6/1/2013

NORTH SMITHFIELD SCHOOL DEPARTMENT

MATHEMATICS CURRICULUM GRADE 5

North Smithfield Elementary School
Curriculum Writers: Carol Blais and Andrea Lafleur

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This curriculum was developed based on the Common Core State Standards utilizing examples and strategies from various websites including Tucson, Arizona, Ohio, and New Jersey.

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The North Smithfield Mathematics Curriculum for grades K-12 was completed in June 2013 by a K-12 team of teachers. The team, identified as the Mathematics Task Force and Mathematics Curriculum Writers referenced extensive resources to design the document that included: *Common Core Standards for Mathematics*

- Common Core State Standards for Mathematics
- Common *Core State Standards for Mathematics Appendix A*
- *Best Practice, New Standards for Teaching and Learning in America's Schools;*
- *Classroom Instruction That Works* Strategies
- Differentiated Instructional Strategies
- Goals for the district
- Khan Academy
- Numerous state curriculum Common Core frameworks, e.g. Ohio Department of Education, Tucson Arizona, New Jersey, Connecticut
- PARCC Model Content Frameworks
- The Illustrative Mathematics Project:
- Third International Mathematics and Science Test (TIMSS)
- *Understanding Common Core State Standards, Kendall*

Mission Statement

**To foster the success of all students,
our mission is to engage them
in a challenging mathematics curriculum,
driven by standards-based instruction and focused on
mathematical practices, skills, concepts, and problem solving.**

The North Smithfield Mathematics Curriculum identifies what students should know and be able to do in mathematics. Each grade or course includes Common Core State Standards (CCSS), grade level Assessment problems, teacher notes, best practice instructional strategies, resources, a map (or suggested timeline), rubrics, checklists, and common formative and summative assessments.

COMMON CORE STATE STANDARDS

- Are fewer, higher, deeper, and clearer.
- Are aligned with college and workforce expectations.
- Include rigorous content and applications of knowledge through high-order skills.
- Build upon strengths and lessons of current state standards (GLEs and GSEs).
- Are internationally benchmarked, so that all students are prepared for succeeding in our global economy and society.
- Are research and evidence-based.

Common Core State Standards components include:

- Standards for **Mathematical Practice** (K-12)
- Standards **for Mathematical Content:**
  - Categories (high school only): e.g. numbers, algebra, functions, data
  - Domains: larger groups of related standards
  - Clusters: groups of related standards
  - Standards**:** define what students should understand and are able to do

The **North Smithfield Common Core Mathematics Curriculum** provides all students with a sequential comprehensive education in mathematics through the study of:

- Standards **for Mathematical Practice (K-12)**
  - Make sense of problems and persevere in solving them
  - Reason abstractly and quantitatively
  - Construct viable arguments and critique the reasoning of others
  - Model with mathematics*
  - Use appropriate tools strategically
  - Attend to precision
  - Look for and make use of structure
  - Look for and express regularity in repeated reasoning

- Standards **for <u>Mathematical Content</u>:**
  - **K – 5 Grade Level Domains of**
    - Counting and Cardinality
    - Operations and Algebraic Thinking
    - Number and Operations in Base Ten
    - Number and Operations – Fractions
    - Measurement and Data
    - Geometry
  - **6-8 Grade Level Domains of**
    - Ratios and Proportional Relationships
    - The Number System
    - Expressions and Equations
    - Functions
    - Geometry
  - **9-12 Grade Level Conceptual Categories of**
    - Number and Quantity
    - Algebra
    - Functions
    - Modeling
    - Geometry
    - Statistics and Probability

RESEARCH-BASED INSTRUCTIONAL STRATEGIES

The North Smithfield Common Core Mathematics Curriculum provides a list of research-based **best practice instructional strategies** that the teacher may model and/or facilitate. It is suggested the teacher:

- Use **formative assessment to** guide instruction
- Provide opportunities for **independent, partner** and **collaborative group work**
- Use ***Classroom Instruction That Works* Strategies:**
  - Setting objectives and providing feedback
  - Reinforcing effort and providing recognition
  - Cooperative learning
  - Cues, questions, and advance organizers
  - Nonlinguistic representations
  - Summarizing and note taking
  - Assigning homework and providing practice
  - Identifying similarities and differences
  - Generating and testing hypotheses
- Differentiate **instruction** by varying the **content, process, and product** and providing opportunities for:
  - anchoring
  - cubing
  - jig-sawing
  - pre/post assessments
  - tiered assignments
- Address **multiple intelligences** instructional strategies, e.g. visual, bodily kinesthetic, interpersonal
- Provide opportunities for **higher level thinking: Webb's Depth of Knowledge, 2,3,4,** skill/conceptual understanding, strategic reasoning, extended reasoning
- Facilitate the integration of **Mathematical Practices** in all content areas of mathematics

- Employ strategies of "best practice" (student-centered, experiential, holistic, authentic, expressive, reflective, social, collaborative, democratic, cognitive, developmental, constructivist/heuristic, and challenging)
- Facilitate integration of the **Applied Learning Standards (SCANS):**
  - communication
  - critical thinking
  - problem solving
  - reflection/evaluation
  - research
- Provide **rubrics** and **models**
- Address **multiple intelligences** and brain dominance (spatial, bodily kinesthetic, musical, linguistic, intrapersonal, interpersonal, mathematical/logical, and naturalist)
- Employ **mathematics best practice strategies** e.g.
  - using manipulatives
  - facilitating cooperative group work
  - discussing mathematics
  - questioning and making conjectures
  - justifying of thinking
  - writing about mathematics
  - facilitating problem solving approach to instruction
  - integrating content
  - using calculators and computers
  - facilitating learning
  - using assessment to modify instruction

COMMON ASSESSMENTS

The North Smithfield Common Core Mathematics Curriculum includes common assessments. Required (red ink) indicates the assessment is required of all students e.g. common tasks/units**,** standardized mid-term exam, standardized final exam.

- **REQUIRED** COMMON ASSESSMENTS
  - Common units
  - Common unit assessment
- **Common Instructional Assessments (I)** - used by teachers and students during the instruction of CCSS.
- **Common Formative Assessments (F)** - used to measure how well students are mastering the content standards **before** taking state assessments
  - teacher and student use to make decisions about what actions to take to promote further learning
  - on-going, dynamic process that involves far more frequent testing
  - serves as a practice for students
- **Common Summative Assessment (S**) - used to measure the level of student, school, or program success
  - make some sort of judgment, e.g. what grade
  - program effectiveness
  - e.g. state assessments (AYP), mid-year and final exams
- Additional suggested assessments include:
  - Anecdotal records
  - Checklist
  - Conferencing
  - Exhibits
  - Interviews
  - Graphic organizers
  - Journals
  - Mathematical Practices
  - Modeling
  - Multiple Intelligences assessments, e.g.
    - Role playing - bodily kinesthetic
    - Graphic organizing - visual
  - Collaboration - interpersonal Oral presentations
  - Problem/Performance based/common tasks
  - Tests and quizzes
  - Technology
  - Think-alouds
  - Writing genres
    - Opinion
    - Informative
    - Research

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RESOURCES FOR Grade 5 Mathematics

Textbooks

enVisionMath

Supplementary

Technology

- Calculators
- Computer lab
- Computers
- Document camera
- Graphing calculator
- Interactive boards
- LCD projectors
- Overhead graphing scientific
- Student response systems

Websites

- http://curriculum.northsmithfieldschools.com
- http://www.achieve.org/http://my.hrw.com
- http://www.illustrativemathematics.org/standards/practice
- http://www.nj.gov/education/modelcurriculum/math/5.pdf
- http://www.ode.state.oh.us/GD/Templates/Pages/ODE/ODEDefaultPage.aspx?page=1
- http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S
- http://www.tusd1.org/contents/distinfo/curriculum/index.asp
- www.commoncore.org/maps
- www.commoncoresheets.com
- www.corestandards.org
- www.illuminatuins.nctm.org
- www.K-5mathteachingresources.com
- www.khanacademy.com
- www.learnzillion.com
- www.pearsonsucessnet.com
- www.ride.ri.gov

Materials

- 3-D solid figures
- Base 10 blocks
- Conversion charts
- Decimal charts
- Decimal flip chart
- Equivalent fraction charts
- Fraction bars
- Graph paper
- Geoboards
- Laminated multiplication charts
- Measuring cups
- Measuring spoons
- Meter/yard stick
- Number cubes
- Number lines (deimals, modeling of multiplication)
- Paper 3-D figures
- Place value charts
- Play money
- Protractors
- Rulers
- Straws

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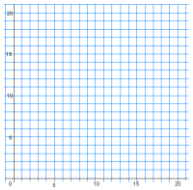
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
OPERATIONS AND ALGEBRAIC THINKING (5.OA) Write and interpret numerical expressions. Use **Mathematical Practices** to 1. Make sense of problems and persevere in solving them 2. 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	**A**	**Students** 5.OA.1 Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols. **Additional content** **Essential question** • *Do we need a conventional order for working with parentheses, brackets and braces? Why or why not? Support your position with evidence.* **Essential knowledge and skills** • There is a difference between mathematical expressions and equations; an expression is a mathematical phrase containing one or more terms linked by operation symbols, and an equation is a mathematical statement divided by an equal symbol that states that two values or expressions have the same value. • Expressions inside a grouping symbol are computed before the rest of the equation—first parentheses, then brackets, and then braces • How does the placement of grouping symbols affect the answer? • What is an expression for the following: (say e.g., "write an expression that is 5 times as large as 3487 + 7432.") • What is an equivalent expression for 4 x (75 +32) ÷ 4? **Teaching Examples:** • Learning the conventional order. Students need experiences with multiple expressions that use grouping symbols throughout the year to develop understanding of when and how to use parentheses, brackets, and braces. First, students use these symbols with whole numbers. Then the symbols can be used as students add, subtract, multiply and divide decimals and fractions. Examples: • (26 + 18) ÷ 4 Answer: 11 • {[2 x (3+5)] – 9} + [5 x (23-18)] Answer: 32 • 12 – (0.4 x 2) Answer: 11.2 **Academic vocabulary** Algebraic expression Braces Brackets Equation Equivalent expression Evaluate Expression Parentheses PEMDAS **Mathematical Practices** • Make sense of problems and persevere in solving them • Use appropriate tools strategically • Look for and express regularity in repeated reasoning	TEACHER NOTES See instructional strategies in the introduction • *Begin with expressions that have two operations without any grouping symbols (multiplication or division combined with addition or subtraction) before introducing expressions with multiple operations. Using the same digits, with the operations in a different order, have students evaluate the expressions and discuss why the value of the expression is different. For example, have students evaluate 5 × 3 + 6 and 5 + 3 × 6. Discuss the rules that must be followed. Have students insert parentheses around the multiplication or division part in an expression. A discussion should focus on the similarities and differences in the problems and the results. This leads to students being able to solve problem situations which require that they know the order in which operations should take place.* (ODE) • *After students have evaluated expressions without grouping symbols, present problems with one grouping symbol, beginning with parentheses, then in*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath*, lessons: ○ 6-4 ○ 6-5 ○ 3-4 (p. 67 only) Supplementary Books, Teacher (T) Student (S) • • Technology • Computers • LCD projectors • Interactive boards Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.ode.state.oh.us/GD/Templates/Pages/ODE/ODEDefaultPage.aspx?page=1 • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%205 • http://www.tusd1.org/contents/distinfo/curriculum/index.asp • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.ride.ri.gov Materials • Calculators • Grid paper	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. □ Role playing - bodily kinesthetic □ Graphic organizing - visual □ Collaboration - interpersonal • Oral presentations

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• (2 + 3) x (1.5 – 0.5) Answer: 5 • $6-\left(\frac{1}{2}+\frac{1}{3}\right)$ Answer: 5 1/6 • { 80 ÷ [2 x (3 ½ + 1 ½)] }+ 100 Answer: 108 To further develop students' understanding of grouping symbols and facility with operations, students place grouping symbols in equations to make the equations true or they compare expressions that are grouped differently. Examples: • 15 - 7 – 2 = 10 → 15 - (7 – 2) = 10 • 3 x 125 ÷ 25 + 7 = 22 → [3 x (125 ÷ 25)] + 7 = 22 • 24 ÷ 12 ÷ 6 ÷ 2 = 2 x 9 + 3 ÷ ½ → 24 ÷ [(12 ÷ 6) ÷ 2] = (2 x 9) + (3 ÷ ½) • Compare 3 x 2 + 5 and 3 x (2 + 5) • Compare 15 – 6 + 7 and 15 – (6 + 7) (TUSD)	*combination with brackets and/or braces.* (ODE)	• *enVisionMath*, lessons: ○ 3-8 ○ 6-51 ○ 6-3	• Problem/Performance based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres □ Opinion □ Informative □ Research
	A	5.OA.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. **Additional content** ○ *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.* **Essential question** **Academic vocabulary** **Essential knowledge and skills** • There is a difference between mathematical expressions and equations; an expression is a mathematical phrase containing one or more terms linked by operation symbols, and an equation is a mathematical statement divided by an equal symbol that states that two values or expressions have the same value. • Expressions inside a grouping symbol are computed before the rest of the equation—first parentheses, then brackets, and then braces. **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively **Teaching Examples:** • Students use their understanding of operations and grouping symbols to write expressions and interpret	• *Have students write numerical expressions in words without calculating the value. This is the foundation for writing algebraic expressions. Then, have students write numerical expressions from phrases without calculating them.* (ODE)		

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		the meaning of a numerical expression. Examples: • Students write an expression for calculations given in words such as "divide 144 by 12, and then subtract 7/8." They write (144 ÷ 12) – 7/8. • Students recognize that 0.5 x (300 ÷ 15) is ½ of (300 ÷ 15) without calculating the quotient. (TUSD) ASSESSMENT PROBLEMS 5.OA.1 Basic • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/969/original/illustrative_mathematics_969.pdf?1353941566 5.OA.1 Advanced • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/555/original/illustrative_mathematics_555.pdf?1346083776 5.OA.2 Basic • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/139/original/illustrative_mathematics_139.pdf?1343856918 5.OA.2 Advanced • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/001/222/original/illustrative_mathematics_1222.pdf?1356990134 • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/590/original/illustrative_mathematics_590.pdf?1343856919			
OPERATIONS AND ALGEBRAIC THINKING (5.OA) Analyze patterns and relationships. Use **Mathematical Practices** to 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	**A**	**Students** 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. **Additional content** ○ *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.* **Essential questions** • *How can a rule help you define a pattern?* • *What can you learn about the relationship between two sequences of numbers by creating a visual representation?* **Academic vocabulary** Coordinate plane Integer Ordered pair Pattern	TEACHER NOTES See instructional strategies in the introduction • *Given two rules with an apparent relationship, students should be able to identify the relationship between the resulting sequences of the terms in one sequence to the corresponding terms in the other sequence. For example, starting with 0, multiply by 4 and starting with 0, multiply by 8 and generate each sequence of numbers (0, 4, 8, 12, 16, …) and (0, 8, 16, 24, 32,…).*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 17-1 – 17.4 ○ 4-7 (p. 105 only)	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
structure 8. Look for and express regularity in repeated reasoning		• *Why is it important to match corresponding terms to create a coordinate pair?* **Essential knowledge and skills** • Given a pattern you can generate a rule; given a rule you can generate a pattern. • Ordered pairs that represent corresponding terms from two patterns can be represented on a graph, and apparent relationships between them can be described. **Teaching Examples:** Example: • Use the rule "add 3" to write a sequence of numbers. Starting with 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, $^{+3}$3, $^{+3}$6, $^{+3}$9, $^{+3}$12, . . . 0, $^{+6}$6, $^{+6}$12, $^{+6}$18, $^{+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) Quadrant Sequence x-axis y-axis **Mathematical Practices** • Reason abstractly and quantitatively • Look for and make use of structure	*Students should see that the terms in the second sequence are double the terms in the first sequence, or that the terms in the first sequence are half the terms in the second sequence.* • *Have students form ordered pairs and graph them on a coordinate plane. Patterns can be also discerned in graphs.* • *Graphing ordered pairs on a coordinate plane is introduced to students in the Geometry domain where students solve real-world and mathematical problems. For the purpose of this cluster, only use the first quadrant of the coordinate plane, which contains positive numbers only. Provide coordinate grids for the students, but also have them make coordinate grids. In Grade 6, students will position pairs of integers on a coordinate plane.* (ODE)  • *The graph of both sequences of numbers is a visual representation that will show the relationship between the two*		• Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. ▫ Role playing - bodily kinesthetic ▫ Graphic organizing - visual ▫ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ▫ Opinion ▫ Informative

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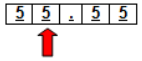
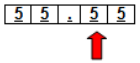
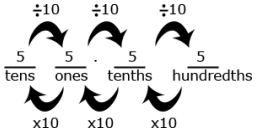
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		(6, 12) (9, 18) (12, 24) (TUSD) ASSESSMENT PROBLEMS 5.OA.3 Advanced • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaRXd0QXYweXVUTFdMNlVKUi1vdmJodw/edit?pli=1 • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaclpGc3M2TTNTRENLXzRpSEJaQ1FDUQ/edit?pli=1	*sequences of numbers.* • *Encourage students to represent the sequences in T-charts so that they can see a connection between the graph and the sequences.* (ODE)		□ Research
NUMBER AND OPERATIONS IN BASE TEN (5.NBT) Understand the place value system. . Use **Mathematical Practices** to 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	**M**	**Students** 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. **Major content** **Essential question** • *How does a digit's position affect its value?* **Essential knowledge and skills** • A digit in one place represents 10 times the unit in the place to its right and 1/10 of the unit in the place to its left. • The base-ten system extends to decimal fractions (1/10 = 0.1). **Teaching Examples:** • In fourth grade, students examined the relationships of the digits in numbers for whole numbers only. This standard extends this understanding to the relationship of decimal fractions. Students use base ten blocks, pictures of base ten blocks, and interactive images of base ten blocks to manipulate and investigate the place value relationships. They use their understanding of unit fractions to compare decimal places and fractional language to describe those comparisons. • Before considering the relationship of decimal fractions, students express their understanding that in multi-digit whole numbers, a digit in one place represents 10 times what it represents in the place to its right and 1/10 of what it represents in the place to its left. **Academic vocabulary** • Base • Base ten number system • Decimal (read decimal point as "and" • Digit • Division – equal parts • Exponent • Fraction (1/10, 1/100, 0.1, 0.01) • Hundredths • Place value • Powers of ten • Round • Standard form • Tenths • Thousandths • Whole number • Word form **Mathematical Practices** • Reason abstractly and quantitatively	TEACHER NOTES See instructional strategies in the introduction • *In Grade 5, the concept of place value is extended to include decimal values to thousandths. The strategies for Grades 3 and 4 should be drawn upon and extended for whole numbers and decimal numbers. For example, students need to continue to represent, write and state the value of numbers including decimal numbers. For students who are not able to read, write and represent multi-digit numbers, working with decimals will be challenging.* • *Money is a good medium to compare decimals. Present contextual situations that require the comparison of the cost of two items to determine the lower or higher priced item. Students should also be able to identify how many pennies, dimes,*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 7-1	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★

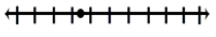
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS

		• A student thinks, "I know that in the number 5555, the 5 in the tens place (5555) represents 50 and the 5 in the hundreds place (5555) represents 500. So a 5 in the hundreds place is ten times as much as a 5 in the tens place or a 5 in the tens place is 1/10 of the value of a 5 in the hundreds place.
		• 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.
		 
		(TUSD)
		• Attend to precision
		• Look for and make use of structure
			dollars and ten dollars, etc., are in a given value. Help students make connections between the number of each type of coin and the value of each coin, and the expanded form of the number. Build on the understanding that it always takes ten of the number to the right to make the number to the left.
			• *Number cards, number cubes, spinners and other manipulatives can be used to generate decimal numbers. For example, have students roll three number cubes, then create the largest and small number to the thousandths place. Ask students to represent the number with numerals and words.*
			(ODE)
					• Multiple Intelligences assessments, e.g.
					  Role playing - bodily kinesthetic
					  Graphic organizing - visual
					  Collaboration - interpersonal
					• Oral presentations
					• Problem/Performance based/common tasks
					• Rubrics/checklists (mathematical practice, modeling)
					• Tests and quizzes
					• Technology
					• Think-alouds
					• Writing genres
					  Opinion
					  Informative
					  Research

	M	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. **Major content**
		
		Use whole-number exponents to denote powers of 10.
		
		Essential questions
		• *How many different relationships can you find between units in the base-ten number system?*
		• *How does the context of the problem help you determine what strategy to use to solve the problem?*
		• *Can you just put two more zeros behind the number when multiplying that number by one hundred? Does it always work? If so, why? If not, why not?*
		
		Academic vocabulary
		
		Mathematical Practices
		• Reason abstractly and quantitatively
		• Attend to precision
				• *enVisionMath*, lessons:
				  7-1
				  7-5	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Essential knowledge and skills • Exponents express powers of a given number (e.g., 104 means 10 x10 x 10 x 10. (Note: Grade 5 focuses on powers of 10 only.) • Multiplying by 10 shifts each digit of the number being multiplied one place to the left, so the product's value is 10 times as large. • Dividing by 10 shifts each digit of the number being divided (dividend) 1 place to right in quotient, so the quotient's value is 10 times as small. **Teaching Examples:** • 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.  Examples: • Students might write: • 36 x 10 = 36 x 10^1 = 360 • 36 x 10 x 10 = 36 x 10^2 = 3600 • 36 x 10 x 10 x 10 = 36 x 10^3 = 36,000 • 36 x 10 x 10 x 10 x 10 = 36 x 10^4 = 360,000 • Students might think and/or say: ○ I noticed that every time, I multiplied by 10 I added a zero to the end of the number. That makes sense because each digit's value became 10 times larger. To make a digit 10 times larger, I have to move it one place value to the left. ○ When I multiplied 36 by 10, the 30 became 300. The 6 became 60 or the 36 became 360. So I had to add a zero at the end to have the 3 represent 3 one-hundreds (instead of 3 tens) and the 6 represents 6 tens (instead of 6 ones). • Students should be able to use the same type of reasoning as above to explain why the following multiplication and division problem by powers of 10 make sense. ○ $523 \times 10^3 = 523{,}000$ The place value of 523 is increased by 3 places. ○ $5.223 \times 10^2 = 522.3$ The place value of 5.223 is increased by 2 places.	• Look for and make use of structure		

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		○ $52.3 \div 10^1 = 5.23$ The place value of 52.3 is decreased by one place. (TUSD)	• Review >,< symbols and how to use them		
	M	5.NBT.3 Read, write, and compare decimals to thousandths. **Major content** a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., 347.392 = 3 × 100 + 4 × 10 + 7 × 1 + 3 × (1/10) + 9 × (1/100) + 2 × (1/1000). 5.NBT.1a 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.1b **Essential questions** • *What role does place value play in your strategy?* • *How is your strategy similar to or different from _'s strategy?* • *Which is greater: 0.309 or 0.81? Justify your thinking.* **Essential knowledge and skills** **Teaching Examples:** • Students build on the understanding they developed in fourth grade to read, write, and compare decimals to thousandths. They connect their prior experiences with using decimal notation for fractions and addition of fractions with denominators of 10 and 100. They use concrete models and number lines to extend this understanding to decimals to the thousandths. Models may include base ten blocks, place value charts, grids, pictures, drawings, manipulatives, technology-based, etc. They read decimals using fractional language and write decimals in fractional form, as well as in expanded notation as show in the standard 3a. This investigation leads them to understanding equivalence of decimals (0.8 = 0.80 = 0.800). Example: Some equivalent forms of 0.72 are: **Academic vocabulary** **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure		• *enVisionMath*, lessons: ○ 1-3 ○ 9-8 ○ 9-9 • *enVisionMath*, lessons: ○ 1-4 ○ 4-4 (p. 93 only)	

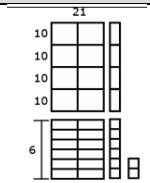
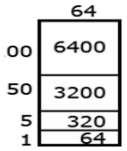
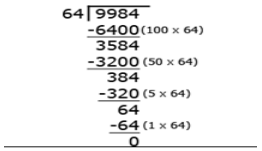
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		72/100 7/10 + 2/100 7 x (1/10) + 2 x (1/100) 0.70 + 0.02 70/100 + 2/100 0.720 7 x (1/10) + 2 x (1/100) + 0 x (1/1000) 720/1000 • Students need to understand the size of decimal numbers and relate them to common benchmarks such as 0, 0.5 (0.50 and 0.500), and 1. Comparing tenths to tenths, hundredths to hundredths, and thousandths to thousandths is simplified if students use their understanding of fractions to compare decimals. (TUSD)			
	M	5.NBT.4 Use place value understanding to round decimals to any place. **Major content** **Essential question** • *How are estimating and rounding similar to and different from each other?* **Essential knowledge and skills** • Understanding place value is the foundation for being able to round numbers. **Teaching Examples:** • When rounding a decimal to a given place, students may identify the two possible answers, and use their understanding of place value to compare the given number to the possible answers. 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).  14.2 14.3 (TUSD) **Academic vocabulary** **Mathematical Practices** • Reason abstractly and quantitatively • Attend to precision • Look for and make use of structure		• *enVisionMath*, lessons: ○ 2-2	
		ASSESSMENT PROBLEMS 5.NBT.1 Basic • http://www.p12.nysed.gov/assessment/common-core-sample-questions/math-grade-5.pdf (#2) 5.NBT.2 Basic • http://www.p12.nysed.gov/assessment/common-core-sample-questions/math-grade-5.pdf (#4)			

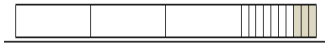
MATHEMATICS CURRICULUM Grade 5

Curriculum Writers: Carol Blais and Andrea Lafleur

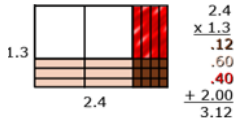
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		5.NBT.3 Basic • http://www.p12.nysed.gov/assessment/common-core-sample-questions/math-grade-5.pdf (#3) 5.NBT.4 Advanced • https://docs.google.com/a/bryantschools.org/file/d/0B6b11pqrwMTBWHp2bHZidkVkcTQ/edit?pli=1			
NUMBER AND OPERATIONS IN BASE TEN (5.NBT) Perform operations with multi-digit whole numbers and with decimals to hundredths. Use **Mathematical Practices** to 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	**M**	**Students** 5.NBT.5 Fluently multiply multi-digit whole numbers using the standard algorithm. **Major content** **Essential question** • *What role does place value play in your strategy?* **Essential knowledge and skills** • An efficient strategy for multiplying multi-digit numbers is the standard algorithm. **Teaching Examples:** • In prior grades, students used various strategies to multiply. Students can continue to use these different strategies as long as they are efficient, but must also understand and be able to use the standard algorithm. In applying the standard algorithm, students recognize the importance of place value. Example: • 123 x 34. When students apply the standard algorithm, they, decompose 34 into 30 + 4. Then they multiply 123 by 4, the value of the number in the ones place, and then multiply 123 by 30, the value of the 3 in the tens place, and add the two products. (TUSD) **Academic vocabulary** Standard algorithm • Area model product • Array • Decompose • Difference • Dividend • Divisor • Quotient • Remainder • Sum **Mathematical Practices** • Reason abstractly and quantitatively • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning	TEACHER NOTES See instructional strategies in the introduction • *Because students have used various models and strategies to solve problems involving multiplication with whole numbers, they should be able to transition to using standard algorithms effectively. With guidance from the teacher, they should understand the connection between the standard algorithm and their strategies.* • *Connections between the algorithm for multiplying multi-digit whole numbers and strategies such as partial products or lattice multiplication are necessary for students' understanding.* • *You can multiply by listing all the partial products. For example:*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 3-4 ○ 3-5 ○ 3-6 ○ 3-8 ○ 5-3 ○ 5-8 ○ 6-4 ○ 10-7	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. □ Role playing - bodily kinesthetic
	M	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. **Major content** **Essential questions** • *How is your strategy similar to or different from someone else's?* • *What real-world word problem can you write for 3 x* **Academic vocabulary** • Partial products	234 x 8 32 Multiply the ones (8 × 4 ones = 32 ones) 240 Multiply the tens (8 × 3 tens = 24 tens or 240 1600 Multiply the hundreds (8 × 2 hundreds = 16 hundr 1872 Add the partial products • *The multiplication can also be done without listing the partial products by*	• *enVisionMath*, lessons: ○ 4-1 through 4-6 ○ 5-1 through 5-8	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		7 = 21? • *How does estimation help you determine whether a solution is reasonable or not?* **Essential knowledge and skills** • Place value understanding is the foundation for being able to estimate numbers; estimation helps determine reasonableness. • The use of strategies and concrete models for the operations helps to demonstrate understanding and to clarify the connections between models, numbers, and the verbal explanations of reasoning. **Teaching Examples:** • In fourth grade, students' experiences with division were limited to dividing by one-digit divisors. This standard extends students' prior experiences with strategies, illustrations, and explanations. When the two-digit divisor is a "familiar" number, a student might decompose the dividend using place value. Example: ○ Using expanded notation ~ 2682 ÷ 25 = (2000 + 600 + 80 + 2) ÷ 25 ○ Using his or her 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 x 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 ÷ 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. (TUSD) **Mathematical Practices** • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics ★ • Use appropriate tools strategically • Look for and make use of structure	*multiplying the value of each digit from one factor by the value of each digit from the other factor. Understanding of place value is vital in using the standard algorithm.* • *In using the standard algorithm for multiplication, when multiplying the ones, 32 ones is 3 tens and 2 ones. The 2 is written in the ones place. When multiplying the tens, the 24 tens is 2 hundreds and 4 tens. But, the 3 tens from the 32 ones need to be added to these 4 tens, for 7 tens. Multiplying the hundreds, the 16 hundreds is 1 thousand and 6 hundreds. But, the 2 hundreds from the 24 tens need to be added to these 6 hundreds, for 8 hundreds.* (ODE) 234 1872 × 8 (ODE)		□ Graphic organizing - visual □ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres □ Opinion □ Informative □ Research

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		 Example: 9984 ÷ 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. (TUSD)   			
	M	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.. **Major content** **Essential question** • *What role does place value play in your strategy?* **Essential knowledge and skills** • Place value understanding is the foundation for being able to estimate numbers; estimation helps determine reasonableness. • The use of strategies and concrete models for the operations helps to demonstrate understanding and to clarify the connections between models, numbers, and the verbal explanations of reasoning. **Academic vocabulary** **Mathematical Practices** • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others		• *enVisionMath*, lessons: ○ 2-6 through 2-8 ○ 7-2 through 7-8	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Teaching Examples: • This standard requires students to extend the models and strategies they developed for whole numbers in grades 1-4 to decimal values. Before students are asked to give exact answers, they should estimate answers based on their understanding of operations and the value of the numbers. 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). • Students should be able to express that when they add decimals they add tenths to tenths and hundredths to hundredths. So, when they are adding in a vertical format (numbers beneath each other), it is important that they write numbers with the same place value beneath each other. This understanding can be reinforced by connecting addition of decimals to their understanding of addition of fractions. Adding fractions with denominators of 10 and 100 is a standard in fourth grade. Example: 4 - 0.3 ○ 3 tenths subtracted from 4 wholes. The wholes must be divided into tenths.  ○ The answer is 3 and 7/10 or 3.7. Example: An area model can be useful for illustrating products	• Model with mathematics ★ • Use appropriate tools strategically • Look for and make use of structure			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS



- 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."

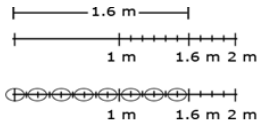
Example of division: finding the number in each group or share

- Students should be encouraged to apply a fair sharing model separating decimal values into equal parts such as 2.4÷4=0.6

Example of division: find 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.

- To divide to find the number of groups, a student might
  - 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.



DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		○ 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." (TUSD) ASSESSMENT PROBLEMS 5.NBT.5 Basic • www.nj.gov (#24-26) 5.NBT.6 Basic • www.nj.gov (# 27-28) 5.NBT.6 Advanced) • www.nj.gov (# 29) 5.NBT.7 Basic • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/292/original/illustrative_mathematics_292.pdf?1357225040			
NUMBER AND OPERATIONS—FRACTIONS (5.NF) Use equivalent fractions as a strategy to add and subtract fractions. Use **Mathematical Practices** to 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 ★	**M**	**Students** 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. **Major content** ○ *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)* **Essential questions** • *Why is it important to estimate before solving problems?* • *How can you mentally estimate the sum or difference of fractions with unlike denominators?* • *Explain why multiplying a fraction by does not change the value of the original fraction.* **Essential knowledge and skills** • Equivalent fractions can be created by multiplying the fraction **Academic vocabulary** • Common denominator • Denominator • Equivalent • Improper fraction • Mixed number • Numerator • Parts • Shares	TEACHER NOTES See instructional strategies in the introduction • *Students are able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction is not a requirement at this grade.* • *To add or subtract fractions with unlike denominators, students*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 10-3 through 10-7 • Fraction bars	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing

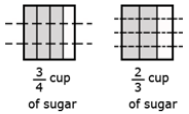
MATHEMATICS CURRICULUM Grade 5

Curriculum Writers: Carol Blais and Andrea Lafleur

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
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		$\frac{a}{b} \times \frac{n}{n}$ where $\frac{n}{n} = 1$. • Fractions with unlike denominators can be added and subtracted by creating and using equivalent fractions. This is determined by subdividing (i.e., further dividing a fractional part) the fraction of one using the denominator of other $\left(i.e., \frac{a}{b} + \frac{c}{d} = \frac{a \times d}{b \times d} + \frac{c \times b}{d \times b} = \frac{ad+bc}{bd}\right)$ Note: Subdividing is actually the process of multiplying a fractional part by a whole that will make each fractional part smaller. **Teaching Examples:** • Students should apply their understanding of equivalent fractions developed in fourth grade and their ability to rewrite fractions in an equivalent form to find common denominators. • Students should know that multiplying the denominators will always give a common denominator but may not result in the smallest denominator. Examples: $\frac{2}{5} + \frac{7}{8} = \frac{16}{40} + \frac{35}{40} = \frac{51}{40}$ $3\frac{1}{4} - \frac{1}{6} = 3\frac{3}{12} - \frac{2}{12} = 3\frac{1}{12}$ (TUSD) • Simplest form • Whole **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics ★ • Look for and make use of structure	*use their understanding of equivalent fractions to create fractions with the same denominators. Start with problems that require the changing of one of the fractions and progress to changing both fractions. Allow students to add and subtract fractions using different strategies such as number lines, area models, fraction bars or strips. Have students share their strategies and discuss commonalities in them.* • *Students need to develop the understanding that when adding or subtracting fractions, the fractions must refer to the same whole. Any models used must refer to the same whole. Students may find that a circular model might not be the best model when adding or subtracting fractions.* • *As with solving word problems with whole number operations, regularly present word problems involving addition or subtraction of fractions. The concept of adding or subtracting fractions with unlike denominators will develop through solving problems.* • *Mental computations and estimation strategies should be used to determine the reasonableness of answers. Students need to prove or disprove whether an*		• Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. ▫ Role playing - bodily kinesthetic ▫ Graphic organizing - visual ▫ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ▫ Opinion ▫ Informative ▫ Research
	M	5.NF.2 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, **Major content** ○ *For example,* 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. ○ *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.* **Essential knowledge and skills** • *Benchmark fractions and number sense can be used to determine if a solution is reasonable.* • *Compare and contrast how fraction models, benchmark fractions and equivalent fractions can be used to solve addition and subtraction of fractions with unlike denominators.* **Teaching Examples:** Examples: **Academic vocabulary** **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly		• *enVisionMath*, lessons: ○ 9-7 ○ 9-11 ○ 10-1 through 10-7	

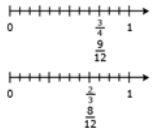
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS

- Jerry was making two different types of cookies. One recipe needed ¾ cup of sugar and the other needed 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

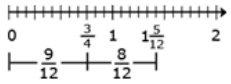


$\frac{3}{4}=\frac{9}{12}$ $\frac{2}{3}=\frac{8}{12}$ $^{2}/_{3}\ ^{9}/_{12}\ \frac{3}{4}+\frac{2}{3}=\frac{17}{12}=\frac{12}{12}+\frac{5}{12}=1\frac{5}{12}$

  - Linear model



Solution:

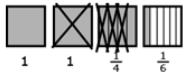
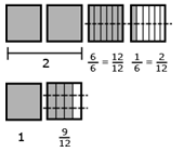


Example: Using a bar diagram

- Sonia had 2 1/3 candy bars. She promised her brother that she would give him ½ of a candy bar. How much will she have left after she gives her brother the amount she promised?
- If Mary ran 3 miles every week for 4 weeks, she would reach her goal for the month. The first day of the first week she ran 1 ¾ miles. How many miles does she still need to run the first week?
  - Using addition to find the answer:1 ¾ + n = 3

and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics ★
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

answer provided for a problem is reasonable.
- *Estimation is about getting useful answers, it is not about getting the right answer. It is important for students to learn which strategy to use for estimation. Students need to think about what might be a close answer.* (ODE)

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		○ A student might add 1 ¼ to 1 ¾ to get to 3 miles. Then he or she would add 1/6 more. Thus 1 ¼ miles + 1/6 of a mile is what Mary needs to run during that week. 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.  • This diagram models a way to show how 3 ,1-3 1/6 and 1 ¾ 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 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.  • Estimation skills include ○ oidentifying when estimation is appropriate, ○ odetermining the level of accuracy needed, ○ oselecting the appropriate method of estimation, and ○ overifying solutions or determining the reasonableness of situations using various estimation strategies. • Estimation strategies for calculations with fractions extend from students' work with whole number operations and can be supported through the use of physical models. Example: • Elli drank $\frac{3}{5}$ quart of milk and Javier drank $\frac{1}{10}$ of a quart less than Ellie. How much milk did they drink all together? Solution:			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		$\frac{3}{5}-\frac{1}{10}=\frac{6}{10}-\frac{1}{10}=\frac{5}{10}$ This is how much milk Javier drank $\frac{3}{5}+\frac{5}{10}=\frac{6}{10}+\frac{5}{10}=\frac{11}{10}$ Together they drank $1\frac{1}{10}$ quarts of milk This solution is reasonable because Ellie drank more than ½ quart and Javier drank ½ quart so together they drank slightly more than one quart. (TUSD) ASSESSMENT PROBLEMS 5.NF.1 Basic • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/848/original/illustrative_mathematics_848.pdf?1352665071 • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/859/original/illustrative_mathematics_859.pdf?1343856894 • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/855/original/illustrative_mathematics_855.pdf?1344361477 • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/847/original/illustrative_mathematics_847.pdf?1344442970 5.NF.1 Advanced • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/861/original/illustrative_mathematics_861.pdf?1344626011 5.NF.2 Advanced • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/481/original/illustrative_mathematics_481.pdf?1343856889			
NUMBER AND OPERATIONS—FRACTIONS (5.NF) Apply and extend previous understandings of multiplication and division to multiply and divide fractions. Use **Mathematical**	**M**	**Students** 5.NF.3 Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). 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. **Major content** ○ *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?* **Essential questions** **Academic vocabulary**	TEACHER NOTES See instructional strategies in the introduction • *Connect the meaning of multiplication and division of fractions with whole-number multiplication and division. Consider area models of multiplication and both sharing and measuring models for division.* •	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 9-2	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS

Practices to
 	
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
		• *How are fractions related to division?*
		• *Write a multiplication or division story problem and give the fraction that can be used to represent and solve your story*.
		
		Essential knowledge and skills
		• Fractions represent division of the numerator by the denominator:
		$\frac{a}{b} = a \div b$
		Teaching Examples:
		• Students are expected to demonstrate their understanding using concrete materials, drawing models, and explaining their thinking when working with fractions in multiple contexts.
		• Students will read 3/5 as "three fifths" and after many experiences with sharing problems, learn that 3/5 can also be interpreted as "3 divided by 5."
		• Ten team members are sharing 3 boxes of cookies. How much of a box will each student get?
		• When working this problem a student should recognize that the 3 boxes are being divided into 10 groups, so s/he is seeing the solution to the following equation, 10 x n = 3 (10 groups of some amount is 3 boxes) which can also be written as n = 3 ÷ 10. Using models or diagram, they divide each box into 10 groups, resulting in each team member getting 3/10 of a box.
		• Two afterschool clubs are having pizza parties. For the Math Club, the teacher will order 3 pizzas for every 5 students. For the student council, the teacher will order 5 pizzas for every 8 students. Since you are in both groups, you need to decide which party to attend. How much pizza would you get at each party? If you want to have the most pizza, which party should you attend?
		• The six fifth grade classrooms have a total of 27 boxes of pencils. How many boxes will each classroom receive?
		• Students may recognize this as a whole number division problem but should also express this equal sharing problem as $^{27}/_{6}$. They explain that each classroom gets $^{27}/_{6}$ boxes of pencils and can further determine that each classroom get 4 $^{3}/_{6}$ or 4 $^{1}/_{2}$ boxes of pencils. (TUSD)
		
		Mathematical Practices
		• Make sense of problems and persevere in solving them
		• Reason abstractly and quantitatively
		• Construct viable arguments and critique the reasoning of others
		• Model with mathematics ★
		• Use appropriate tools strategically
		• Attend to precision
		• Look for and make use of structure
		• Look for and express regularity in repeated reasoning
			• *Ask questions such as, "What does 2 × 3 mean?" and "What does 12 ÷ 3 mean?"*
			•
			• *Encourage students to use models or drawings to multiply or divide with fractions. Begin with students modeling multiplication and division with whole numbers. Have them explain how they used the model or drawing to arrive at the solution.*
			• *Models to consider when multiplying or dividing fractions include, but are not limited to: area models using rectangles or squares, fraction strips/bars and sets of counters.*
			• *Use calculators or models to explain what happens to the result of multiplying a whole number by a fraction* (ODE)
					• Anecdotal records
					• Conferencing
					• Exhibits
					• Interviews
					• Graphic organizers
					• Journals
					• Mathematical Practices
					• Modeling ★
					• Multiple Intelligences assessments, e.g.
					  Role playing - bodily kinesthetic
					  Graphic organizing - visual
					  Collaboration - interpersonal
					• Oral presentations
					• Problem/Performance based/common tasks
					• Rubrics/checklists (mathematical practice, modeling)
					• Tests and quizzes
					• Technology
					• Think-alouds

MATHEMATICS CURRICULUM Grade 5

Curriculum Writers: Carol Blais and Andrea Lafleur

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
	M	5.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. **Major content** *a.* Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)* 5.NF.4a **Essential questions** • Write a multiplication or division story problem and give the fraction that can be used to represent and solve your story. **Essential knowledge and skills** • Division problems involving whole numbers and fractions may be represented and solved using visual fraction models. (TUSD) **Teaching Examples** **Academic vocabulary** **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning		• *enVisionMath*, lessons: ○ 11-1 through 11-3	• Writing genres □ Opinion □ Informative □ Research
		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.4b **Essential questions** **Academic vocabulary**		• *enVisionMath*, lessons: ○ 11-1 through 11-3	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS

- Use a model to explain why multiplying a number by a fraction less than 1 results in a product smaller than the given number.

Essential knowledge and skills

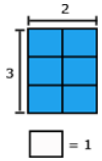
- Multiplying a given number by a fraction less than 1, results in a product smaller than the given number; likewise, multiplying a given number by a fraction greater than 1, results in a product greater than the given number.

Teaching Examples

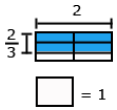
- Students are expected to multiply fractions including proper fractions, improper fractions, and mixed numbers. They multiply fractions efficiently and accurately as well as solve problems in both contextual and non-contextual situations.
- As they multiply fractions such as 3/5 x 6, they can think of the operation in more than one way.
  - 3 x (6 ÷ 5) or (3 x 6/5)
  - (3 x 6) ÷ 5 or 18 ÷ 5 (18/5)
- Students create a story problem for 3/5 x 6 such as,
  - Isabel had 6 feet of wrapping paper. She used 3/5 of the paper to wrap some presents. How much does she have left?
  - Every day Tim ran 3/5 of mile. How far did he run after 6 days? (Interpreting this as 6 x 3/5)

Examples: Building on previous understandings of multiplication

- Rectangle with dimensions of 2 and 3 showing that 2 x 3 = 6.



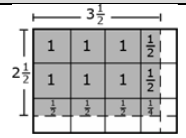
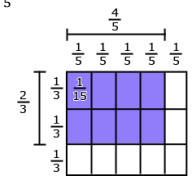
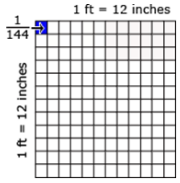
- Rectangle with dimensions of 2 and $\frac{2}{3}$ showing that 2 x 2/3 = 4/3

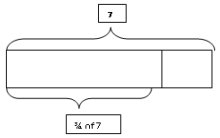


- $2\frac{1}{2}$ groups of $3\frac{1}{2}$:

Mathematical Practices

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics ★
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		 • •In solving the problem $\frac{2}{3}$ x $\frac{4}{5}$, 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 $\frac{2}{3}$ is more than $\frac{1}{2}$ of a $\frac{4}{5}$ and less than one group of $\frac{4}{5}$. (TUSD)  • The area model and the line segments show that the area is the same quantity as the product of the side lengths.  (TUSD) 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		• *enVisionMath*, lessons: ○ 11-2	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
	M	size of the other factor, without performing the indicated multiplication. 5.NF.5a **Essential questions** • How is multiplication similar to or different from scaling (resizing)? **Essential knowledge and skills** • Multiplication can be interpreted as scaling (resizing). **Teaching Examples** • **Academic vocabulary** **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics ★ • Attend to precision • Look for and make use of structure 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. 5.NF.5b **Major content** **Essential questions** **Essential knowledge and skills** • The relationship between the size of the factors and the size of the product can be interpreted without solving for the product: **Teaching Examples** • $\frac{3}{4} \times 7$ is less than 7 because 7 is multiplied by a factor less than 1 so the product must be less than 7.  • $2\frac{2}{3}$ x 8 must be more than 8 because 2 groups of 8 is 16 and is almost 3 groups of 8. So the answer **Academic vocabulary** **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics ★ • Attend to precision • Look for and make use of structure		• *enVisionMath*, lessons: ○ 11-4	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		must be close to, but less than 24. • $\frac{3}{4} = \frac{5x3}{5x4}$ because multiplying $\frac{3}{4}$ by $\frac{5}{5}$ is the same as multiplying by 1. (TUSD)			
	M	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. **Major content**		• *enVisionMath*, lessons: ○ 11-1 through 11-3	

Essential questions

- *Use a model to explain why multiplying a number by a fraction less than 1 results in a product smaller than the given number.*

Essential knowledge and skills

- Multiplying a given number by a fraction less than 1, results in a product smaller than the given number; likewise, multiplying a given number by a fraction greater than 1, results in a product greater than the given number.

Teaching Examples

- Evan bought 6 roses for his mother. $\frac{2}{3}$ of them were red. How many red roses were there?
- Using a visual, a student divides the 6 roses into 3 groups and counts how many are in 2 of the 3 groups.

- •A student can use an equation to solve.

$$\frac{2}{3} \times 6 = \frac{12}{3} = 4$$ red roses

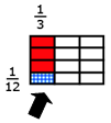
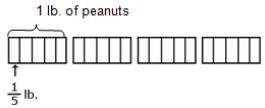
- Mary and Joe determined that the dimensions of their school flag needed to be $1\frac{1}{3}$ ft. by $2\frac{1}{4}$ ft. What will be the area of the school flag?
- A student can draw an array to find this product and can also use his or her understanding of decomposing numbers to explain the multiplication.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

Academic vocabulary

Mathematical Practices

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics ★
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		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 (TUSD)			
	M	5.NF.7 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. **Major content** a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. 5.NF.7a ○ *For example, create a story context for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.* b. Interpret division of a whole number by a unit fraction, and compute such quotients. 5.NF.7B ○ *For example, create a story context for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that4 ÷ (1/5) = 20 because 20 × (1/5) = 4.* 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. 5.NF.7C ○ *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many1/3-cup servings are in 2 cups of raisins?* **Essential questions** • *Write a multiplication or division story* • *How is dividing a whole number by a fraction similar to/different from dividing a fraction by a whole number?* **Essential knowledge and skills** • **Teaching Examples** **Academic vocabulary** **Mathematical Practices** • Make sense of		• *enVisionMath*, lessons: ○ 11- 5 • *enVisionMath*, lessons: ○ 11-4 • *enVisionMath*, lessons: ○ 11-4 and 11-5	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• In fifth grade, students experience division problems with whole number divisors and unit fraction dividends (fractions with a numerator of 1) or with unit fraction divisors and whole number dividends. Students extend their understanding of the meaning of fractions, how many unit fractions are in a whole, and their understanding of multiplication and division as involving equal groups or shares and the number of objects in each group/share. In sixth grade, they will use this foundational understanding to divide into and by more complex fractions and develop abstract methods of dividing by fractions. Division 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.  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.  • How much rice will each person get if 3 people share 1/2 lb of rice equally?	problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning		

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		$\frac{1}{2} \div 3 = \frac{3}{6} \div 3 = \frac{1}{6}$ A student may think or draw ½ and cut it into 3 equal groups then determine that each of those part is 1/6. • A student may think of ½ as equivalent to 3/6. 3/6 divided by 3 is 1/6. (TUSD) ASSESSMENT PROBLEMS 5.NF.3 Basic • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/858/original/illustrative_mathematics_858.pdf?1343856905 5.NF.4 Advanced • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/321/original/illustrative_mathematics_321.pdf?1343856886 5.NF.5 Basic • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/150/original/illustrative_mathematics_150.pdf?1343856897 5.NF.5 Advanced • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/049/original/illustrative_mathematics_49.pdf?1343856911 • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/022/original/illustrative_mathematics_22.pdf?1343856914 5.NF.6 Basic • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/296/original/illustrative_mathematics_296.pdf?1343856902 • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/294/original/illustrative_mathematics_294.pdf?1343856915 5.NF.6 Advanced • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/297/original/illustrative_mathematics_297.pdf?1343856908 • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/609/original/illustrative_mathematics_609.pdf?1345511789 5.NF.7 Basic • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/957/original/illustrative_mathematics_957.pdf?1352927826 5.NF.7 Advanced • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/001/172/original/illustrative_mathematics_1172.pdf?1347748658 • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/001/196/original/illustrative_mathematics_1196.pdf?1350355804 • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/012/original/illustrative_mathematics_12.pdf?1343856888			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/829/original/illustrative_mathematics_829.pdf?1343856903 • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/001/120/original/illustrative_mathematics_1120.pdf?1350052495 • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/958/original/illustrative_mathematics_958.pdf?1352927848			
MEASUREMENT AND DATA (5.MD) Convert like measurement units within a given measurement system. Use **Mathematical Practices** to 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	**S**	**Students** 5.MD.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. **Supporting content** **Essential questions** • *Why does "what" we measure influence "how" we measure?* • *What unit would be most appropriate for solving a given problem?* **Essential knowledge and skills** • Measurements can be converted into different sized standard unit measurements within a given measurement system (i.e. cm to m, or m to cm) • Conversions can be used to solve multistep, real-world problems • **Teaching Examples** • In fifth grade, students build on their prior knowledge of related measurement units to determine equivalent measurements. Prior to making actual conversions, they examine the units to be converted, determine if the converted amount will be more or less units than the original unit, and explain their reasoning. They use several strategies to convert measurements. When converting metric measurement, students apply their understanding of place value and decimals. (TUSD) **Academic vocabulary** • Area • Base • Capacity • Convert • Cubic unit • Cubic unit • Height • Length • Line plot • Metric measurement • Rectangular prism • Standard measurement • Volume • Weight • Width **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Use appropriate tools strategically • Attend to precision	TEACHER NOTES See instructional strategies in the introduction • *Students should gain ease in converting units of measures in equivalent forms within the same system. To convert from one unit to another unit, the relationship between the units must be known. In order for students to have a better understanding of the relationships between units, they need to use measuring tools in class. The number of units must relate to the size of the unit. For example, students have discovered that there are 12 inches in 1 foot and 3 feet in 1 yard. This understanding is needed to convert inches to yards. Using 12-inch rulers and yardsticks, students can see that three of the 12-inch rulers are equivalent to one yardstick (3 × 12 inches = 36 inches; 36 inches = 1 yard). Using this knowledge, students can decide whether to multiply or divide when making*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 14-1 through 14-5 **Materials** • *Yardsticks*(meter sticks) and rulers (marked with customary and metric units) • *Teaspoons* and tablespoons • *Graduated* measuring cups (marked with customary and metric units)	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments • Oral presentations

MATHEMATICS CURRICULUM Grade 5

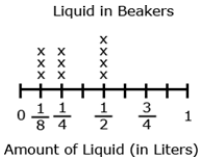
Curriculum Writers: Carol Blais and Andrea Lafleur

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS

		ASSESSMENT PROBLEMS
		5.MD.1 Advanced
		• http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/878/original/illustrative_mathematics_878.pdf?1363534387
		• http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/293/original/illustrative_mathematics_293.pdf?1343856883
		• http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/001/031/original/illustrative_mathematics_1031.pdf?1363534303
			conversions.
			• *Once students have an understanding of the relationships between units and how to do conversions, they are ready to solve multi-step problems that require conversions within the same system. Allow students to discuss methods used in solving the problems. Begin with problems that allow for renaming the units to represent the solution before using problems that require renaming to find the solution.* (ODE)
					• Problem/Performance based/common tasks
					• Rubrics/checklists (mathematical practice, modeling)
					• Tests and quizzes
					• Technology
					• Think-alouds
					• Writing genres
					  Opinion
					  Informative
					  Research

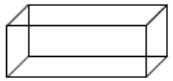
MEASUREMENT AND DATA (5.MD) Represent and interpret data. Use **Mathematical Practices** to 1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others 4. Model with mathematics ★ 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning	**S**	**Students** 5.MD.2 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. **Supporting content** ○ *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.* **Essential questions** • *Why does "what" we measure influence "how" we measure?* • *How does the first data entry compare to the last data entry?* • *Why display data in different ways?* • *What happens when fractions are included using all the operations in problems?* **Essential knowledge and skills** • Data can be collected and represented in many ways, including graphs or line plots. • Data can be interpreted, analyzed and compared using graphs or line plots. **Academic vocabulary** **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Model with	TEACHER NOTES See instructional strategies in the introduction *Using a line plot to solve problems involving operations with unit fractions now includes multiplication and division. Revisit using a number line to solve multiplication and division problems with whole numbers. In addition to knowing how to use a number line to solve problems, students also need to know which operation to use to solve problems.* (ODE)	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 18-3	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS

		• The foundation of a line plot is a number line; an 'X' is made above the corresponding value using whole and mixed number (halves, fourths and eighths) units on the line for every corresponding piece of data.
		Teaching Examples
		• Ten beakers, measured in liters, are filled with a liquid.
		 
		
		• The line plot above shows the amount of liquid in liters in 10 beakers. If the liquid is redistributed equally, how much liquid would each beaker have? (This amount is the mean.)
		• Students apply their understanding of operations with fractions. They use either addition and/or multiplication to determine the total number of liters in the beakers. Then the sum of the liters is shared evenly among the ten beakers. (TUSD)
		
		ASSESSMENT PROBLEMS
		5.MD.2 Advanced
		• https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaZDU4ZTEwNWItMmZkOC00MDliLWFmMWItZGYyMmQ5ODA4Njcy/edit?pli=1
		• https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaZWNkY2ZkOGUtMzQyNC00NmI4LWIxYTEtYjlhMGM4YmUyZjNk/edit?pli=1
			mathematics ★
			• Use appropriate tools strategically
			• Attend to precision
			• Look for and make use of structure
					• Graphic organizers
					• Journals
					• Mathematical Practices
					• Modeling ★
					• Multiple Intelligences assessments
					• Oral presentations
					• Problem/Performance based/common tasks
					• Rubrics/checklists (mathematical practice, modeling)
					• Tests and quizzes
					• Technology
					• Think-alouds
					• Writing genres
					  Opinion
					  Informative
					  Research

MEASUREMENT AND DATA (5.MD) Geometric measurement: understand concepts of	M	**Students** 5.MD.3 Recognize volume as an attribute of solid figures and understand concepts of volume measurement. **Major content** 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. 5.MD.3 a	TEACHER NOTES See instructional strategies in the introduction • *Volume refers to the amount of space that an*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 13-5	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
volume and relate volume to multiplication and to addition. Use **Mathematical Practices** to 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		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.3b **Essential questions** **Academic vocabulary** **Essential knowledge and skills** • *Volume is an attribute of 3 dimensions; length, width, height.* • *Volume is measured by the quantity of same size units times of volume that completely fill the space.* • *1 x 1 x 1 unit cube is standard unit of measurement for volume; either customary or metric measurement can be used.* **Teaching Examples** • Students' prior experiences with volume were restricted to liquid volume. As students develop their understanding volume they understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. This cube has a length of 1 unit, a width of 1 unit and a height of 1 unit and is called a cubic unit. This cubic unit is written with an exponent of 3 (e.g., in3, m3). Students connect this notation to their understanding of powers of 10 in our place value system. Models of cubic inches, centimeters, cubic feet, etc are helpful in developing an image of a cubic unit. Students estimate how many cubic yards would be needed to fill the classroom or how many cubic centimeters would be needed to fill a pencil box. (TUSD) **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure	*object takes up and is measured in cubic units such as cubic inches or cubic centimeters.* • *Students need to experience finding the volume of rectangular prisms by counting unit cubes, in metric and standard units of measure, before the formula is presented. Provide multiple opportunities for students to develop the formula for the volume of a rectangular prism with activities similar to the one described below.* • *Give students one block (a I- or 2- cubic centimeter or cubic-inch cube), a ruler with the appropriate measure based on the type of cube, and a small rectangular box. Ask students to determine the number of cubes needed to fill the box. Have students share their strategies with the class using words, drawings or numbers. Allow them to confirm the volume of the box by filling the box with cubes of the same size.* • *By stacking geometric solids with cubic units in layers, students can begin understanding the concept of how addition plays a part in finding volume. This will lead to an understanding of the formula for the volume of a right rectangular prism, b x h, where b is the area of*	**Materials** • Cubes • Rulers (marked in standard or metric units) • Grid paper • *enVisionMath*, lessons: ○ 13-5	• Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. □ Role playing - bodily kinesthetic □ Graphic organizing - visual □ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Rubrics/checklists (mathematical
	M	5.MD.4 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units. **Major content** **Essential questions** **Academic vocabulary** **Essential knowledge and skills** • 1 x 1 x 1 unit cube is standard unit of measurement for volume; either customary or metric measurement can be used. **Teaching Examples** • Students understand that same sized cubic units are	**Mathematical Practices** • Reason abstractly and quantitatively		

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		used to measure volume. They select appropriate units to measure volume. For example, they make a distinction between which units are more appropriate for measuring the volume of a gym and the volume of a box of books. They can also improvise a cubic unit using any unit as a length (e.g., the length of their pencil). Students can apply these ideas by filling containers with cubic units (wooden cubes) to find the volume. They may also use drawings or interactive computer software to simulate the same filling process. (TUSD) • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision	*the base. A right rectangular prism has three pairs of parallel faces that are all rectangles.*  • *Have students build a prism in layers. Then, have students determine the number of cubes in the bottom layer and share their strategies. Students should use multiplication based on their knowledge of arrays and its use in multiplying two whole numbers.* • *Ask what strategies can be used to determine the volume of the prism based on the number of cubes in the bottom layer. Expect responses such as "adding the same number of cubes in each layer as were on the bottom layer" or multiply the number of cubes in one layer times the number of layers.* (ODE)		practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ○ Opinion ○ Informative ○ Research
	M	5.MD.5 Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume. **Major content** a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication. 5.MD.5a b. Apply the formulas V = l × w × h and V = b × 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. 5.MD.5b c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems. 5.MD.5c		• *enVisionMath*, lessons: ○ 13-5 • *enVisionMath*, lessons: ○ 13-5 ○ 13-6 • *enVisionMath*, lessons: ○ 13-6	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS

Essential questions

- *How is volume related to multiplication?*
- *When finding the volume of two non-overlapping right rectangular prisms what measurements do you need? Explain.*

Essential knowledge and skills

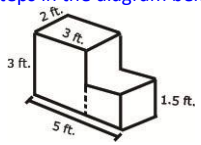
- Volume of a rectangular prism is determined by multiplying its three dimensions; length times width times height OR the base x the height.

Teaching Examples

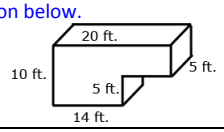
- Students need multiple opportunities to measure volume by filling rectangular prisms with cubes and looking at the relationship between the total volume and the area of the base. They derive the volume formula (volume equals the area of the base times the height) and explore how this idea would apply to other prisms. Students use the associative property of multiplication and decomposition of numbers using factors to investigate rectangular prisms with a given number of cubic units. Examples:
- When given 24 cubes, students make as many rectangular prisms as possible with a volume of 24 cubic units. Students build the prisms and record possible dimensions.

Length	Width	Height
1	2	12
2	2	6
4	2	3
8	3	1

- Students determine the volume of concrete needed to build the steps in the diagram below.



- 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.



(TUSD)

Academic vocabulary

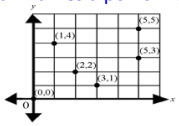
Mathematical Practices

- Make sense of problems and persevere in solving them
- Reason abstractly and quantitatively
- Construct viable arguments and critique the reasoning of others
- Model with mathematics ★
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure
- Look for and express regularity in repeated reasoning

MATHEMATICS CURRICULUM Grade 5

Curriculum Writers: Carol Blais and Andrea Lafleur

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		ASSESSMENT PROBLEMS 5.MD.3 Basic • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaN2RjMGM0ZTQtMTc1Yi00YWUzLThhYTUtMTRlZTc3NjNhYjkz/edit?pli=1 • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaZGQ4NWEzYzEtNTVhZC00YzM1LWE3YjAtYzJlMGU3MjcxMjc2/edit?pli=1 • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaMjQzOTkzNTctOGE4OS00MzhiLTgxNzEtN2E5ZDg2NDUwZTMx/edit?pli=1 5.MD.4 Basic • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaa0tzdG52d2lTLVMwZEJKZWZfTkZMQQ/edit?pli=1 5.MD.4 Advanced • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amack5OWXBBTmRRNktuUDRmY2VCTmxaQQ/edit?pli=1 5.MD.5 Basic • http://www.p12.nysed.gov/assessment/common-core-sample-questions/math-grade-5.pdf (#6) • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaMTdmZDRjMmUtZDZjMi00ZWZjLWE2ZmEtYjhkNzI4NmRlYjVk/edit?pli=1 • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaYzJlNzMwMmItNDU1Yy00OWNhLTk4OTktZGU2MmM0NTEzMzEy/edit?pli=1			
GEOMETRY (5.G) Graph points on the coordinate plane to solve real-world and mathematical problems. . Use **Mathematical Practices** to 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	**A**	**Students mm** 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. **Additional content** 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). **Essential question** • *With any two coordinate values (x,y), how can you locate the point?* **Essential knowledge and skills** • Shapes can be described in terms of their location in **Academic vocabulary** • Acute angle • Congruent • Coordinate Plane • Intersection	TEACHER NOTES See instructional strategies in the introduction • *Students need to understand the underlying structure of the coordinate system and see how axes make it possible to locate points anywhere on a coordinate plane. This is the first time students are working with coordinate planes, and only in the first quadrant. It is important that students create the coordinate grid themselves. This can be*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 15-4 ○ 17-2 ○ 17-4 • Graph paper	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
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		a plane or in space. • Space can be defined by an ordered pair of numbers that designate an intersection point on a grid. • This point corresponds to a location on both a horizontal x-axis and a vertical y-axis on the coordinate plane. • The point (0,0) is an ordered pair that marks the origin on a coordinate plane. **Teaching Examples** • Students can use a classroom size coordinate system to physically locate the coordinate point (5, 3) by starting at the origin point (0,0), walking 5 units along the x axis to find the first number in the pair (5), and then walking up 3 units for the second number in the pair (3). • The ordered pair names a point in the plane.  • Graph and label the points below in a coordinate system. ○ A (0, 0) ○ B (5, 1) ○ C (0, 6) ○ D (2.5, 6) ○ E (6, 2) ○ F (4, 1) ○ G (3, 0) (TUSD) • Obtuse angle • Ordered pairs • Origin • Parallel • Perpendicular • Point • Polygon • Quadrilateral • Right angle • Segment • X axis • Y axis **Mathematical Practices** • Model with mathematics ★ • Attend to precision • Look for and make use of structure	*related to two number lines and reliance on previous experiences with moving along a number line.* • *Multiple experiences with plotting points are needed. Provide points plotted on a grid and have students name and write the ordered pair. Have students describe how to get to the location. Encourage students to articulate directions as they plot points.* • *Present real-world and mathematical problems and have students graph points in the first quadrant of the coordinate plane. Gathering and graphing data is a valuable experience for students. It helps them to develop an understanding of coordinates and what the overall graph represents. Students also need to analyze the graph by interpreting the coordinate values in the context of the situation.* (ODE)		• Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. □ Role playing - bodily kinesthetic □ Graphic organizing - visual □ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres □ Opinion □ Informative
	A	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. **Additional content** **Essential questions** • *How do we apply these ideas to real-world context?* **Essential knowledge and skills** • Points on a coordinate plane can be used to graph real world problems to find solutions. **Teaching Examples** • Sara has saved $20. She earns $8 for each hour she works. ○ If Sara saves all of her money, how much **Academic vocabulary** **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively		• *enVisionMath*, lessons: ○ 17-2 ○ 17=4	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		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? • Model with mathematics ★ • Use appropriate tools strategically • 6Attend to precision • Look for and make use of structure • Use the graph below to determine how much money Jack makes after working exactly 9 hours.  (TUSD) ASSESSMENT PROBLEMS 5.G.1 Advanced • http://s3.amazonaws.com/illustrativemathematics/illustration_pdfs/000/000/489/original/illustrative_mathematics_489.pdf?1343856881 5.G.2 Basic • http://www.p12.nysed.gov/assessment/common-core-sample-questions/math-grade-5.pdf (#5) • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaMDB2MS1qb09SWHF1S0M2UnVVeWJUZw/edit?pli=1			□ Research
GEOMETRY (5.G) Classify two-dimensional figures into categories based on their properties. Use **Mathematical Practices** to 1. Make sense of problems and persevere in solving	**A**	**Students** 5.G.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. **Additional content** ○ *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.* **Essential questions** • *What are the attributes of this figure (name a figure)? How do you know?* • *Every quadrilateral is a polygon, but not every polygon is a quadrilateral. Why is this true?* **Essential knowledge and skills** **Teaching Examples** **Academic vocabulary** **Mathematical Practices** • Reason abstractly	TEACHER NOTES See instructional strategies in the introduction • *In Grade 4 students built, drew and analyzed two-dimensional shapes to deepen their understanding of the properties of two-dimensional shapes. They looked at the presence or absence of parallel and*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 8-3 through 8-6	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
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		• If the opposite sides on a parallelogram are parallel and congruent, then rectangles are parallelograms A sample of questions that might be posed to students include: • A parallelogram has 4 sides with both sets of opposite sides parallel. What types of quadrilaterals are parallelograms? • Regular polygons have all of their sides and angles congruent. Name or draw some regular polygons. • All rectangles have 4 right angles. Squares have 4 right angles so they are also rectangles. True or False? • A trapezoid has 2 sides parallel so it must be a parallelogram. True or False? (TUSD) and quantitatively • Attend to precision • Look for and make use of structure	*perpendicular lines or the presence or absence of angles of a specified size to classify two-dimensional shapes. Now, students classify two-dimensional shapes in a hierarchy based on properties. Details learned in earlier grades need to be used in the descriptions of the attributes of shapes. The more ways that students can classify and discriminate shapes, the better they can understand them. The shapes are not limited to quadrilaterals.* • *Students can use graphic organizers such as flow charts or T-charts to compare and contrast the attributes of geometric figures. Have students create a T-chart with a shape on each side. Have them list attributes of the shapes, such as number of side, number of angles, types of lines, etc. they need to determine what's alike or different about the two shapes to get a larger classification for the shapes.* • *Pose questions such as, "Why is a square always a rectangle?" and "Why is a rectangle not always a square?"* (ODE)		• Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. □ Role playing - bodily kinesthetic □ Graphic organizing - visual □ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds
	A	5.G.4 Classify two-dimensional figures in a hierarchy based on properties. **Additional content** **Essential questions** • *What are the attributes of this figure (name a figure)? How do you know?* • *Every quadrilateral is a polygon, but not every polygon is a quadrilateral. Why is this true?* **Essential knowledge and skills** • Two-dimensional geometric figures can be analyzed, classified and compared based on their properties (i.e., symmetry, parallel sides, particular angle measures, and perpendicular sides) and represented in a hierarchical structure which defines them. **Teaching Examples** Properties of figure may include: • Properties of sides—parallel, perpendicular, congruent, number of sides • Properties of angles—types of angles, congruent Examples: • A right triangle can be both scalene and isosceles, but not equilateral. • A scalene triangle can be right, acute and obtuse. Triangles can be classified by: **Academic vocabulary** **Mathematical Practices** • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Use appropriate tools strategically • Attend to precision • Look for and make use of structure		• *enVisionMath*, lessons: ○ 8-3 through 8-6	

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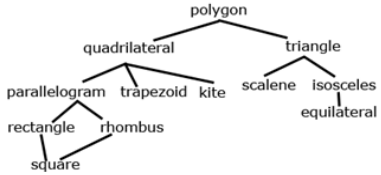
		• Angles ○ Right: The triangle has one angle that measures 90º. ○ Acute: The triangle has exactly three angles that measure between 0º and 90º. ○ oObtuse: The triangle has exactly one angle that measures greater than 90º and less than 180º. • Sides ○ Equilateral: All sides of the triangle are the same length. ○ Isosceles: At least two sides of the triangle are the same length. ○ Scalene: No sides of the triangle are the same length.  (TUSD) ASSESSMENT PROBLEMS 5.G.3 Basic • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaYmU0OTM5M2EtNjgwNi00MDYxLThmYzgtOTA0MjA5NjlmZGNi/edit?pli=1 • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaWUdydzRXVnlUazZMdGhzaF9fNER3Zw/edit?pli=1 • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaWlVzVWtzNE9TdTZvTDFzblFQcHhNZw/edit?pli=1 5.G.4 Basic • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaNzRhMjcwZjktYTE3Ni00YTExLWJmNDMtMjZhNzZhZjc2MDVh/edit?pli=1 • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaOGI4Njc0YjctODQ2YS00OWNhLTlkNjItYmMxOGJlNTBiMjEz/edit?pli=1 • https://docs.google.com/a/bryantschools.org/file/d/0By53YArZ6amaYjQwNmVmNDMtYTM1Mi00YzIyLWE1MzAtNDJlMmIwMTNkOTE4/edit?pli=1			• Writing genres □ Opinion □ Informative □ Research