questions" in your work for this problem.
2 **Proficien**t – ***Representing & Analyzing*** –I understand how place value and operations affect the magnitude of numbers, but I am unable to fully justify my response.	
1 **Basic** –***Recognizing & Recalling*** –I can recognize place value of numbers. I can recall that multiplication of whole numbers increases the size of numbers and division of whole numbers decreases the size of numbers, but my methods, strategies and/or answers are incorrect.	
0 **Below basic** – I don't understand place value or how operations affect the magnitude of numbers.	

GENERAL SCALE FOR LEARNING GOALS	
3	**Advanced Proficient –** I understand the goal(s) completely!
2	**Proficient –** I understand most of the goal(s).
1	**Basic –** I understand a limited amount.
0	**Below basic –** I don't understand at all!

OTHER EVIDENCE:

The following problems can be used in addition with other formative assessments (e.g. homework, exit passes, quick checks, quizzes, classwork, journal entries, etc.)

- Show the difference between the 4 in 74.9 and 7.49.
- Martha earned $4.20 each day for ten days of babysitting. Over a year's time, she worked ten times ten days. Write an expression using exponents of 10 to show how much she earned in ten days, then in 10 times ten days. How much did she earn in one year? Justify your answer.
- Leo and Silvia are looking at the following problem:
  How does the product 60 × 225 compare to the product 30 × 225.
  Silvia says she can compare these products without multiplying the numbers out. Explain how she might do this. Draw pictures to illustrate your explanation.
- Samantha wants to split a collection of stickers into groups of 48. Samantha has 1,008 stickers. How many groups will be created? Show two ways to find the answer.
- Find four numbers that are between 0.11 and 0.12 and put all six numbers in order from least to greatest.
- Write 562.376 in expanded form.
- Where do the parentheses have to be placed for this equation to be true?
  $7 + 8 \times 3 = 45$
- Compare the expressions below using <,>, or =.
  $3 \times 100 \div 25 + 7$ _____ $[3 \times (100 \div 25)] + 7$

- Using all four of the numbers 1, 2, 3, 4 and the operations +, -, ×, ÷, make equations that equal 0 through 10. (You may use the numbers and operations in any order, and you may use an operation more than once.)
- Evaluate the following numerical expressions.
  - 2(5+(3)(2)+4)
  - 2((5+3)(2+4))
  - 2(5+3(2+4))

  Can the parentheses in any of these expressions be removed without changing the value the expression?
- Eric is playing a video game. At a certain point in the game, he has 31,500 points. Then the following events happen, in order:
    - He earns 2450 additional points.
    - He loses 3310 points.
    - The game ends, and his score doubles.
  - Write an expression for the number of points Eric has at the end of the game. Do not evaluate the expression. The expression should keep track of what happens in each step listed above.
  - Eric's sister Leila plays the same game. When she finished playing, her score is given by the expression:

    $$3(24{,}500 + 3{,}610) - 6{,}780$$

  - Describe a sequence of events that might have led to Leila earning these scores.
- Write an expression that records the calculations described below, but do not evaluate.

  Add 2 and 4 and multiply the sum by 3. Next, add 5 to that product and then double the result.
- Monique went to the store to buy items for her party. She bought 5 bags of chips for $2 each. She also bought 6 cartons of ice cream for $4 each. At the check-out, she was given $3 off the bags of chips. Write an expression that represents the problem. You may use models if you choose to do so. Then solve the problem to determine how much Monique spent in all. Explain your reasoning.
- Mara bought 6 bags of Skittles at $0.85 each and 9 packs of gum at $1.20 each for a sleepover. Express what she purchased mathematically.
- Write an expression for calculations given in words such as the following: "Divide 144 by 12, and then subtract 7."

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction

Pre-assessment:

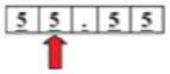
- Teachers can assign diagnostic measures (i.e. KWL, pre-test, do now) to assess student prior knowledge.
- Teacher created assessments (possible resource: Pearson ExamView Test Generator, SuccessNet, etc.)

Learning Activities:

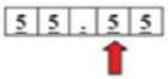
- Using base-ten blocks in class, to show the 1/10 relationship in place value. Use problems such as: Show at least two ways to represent the number 3.2 as activities during instruction.
- Example of the 1/10 relationship students should know.

To extend this understanding of place value to their work with decimals, students use a model of one unit; they cut it into 10 equal pieces, shade in, or describe 1/10 of that model using fractional language ("This is 1 out of 10 equal parts. So it is 1/10". I can write this using 1/10 or 0.1"). They repeat the process by finding 1/10 of a 1/10 (e.g., dividing 1/10 into 10 equal parts to arrive at 1/100 or 0.01) and can explain their reasoning, "0.01 is 1/10 of 1/10 thus is 1/100 of the whole unit."

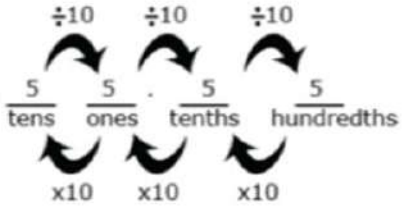
In the number 55.55, each digit is 5, but the value of the digits is different because of the placement.



The 5 that the arrow points to is 1/10 of the 5 to the left and 10 times the 5 to the right. The 5 in the ones place is 1/10 of 50 and 10 times five tenths.



The 5 that the arrow points to is 1/10 of the 5 to the left and 10 times the 5 to the right. The 5 in the tenths place is 10 times five hundredths.



- Virtual base-ten blocks: Go to http://nlvm.usu.edu/ and click on Numbers and Operations grade 3-5.
- Representing Decimals with Base 10 Blocks - Resource can be found on the **Math Share** Drive in Grade 5 Unit 1 Resources.
- Representing Decimals in Different Ways - Resource can be found on the **Math Share** Drive in Grade 5 Unit 1 Resources. – This game can be adapted to have students round the decimals instead. Also, students can order the decimals they create as another alternative. Please encourage students to include decimals to the thousandths as specified in the standard.
- Decimal Draw – Give students cards with different decimals through the thousandths written on them. Students will have the cards in a pile

face down. The first student will pick a decimal card and represent the decimal using base 10 blocks or drawing a pictorial representation. They must also then name the decimal. The second student checks their work and then play continues with the other student picking a decimal card. (Other versions of this activity can include writing the decimal in expanded form.)

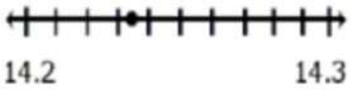
- Hunt for Decimals - Resource can be found on the **Math Share** Drive in Grade 5 Unit 1 Resources
- Expanded Notation Games - Game directions can be found on the **Math Share** Drive in Grade 5 Unit 1 Resources in the Unit 1 Resources word document.
- Comparing Decimals - Resource can be found on the **Math Share** Drive in Grade 5 Unit 1 Resources – Please use decimal cards that incorporate decimal numbers to the thousandths as specified in the standard. Students can also explain how they know which decimal is larger. This can be incorporated as a journal activity where students need to use models and/or knowledge of place value to explain their answer.
- Rounding Decimals to the Nearest Hundredth - Resource located on the **Math Share** Drive in Grade 5 Unit 1 Resources Folder. Activity can be modified to round to any place to incorporate the exact needs of the standard. Students can rotate the place in which they round to by rounds of the activity.
- Example of a technique for rounding that students should be familiar with.

This standard refers to rounding. Students should go beyond simply applying an algorithm or procedure for rounding. The expectation is that students have a deep understanding of place value and number sense and can explain and reason about the answers they get when they round. Students should have numerous experiences using a number line to support their work with rounding.

Example:

Round 14.235 to the nearest tenth.

Students recognize that the possible answer must be in tenths thus, it is either 14.2 or 14.3. They then identify that 14.235 is closer to 14.2 (14.20) than to 14.3 (14.30).



Students should use benchmark numbers to support this work. Benchmarks are convenient numbers for comparing and rounding numbers. 0., 0.5, 1, 1.5 are examples of benchmark numbers.

- The following problem can be used as a sample journal entry
  Explain why the following multiplication and division problems with powers of ten are true.
  $523 \times 10^3 = 523000$
  $5.23 \times 10^2 = 523$
  $52.3 \div 10^1 = 5.23$
- Multiplication Madness - Resources can be found in the **Math Share** Folderunder Grade 5 Unit 1 Resources.
- Make the Largest Product and Make the Smallest Product Activities - Resources can be found in the **Math Share** Folder under Grade 5 Unit 1 Resources. Please modify activity to incorporate 3-digit by 2-digit number, which is a requirement for the standard.
- Alternative Strategies to teach multiplication as needed. The standard algorithm is acceptable, but these other models may also be used.

Examples of alternative strategies:
There are 225 dozen cookies in the bakery. How many cookies are there?

Student 1	Student 2	Student 3
225 x 12 I broke 12 up into 10 and 2. 225 x 10 = 2,250 225 x 2 = 450 2,250 + 450 = 2,700	225x12 I broke up 225 into 200 and 25. 200 x 12 = 2,400 I broke 25 up into 5 x 5, so I had 5 x 5 x12 or 5 x 12 x 5. 5 x12= 60. 60 x 5 = 300 I then added 2,400 and 300 2,400 + 300 = 2,700.	I doubled 225 and cut 12 in half to get 450 x 6. I then doubled 450 again and cut 6 in half to get 900 x 3. 900 x 3 = 2,700.

Draw a array model for 225 x 12.... 200 x 10, 200 x 2, 20 x 10, 20 x 2, 5 x 10, 5 x 2

225 x 12

	200	20	5
10	2,000	200	50
2	400	40	10

2,000
400
200
40
50
+ 10
2,700

- Delightful Division Activity - Resources can be found on the **Math Share** folder under Grade 5 Unit 1 Resources.
- Examples of the different division methods required are shown below. Students should be able to find quotients using multiple methods.

Example:
There are 1,716 students participating in Field Day. They are put into teams of 16 for the competition. How many teams get created? If you have left over students, what do you do with them?

Student 1
1,716 divided by 16
There are 100 16's in 1,716.
1,716 – 1,600 = 116
I know there are at least 6 16's.
116 - 96 = 20
I can take out at least 1 more 16.
20 - 16 = 4
There were 107 teams with 4 students left over. If we put the extra students on different team, 4 teams will have 17 students.

Student 2
1,716 divided by 16.
There are 100 16's in 1,716.
Ten groups of 16 is 160.
That's too big.
Half of that is 80, which is 5 groups.
I know that 2 groups of 16's is 32.
I have 4 students left over.

1716 -1600	100
116 -80	5
36 -32	2
4	

Student 3
1,716 ÷ 16 =
I want to get to 1,716
I know that 100 16's equals 1,600
I know that 5 16's equals 80
1,600 + 80 = 1,680
Two more groups of 16's equals 32, which gets us to 1,712
I am 4 away from 1,716
So we had 100 + 6 + 1 = 107 teams
Those other 4 students can just hang out

Student 4
How many 16's are in 1,716?
We have an area of 1,716. I know that one side of my array is 16 units long. I used 16 as the height. I am trying to answer the question what is the width of my rectangle if the area is 1,716 and the height is 16. 100 + 7 = 107 R 4

	100	**7**
16	100 x 16 = 1,600	7 x 16 =112

1,716 - 1,600 = 116

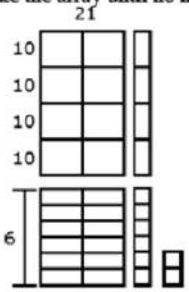
116 - 112 = **4**

Example:
Using expanded notation $2682 \div 25 = (2000 + 600 + 80 + 2) \div 25$
Using understanding of the relationship between 100 and 25, a student might think –

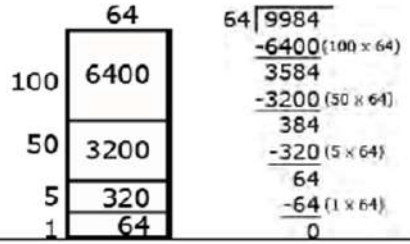
- I know that 100 divided by 25 is 4 so 200 divided by 25 is 8 and 2000 divided by 25 is 80.
- 600 divided by 25 has to be 24.
- Since 3 x 25 is 75, I know that 80 divided by 25 is 3 with a reminder of 5.
  (Note that a student might divide into 82 and not 80)
- I can't divide 2 by 25 so 2 plus the 5 leaves a remainder of 7.
- 80 + 24 + 3 = 107. So, the answer is 107 with a remainder of 7.

Using an equation that relates division to multiplication, $25 \times n = 2682$, a student might estimate the answer to be slightly larger than 100 because s/he recognizes that 25 x 100 = 2500.

Example: $968 \div 21$
Using base ten models, a student can represent 962 and use the models to make an array with one dimension of 21. The student continues to make the array until no more groups of 21 can be made. Remainders are not part of the array.



Example: $9984 \div 64$
An area model for division is shown below. As the student uses the area model, s/he keeps track of how much of the 9984 is left to divide.



64 | 9984
-6400 (100 x 64)
3584
-3200 (50 x 64)
384
-320 (5 x 64)
64
-64 (1 x 64)
0

- Creating and Solving a Division Problem - Resource located on the **Math Share** Drive in Grade 5 Unit 1 Resources Folder.
- Primary Krypto – (http://illuminations.nctm.org) – Give students 5 digits and a target number. Students need to use the 5 digits and operations of their choice including parenthesis and brackets to create an expression that will result in the target number. You may play a version where students use less than the 5 numbers to get the target number, however the winner should be the student who can get the target number using all 5 digits.

- Target Number Dash - Resource located on the **Math Share** Drive in Grade 5 Unit 1 Resources Folder.
- Numerical Expressions Wall Clock - Resource located on the **Math Share** Drive in Grade 5 Unit 1 Resources Folder.
- "Hit the Target" Game - See page 29 in Acing Math – One Deck at a Time Math Games PDF located on the **Math Share** Drive in Grade 5
- Numerical Expression Matching Game – Create cards with numerical expressions on them and the matching verbal phrase. Give pairs of students the cards and have them work together to match the phrases with the expressions. The pairs that match all of the cards correctly the fastest win. This can also be played like a concentration game.
- Center Activities from EnVisions series.

Literacy Connection:

- Count to a Million by Jerry Pallotta – This book can be used to reinforce the idea the idea of the 1/10 relationship between the place value units. It can be also used to introduce the idea of powers of 10. As you read through the book with students, they can write down the powers of 10 they hear using exponents.
- Math Curse by Jon Scieszka – As the story is read to students, ask them to find the problems that can be solved by using multiplication (or division depending on what is being taught). Ask students how they knew that those problems could be solved by using multiplication.

Suggested Resources:

*Pearson has created supplemental lessons to help align envisions to the new Common Core Standards.
Lessons with A or B after the lesson topic number can be found on www.pearsonsuccessnet.com.
Log into your account and then click on ***Teacher Resources*** located by the Premium, TE, SE links.
Click on the link - ***Transitioning to Common Core with enVisions Math***.
Click on the lesson you need and you will see teacher black line masters, Student work page, and teacher edition plans.

http://www.uen.org/commoncore/ Click on the Grade 5 Core Standards for Math to move to a site that offers links for each standard that contain additional examples and explanations of the material.

http://www.ode.state.or.us/search/page/?id=3511 The Mathematics Unpacked Content for Grade 5 offers detailed explanations of the requirements for each standard to use a reference.

http://www.k-5mathteachingresources.com/

http://illustrativemathematics.org/standards/k8

Topic & Standard	Suggested Resources: EnVisions
Number and Operations in Base Ten – *Understand the place value system.* **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	1-1, 1-3, 1-5

of what it represents in the place to its left.	
Number and Operations in Base Ten – *Understand the place value system.* **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. **b**. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.	1-3, 1-4 Intervention System H23, H24, H29 Decimal place value through the thousandths only is expected. The expanded form notation for a decimal number should be stressed at this point. Also, the idea of equivalent decimals needs to be incorporated.
Number and Operations in Base Ten – *Understand the place value system.* **5.NBT.4** – Use place value understanding to round decimals to any place.	2-2 (The idea of using a number line to help around as in the "Another Example" of this lesson needs to be incorporated as well.) Intervention System H27
Number and Operations in Base Ten – *Understand the place value system.* **5.NBT.2** – Explain in 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.	Intervention System F15 7-1, 7-5 Supplemental materials to include multiplying by powers of 10 and using exponents to represent the powers. (3-7 may be used to assist with exponents as needed)
Number and Operations in Base Ten – *Perform operations with multi-digit whole numbers and with decimals to hundredths.* **5.NBT.5** – Fluently multiply multi-digit whole numbers using the standard algorithm.	3-1, 3-3, 3-6 Intervention System F41 and F40 (Review properties of operations, if needed – Commutative Property, Zero Property, Identity Property of Multiplication, Associative Property, Distributive Property) 3-4, 3-5 (Use only if needed to review 4th grade material.)
Number and Operations in Base Ten – *Perform operations with multi-digit whole numbers and with decimals to hundredths.* **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.	*Transitioning to Common Core with EnVisions Math: 5-3A 5-2, 5-5, 5-6, 5-7 4-5, 4-6, 4-9 (Use to review dividing by 1-digit divisors only if needed.)
Operations and Algebraic Thinking – *Write and interpret numerical expressions.* **5.OA.1** – Use parentheses, brackets, or braces in numerical expressions, and	6-5 *Transitioning to Common Core with EnVisions Math: 6-6A Intervention System F39

evaluate expressions with these symbols.	
Operations and Algebraic Thinking – *Write and interpret numerical expressions.* **5.OA.2** – Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.	Intervention System F35 Supplemental materials to include phrases with parenthesis. (Variables not needed – only numbers and operation symbols)

UNIT 2

Stage 1 Desired Results

ESTABLISHED GOALS

Common Core Math Standards

Classify two-dimensional figures into categories based on their properties.

5.G.3 - Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.

5.G.4 - Classify two-dimensional figures in a hierarchy based on properties.

Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

5.MD.3 - Recognize volume as an attribute of solid figures and understand concept 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 involving volume.

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

Transfer

Students will be able to independently use their learning to…

classify 2-D figures into categories, understand concepts of volume, and relate volume to multiplication and addition as it applies to real-world problems.

Meaning

UNDERSTANDINGS

Students will understand that…

1. Volume is an attribute that describes the amount of space inside a three-dimensional figure.
2. Two-dimensional figures can be categorized in a hierarchy based on their properties.
3. Our world can be described in terms of 2 and 3-dimensional measurement.

ESSENTIAL QUESTIONS

1. How are do the relationships among two-dimensional figures help use make sense of geometric situations?
2. How can we use volume to model real-life situations?

Acquisition

Students will know…

1. There is more than one way to categorize two-dimensional figures based on their properties.
2. Volume describes the amount of space inside a three-dimensional figure.
3. Unit cubes of any size can be used to measure volume.
4. Volume can be found by packing a rectangular prism with unit cubes.
5. There is a relationship between the formula $V = l \times w \times h$ and

Students will be skilled at…

1. Identifying similar properties in 2-D figures.
2. Classifying 2-D figures in groups based on properties.
3. Finding the volume of a figure by counting unit cubes.
4. Determining the volume of a rectangular prism by filling the space with unit cubes.
5. Calculating volume of a rectangular prism using both formulas $V = l \times w \times h$ and $V = B \times h$
6. Solving real-world problems involving finding volume of rectangular prisms.
7. Calculating the volume of irregular figures made up of only rectangular prisms.

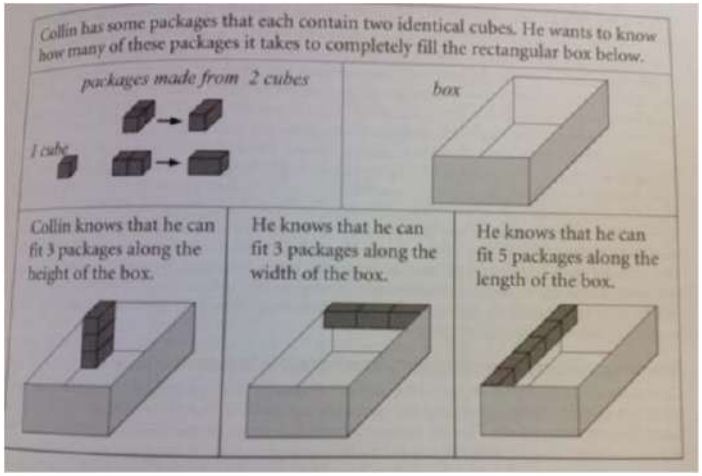
by multiplying the edge lengths, equivalent by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. b. Apply the formulas *V= l x w x h* and *V = b x h* for rectangular prisms to find volumes 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 word problems. Mathematical Practices 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	$V = B \times h$ for finding volume of a rectangular prism. 6. Volume of irregular figures can be found by finding the volume of smaller parts and adding the volumes. (Volume is additive.) 7. Vocabulary: attribute, category, subcategory, hierarchy, two-dimensional, measurement, volume, solid figure, right rectangular prism, unit, unit cube, gap, overlap, cubic units, edge lengths, height, area of base, formula	

Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence
GOAL: Students will understand volume as an attribute that represents the amount of space in a three-dimensional figure.	PERFORMANCE TASK(S): The following problem(s) can be used in addition with other Summative assessments, including **projects**, **unit tests,** and **benchmarks**: **Collin's Box Problem:** Collin has some packages that each contain two identical cubes. He

3	**Advanced Proficient** – ***Knowledge Utilization*** –I understand the meaning of volume. I can find the volume of a rectangular prism in different units and I can justify my answer using words, formulas, etc.
2	**Proficient** – ***Representing & Analyzing*** – I understand the meaning of volume and can find the volume of a given rectangular prism. I am unable to fully justify my response.
1	**Basic** –***Recognizing & Recalling*** –I can recognize the volume of a figure and can recall the definition of volume, but am unable to properly calculate it.
0	**Below basic** – I do not understand volume and I cannot find the volume of a rectangular prism.

wants to know how many of these packages it takes to completely fill the rectangular box below.



Task: Find how many packages Collin can fit in the box. Justify your answer. Then, find how many cubes Collin can fit in the box. Justify your answer.

GENERAL SCALE FOR LEARNING GOALS	
3	**Advanced Proficient –** I understand the goal(s) completely!
2	**Proficient –** I understand most of the goal(s).
1	**Basic –** I understand a limited amount.
0	**Below basic –** I don't understand at all!

OTHER EVIDENCE:

The following problems can be used in addition with other formative assessments (e.g. homework, exit passes, quick checks, quizzes, classwork, journal entries, etc.)

- Explain why all squares are rectangles, but not all rectangles are squares.
- My friend was sure that she had made a rectangle. The teacher said that it was not a rectangle. How can my friend check to see if it is?
- Sometimes, Always, Never Questions:
  - Example: A parallelogram is a square – sometimes, never, always? Explain how you know using words and/or pictures.
- True/False Questions:
  - Example: A trapezoid has two sides parallel, so it must be a parallelogram. Justify your answer using words and/or pictures.
  - Use statements in the following forms: "If it is a _____, then it is also a _____." "All _____ are _____." "Some _____ are _____." Some suggested examples are listed below.
    - If it is a square, then it is a rhombus.

- All squares are rectangles.
- Some parallelograms are rectangles.
- All trapezoids are quadrilaterals.
- Some rhombuses are squares.

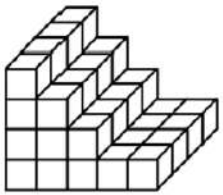
❖ Using appropriate vocabulary words, explain how a strategy to compute volume. Provide an example to illustrate your strategy.

Dillan made a wedding cake with three layers.
The bottom layer: b = 64 inches^2 h = 2 inches
The middle layer: b = 36 inches^2 h = 2 inches
The top layer: b = 16 inches^2 h = 2 inches
What is the total volume of the cake?

Answer: 232 cubic inches

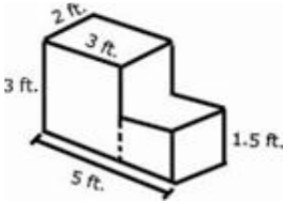
What is the volume of this stack of blocks?

Answer: 44 cubic units



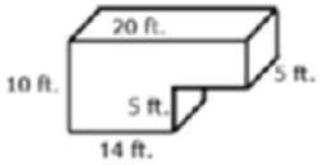
❖ How many cubic cm would it take to fill a rectangular prism with the height of 2cm, length of 3cm, and width of 5cm?

❖ The city swimming pool has a base area of 100 ft^3 and a depth of 12 ft. Find the volume of the pool.



Find the volume of the figure.

- A homeowner is building a swimming pool and needs to calculate the volume of water needed to fill the pool. The design of the pool is shown in the illustration below.



Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction

Pre-assessment:

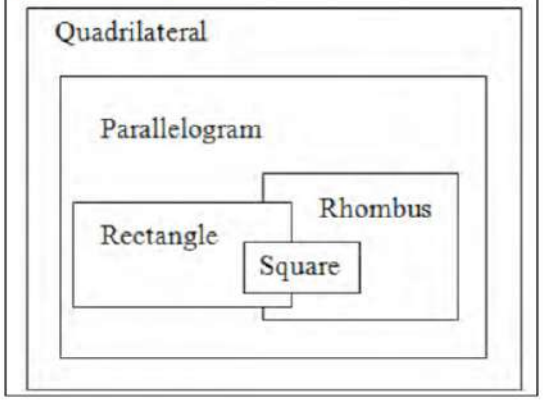
- Teachers can assign diagnostic measures (i.e. KWL, pre-test, do now) to assess student prior knowledge.
- Teacher created assessments (possible resource: Pearson ExamView Test Generator, SuccessNet, etc.)

Learning Activities:

- Shape Sorts Activities – Resource located on the **Math Share** Drive in the Grade 5 Unit 2 Resources Folder.
- Use pattern blocks to have students sort their shapes into categories. Students can create a hierarchy using headings such as quadrilaterals, rectangles, squares, rhombuses, etc. and put the shapes where they belong.

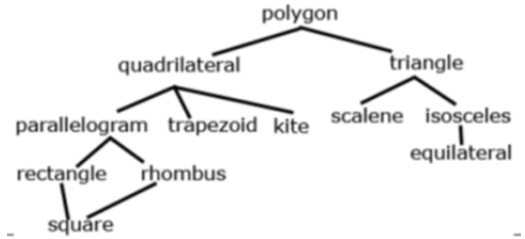
quadrilateral – a four-sided polygon.
parallelogram – a quadrilateral with two pairs of parallel and congruent sides.
rectangle – a quadrilateral with two pairs of congruent, parallel sides and four right angles.
rhombus – a parallelogram with all four sides equal in length.
square – a parallelogram with four congruent sides and four right angles.

Possible student solution:



- Mystery Definition Activity– Resource located on the **Math Share** Drive in the Grade 5 Unit 2 Resources Folder.
- Sorting the Quadrilaterals Activity– Resource located on the **Math Share** Drive in the Grade 5 Unit 2 Resources Folder.

- Minimal Defining Lists Activity– Resource located on the **Math Share** Drive in the Grade 5 Unit 2 Resources Folder.
- Have students identify all the polygons they can find in a piece of geometric art. Then, label those polygons with all the labels that fit (e.g. a rhombus should be labeled as a rhombus, parallelogram, quadrilateral, and polygon.)
- Have students construct a mobile that displays the hierarchy. Have them start with a polygon. Construct a general polygon and label it. From the polygon hang models of quadrilaterals and triangles. Continue this pattern, hanging the shapes of the more specific definitions from the shape with a broader definition. See example below.



- Give students sets of triangle-shaped cards to play "Guess My Rule." – Resource located on the **Math Share** Drive in the Grade 5 Unit 2 Resources Folder. Player 1 will look through the variety of triangles and find at least 2 triangles that share a common attribute. Player 2 looks at the grouped cards to determine the common attribute. Students record the common attribute before the next person creates his/her grouping. Continue play for a while, then regroup as a class and discuss the rules they listed. Discuss how these properties listed are properties that mathematicians use to define specific triangles. Make a poster with the definitions as a class of the triangle types and discuss how using these rules a triangle can fit into multiple categories. (Activity can be repeated with Quadrilaterals)
- Have students make their own piece of art, making sure to include a variety of polygons. Have students use their understanding of hierarchy to make the piece (for example, the top of the picture can contain any polygons, but as it goes down it has to use more specific types of polygons)
- Have students use geoboards (or virtual geoboards) to construct various shapes. Ask students to make a parallelogram. Discuss how a rectangle, square, and rhombus may all correctly answer that prompt.
- Fill a clear plastic rectangular container with unit cubes and then with non-unit shapes to show how to represent volume. Example: popcorn, packing peanuts, marbles, etc.
- Volume of Boxes Activity – Provide students with some cardboard boxes and small centimeter cubes. The task is to determine how many cubes will fit inside the box. Most likely your boxes will not have whole number dimensions, so tell students to ignore any fractional parts of cubes. This will help them come up with the formula $V = l \times w \times h$.
    - Extension of this activity – Use cubes other than centimeter cubes and discuss if the units affect the volume.
- Have students build three different solid figures using a variety of unit cubes and find their volume.
- How Many Packages Activity– Resource located on the **Math Share** Drive in the Grade 5 Unit 2 Resources Folder.
- Give students unit cubes. Tell students a specific volume and have students create as many rectangular prisms as possible with the specified volume. Students can record the length, width, and height of their created rectangular prisms in a chart.
- Cubes Activity from Illuminations Website. (http://illuminations.nctm.org Click Activities, then grades 3-5. Scroll down until the activity titled "Cubes" is found. Follow directions for the activity.)
- Center Activities from EnVisions series.

Literacy Connection:

- Counting on Frank by Rod Clement – Activities relating to volume can be found on http://illuminations.nctm.org/LessonDetail.aspx?ID=L203

Resources:

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Lessons with A or B after the lesson topic number can be found on www.pearsonsuccessnet.com.
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http://www.k-5mathteachingresources.com/

http://illustrativemathematics.org/standards/k8

Topic & Standard	Suggested Resources: EnVisions
Geometry – *Classify two-dimensional figures into categories based on their properties.* **5.G.3** – Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.	*Transitioning to Common Core with EnVisions Math: 8-6A (8-1 through 8-5 only to review if needed)
Geometry – *Classify two-dimensional figures into categories based on their properties.* **5.G.4** – Classify two-dimensional figures in a hierarchy based on properties.	*Transitioning to Common Core with EnVisions Math: 8-6B

Measurement and Data – *Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition* **5.MD.3** – Recognize volume as an attribute of solid figures and understand concept 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 involving volume. **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, equivalent 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 word problems.	*Transitioning to Common Core with EnVisions Math: 13-5A, 13-6A 13-5 13-6 (only volume) Intervention System I55, I56

UNIT 3

Stage 1 Desired Results

ESTABLISHED GOALS

Common Core Math Standards

Understand the place value system.
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.

Perform operations with multi-digit whole numbers and with decimals to hundredths.
5.NBT.5 - Fluently multiply multi-digit whole numbers using the standard algorithm.
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.

Use equivalent fractions as a strategy to add and subtract fractions.

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.

Transfer

Students will be able to independently use their learning to…
Perform operations with decimals to the hundredths and fractions, and convert measurement units in real-world applications.

Meaning

UNDERSTANDINGS
Students will understand that…

1. The same object can be described by using different measurements.
2. Number benchmarks are useful for relating numbers and estimating amounts when appropriate.
3. Representations and operations of rational numbers can help them make sense of real world situations and problems.

ESSENTIAL QUESTIONS

1. How do you look for and make use of structure when operating with fractions and decimals?
2. How do you know that your answer makes sense?

Acquisition

Students will know…

1. That the placement of the decimal point plays an important role in the computation of decimals.
2. There is a relationship between fractions and division.
3. There are an infinite number of equivalent fractions that can be used to add/subtract fractions with unlike denominators.
4. Units of measurement can be changed into other units.
5. Vocabulary: decimal, decimal point, product, quotient, dividend, divisor, tenths, hundredths, fraction, equivalent, sum, difference, unlike denominator, numerator, mixed number, improper fraction, benchmark fraction, reasonableness,

Students will be skilled at…

1. Adding, subtracting, multiplying, and dividing decimals to the hundredths.
2. Modeling operations with decimals.
3. Converting units of measure in both standard and metric systems.
4. Drawing a model to represent addition and subtraction of fractions.
5. Adding and subtracting fractions and mixed numbers with unlike denominators.
6. Solving word problems with addition and subtraction of fractions and mixed numbers with unlike denominators.
7. Using benchmark fractions to check the reasonableness of

Apply and extend previous understandings of multiplication and division to multiply and divide fractions. 5.NF.3 - Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. **Convert like measurement units within a given measurement system.** 5.MD.1 - Convert among different-sized standard measurement units within a given measurement system, and use these conversions in solving multi-step, real world problems. Mathematical Practices 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	estimate, conversion/convert, metric measurement, customary measurement.	addition/subtraction fraction problems. 8. Writing a fraction as its equivalent division problem. 9. Solving word problems with division of whole numbers by whole numbers that give a fraction and/or mixed number answer.
Stage 2 - Evidence		
Evaluative Criteria	**Assessment Evidence**	

GOAL: Students will understand the relationship between operations and the magnitude of numbers.	
3	**Advanced Proficient** – ***Knowledge Utilization*** – I understand the relationship between operations and the magnitude of numbers. I am able to justify my answer by using words, models, and/or examples.
2	**Proficien**t – ***Representing & Analyzing*** – I understand the relationship between operations and the magnitude of numbers, but I am unable to fully justify my answer.
1	**Basic** –***Recognizing & Recalling*** –I can recall and/or recognize that there is a relationship between operations and the magnitude of numbers, but I cannot properly demonstrate this relationship in the problem.
0	**Below basic** – I do not understand the relationship between operations and the magnitude of numbers.

PERFORMANCE TASK(S):
The following problem(s) can be used in addition with other Summative assessments, including **projects**, **unit tests,** and **benchmarks**:

SCHOOL FESTIVAL PROJECT:(*See full School Festival Project assignment sheets on the Math Share drive… budget planning overview, suggested questions, answers) You serve on a committee that is in charge of planning a school festival. The following tasks need to be completed by committee members as part of the planning for the school festival:

- Determine the budget for the festival.
- Choose the food and drinks for the festival.
- Determine amounts of supplies for making a dessert.
- Make a schedule of the different activities.
- Make some decisions on the games and prizes used during the festival.

TABLE AREA PROBLEM: A tabletop has the measurements 3.5 meters by 1.2 meters. What is the area in square meters? If your brother cut 0.3 meters off of one side, how would that affect the area of the tabletop? Does it matter which side is cut? Show your work, including a diagram. You can use graph paper if needed.

GENERAL SCALE FOR LEARNING GOALS	
3	**Advanced Proficient –** I understand the goal(s) completely!
2	**Proficient –** I understand most of the goal(s).
1	**Basic –** I understand a limited amount.

OTHER EVIDENCE:

The following problems can be used in addition with other formative assessments (e.g. homework, exit passes, quick checks, quizzes, classwork, journal entries, etc.)

- ❖ Explain the significance of decimal places when working with measurement (time, weight, length, money, area, volume).
- ❖ Have students make up a story problem that involves 22.8 ÷ 6. Also, have students explain how they got the answer to their problem.
- ❖ I divided 6.12 by 3 and got the quotient 2.4. What did I do wrong? Give a similar problem where I might make the same error.
- ❖ I added 3 decimals together and got exactly 4. What might those 3 decimal numbers be?
- ❖ In this calculation some numbers are missing. What might they be? How do you know?

  3.??
  <u>- ?.7?</u>

0 **Below basic** – I don't understand at all!	1.?3 ❖ Show 3 possible solutions for each of the following: The sum of 2 decimals is less than 1. The sum of 2 decimals is greater than 1. The sum of 2 decimals is equal to 1. ❖ How many different ways can you make your calculator show a number with a particular decimal point, such as 12.34, without pressing the decimal point button? ❖ A fifth grade class is running a 5k race. The class will begin by practicing to increase their endurance, starting with 1,500 meters and adding 500 meters each week. How many weeks will it take to be ready for the race? ❖ A fifth grade class is running a three-mile race. The class will begin practicing to increase their endurance, starting with 880 yards and adding 440 yards per week. How many weeks will it take to be ready for the race? ❖ Zuri, the baby elephant, was born August 10, 2009 at Hogle Zoo. The calf weighed 251 lbs. at birth. If the baby elephant gains 48 ounces per day, how much will she weigh at the end of 7 days? ❖ Converting Fractions of a Unit into a Smaller Unit Problems – Resource located on the **Math Share** Drive in the Grade 5 Unit 3 Resources Folder. ❖ John brought a pizza to a party. His friend Sally also brought a pizza to the party. At the end of the party, John had ¼ of his pizza left. Sally had 3/8 of her pizza left. How much pizza was left at the end of the party? How much pizza was eaten? ❖ Create a word problem that could be solved by adding two specific fractions with unlike denominators. Example: ½ + ¾ = Then, represent the problem using both a diagram and an equation. Solve your problem. Show all of your work. Use benchmark fractions to explain how you know that your answer is reasonable. ❖ Draw a picture and write an equation to solve the following problem: Six teachers need to equally share 27 boxes of pencils. How many boxes of pencils will each teacher receive? ❖ Write a word problem to show that ¾ is a division problem. Draw a model to illustrate the story problem. ❖ Write a word problem with a fraction less than 1 used as a division problem. Draw a model to illustrate the story. ❖ Write a word problem with a fraction greater than 1 used as a division problem. Draw a model to illustrate the story problem. ❖ Solve the problem with a visual model and equation. Also, use benchmark fractions to check the reasonableness of your answer. Claire took 2 ¾ hours to read a book. Her brother, Dan, took 2/3 hour less to read his book. How much more time did Claire spend reading than Dan? Extension Question: How much time did they spend altogether reading their books?

	❖ The difference between two mixed numbers with unlike denominators is 3 ¾ . What might those two mixed numbers be? ❖ Do These Add Up? Problems – Resource located on the **Math Share** Drive in the Grade 5 Unit 3 Resources Folder. ❖ After a class potluck, Emily has three equally sized apple pies left and she wants to divide them into eight equal portions to give to eight students who want to take some pie home. o Draw a picture showing how Emily might divide the pies into eight equal portions. Explain how your picture shows eight equal portions. o What fraction of a pie will each of the eight students get? o Explain how the answer to (b) is related the division problem 3÷8.

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction

Pre-assessment:

- Teachers can assign diagnostic measures (i.e. KWL, pre-test, do now) to assess student prior knowledge.
- Teacher created assessments (possible resource: Pearson ExamView Test Generator, SuccessNet, etc.)

Learning Activities:

- Base Ten Pictures with Decimals - Resource located on the **Math Share** Folder in the Unit 3 Resources Folder.
- Base Ten Buildings with Decimals - Resource located on the **Math Share** Folder in the Unit 3 Resources Folder. – Have the pairs find the sum and difference of their buildings.
- Base Ten Decimal Bag: Addition - Resource located on the **Math Share** Folder in the Unit 3 Resources Folder.
- Base Ten Decimal: Subtraction - Resource located on the **Math Share** Folder in the Unit 3 Resources Folder.
- Total Ten - Resource located on the **Math Share** Folder in the Unit 3 Resources Folder. – Adjust the game board to include hundredths. This game can also be adapted to subtract numbers to get 0 or multiplying numbers to get over a certain product.
- Decimal Cross Number Products - Resource located on the **Math Share** Folder in the Unit 3 Resources Folder.
- Decimal Subtraction Spin - Resource located on the **Math Share** Folder in the Unit 3 Resources Folder.
- Decimal Addition to 500 - Resource located on the **Math Share** Folder in the Unit 3 Resources Folder. – This activity can be modified to include multiplication. Students will multiply the numbers they create until they get higher than a specified product.
- Magic Squares – Adding Decimals - Resource located on the **Math Share** Folder in the Unit 3 Resources Folder.
- Get to the Decimal Point Addition or Advanced Addition - See page 60-61 in Acing Math – One Deck at a Time Math Games PDF located on the **Math Share** Folder in Grade 5 Resources.
- Get to the Decimal Point Subtraction or Advanced Subtraction - See page 62-63 in Acing Math – One Deck at a Time Math Games PDF located on the **Math Share** Folder in Grade 5 Resources.
- Multiplication/Division of Decimals Kaboom! - Resource located on the **Math Share** Folder in the Unit 3 Resources Folder.
- Where Does the Decimal Go? Multiplication – Have students compute the following product: 24 × 63. Using only the result of this computation and estimation, have them give the exact answer to each of the following:

0.24 × 6.3 24 × 0.63 2.4 × 63 0.24 × 0.63

For each computation they should write a rationale for their answers. They can check their results with a calculator. Any errors must be acknowledged and the rationale that produced the error adjusted.

- Where Does the Decimal Go? Division – Provide a quotient such as 146 ÷ 7 = 20857 correct to five digits but without the decimal point. The task is to use only this information and estimation to give a fairly precise answer to each of the following:
  146 ÷ 0.7 1.46 ÷ 7 14.6 ÷ 0.7 1460 ÷ 70
- Virtual base-ten blocks: Go to http://nlvm.usu.edu/ and click on Numbers and Operations grade 3-5.
- Estimation Sample:

> Examples:
> - 3.6 + 1.7
>
> A student might estimate the sum to be larger than 5 because 3.6 is more than 3 ½ and 1.7 is more than 1 ½.
> - 5.4 – 0.8
>
> A student might estimate the answer to be a little more than 4.4 because a number less than 1 is being subtracted.
> - 6 x 2.4
>
> A student might estimate an answer between 12 and 18 since 6 x 2 is 12 and 6 x 3 is 18. Another student might give an estimate of a little less than 15 because s/he figures the answer to be very close, but smaller than 6 x 2 ½ and think of 2 ½ groups of 6 as 12 (2 groups of 6) + 3 (½ of a group of 6).

- The following are examples of the models that should be used to show the different decimal operations.
  Subtraction:

Example: 4 - 0.3

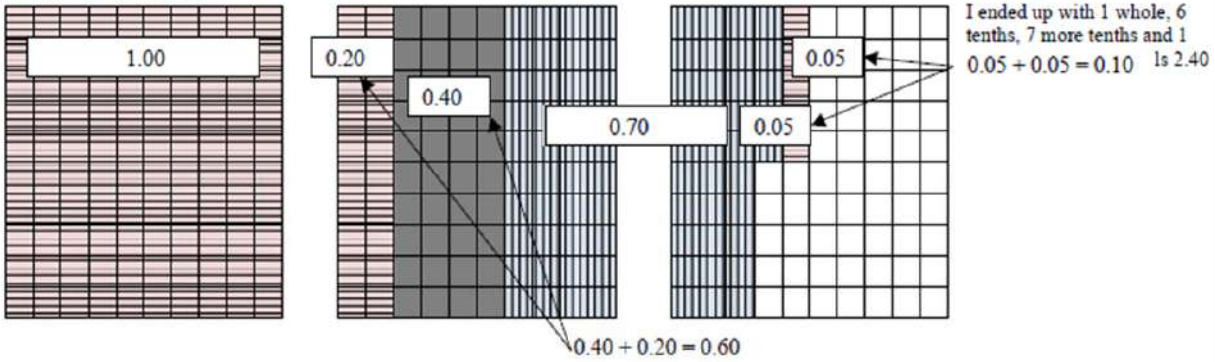
3 tenths subtracted from 4 wholes. The wholes must be divided into tenths.

The solution is 3 and 7/10 or 3.7.

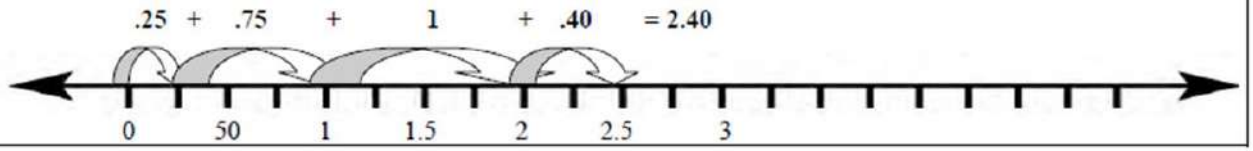
Addition:

Example:
A recipe for a cake requires 1.25 cups of milk, 0.40 cups of oil, and 0.75 cups of water. How much liquid is in the mixing bowl?

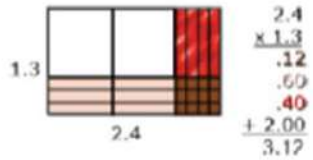
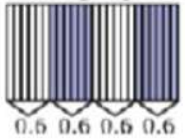
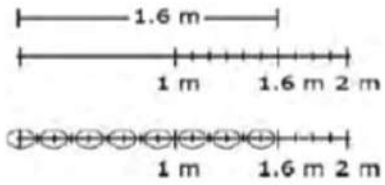
Student 1
1.25 + 0.40 + 0.75
First, I broke the numbers apart:
I broke 1.25 into 1.00 + 0.20 + 0.05
I left 0.40 like it was.
I broke 0.75 into 0.70 + 0.05
I combined my two 0.05s to get 0.10.
I combined 0.40 and 0.20 to get 0.60.
I added the 1 whole from 1.25.



Student 2
I saw that the 0.25 in 1.25 and the 0.75 for water would combine to equal 1 whole.
I then added the 2 wholes and the 0.40 to get 2.40.

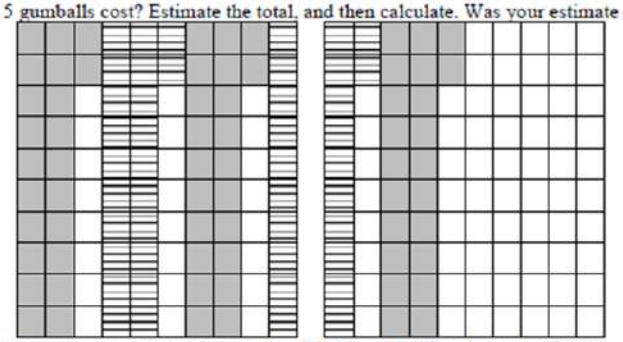


Multiplication and Division:

An area model can be useful for illustrating products.  2.4 x 1.3 .12 .60 .40 + 2.00 3.12	**Students should be able to describe the partial products displayed by the area model.** **For example,** **"3/10 times 4/10 is 12/100.** **3/10 times 2 is 6/10 or 60/100.** **1 group of 4/10 is 4/10 or 40/100.** **1 group of 2 is 2."**
Example of division: finding the number in each group or share. **Students should be encouraged to apply a fair sharing model separating decimal values into equal parts such as** $2.4 \div 4 = 0.6$  	**Example of division: finding the number of groups.** **Joe has 1.6 meters of rope. He has to cut pieces of rope that are 0.2 meters long. How many can he cut?**
Example of division: finding the number of groups. **Students could draw a segment to represent 1.6 meters. In doing so, s/he would count in tenths to identify the 6 tenths, and be able identify the number of 2 tenths within the 6 tenths. The student can then extend the idea of counting by tenths to divide the one meter into tenths and determine that there are 5 more groups of 2 tenths.**  	**Students might count groups of 2 tenths without the use of models or diagrams. Knowing that 1 can be thought of as 10/10, a student might think of 1.6 as 16 tenths. Counting 2 tenths, 4 tenths, 6 tenths, . . .16 tenths, a student can count 8 groups of 2 tenths.** **Use their understanding of multiplication and think, "8 groups of 2 is 16, so 8 groups of 2/10 is 16/10 or 1 6/10."**

Example of Multiplication:

A gumball costs $0.22. How much do 5 gumballs cost? Estimate the total, and then calculate. Was your estimate close?



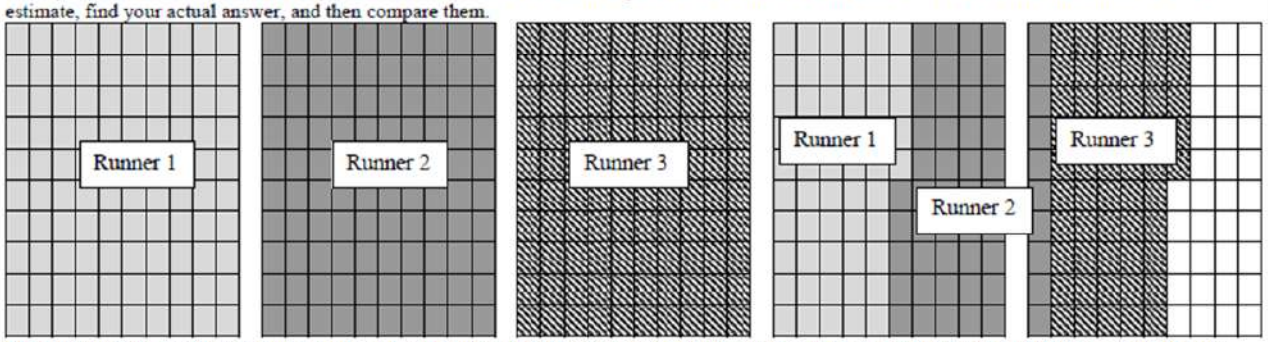
I estimate that the total cost will be a little more than a dollar. I know that 5 20's equal 100 and we have 5 22's.

I have 10 whole columns shaded and 10 individual boxes shaded. The 10 columns equal 1 whole. The 10 individual boxes equal 10 hundredths or 1 tenth. My answer is $1.10.

My estimate was a little more than a dollar, and my answer was $1.10. I was really close.

Example of Division:

A relay race lasts 4.65 miles. The relay team has 3 runners. If each runner goes the same distance, how far does each team member run? Make an estimate, find your actual answer, and then compare them.



My estimate is that each runner runs between 1 and 2 miles. If each runner went 2 miles, that would be a total of 6 miles which is too high. If each runner ran 1 mile, that would be 3 miles, which is too low.

I used the 5 grids above to represent the 4.65 miles. I am going to use all of the first 4 grids and 65 of the squares in the 5th grid. I have to divide the 4 whole grids and the 65 squares into 3 equal groups. I labeled each of the first 3 grids for each runner, so I know that each team member ran at least 1 mile. I then have 1 whole grid and 65 squares to divide up. Each column represents one-tenth. If I give 5 columns to each runner, that means that each runner has run 1 whole mile and 5 tenths of a mile. Now, I have 15 squares left to divide up. Each runner gets 5 of those squares. So each runner ran 1 mile, 5 tenths and 5 hundredths of a mile. I can write that as 1.55 miles.

My answer is 1.55 and my estimate was between 1 and 2 miles. I was pretty close.

- http://reviewgamezone.com/game-list.php?id=123&name=Measurement This site offers games for students to play online to practice converting units of measure.
- Using a variety of manipulatives (e.g., fraction strips, area models, pattern blocks, number lines) model converting pieces of equivalent fractions. Connect manipulative models with numerical representations.
- Equivalent fractions - http://illuminations.nctm.org/ActivityDetail.aspx?ID=80
- Sum Fractions Game - See page 34 in Acing Math – One Deck at a Time Math Games PDF located on the **Math Share** Folder in Grade 5 Resources.
- Difference Fractions Game - See page 35 in Acing Math – One Deck at a Time Math Games PDF located on the **Math Share** Folder in Grade 5 Resources.
- Fraction War – Give students cards with fraction addition and/or subtraction problems on them. Students divide the pile of cards in half. Each student flips over a card and adds and/or subtracts the fractions. The student with the higher sum or difference wins both cards. Play continues until students go through their entire pile. The student with the most cards won is the winner.
- Divide 12 equal-sized pizzas among 4 students (12/4 = 12 ÷ 4). Ask: How many pizzas does each student get? Then, have students suggest how to divide 2 pizzas equally among 3 students (2/3 = 2 ÷ 3). Explain how to divide the pizzas in smaller pieces using fraction circles. Show that each pizza is divided equally into the number of parts which represent the number of students. So each pizza is divided into 3 smaller pieces. Show that dividing 6 smaller pieces of pizza among 3 students means each student gets 2 pieces each. Because a pizza comprises 3 equal pieces, each student gets 2/3 of a pizza.
- Fraction Game - (http://illuminations.nctm.org Click Activities, then grades 3-5. Scroll down until the activity titled "Fraction Game" is found. Follow directions for the activity.)
- Practice using the models for adding and subtracting fractions using http://visualfractions.com This website includes both a linear and circular model.
- Example of using benchmark fractions to estimate and solve real-world problems.

Example:
Your teacher gave you 1/7 of the bag of candy. She also gave your friend 1/3 of the bag of candy. If you and your friend combined your candy, what fraction of the bag would you have? Estimate your answer and then calculate. How reasonable was your estimate?

Student 1
1/7 is really close to 0. 1/3 is larger than 1/7, but still less than 1/2. If we put them together we might get close to 1/2.
1/7 + 1/3= 3/21 + 7/21 = 10/21. The fraction does not simplify. I know that 10 is half of 20, so 10/21 is a little less than ½.
Another example: 1/7 is close to 1/6 but less than 1/6, and 1/3 is equivalent to 2/6, so I have a little less than 3/6 or ½.

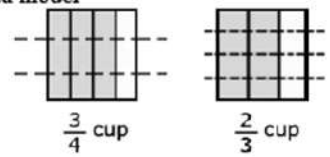
- Example of modeling fraction addition and subtraction.

Example:
Jerry was making two different types of cookies. One recipe needed 3/4 cup of sugar and the other needed 2/3 cup of sugar. How much sugar did he need to make both recipes?

- Mental estimation:

A student may say that Jerry needs more than 1 cup of sugar but less than 2 cups. An explanation may compare both fractions to ½ and state that both are larger than ½ so the total must be more than 1. In addition, both fractions are slightly less than 1 so the sum cannot be more than 2.

- Area model

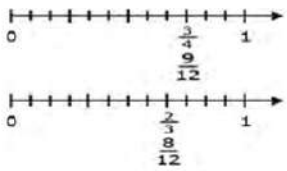


$\frac{3}{4}$ cup of sugar

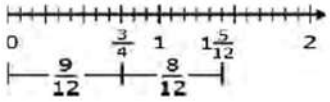
$\frac{2}{3}$ cup of sugar

$\frac{3}{4}=\frac{9}{12}$ $\frac{2}{3}=\frac{8}{12}$ $\frac{3}{4}+\frac{2}{3}=\frac{17}{12}=\frac{12}{12}+\frac{5}{12}=1\frac{5}{12}$

- Linear model

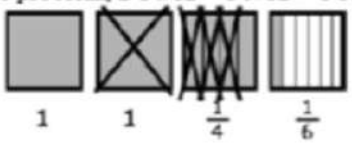


Solution:

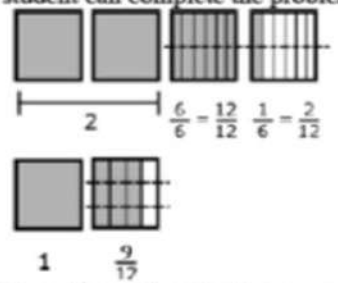


Example: Using an area model to subtract

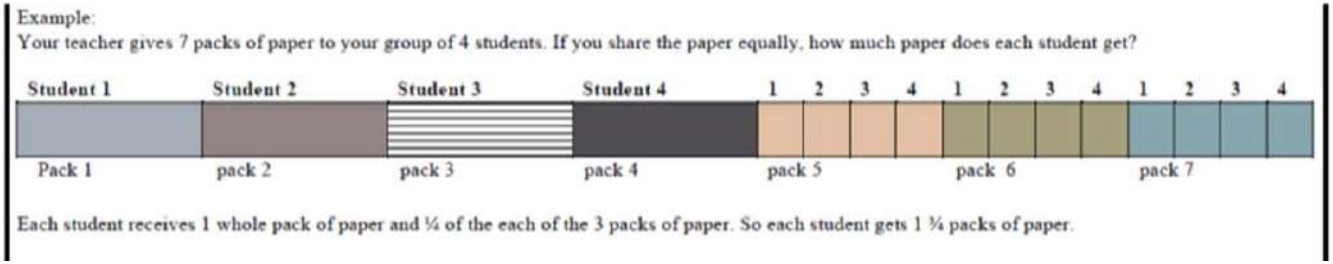
- **This model shows 1 ¾ subtracted from 3 1/6 leaving 1 + ¼ = 1/6 which a student can then change to 1 + 3/12 + 2/12 = 1 5/12. 3 1/6 can be expressed with a denominator of 12. Once this is done a student can complete the problem, 2 14/12 – 1 9/12 = 1 5/12.**



- **This diagram models a way to show how 3 1/6 and 1 ¾ can be expressed with a denominator of 12. Once this is accomplished, a student can complete the problem, 2 14/12 – 1 9/12 = 1 5/12.**



- Example of a model to relate division and fractions.



- Center Activities from EnVisions series.

Literacy Connection

- The Wishing Club – A Story about Fractions by Donna Jo Napoli. Related activities titled The Wishing Club Activity 1 and The Wishing Club Activity 2 on the **Math Share** Folder in the Grade 5 Unit 3 Resources Folder.
- How Long or How Wide? A Measuring Guide by Brian P. Cleary. This book can be used to introduce the idea of converting units of measure to students.

Resources

*Pearson has created supplemental lessons to help align envisions to the new Common Core Standards.
Lessons with A or B after the lesson topic number can be found on www.pearsonsuccessnet.com.
Log into your account and then click on ***Teacher Resources*** located by the Premium, TE, SE links.
Click on the link - ***Transitioning to Common Core with enVisions Math***.
Click on the lesson you need and you will see teacher black line masters, Student work page, and teacher edition plans.

http://www.uen.org/commoncore/ Click on the Grade 5 Core Standards for Math to move to a site that offers links for each standard that contain additional examples and explanations of the material.

http://www.ode.state.or.us/search/page/?id=3511 The Mathematics Unpacked Content for Grade 5 offers detailed explanations of the requirements for each standard to use a reference.

http://www.k-5mathteachingresources.com/

http://illustrativemathematics.org/standards/k8

Topic & Standard	Suggested Resources: EnVisions
Number and Operations in Base Ten – *Perform operations with multi-digit whole numbers and with decimals to hundredths.* **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.	*Transitioning to Common Core with EnVisions Math: 2-6A, 7-4A, 7-4B, 7-6A 2-3 (Estimating Decimals Only) 2-6, 2-7 (It is important to include the addition and subtraction of a decimal number with a whole number.) 7-2 to 7-4, 7-6 to 7-8 Intervention System H53, H52, H61, H63
Measurement and Data – *Convert like measurement units within a given measurement system.* **5.MD.1** – Convert among different-sized standard measurement units within a given measurement system, and use these conversions in solving multi-step, real	14-4, 14-5 Intervention System I33, I34, I35, I36 Supplemental materials to incorporate real world applications.

world problems.	
Number and Operations – Fractions – *Use equivalent fractions as a strategy to add and subtract fractions.* **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.	9-4, 9-7 *Transitioning to Common Core with EnVisions Math: 10-1A, 10-7A 10-3 to 10-6 Intervention System H42 10-1, 10-2 (Use to review as needed.)
Number and Operations – Fractions – *Use equivalent fractions as a strategy to add and subtract fractions.* **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.	*Transitioning to Common Core with EnVisions Math: 10-5A Supplemental materials to include fraction word problems and the use of benchmark fractions to check for reasonableness.
Number and Operations – Fractions – *Apply and extend previous understandings of multiplication and division to multiply and divide fractions.* **5.NF.3** – Interpret a fraction as division of the numerator by the denominator (a/b = a ÷ b). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem.	9-2 Supplemental materials to include models and word problems.
Number and Operations in Base Ten – *Understand the place value system.* **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.	These standards are revisited during this unit. They can be incorporated through do now activities and open-ended questions.
Number and Operations in Base Ten – *Perform operations with multi-digit whole numbers and with decimals to hundredths.* **5.NBT.5** – Fluently multiply multi-digit whole numbers using the standard algorithm.	

UNIT 4

Stage 1 Desired Results

ESTABLISHED GOALS

Common Core Math Standards

Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

5.NF.4 - Apply and extend previous understandings of multiplication to multiply a fraction or a whole number by a fraction.

a. Interpret the product (a/b) x q as *a* parts of a partition of *q* into *b* equal parts; equivalently, as the result of a sequence of operations *a x q ÷ 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. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.

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

Transfer

Students will be able to independently use their learning to…

Apply and extend previous understandings of multiplication and division o multiply and divide fractions as it applies to real-world situations.

Meaning

UNDERSTANDINGS

Students will understand that…

1. Visual models help us to represent and interpret the multiplication and division of fractions.
2. Using multiple methods, we can predict the size of products and quotients of fractions.
3. Many real-life situations require using numbers that are not whole numbers.

ESSENTIAL QUESTIONS

1. How can we model situations using operations with fractions?
2. How can I check the reasonableness of my answer?

Acquisition

Students will know that…

1. Visual models can be used to represent and interpret the products and quotients of fractions.
2. Multiplying a number by a fraction greater than 1results in a larger product and multiplying a number by a fraction less than 1 results in a smaller product.
3. Dividing by a unit fraction involves the act of breaking a whole number into pieces of that fractional size.
4. Benchmark fractions are useful in predicting the size of a product.
5. We can interpret products geometrically as areas.
6. Vocabulary: fraction, numerator, denominator, product, quotient, partition, equal parts, equivalent, factor, unit fraction, area, side lengths,

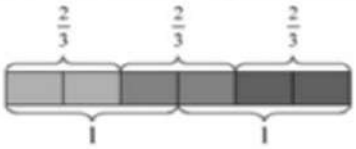
Students will be skilled at…

1. Representing fraction multiplication and division using models.
2. Multiplying a fraction by a whole number.
3. Multiplying a fraction by a fraction.
4. Finding area of rectangles with fractional side lengths using computational procedures.
5. Calculating area of rectangles with fractional side lengths using models.
6. Predicting the size of a product of fractions without actually multiplying.
7. Explaining how multiplying by a fraction greater than 1 or less than

less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n\times a)/(n\times b)$ 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. Mathematical Practices 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	fractional side lengths, scaling, comparing, mixed numbers, divide/division, multiply/multiplication dimension, square units, "of", array, increase, decrease	1 will affect the product. 8. Dividing unit fractions by whole numbers. 9. Dividing whole numbers by unit fractions. 10. Using models to solve real-world problems multiplying a fraction by a mixed number.
Stage 2 - Evidence		

Evaluative Criteria	**Assessment Evidence**
GOAL: Students will understand visual fraction models as a way to represent fraction multiplication. **3** **Advanced Proficient** – ***Knowledge Utilization*** – I can represent fraction multiplication using a model. I can justify why my model is correct. I can explain why each area is larger or smaller than 5. **2** **Proficien**t – ***Representing & Analyzing*** – I can represent fraction multiplication using models. I cannot fully justify why the model is correct. **1** **Basic** –***Recognizing & Recalling*** –I can recognize that I need to use fraction multiplication. I cannot fully complete a model to represent the situation. **0** **Below basic** – I do not know how to make a model to show fraction multiplication.	PERFORMANCE TASK(S): The following problem(s) can be used in addition with other Summative assessments, including **projects**, **unit tests,** and **benchmarks**: **AREA COMPARISON**: Mrs. Bennett is planting two flower beds. The first flower bed is 5 feet long and 1 1/5 feet wide. The second flower bed is 5 feet long and 5/6 feet wide. How do the areas of these two flower beds compare? Is the value of the area larger or smaller than 5 square feet for each flower bed, why? Justify your answer using words **and** models. In your response, please refer back to the essential questions and understandings of this unit.
GENERAL SCALE FOR LEARNING GOALS **3** **Advanced Proficient –** I understand the goal(s) completely! **2** **Proficient –** I understand most of the goal(s). **1** **Basic –** I understand a limited amount. **0** **Below basic –** I don't understand at all!	OTHER EVIDENCE: The following problems can be used in addition with other formative assessments (e.g. homework, exit passes, quick checks, quizzes, classwork, journal entries, etc.) ❖ Find the product and create a story context for this problem: 4/5 × 3/4. ❖ Use a visual model to solve this problem: George drank 3/4 of ½ gallon of milk. How much of the gallon did he drink? How much of the gallon is left? ❖ Interpret the product with a visual model. 1/3 × 5 = 2 ¼ × 3 = 1/3 × 7/8 = ❖ Mr. Brown is building a sandbox that is 6 ½ feet by 4 ½ feet. Draw a model of the sandbox, labeling all dimensions. Find the total area of the sandbox. Explain your answer.

Makayla said, "I can represent $3 \times \frac{2}{3}$ with 3 rectangles each of length $\frac{2}{3}$."



Connor said, "I know that $\frac{2}{3} \times 3$ can be thought of as $\frac{2}{3}$ of 3. Is 3 copies of $\frac{2}{3}$ the same as $\frac{2}{3}$ of 3?"

a. Draw a diagram to represent $\frac{2}{3}$ of 3.

b. Explain why your picture and Makayla's picture together show that $3 \times \frac{2}{3} = \frac{2}{3} \times 3$.

c. What property of multiplication do these pictures illustrate?

- Luke had a calculator that will only display numbers less than or equal to 999,999,999. Which of the following products will his calculator display? Explain.
  - 792 × 999,999,999
  - ½ × 999,999,999
  - 15/4 × 999,999,999
  - 0.67 × 999,999,999

  Solution:
  Since multiplying a positive number by a factor greater than 1 always results in a larger number, the first and third products will be too large to display.
  Since multiplying a positive number by a factor less than 1 (but greater than zero) always results in a smaller number, the second and fourth products will be displayed on his calculator.
- Decide which number is greater without multiplying.
  - 817 or 235 × 817
  - 99 or ¼ × 99
  - 51/100 or 51/100 × 301
  - 13/90 or 2/3 × 13/90
  - 101/102 or 101/102 × 101/102
  - 99/5 or 99/5 × ½
  - 8/21 × 40 or 28/21 × 40
  - 8/3 × 5/7 or 8/3 × 9/4
- Without multiplying, which product is larger? Justify your response.
  12 × 1/5 or 6 × 1/5
- Fundraising Problem – Resource located on the **Math Share** Drive in the Grade 5 Unit

	4 Resource Folder. ❖ Grass Seedlings – Resource located on the **Math Share** Drive in the Grade 5 Unit 4 Resource Folder. ❖ Reasoning about Multiplication – Resource located on the **Math Share** Drive in the Grade 5 Unit 4 Resource Folder. ❖ Running a Mile – Resource located on the **Math Share** Drive in the Grade 5 Unit 4 Resource Folder. ❖ A recipe for chocolate chip cookies makes 4 dozen cookies and calls for the following ingredients: • 1 1/2 C margarine • 13/4 C sugar • 2t vanilla • 31/4 C flour • 1t baking powder • ¼ t salt • 8oz chocolate chips 1. How much of each ingredient is needed for 12 dozen cookies? 2. How much of each ingredient is needed for 3 dozen cookies? Use models when needed to show your work. ❖ The distance between Rosa's house and her school is ¾ mile. She ran 1/3 of the way to school. How many miles did she run? Draw a model and write an equation to solve the problem. ❖ To Multiply or not to Multiply? - Resource located on the **Math Share** Drive in the Grade 5 Unit 4 Resource Folder. ❖ Given the problem 3/5 × 1 ½, write a real-world problem to represent this expression and solve. ❖ Solve with visual fraction models and an equation to represent the problem: Tasha finished a job in 3/4 hour. Megan finished the same job in 4/5 of the time Tasha took. How long did Megan take to finish the job? ❖ Solve the four problems below. Which of the following problems can be solved by finding 3÷1/2? • Shauna buys a three-foot-long sandwich for a party. She then cuts the sandwich into pieces, with each piece being ½ foot long. How many pieces does she get? • Phil makes 3quarts of soup for dinner. His family eats half of the soup for

	dinner. How many quarts of soup does Phil's family eat for dinner? • A pirate finds three pounds of gold. In order to protect his riches, he hides the gold in two treasure chests, with an equal amount of gold in each chest. How many pounds of gold are in each chest? • Leo used half of a bag of flour to make bread. If he used 3 cups of flour, how many cups were in the bag to start? ❖ ½ of a pie is shared between 3 friends. How much of the original whole pie does each person get? ❖ Jacob has a 40-gallon gas tank. If it fills up 1/8 of a gallon every minute, how long will it take to fill an entire tank? ❖ Write a real-world problem to represent the following expression. Then, solve using an equation and visual model. 5 ÷ 1/6

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction

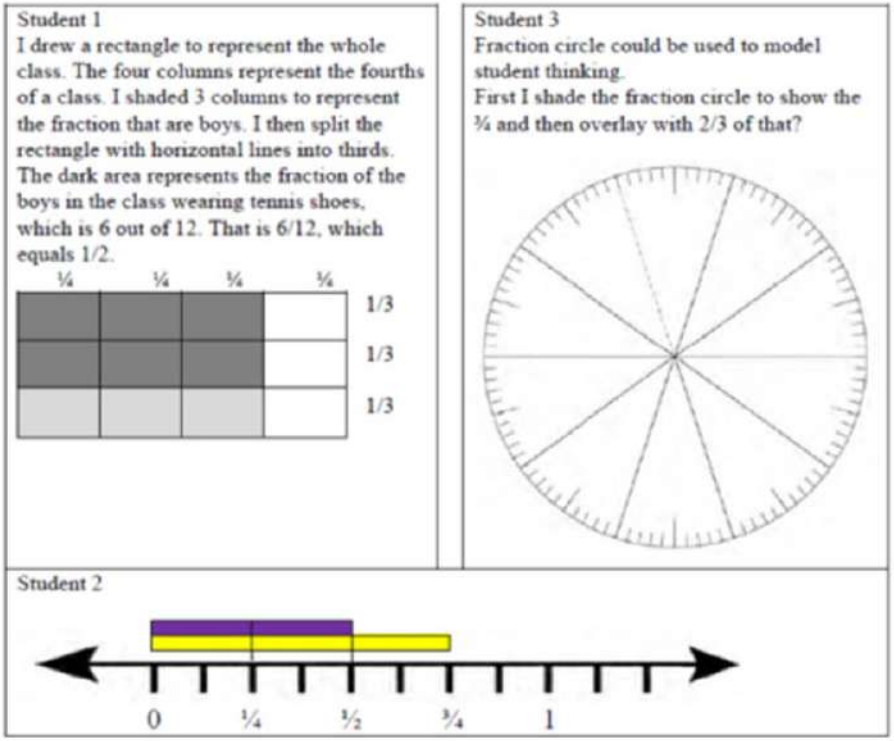
Pre-assessment:

- Teachers can assign diagnostic measures (i.e. KWL, pre-test, do now) to assess student prior knowledge.
- Teacher created assessments (possible resource: Pearson ExamView Test Generator, SuccessNet, etc.)

Learning Activities:

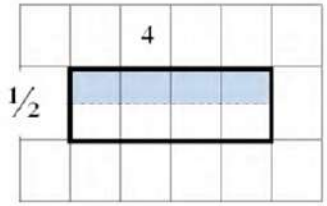
- Put students in small groups to solve problems such as those found below. Have each group present their answers to the class and justify their answers using models and equations.
  Example 1: Mrs. Jones teaches in a room that is 60 feet wide and 40 feet long. Mr. Thomas teaches in a room that is half as wide, but has the same length. How do the dimensions and area of Mr. Thomas' classroom compare to Mrs. Jones' room? Draw a picture to prove your answer.
  Example 2: How does the product of 225 × 60 compare to the product of 225 × 30? How do you know?
  Example 3: Joey has a bedroom that is 12 feet by 8 feet long. His sister, Mary, has a bedroom that is 10 feet by 12 feet long. Which bedroom has the greatest area? Justify your reasoning with a model and an equation.
- Drinking Juice Problem – Use the problem to practice the different ways to model fraction by fraction multiplication. Examples of models are included in this document. - Resource located on the **Math Share** Drive in the Grade 5 Unit 4 Resource Folder.
- Half a Recipe - Use the problem to practice the different ways to model fraction by mixed number multiplication. Examples of models are included in this document. - Resource located on the **Math Share** Drive in the Grade 5 Unit 4 Resource Folder.
- The Multiplying Game – Resource located on the **Math Share** Drive in the Grade 5 Unit 4 Resource Folder.
- An Experiment with Mice - Resource located on the **Math Share** Drive in the Grade 5 Unit 4 Resource Folder.
- Interactive Rectangular Model for Fraction Multiplication - http://nlvm.usu.edu/ Click Numbers and Operations for Grade 3-5. Scroll down to the Fractions-Rectangular Multiplication application.
- Multiplying with Rectangles - Resource located in the **Math Share** Folder in Grade 5 Unit 4 Resources Folder.
- Area Word Problems with Fractional Lengths - Resource located in the **Math Share** Folder in Grade 5 Unit 4 Resources Folder.
- Multiplying Fractions using Rectangles - Resource located in the **Math Share** Folder in Grade 5 Unit 4 Resources Folder.

- Mixed Number × Fraction with Cuisenaire Rods - Resource located in the **Math Share** Folder in Grade 5 Unit 4 Resources Folder.
- Whole Number × Mixed Number with Cuisenaire Rods - Resource located in the **Math Share** Folder in Grade 5 Unit 4 Resources Folder.
- Samples of Models for Multiplying Fractions
  Problem: Three-fourths of the class is boys. Two-thirds of the boys are wearing tennis shoes. What fraction of the class are boys with tennis shoes?



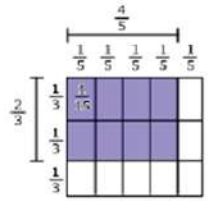
- Samples of Area models for Multiplying fractions

Example:
The home builder needs to cover a small storage room floor with carpet. The storage room is 4 meters long and half of a meter wide. How much carpet do you need to cover the floor of the storage room? Use a grid to show your work and explain your answer.
In the grid below I shaded the top half of 4 boxes. When I added them together, I added ½ four times, which equals 2. I could also think about this with multiplication ½ x 4 is equal to 4/2 which is equal to 2.



Example:

In solving the problem $\frac{2}{3} \times \frac{4}{5}$, students use an area model to visualize it as a 2 by 4 array of small rectangles each of which has side lengths 1/3 and 1/5. They reason that 1/3 x 1/5 = 1/(3 x 5) by counting squares in the entire rectangle, so the area of the shaded area is (2 x 4) x 1/(3 x 5) = $\frac{2 \times 4}{3 \times 5}$. They can explain that the product is less than $\frac{4}{5}$ because they are finding $\frac{2}{3}$ of $\frac{4}{5}$. They can further estimate that the answer must be between $\frac{2}{5}$ and $\frac{4}{5}$ because $\frac{2}{3}$ of $\frac{4}{5}$ is more than $\frac{1}{2}$ of $\frac{4}{5}$ and less than one group of $\frac{4}{5}$.



The area model and the line segments show that the area is the same quantity as the product of the side lengths.

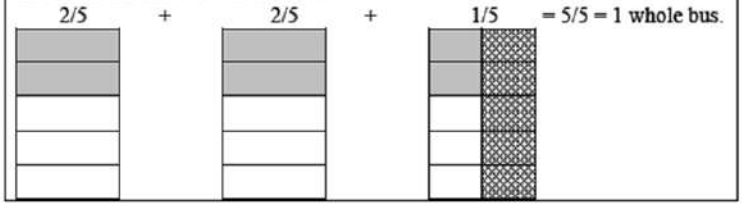
- Sample of Multiplying Mixed Numbers and Fractions with Models – Students do not need to use the traditional algorithm to solve these types of

problems, but rather different strategies such as the ones below.

Example:
There are 2 ½ bus loads of students standing in the parking lot. The students are getting ready to go on a field trip. 2/5 of the students on each bus are girls. How many busses would it take to carry ***only*** the girls?

Student 1
I drew 3 grids and 1 grid represents 1 bus. I cut the third grid in half and I marked out the right half of the third grid, leaving 2 ½ grids. I then cut each grid into fifths, and shaded two-fifths of each grid to represent the number of girls. When I added up the shaded pieces, 2/5 of the 1st and 2nd bus were both shaded, and 1/5 of the last bus was shaded.

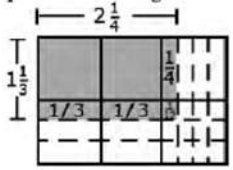
2/5 + 2/5 + 1/5 = 5/5 = 1 whole bus.



Student 2
2 ½ x 2/5=
I split the 2 ½ into 2 and ½
2 x 2/5 = 4/5
½ x 2/5 = 2/10
I then added 4/5 and 2/10. That equals 1 whole bus load.

Example:

Mary and Joe determined that the dimensions of their school flag needed to be $1\frac{1}{3}$ ft. by $2\frac{1}{4}$ ft. What will be the area of the school flag?
A student can draw an array to find this product and can also use his or her understanding of decomposing numbers to explain the multiplication. Thinking ahead a student may decide to multiply by $1\frac{1}{3}$ instead of $2\frac{1}{4}$.



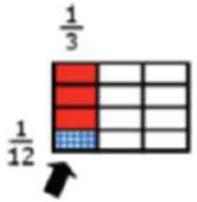
The explanation may include the following:

- First, I am going to multiply $2\frac{1}{4}$ by 1 and then by $\frac{1}{3}$.
- When I multiply $2\frac{1}{4}$ by 1, it equals $2\frac{1}{4}$.
- Now I have to multiply $2\frac{1}{4}$ by $\frac{1}{3}$.
- $\frac{1}{3}$ times 2 is $\frac{2}{3}$.
- $\frac{1}{3}$ times $\frac{1}{4}$ is $\frac{1}{12}$.
- So the answer is $2\frac{1}{4} + \frac{2}{3} + \frac{1}{12}$ or $2\frac{3}{12} + \frac{8}{12} + \frac{1}{12} = 2\frac{12}{12} = 3$

- Divide a Unit Fraction by a Whole Number - Resource located in the **Math Share** Folder in Grade 5 Unit 4 Resources Folder.

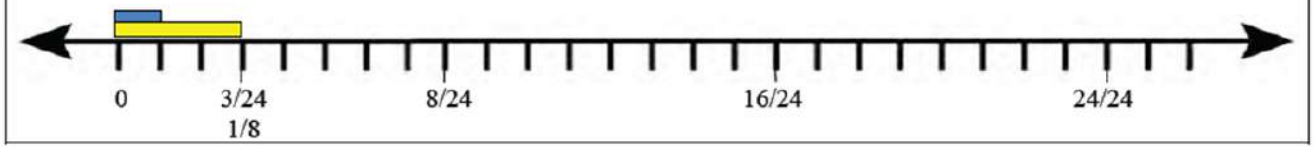
- Divide a Whole Number by a Unit Fraction - Resource located in the **Math Share** Folder in Grade 5 Unit 4 Resources Folder.
- Dividing a Whole Number by Unit Fraction with Cuisenaire Rods - Resource located in the **Math Share** Folder in Grade 5 Unit 4 Resources Folder.
- Give students real life scenarios that can be modeled with rectangles such as cutting or sharing candy bars, pie, cheese bars, pizza, etc. Discuss dividing by the unit fraction by modeling that if students have 4 candy bars and they want to divide it by 1/3, they would cut each bar into 3 pieces and count all the pieces. By doing this numerous times, students will begin to realize that you multiply the whole number by the denominator of the unit fraction to obtain the answer.
- The Quotient Stays the Same - Resource located in the **Math Share** Folder in Grade 5 Unit 4 Resources Folder. – Students only need to do the top half of the activity. The 4 problems at the bottom starting with 2 ÷ 2/3 are not needed. Lesson Idea: Write the same headings as the worksheet on the board. Start with the problem 4 ÷ 1/6 in the first column. Ask students to try to figure out the answer to this problem. Some will come up with 24. Record it. Then ask students what multiplication problem could check it (24 ×1/6 = 4). This should be recorded in the Check column. For the last column, tell students the multiplication problem starts with the same first number and the same answer. What is the missing factor (4 × 6 = 24)? Repeat this process again with another whole number divided by a unit fraction. Students should begin to notice the pattern. Have them complete the first half of the worksheet with a partner and discuss.
- Models to show division of fractions.

Example:
Knowing the number of groups/shares and finding how many/much in each group/share
Four students sitting at a table were given 1/3 of a pan of brownies to share. How much of a pan will each student get if they share the pan of brownies equally?
The diagram shows the 1/3 pan divided into 4 equal shares with each share equaling 1/12 of the pan.

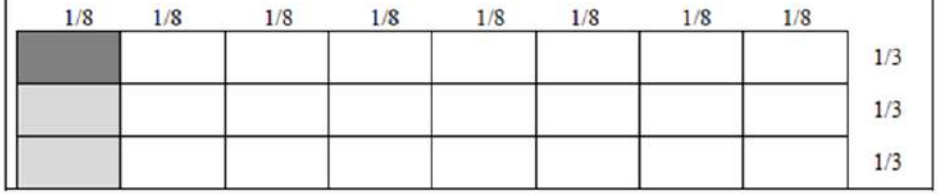


You have 1/8 of a bag of pens and you need to share them among 3 people. How much of the bag does each person get?

Student 1
Expression 1/ 8 ÷ 3



Student 2
I drew a rectangle and divided it into 8 columns to represent my 1/8. I shaded the first column. I then needed to divide the shaded region into 3 parts to represent sharing among 3 people. I shaded one-third of the first column even darker. The dark shade is 1/24 of the grid or 1/24 of the bag of pens.



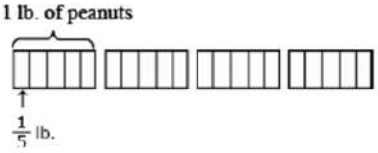
Student 3
1/8 of a bag of pens divided by 3 people. I know that my answer will be less than 1/8 since I'm sharing 1/8 into 3 groups. I multiplied 8 by 3 and got 24, so my answer is 1/24 of the bag of pens. I know that my answer is correct because (1/24) x 3 = 3/24 which equals 1/8.

Student
The bowl holds 5 Liters of water. If we use a scoop that holds 1/6 of a Liter, how many scoops will we need in order to fill the entire bowl?

I created 5 boxes. Each box represents 1 Liter of water. I then divided each box into sixths to represent the size of the scoop. My answer is the number of small boxes, which is 30. That makes sense since 6 x 5 = 30.

1 = 1/6 + 1/6 + 1/6 + 1/6 + 1/6 a whole has 6/6 so five wholes would be 6/6 + 6/6 + 6/6 + 6/6 + 6/6 =30/6

Examples:
Knowing how many in each group/share and finding how many groups/shares
Angelo has 4 lbs of peanuts. He wants to give each of his friends 1/5 lb. How many friends can receive 1/5 lb of peanuts?
A diagram for 4 ÷ 1/5 is shown below. Students explain that since there are five fifths in one whole, there must be 20 fifths in 4 lbs.



- Interactive Models for Multiplying and Dividing Fractions - http://www.learner.org/courses/learningmath/number/session9/part_a/
- Have students create their own real-world problems for multiplying and dividing fractions. Have students trade with a partner and solve each other's problems.
- Center Activities from EnVisions series.

Literacy Connection:

- Go, Fractions! by Judith Stamper. This book can be used to introduce multiplying a fraction by a whole number. Have students look for the patterns the team uses in the story to figure out ½, ¼, etc. of a whole number.

Resources

*Pearson has created supplemental lessons to help align envisions to the new Common Core Standards.
Lessons with A or B after the lesson topic number can be found on www.pearsonsuccessnet.com.
Log into your account and then click on ***Teacher Resources*** located by the Premium, TE, SE links.
Click on the link - ***Transitioning to Common Core with enVisions Math***.
Click on the lesson you need and you will see teacher black line masters, Student work page, and teacher edition plans.

http://www.uen.org/commoncore/ Click on the Grade 5 Core Standards for Math to move to a site that offers links for each standard that contain additional examples and explanations of the material.

http://www.ode.state.or.us/search/page/?id=3511 The Mathematics Unpacked Content for Grade 5 offers detailed explanations of the requirements for each standard to use a reference.

http://www.k-5mathteachingresources.com/

http://illustrativemathematics.org/standards/k8

http://www.learner.org/courses/learningmath/number/session9/part_a/

Topic & Standard	Suggested Resources: EnVisions
Number and Operations – Fractions – *Apply and extend previous understandings of multiplication and division to multiply and divide fractions.*	11-1, 11-2 *Transitioning to Common Core with EnVisions Math: 11-3A
5.NF.4 – Apply and extend previous understandings of multiplication to multiply a fraction or a whole number by a fraction. **a**. Interpret the product (a/b) x q as *a* parts of a partition of *q* into *b* equal	Intervention System H45, H46 Supplemental materials to incorporate models, repeated addition method, and area of rectangles with fractional lengths.

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. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.	
Number and Operations – Fractions – *Apply and extend previous understandings of multiplication and division to multiply and divide fractions.* **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 $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.	*Transitioning to Common Core with EnVisions Math: 11-2A, 11-4A
Number and Operations – Fractions – *Apply and extend previous understandings of multiplication and division to multiply and divide fractions.* **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.	11-5 Intervention System H50 Supplemental materials to include real-world problems.
Number and Operations – Fractions – *Apply and extend previous understandings of multiplication and division to multiply and divide fractions.* **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.	11-4 *Transitioning to Common Core with EnVisions Math: 11-5A Intervention System H47

UNIT 5

Stage 1 Desired Results

ESTABLISHED GOALS

Common Core Math Standards

Graph points on the coordinate plane to solve real-world and mathematical 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.

Analyze patterns and relationships.
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.

Represent and interpret data.

Transfer

Students will be able to independently use their learning to…
Analyze and interpret patterns, relationships, data and graph on the coordinate plane to solve real-world and mathematical problems.

Meaning

UNDERSTANDINGS
Students will understand that…

1. Numerical patterns can be interpreted through tables, graphs, and verbal descriptions.
2. The coordinate plane is a useful tool for representation of numerical data.
3. Patterns help us make sense of the world.

ESSENTIAL QUESTIONS

1. How can I use a coordinate plane to represent and model real-world mathematical situations?
2. How can I interpret data in a meaningful and useful way?

Acquisition

Students will know…

1. Ordered pairs represent a unique location on a coordinate plane.
2. Numerical patterns can be represented on a coordinate plane.
3. Tables, graphs, and verbal phrases can be used to make sense of numerical patterns.
4. Line plots can be used to organize and represent data.
5. Operations can be used to interpret data represented on line plots.
6. Vocabulary: numerical patterns, rules, ordered pairs, coordinate plane, line plot, length, mass, liquid volume, first

Students will be skilled at…

1. Graphing ordered pairs on the first quadrant of the coordinate plane.
2. Interpreting coordinate points in the context of real life situations.
3. Plotting ordered pairs on a grid to create geometric figures and identify missing points.
4. Using rules to generate a numerical pattern.
5. Creating ordered pairs from data generated by using rules.
6. Creating and interpret a line graph to represent data.
7. Measuring objects to the nearest ½,

5.MD.2 - Make a line plot to display a data set of measurements in fractions of a unit (1/2, ¼, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. **Classify two-dimensional figures into categories based on their properties.** 5.G.3 - Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. 5.G.4 - Classify two-dimensional figures in a hierarchy based on properties. **Perform operations with multi-digit whole numbers and with decimals to hundredths.** 5.NBT.5 - Fluently multiply multi-digit whole numbers using the standard algorithm. 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. Mathematical Practices 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	quadrant, points, lines, axis/axes, x-axis, y-axis, horizontal, vertical, intersection of lines, origin, ordered pairs, coordinates, x-coordinate, y-coordinate	1/4, or 1/8 unit. (length, mass, and liquid volume) 8. Creating a line plot from data that includes fractional units. 9. Operating on numerical data from line plots.

Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence

GOAL: Students will understand numerical data can be interpreted through graphs, tables, and verbal phrases.

3	**Advanced Proficient** – ***Knowledge Utilization*** – I know how to measure and represent my data in a line plot using an appropriate scale. I can make an accurate generalization to interpret my data. I can justify that my units are appropriate and my total length is accurate.
2	**Proficien**t – ***Representing & Analyzing*** – I understand how to measure and represent data in a line plot. My generalization, scale, and measurements are mostly accurate. I was able to use an accurate process to find my total length with only minor to no errors.
1	**Basic** –***Recognizing & Recalling*** –I can recognize a unit of measure to use and can recall in general how to make a line plot. I have major errors in my process and calculations.
0	**Below basic** – I cannot measure objects accurately or create a line plot to display my data. I cannot interpret my data by writing a generalization.

PERFORMANCE TASK(S):
The following problem(s) can be used in addition with other Summative assessments, including **projects**, **unit tests,** and **benchmarks**:

GEOCACHING INVESTIGATION: Geocaching is an indoor or outdoor treasure-seeking game. You can use different tools to find "treasure." In this activity, a geocache is the hidden treasure that you must find using a set of clues. **(*See full Geocache investigation sheets on the Math Share drive… clues, graphs, suggested questions, answers)**We recommend the teacher also show the class background on geocaching from youtube or other video.

MEASUREMENT SCAVENGER HUNT: Have students decide on a category of objects that they would like to measure. (Note: The number should be at least 10 to get a large variety of data.) For example: lengths of leaves, lengths of candy bars, lengths of books, lengths of erasers, lengths of pastas etc. (Note: volume or mass units may also be used.)

Students will gather their items and bring them to school on an assigned day.

Task:

- Determine which unit of measurement would be best for your group of items.
- Measure each of your items. (Measurements should be represented using ¼, ½, or 1/8 of a unit.)
- Create a line plot to display your data, making sure to choose an appropriate scale.
- Using your line plot, determine the total length of all of your items. Show all of your work.
- Write a generalization to describe your data.

Extension: If all of your items were evened out to be the same length, what would that length be? How do you know?

GENERAL SCALE FOR LEARNING GOALS

3	**Advanced Proficient –** I understand the goal(s) completely!

OTHER EVIDENCE:

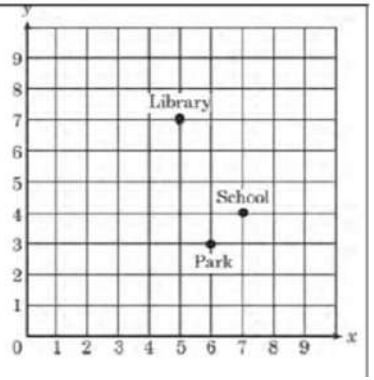
The following problems can be used in addition with other formative assessments (e.g. homework, exit passes, quick checks, quizzes, classwork, journal entries, etc.)

- ❖ Emanuel draws a line segment from (1, 3) to (8, 10). He then draws a line segment from (0, 2) to (7, 9). If he wants to draw another line segment that is parallel to those two segments, what points can he use?

2	**Proficient** – I understand most of the goal(s).
1	**Basic** – I understand a limited amount.
0	**Below basic** – I don't understand at all!

- Plot these points on a coordinate grid.
  Point A: (2,6)
  Point B: (4,6)
  Point C: (6,3)
  Point D: (2,3)
  Connect the points in order. Make sure to connect point D back to Point A.
  1. What geometric figure is formed? What attributes did you use to identify it?
  2. What line segments in this figure are parallel?
  3. What line segments in this figure are perpendicular?
- Plot the following points on the coordinate plane.
  Point A: (7,4)
  Point B: (4,4)
  Point C: (4, 7)
  Give the coordinates of Point D, so that the points will form a square when connected in order A, B, C, D.

Example:
Using the coordinate grid, which ordered pair represents the location of the School?
Explain a possible path from the school to the library.



- Sara has saved $20. She earns $8 for each hour she works. If Sara saves all of her money, how much will she have after working 3 hours? 5 hours? 10 hours? Create a graph that shows the relationship between the hours Sara worked and the amount of money she has saved. What other information do you know from analyzing the graph?
- The local department store has recently released its information regarding video game sales over the last nine months. In the first month they sold 75 games. In the next month they sold 72. In the third month the sold 60 and in the fourth they sold 42. In the fifth month they sold 45, in the sixth month they sold 38, in the seventh month they sold 56, in the eighth they sold 62, and in the ninth they sold 79. Organize this data in a chart and then plot it on a coordinate grid to help the store understand their video game sales. Write a generalization about the video game sales.

- Have students generate two numerical patterns. Example: "Add 2" and "Add 4." Instruct students to:
  - Complete the patterns.
  - Find corresponding terms.
  - Form ordered pairs from corresponding terms.
  - Graph ordered pairs on a coordinate grid.
- John and Maren are flying model airplanes. Both planes take off at the same time. John's plane climbs 3 feet every second. Maren's plane climbs 6 feet every second. Create a table to show the pattern. Then graph the pattern.
- Complete the table below. Identify the pattern for each row. Form ordered pairs rom corresponding terms. Graph ordered pairs on a coordinate grid.

8	16				
2	4				

- Russell bought 3 movie tickets for a total of $21. Catherine bought 5 movie tickets for a total of $35. Create a table to show the pattern of the prices of movie tickets. How much is 1 ticket, 2 tickets, and 4 tickets? Graph the corresponding terms as ordered pairs on a coordinate plane. What pattern do you see? Explain why.

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction

Pre-assessment:

- Teachers can assign diagnostic measures (i.e. KWL, pre-test, do now) to assess student prior knowledge.
- Teacher created assessments (possible resource: Pearson ExamView Test Generator, SuccessNet, etc.)

Learning Activities:

- Create a life-size grid on the classroom floor. Label the axes. Have students physically more along the grid, exploring movements long the x-axis and the y-axis. Then discuss how the movement can be represented with ordered pairs.
- Using a life-sized grid on the classroom floor. Place an object on a specific point. Have students describe how to get to the point and give the coordinates for the object.
- Give students a map of the school. Overlay a coordinate grid on top. (Copying a coordinate grid on a transparency would work.) Ask them to identify where certain places in the school are found. Then have students tell what is located a particular given coordinate pair. (Note: This can be done with any map.)
- Billy Bug and his Quest for Grub Game. Have students use laptops to play the game at the following site. http://www.oswego.org/ocsd-web/games/BillyBug/bugcoord.html
- Gridlock Game - Resources located on **Math Share** Drive in in the Grade 5 Unit 5 Resources Folder.
- High Five - Resources located on **Math Share** Drive in in the Grade 5 Unit 5 Resources Folder.

- Fruit Loops on geoboards to play Battleship. Give pairs of students each a geoboard. Have students use tape to label the side and bottom of their geoboards with numbers. Students will then place a red fruit loop on one ordered pair. Place a divider between desks. Students then use other colored fruit loops to mark off ordered pairs as they call them out in an attempt to locate their partner's red fruit loop.
- Capture the Shape Game- Resources located on **Math Share** Drive in in the Grade 5 Unit 5 Resources Folder. – The game board can be modified to have larger axis to make it more challenging.
- Sample work for Standard 5.OA.3

This standard extends the work from Fourth Grade, where students generate numerical patterns when they are given one rule. In Fifth Grade, students are given two rules and generate two numerical patterns. The graphs that are created should be line graphs to represent the pattern. This is a linear function which is why we get the straight lines. The Days are the independent variable, Fish are the dependent variables, and the constant rate is what the rule identifies in the table.

Example:

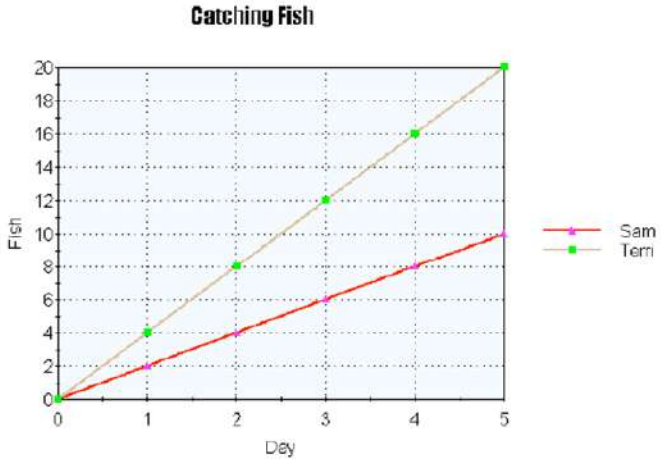
Make a chart (table) to represent the number of fish that Sam and Terri catch.

Days	Sam's Total Number of Fish	Terri's Total Number of Fish
0	0	0
1	2	4
2	4	8
3	6	12
4	8	16
5	10	20

Example:

Describe the pattern:
Since Terri catches 4 fish each day, and Sam catches 2 fish, the amount of Terri's fish is always greater. Terri's fish is also always twice as much as Sam's fish. Today, both Sam and Terri have no fish. They both go fishing each day. Sam catches 2 fish each day. Terri catches 4 fish each day. How many fish do they have after each of the five days? Make a graph of the number of fish.

Plot the points on a coordinate plane and make a line graph, and then interpret the graph.
Student:
My graph shows that Terri always has more fish than Sam. Terri's fish increases at a higher rate since she catches 4 fish every day. Sam only catches 2 fish every day, so his number of fish increases at a smaller rate than Terri.
Important to note as well that the lines become increasingly further apart. Identify apparent relationships between corresponding terms. Additional relationships: The two lines will never intersect; there will not be a day in which boys have the same total of fish, explain the relationship between the number of days that has passed and the number of fish a boy has (2n or 4n, n being the number of days).



Example:

Use the rule "add 3" to write a sequence of numbers. Starting with a 0, students write 0, 3, 6, 9, 12, . . .

Use the rule "add 6" to write a sequence of numbers. Starting with 0, students write 0, 6, 12, 18, 24, . . .

After comparing these two sequences, the students notice that each term in the second sequence is twice the corresponding terms of the first sequence. One way they justify this is by describing the patterns of the terms. Their justification may include some mathematical notation (See example below). A student may explain that both sequences start with zero and to generate each term of the second sequence he/she added 6, which is twice as much as was added to produce the terms in the first sequence. Students may also use the distributive property to describe the relationship between the two numerical patterns by reasoning that $6 + 6 + 6 = 2\ (3 + 3 + 3)$.

0, $\overset{+3}{}$ 3, $\overset{+3}{}$ 6, $\overset{+3}{}$ 9, $\overset{+3}{}$ 12, . . .

0, $\overset{+6}{}$ 6, $\overset{+6}{}$ 12, $\overset{+6}{}$ 18, $\overset{+6}{}$ 24, . . .

Once students can describe that the second sequence of numbers is twice the corresponding terms of the first sequence, the terms can be written in ordered pairs and then graphed on a coordinate grid. They should recognize that each point on the graph represents two quantities in which the second quantity is twice the first quantity.

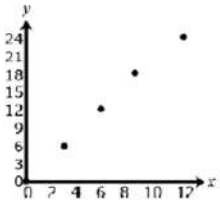
Ordered pairs

(0, 0)

(3, 6)

(6, 12)

(9, 18)



- Give students different containers to fill with water. Have students use beakers to measure the volume of water that can be held in each container. Students should measure to the nearest ½, ¼, or 1/8 unit. They can then create a line plot to display the data. They should make sure they have an appropriate scale including fractional lengths in their line plot. Question to pose: How much liquid can all of your containers hold together? (Note: This activity can be done with measure object lengths, or using a scale to measure mass of an object.)
- Center Activities from EnVisions series.

Literacy Connection

- The Fly on the Ceiling: A Math Myth by Dr. Julie Glass. Related Activities titled "A Fly on the Ceiling" are located in the **Math Share** Drive Unit 5 Resources.
- If You Hopped Like A Frog by David M. Schwartz. After reading the story, read the fact page in the back that states a frog can hop 20 times its body length. Have students see how far they could hop like a frog and measure the distance using fractional units when needed. Display the data from their group in a line plot. Then, figure out how far the group hopped in all. Challenge: If the total distance hopped was shared fairly

among the group, how far would each person have hopped?
Resources *Pearson has created supplemental lessons to help align envisions to the new Common Core Standards. Lessons with A or B after the lesson topic number can be found on www.pearsonsuccessnet.com. Log into your account and then click on ***Teacher Resources*** located by the Premium, TE, SE links. Click on the link - ***Transitioning to Common Core with enVisions Math***. Click on the lesson you need and you will see teacher black line masters, Student work page, and teacher edition plans. http://www.uen.org/commoncore/ Click on the Grade 5 Core Standards for Math to move to a site that offers links for each standard that contain additional examples and explanations of the material. http://www.ode.state.or.us/search/page/?id=3511 The Mathematics Unpacked Content for Grade 5 offers detailed explanations of the requirements for each standard to use a reference. http://www.k-5mathteachingresources.com/ http://illustrativemathematics.org/standards/k8

Topic & Standard	Suggested Resources: EnVisions
Geometry – *Graph points on the coordinate plane to solve real-world and mathematical 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)	*Transitioning to Common Core with EnVisions Math: 17-4A 17-2 (1st quadrant only) Intervention System F30, F33 (1st quadrant only.)

Geometry – *Graph points on the coordinate plane to solve real-world and mathematical problems.* **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.	*Transitioning to Common Core with EnVisions Math: 17-4B, 17-4C Supplemental materials to include plotting figures on the coordinate grid & finding missing coordinates or traveling between two points. (1st quadrant only)
Operations and Algebraic Thinking – *Analyze patterns and relationships.* **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.	*Transitioning to Common Core with EnVisions Math: 6-4A, 6-6B, 6-6C 17-4 (At this time, the equation representation does not need to be stressed.) Supplemental materials to include word problems with two patterns.
Measurement and Data – *Represent and interpret data.* **5.MD.2** – Make a line plot to display a data set of measurements in fractions of a unit (1/2, ¼, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots.	*Transitioning to Common Core with EnVisions Math: 18-2A, 18-2B 12-1 (only if needed to practice using a ruler.) 18-1 and Intervention System I62 (only if needed to review line plots)
Geometry – *Classify two-dimensional figures into categories based on their properties.* **5.G.3** – Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.	These standards are revisited during this unit. They can be incorporated through do now activities and open-ended questions.
Geometry – *Classify two-dimensional figures into categories based on their properties.* **5.G.4** – Classify two-dimensional figures in a hierarchy based on properties.	
Number and Operations in Base Ten – *Perform operations with multi-digit whole numbers and with decimals to hundredths.* **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.	These standards are revisited during this unit. They can be incorporated through do now activities and open-ended questions.
Number and Operations in Base Ten – *Perform operations with multi-digit whole numbers and with decimals to hundredths.* **5.NBT.5** – Fluently multiply multi-digit whole numbers using the standard algorithm.	