6/1/2013

NORTH SMITHFIELD SCHOOL DEPARTMENT

MATHEMATICS CURRICULUM GRADE 3

North Smithfield Elementary School
Curriculum Writers: Amy Kraus and Clarissa Russell

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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

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.

- 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 3 Mathematics

Textbooks

- *enVisionMath*
- *Newmark Learning Common Core Math Grade 3*

Supplementary

- Read alouds

Technology

- Calculators (for modification)
- Computer lab
- Computers
- Interactive boards
- LCD projectors
- 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/3.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.K-5mathteachingresources.com
- www.khanacademy.com
- www.learnzillion.com
- www.pearsonsucessnet.com
- www.ride.ri.gov

Materials

- Arrays
- 1-inch or 1-centimeter grid paper
- Balance scales
- Base 10 blocks
- Beakers with whole number measures
- Chart/graph paper
- Conversion charts
- Counters
- Equivalent fraction charts
- Food coloring
- Fraction bars
- Geoboards
- Geoboards and rubber bands
- Graduated cylinders
- Graph paper
- Grid or graph paper
- Laminated multiplication charts
- Measuring cups
- Measuring cups with liter markings
- Measuring spoons
- Meter/yard stick
- Multiplication charts
- Nonstretchy string
- Number lines (modeling of multiplication
- Objects to weigh
- Pan or bucket balances
- Place value charts
- Rulers
- Sets of counters
- Square tiles
- Student clocks
- Unifix cubes or cubes
- Water
- Weights in grams and kilograms
- Wipe-off place value charts

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CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
OPERATIONS AND ALGEBRAIC THINKING (3.OA) Represent and solve problems involving multiplication and division. . 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** 3.OA.1 Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. **Major content** o *For example, describe a context in which a total number of objects can be expressed as 5 × 7.* **Essential Question** • *How can you find the total number of objects in equal groups?* **Essential knowledge and skills** • Using models of equal groups, students write multiplication sentences and identify factors and products **Teaching Examples** • Equal groups  3 x 4 = 12 (3 groups of 4) (TUSD) **Academic vocabulary** • Array • Equal groups • Equation • Factors • Multiplication • Product **Mathematical Practices** • Make sense of problems and persevere in solving them • Model with mathematics • Look for and make use of structure	TEACHER NOTES See instructional strategies in the introduction • *In Grade 2, students found the total number of objects using rectangular arrays, such as a 5 x 5, and wrote equations to represent the sum. This strategy is a foundation for multiplication because students should make a connection between repeated addition and multiplication.* • *Students need to experience problem-solving involving equal groups.* • *Encourage students to solve these problems in different ways to show the same idea and be able to explain their thinking verbally and in written expression.* • *Sets of counters, number lines to skip count and relate to multiplication and arrays/area models will aid students in solving problems involving multiplication and division. Allow students to model problems using these tools. They should represent the model used as a drawing or equation to find the solution*  • *This shows multiplication using grouping with 3 groups of 5 objects and can be written as 3 × 5.* • *Have students create multiplication problem situations in which they*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath,* ○ Topic 5 (3.OA.1) ○ Topics 7 & 8 (3.OA.2) ○ Topics 5,6, 7,8 (3.OA.3) ○ Topic 8 (3.OA.4) Supplementary Books, Teacher (T) Student (S) • *Newmark Learning Common Core Math Grade 3,* ○ p.p. 31-35 (3.OA.1) ○ p.p. 51-55 (3.OA.2) ○ p.p. 61-65 (3.OA.3) ○ p.p. 66-70 (3.OA.4) Technology • Computers • LCD projectors • Interactive boards Read Alouds • *Amanda Bean's Amazing Dream* by Cindy Neushwander • *Each Orange Had 8 Slices,* by Paul Giganto • *Multiplying Menace: The Revenge of Rumplestiltskin* by Pam Calvert • *Divide and Ride* by Stewart Murphy • *One Hundred Ants* by Elinor Princzes Websites • http://curriculum.northsmithfieldschools.c	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • 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
	M	3.OA.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. **Major content** o *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.* **Essential Question** • *How can a set of objects be put into equal groups?* **Essential knowledge and skills** • Students will write division sentences using models to solve problems involving sharing • Students will identify the quotient, dividend, and divisor in division sentences. **Academic vocabulary** • Quotients • Dividend • Divisor • Partitioned			

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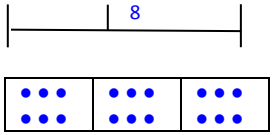
	M	**Teaching Examples**  18÷3 = 3 (TUSD) 3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. (see table below) **Major content** (See enlarged chart at the end of the document)	*interpret the product of whole numbers as the total number of objects in a group and write as an expression. Also, have students create division-problem situations in which they interpret the quotient of whole numbers as the number of shares.* • *Students can use known multiplication facts to determine the unknown fact in a multiplication or division problem. Have them write a multiplication or division equation and the related multiplication or division equation. For example, to determine the unknown whole number in 27 ÷ □= 3, students should use knowledge of the related multiplication fact of 3 × 9 = 27. They should ask themselves questions such as, "How many 3s are in 27 ?" or "3 times what number is 27?" Have them justify their thinking with models or drawings.* (ODE)	om • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.commoncoresheets.com • www.pearsonsucessnet.com • www.K-5mathteachingresources.com • www.learnzillion.com • www.ride.ri.gov Materials • Arrays • Number lines to skip count and relate to multiplication • Counters • Multiplication charts • Table 2. Common multiplication and division situations (Common Core State	- interpersonal • Oral presentations • Problem/Performance based/common tasks • Tests and quizzes • Technology • Think-alouds • Writing genres □ Opinion □ Informative

	Unknown Product	Group Size Unknown ("How many in each group?" Division)	Number of Groups Unknown ("How many groups?" Division)
	3 × 6 = ?	3 × ? = 18, and 18 ÷ 3 = ?	? × 6 = 18, and 18 ÷ 6 = ?
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example.* You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example.* You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example.* You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Arrays,[4] Area[5]	There are 3 rows of apples with 6 apples in each row. How many apples are there? *Area example.* What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? *Area example.* A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? *Area example.* A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
Compare	A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? *Measurement example.* A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? *Measurement example.* A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? *Measurement example.* A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	$a \times b = ?$	$a \times ? = p$, and $p \div a = ?$	$? \times b = p$, and $p \div b = ?$

[4]The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.

[5]Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.

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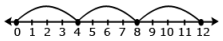
		Essential knowledge and skills • *What is the main idea of multiplication or division?* **Essential knowledge and skills** • Using arrays, pictures or equal groups, students will solve multiplication and division word problems. **Teaching Examples** • Students use a variety of representations for creating and solving one-step word problems, i.e., numbers, words, pictures, physical objects, or equations. They use multiplication and division of whole numbers up to 10 x10. Students explain their thinking, show their work by using at least one representation, and verify that their answer is reasonable. (TUSD) • Word problems may be represented in multiple ways: ○ Equations: 3 x 4 = ?, 4 x 3 = ?, 12 ÷ 4 = ? and 12 ÷ 3 = ? ○ Array:  ○ Equal groups  ○ Repeated addition: 4 + 4 + 4 or repeated subtraction ○ Three equal jumps forward from 0 on the number line to 12 or three equal jumps backwards from 12 to 0  Examples of division problems: • Determining the number of objects in each share (partitive division, where the size of the groups is unknown): ○ The bag has 92 hair clips, and Laura and her three friends want to share them equally. How many hair clips will each person receive? (TUSD) **Academic vocabulary** • Array • Missing factor **Mathematical Practices** • Make sense of problems and persevere in solving them • Model with mathematics • Look for and make use of structure			

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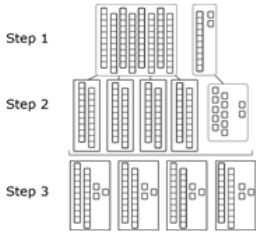

- Determining the number of shares (measurement division, where the number of groups is unknown)
- Max the monkey loves bananas. Molly, his trainer, has 24 bananas. If she gives Max 4 bananas each day, how many days will the bananas last?

Starting	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
24	24-4= 20	20-4= 16	16-4= 12	12-4= 8	8-4= 4	4-4= 0

- Solution: The bananas will last for 6 days.
- Students may use interactive whiteboards to show work and justify their thinking
- There are 4 flowers in each vase. There a 6 vases. How many flowers in each vase?
- I have 24 flowers and 4 vases. How many flowers in each vase? (TUSD)

M

3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. **Major content**

- *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = □ ÷ 3, 6 × 6 = ?.*

Essential Question

- *How can multiplication facts help you to divide?*

Essential knowledge and skills

- Students will write related division and multiplication facts when given numbers within a fact family.

Teaching Examples

- This standard is strongly connected to 3.OA.3 where students solve problems and determine unknowns in equations. Students should also

Academic vocabulary

- Equation
- Fact family
- Factors
- Whole numbers

Mathematical Practices

- Make sense of problems and persevere in solving

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		experience creating story problems for given equations. When crafting story problems, they should carefully consider the question(s) to be asked and answered to write an appropriate equation. Students may approach the same story problem differently and write either a multiplication equation or division equation. • Students apply their understanding of the meaning of the equal sign as "the same as" to interpret an equation with an unknown. When given 4 x ? = 40, they might think: ○ 4 groups of some number is the same as 40 ○ 4 times some number is the same as 40 ○ I know that 4 groups of 10 is 40 so the unknown number is 10 ○ The missing factor is 10 because 4 times 10 equals 40. • Equations in the form of a x b = c and c = a x b should be used interchangeably, with the unknown in different positions. Examples: • Solve the equations below: 24 = ? x 6 72 ÷ Δ = 9 • Rachel has 3 bags. There are 4 marbles in each bag. How many marbles does Rachel have altogether? 3 x 4 = *m* • Students may use interactive whiteboards to create digital models to explain and justify their thinking. (TUSD) • them • Reason abstractly and quantitatively • Attend to precision • Look for and make use of structure ASSESSMENT PROBLEMS 3. OA.1 Basic • http://www.k-5mathteachingresources.com/support-files/arraypicturecards.pdf • http://www.pearsonsuccessnet.com/snpapp/iText/products/0-328-30260-0/data/pdfs/nt3_05_32.pdf 3. OA.2 Basic • http://www.pearsonsuccessnet.com/snpapp/iText/products/0-328-30260-0/data/pdfs/nt3_07_18.pdf 3. OA.2 Advanced • http://www.k-5mathteachingresources.com/support-files/Sharing-or-Grouping.pdf			

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		3. OA.3 Basic • http://www.illustrativemathematics.org/illustrations/344 • http://www.illustrativemathematics.org/illustrations/262 • http://www.k-5mathteachingresources.com/support-files/building-arrays.pdf • http://www.k-5mathteachingresources.com/support-files/number-story-arrays-set1.pdf • http://www.k-5mathteachingresources.com/support-files/x5x10wordproblems.pdf • http://www.k-5mathteachingresources.com/support-files/3rd-gd-multiplication-word-problems.pdf 3. OA.3 Advanced • http://www.illustrativemathematics.org/illustrations/365 • http://www.khanacademy.org/math/arithmetic/multiplication-division/delightful_division/e/arithmetic_word_problems_2 • http://www.k-5mathteachingresources.com/support-files/equalrowsinamarchingband.pdf • http://www.k-5mathteachingresources.com/support-files/sharingmarbles.pdf 3. OA.4 Basic • http://www.k-5mathteachingresources.com/support-files/missingnumbersmultiplication.pdf • http://www.k-5mathteachingresources.com/support-files/whatisthemissingnumberdivision.pdf • https://docs.google.com/file/d/0B-A9qMIF_l6UMzc5NzFkY2ItMjA3MS00NTQzLWE0OGEtY2RlMDE0OTY5MzNm/edit?usp=drive_web&pli=1			
OPERATIONS AND ALGEBRAIC THINKING (3.OA) Understand properties of multiplication and the relationship between multiplication and division. 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** 3. OA.5 Apply properties of operations as strategies to multiply and divide. *Examples: If* ○ *6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.)* ○ *3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.)* ○ *Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)* **Major content** **Essential Question** • *Can the order of the factors be reversed in a multiplication problem? If so, is this always true?* • *Can the order of the numbers be reversed in a division problem? If so, is this always true? Why or why not?* **Academic vocabulary** • Associative property • Commutative property • Distributive	TEACHER NOTES See instructional strategies in the introduction • *Students need to apply properties of operations (commutative, associative and distributive) as strategies to multiply and divide. Applying the concept involved is more important than students knowing the name of the property. Understanding the commutative property of multiplication is developed through the use of models as basic multiplication facts are learned. For example, the result of multiplying 3 x 5 (15)*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath,* ○ Topic 8, 6-6 (3.OA.5) ○ Topics 7 & 8 (3.OA.6) Supplementary Books, Teacher (T) Student (S) • *Newmark Learning Common Core Math Grade 3,* ○ p.p. 36-40 (3.OA.5) ○ p.p. 51-55, 66-70 (3.OA.6) Technology • Computers • LCD projectors	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist

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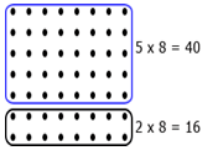
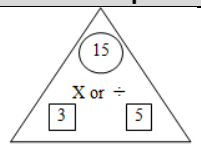
5. Use appropriate tools strategically
6. Attend to precision
7. Look for and make use of structure
8. Look for and express regularity in repeated reasoning
		Essential knowledge and skills
		• Understand the properties of multiplication (commutative, associative, distributive) helps us become efficient and flexible problem solvers.
		Teaching Examples
		• Students represent expressions using various objects, pictures, words and symbols in order to develop their understanding of properties. They multiply by 1 and 0 and divide by 1. They change the order of numbers to determine that the order of numbers factors does not make a difference in multiplication (but does make a difference in division). Given three factors, they investigate changing the order of how they multiply the numbers to determine that changing the order of the factors does not change the product. They also decompose numbers to build fluency with multiplication.
		• Models help build understanding of the commutative property:
		Example: 3 x 6 = 6 x 3
		• In the following diagram it may not be obvious that 3 groups of 6 is the same as 6 groups of 3. A student may need to count to verify this.
		 
		is the same quantity as
		 
		Example: 4 x 3 = 3 x 4
		An array explicitly demonstrates the concept of the commutative property.
		 
		4 rows of 3, or 4 x 3
		 
		3 rows of 4, or 3 x 4
		• Students are introduced to the distributive property of multiplication over addition as a strategy for using products they know to solve products they don't know. For example, if students are asked to find the product of 7 x 8, they might decompose 7 into 5 and 2 and then multiply 5 x 8 and 2 x 8 to arrive at 40 + 16 or 56.
		• Commutative property
		• Distributive property
		• Identity property
		• Part
		• Whole
		• Zero property
		Mathematical Practices
		• Make sense of problems and persevere in solving them
		• Model with mathematics
		• Look for and make use of structure
		• Look for and express regularity in repeated reasoning
			is the same as the result of multiplying 5 x 3 (15).
			• *To find the product of three numbers, students can use what they know about the product of two of the factors and multiply this by the third factor. For example, to multiply 5 x 7 x 2, students know that 5 x 2 is 10. Then, they can use mental math to find the product of 10 x 7 (70). Allow students to use their own strategies and share with the class when applying the associative property of multiplication.*
			• *Splitting arrays can help students understand the distributive property. They can use a known fact to learn other facts that may cause difficulty. For example, students can split a 6 x 9 array into 6 groups of 5 and 6 groups of 4; then, add the sums of the groups.*
			 
			• *The 6 groups of 5 is 30 and the 6 groups of 4 is 24. Students can write 6 x 9 as 6 x 5 + 6 x 4.*
			• *Students' understanding of the part/whole relationships is critical in understanding the connection between multiplication and division.* (ODE)
				• Interactive boards
				
				Read Alouds
				
				Websites
				• http://curriculum.northsmithfieldschools.com
				• http://www.illustrativemathematics.org/standards/practice
				• http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S
				• www.commoncore.org/maps
				• www.corestandards.org
				• www.khanacademy.com
				• www.commoncoresheets.com
				• www.pearsonsucessnet.com
				• www.K-5mathteachingresources.com
				• www.learnzillion.com
				• www.ride.ri.gov
				
				Materials
				• 1-inch or 1-centimeter grid paper
				• Geoboards and rubber bands
				• Nonstretchy string
				• Square tiles
					• 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

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.

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Students should learn that they can decompose either of the factors. It is important to note that the students may record their thinking in different ways. 5 x 8 = 40 2 x 8 = 16 56  7 x 4 = 28 7 x 4 = 28 56 • To further develop understanding of properties related to multiplication and division, students use different representations and their understanding of the relationship between multiplication and division to determine if the following types of equations are true or false. (TUSD) • 0 x 7 = 7 x 0 = 0 (Zero Property of Multiplication) • 1 x 9 = 9 x 1 = 9 (Multiplicative Identity Property of 1) • 3 x 6 = 6 x 3 (Commutative Property) • 8 ÷ 2 = 2 ÷ 8 (Students are only to determine that these are not equal) • 2 x 3 x 5 = 6 x 5 • 10 x 2 < 5 x 2 x 2 • 2 x 3 x 5 = 10 x 3 • 0 x 6 > 3 x 0 x 2			
	M	3. OA.6 Understand division as an unknown-factor problem. **Major content** o *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.* **Essential Question** • *What multiplication facts could you use to solve division sentences?* **Essential knowledge and skills** • Students solve multiplication problems with missing factors **Teaching Examples** • Multiplication and division are inverse operations and that understanding can be used to find the unknown. Fact family triangles demonstrate the inverse operations of multiplication and division by showing the two factors and how those factors relate to the product and/or quotient. **Academic vocabulary** • Factors • Divisors • Dividends • Quotients **Mathematical Practices** • Make sense of problems and persevere in solving them • Look for and make use of structure			

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

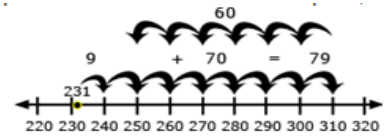
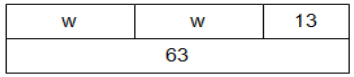
		Examples:
		• 3 x 5 = 15 5 x 3 = 15
		• 15 ÷ 3 = 5 15 ÷ 5 = 3
		 
		
		• Students use their understanding of the meaning of the equal sign as "the same as" to interpret an equation with an unknown. When given 32 ÷ = 4, students may think:
		  ○ 4 groups of some number is the same as 32
		  ○ 4 times some number is the same as 32
		  ○ I know that 4 groups of 8 is 32 so the unknown number is 8
		  ○ The missing factor is 8 because 4 times 8 is 32.
		• Equations in the form of a ÷ b = c and c = a ÷ b need to be used interchangeably, with the unknown in different positions. (TUSD)
		
		ASSESSMENT PROBLEMS
		3. OA.5 Basic
		• http://www.khanacademy.org/math/arithmetic/order-of-operations/arithmetic_properties/e/properties_of_numbers_1
		3. OA.5 Advanced
		• http://www.k-5mathteachingresources.com/support-files/Split-a-Factor.pdf
		• http://www.k-5mathteachingresources.com/support-files/Decompose-a-Factor.pdf
		
		3. OA.6 Basic
		• http://www.khanacademy.org/math/arithmetic/multiplication-division/long_division/e/division_1.5
		• http://www.k-5mathteachingresources.com/support-files/division-as-unknown-factor.pdf
		3. OA.6 Advanced
		• http://www.khanacademy.org/math/arithmetic/factors-multiples/divisibility_and_factors/e/divisibility_intuition
		• http://www.k-5mathteachingresources.com/support-files/multiplicationdivisionstories3oa6.pdf			

MATHEMATICS CURRICULUM Grade 3

Curriculum Writers: Amy Kraus and Clarissa Russell

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
OPERATIONS AND ALGEBRAIC THINKING (3.OA) Multiply and divide within 100. 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** 3. OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division **Major content** ○ *For example,* knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **Essential Question** • *How can multiplication strategies help you solve other facts* **Essential knowledge and skills** • Know from memory all products and quotients of one digit numbers • Students will study patterns and relationships of multiplication facts and relate it to division. **Teaching Examples** • By studying patterns and relationships in multiplication facts and relating multiplication and division, students build a foundation for fluency with multiplication and division facts. Students demonstrate fluency with multiplication facts through 10 and the related division facts. Multiplying and dividing fluently refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently. • Strategies students may use to attain fluency include: ○ Multiplication by zeros and ones ○ Doubles (2s facts), Doubling twice (4s), Doubling three times (8s) ○ Tens facts (relating to place value, 5 x 10 is 5 tens or 50) ○ Five facts (half of tens) Skip counting (counting groups of __ and knowing how many groups have been counted) ○ Square numbers (ex: 3 x 3) Nines (10 groups less one group, e.g., 9 x 3 is 10 groups of 3 minus one group of 3) ○ Decomposing into known facts (6 x 7 is 6 x 6 plus one more group of 6) **Academic vocabulary** • Doubling • Multiples • Square numbers • Skip counting **Mathematical Practices** • Reason abstractly and quantitatively • Look for and make use of structure • Look for and express regularity in repeated reasoning	TEACHER NOTES See instructional strategies in the introduction • *Students need to understand the part/whole relationships in order to understand the connection between multiplication and division. They need to develop efficient strategies that lead to the big ideas of multiplication and division. These big ideas include understanding the properties of operations, such as the commutative and associative properties of multiplication and the distributive property. The naming of the property is not necessary at this stage of learning.* • *In Grade 2, students found the total number of objects using rectangular arrays, such as a 5 x 5, and wrote equations to represent the sum. This is called unitizing, and it requires students to count groups, not just objects. They see the whole as a number of groups of a number of objects. This strategy is a foundation for multiplication in that students should make a connection between repeated addition and multiplication.* • *As students create arrays for multiplication using objects or drawing on graph paper, they may discover that three groups of four and four groups of three yield the same results. They should observe that the arrays stay the same, although how*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath,* ○ Topic 8 (3.OA.7) Supplementary Books, Teacher (T) Student (S) • *Newmark Learning Common Core Math Grade 3,* ○ p.p. 56-60 (3.OA.7) Technology • Computers • LCD projectors • Interactive boards Read Alouds Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.commoncoresheets.com • www.pearsonsucessnet.com • www.K-5mathteachingresour	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. □ Role playing - bodily kinesthetic □ Graphic organizing - visual

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		○ Turn-around facts (Commutative Property) ○ Fact families (Ex: 6 x 4 = 24; 24 ÷ 6 = 4; 24 ÷ 4 = 6; 4 x 6 = 24) ○ Missing factors • General Note: Students should have exposure to multiplication and division problems presented in both vertical and horizontal forms. (TUSD) Assessment Problems 3. OA.7 Basic • http://www.k-5mathteachingresources.com/support-files/x2-to-x5-arrays.pdf • http://www.k-5mathteachingresources.com/support-files/multiplicationnumberwheel.pdf • http://www.k-5mathteachingresources.com/support-files/division-spin.pdf 3. OA.7 Advanced • http://www.k-5mathteachingresources.com/support-files/divisionriddlesdoc.pdf • http://www.k-5mathteachingresources.com/support-files/theproductis3oa7.pdf • http://www.k-5mathteachingresources.com/support-files/theansweris3oa7.pdf	*they are viewed changes. Provide numerous situations for students to develop this understanding.*  • *To develop an understanding of the distributive property, students need decompose the whole into groups. Arrays can be used to develop this understanding. To find the product of 3 × 9, students can decompose 9 into the sum of 4 and 5 and find 3 × (4 + 5).*  • *The distributive property is the basis for the standard multiplication algorithm that students can use to fluently multiply multi-digit whole numbers in Grade 5.* (ODE)	ces.com • www.learnzillion.com • www.ride.ri.gov Materials • Grid or graph paper • Sets of counters • Unifix cubes or cubes	▫ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Tests and quizzes • Technology • Think-alouds • Writing genres ▫ Opinion ▫ Informative
OPERATIONS AND ALGEBRAIC THINKING (3.OA) Solve problems involving the four operations, and identify and explain patterns in arithmetic. 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	**M**	**Students** 3. OA.8 Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **Major content** **Essential Question** • *What strategies help you determine the reasonableness of an answer?* **Essential knowledge and skills** • Students use multiplication steps to solve two step word problems **Teaching Examples** • Students should be exposed to multiple problem-solving strategies (using any combination of words, numbers, diagrams, physical objects or symbols) and be able to choose which ones to use. **Academic vocabulary** • Part-part-total • Reasonableness • Estimate • Number sentence • Multiple step • Patterns • Rounding **Mathematical Practices** • Make sense of problems and	TEACHER NOTES See instructional strategies in the introduction • *This standard is limited to problems posed with whole numbers and having whole number answers: students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order (Order of Operations).* • *Students gain a full understanding of which operation to use in any given situation through contextual*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath,* ○ Topics embedded throughout ○ Topics 2-1, 2-2, 5 and 6 (3.OA.9) Supplementary Books, Teacher (T) Student (S) • *Newmark Learning Common Core Math Grade 3,* ○ p.p. 26-30 (3.OA.8) ○ 41-45 (3.OA.9)	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning		Examples: • Jerry earned 231 points at school last week. This week he earned 79 points. If he uses 60 points to earn free time on a computer, how many points will he have left?  • A student may use the number line above to describe his/her thinking, "231 + 9 = 240 so now I need to add 70 more. 240, 250 (10 more), 260 (20 more), 270, 280, 290, 300, 310 (70 more). Now I need to count back 60. 310, 300 (back 10), 290 (back 20), 280, 270, 260, 250 (back 60)." • A student writes the equation, 231 + 79 – 60 = m and uses rounding (230 + 80 – 60) to estimate. • A student writes the equation, 231 + 79 – 60 = m and calculates 79-60 = 19 and then calculates 231 + 19 = m. ○ The soccer club is going on a trip to the water park. The cost of attending the trip is $63. Included in that price is $13 for lunch and the cost of 2 wristbands, one for the morning and one for the afternoon. Write an equation representing the cost of the field trip and determine the price of one wristband.  ○ The above diagram helps the student write the equation, w + w + 13 = 63. Using the diagram, a student might think, "I know that the two wristbands cost $50 ($63-$13) so one wristband costs $25." To check for reasonableness, a student might use front end estimation and say 60-10 = 50 and 50 ÷ 2 = 25. • When students solve word problems, they use various estimation skills which include identifying when estimation is appropriate, determining the level of accuracy needed, selecting the appropriate method of estimation, and verifying persevere in solving them • Reason abstractly and quantitatively • Model with mathematics ★ • Use appropriate tools strategically	*problems. Number skills and concepts are developed as students solve problems. Problems should be presented on a regular basis as students work with numbers and computations.* • *Researchers and mathematics educators advise against providing "key words" for students to look for in problem situations because they can be misleading. Students should use various strategies to solve problems. Students should analyze the structure of the problem to make sense of it. They should think through the problem and the meaning of the answer before attempting to solve it.* • *Encourage students to represent the problem situation in a drawing or with counters or blocks. Students should determine the reasonableness of the solution to all problems using mental computations and estimation strategies.* • *Students can use base–ten blocks on centimeter grid paper to construct rectangular arrays to represent problems.* • *Students are to identify arithmetic patterns and explain them using properties of operations. They can explore patterns by determining likenesses, differences and changes. Use patterns in addition and multiplication tables.* (ODE)	Technology • Computers • LCD projectors • Interactive boards Read Alouds Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.commoncoresheets.com • www.pearsonsucessnet.com • www.K-5mathteachingresources.com • www.learnzillion.com • www.ride.ri.gov Materials • Number line	• 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

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

		solutions or determining the reasonableness of solutions.
		Estimation strategies include, but are not limited to:
		• using benchmark numbers that are easy to compute
		  ○ front-end estimation with adjusting (using the highest place value and estimating from the front end making adjustments to the estimate by taking into account the remaining amounts)
		  ○ rounding and adjusting (students round down or round up and then adjust their estimate depending on how much the rounding changed the original values) (TUSD)
		
		3. OA.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.
		  ○ *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*
		Essential Question
		• *What numeric patterns do you see?*
		Essential knowledge and skills
		• Students observe addition and multiplication tables to find patterns and explain how those patterns exist
		Teaching Examples
		• Students need ample opportunities to observe and identify important numerical patterns related to operations. They should build on their previous experiences with properties related to addition and subtraction. Students investigate addition and multiplication tables in search of patterns and explain why these patterns make sense mathematically. For example:
		  ○ Any sum of two even numbers is even.
		  ○ Any sum of two odd numbers is even.
		  ○ Any sum of an even number and an odd number is odd.
		  ○ The multiples of 4, 6, 8, and 10 are all even because they can all be decomposed into two equal groups.
		  ○ The doubles (2 addends the same) in an addition table fall on a diagonal while the
		Academic vocabulary
		• Addend
		• Diagonal
		• Doubles
		• Even
		• Factor
		• Horizontal
		• Multiple
		• Odd
		• Patterns
		• Product
		• Sum
		• Vertical
		Mathematical Practices
		• Make sense of problems and persevere in solving them
		• Reason abstractly and quantitatively
		• Construct viable arguments and critique the			

<table>
<tr><th>CATEGORIES, DOMAINS, CLUSTERS</th><th>UNIT</th><th>STANDARDS/BENCHMARKS
North Smithfield School Department</th><th>INSTRUCTIONAL STRATEGIES</th><th>RESOURCES</th><th>ASSESSMENTS</th></tr>
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doubles (multiples of 2) in a multiplication table fall on horizontal and vertical lines.
○ The multiples of any number fall on a horizontal and a vertical line due to the commutative property.
○ All the multiples of 5 end in a 0 or 5 while all the multiples of 10 end with 0. Every other multiple of 5 is a multiple of 10.
• Students also investigate a hundreds chart in search of addition and subtraction patterns. They record and organize all the different possible sums of a number and explain why the pattern makes sense (TUSD)
<table>
<tr><th>addend</th><th>addend</th><th>sum</th></tr>
<tr><td>0</td><td>20</td><td>20</td></tr>
<tr><td>1</td><td>19</td><td>20</td></tr>
<tr><td>2</td><td>18</td><td>20</td></tr>
<tr><td>3</td><td>17</td><td>20</td></tr>
<tr><td>4</td><td>16</td><td>20</td></tr>
<tr><td>•</td><td>•</td><td>•</td></tr>
<tr><td>•</td><td>•</td><td>•</td></tr>
<tr><td>•</td><td>•</td><td>•</td></tr>
<tr><td>20</td><td>0</td><td>20</td></tr>
</table>
reasoning of others
• Attend to precision
• Look for and make use of structure

ASSESSMENT PROBLEMS
3. OA.8 Basic
• http://www.illustrativemathematics.org/illustrations/13
• http://www.k-5mathteachingresources.com/support-files/3rdgrademultistepproblems.pdf
3. OA.8 Advanced
• http://www.illustrativemathematics.org/illustrations/1301
• http://www.k-5mathteachingresources.com/support-files/twostepwordproblemssetset2.pdf

3. OA.9 Basic
• http://www.illustrativemathematics.org/illustrations/953
• http://www.k-5mathteachingresources.com/support-files/oddandevensums.pdf
• http://www.k-5mathteachingresources.com/support-files/oddandevenproducts.pdf
• http://www.k-5mathteachingresources.com/support-files/rollarule.pdf
• http://www.k-5mathteachingresources.com/support-files/twostepnumberpatterns3.oa9.pdf
3. OA.9 Advanced
• http://www.k-5mathteachingresources.com/support-files/roll-a-rule-two-step.pdf
• http://www.illustrativemathematics.org/illustrations/954
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<tr>
<td>NUMBER AND OPERATIONS IN BASE TEN (3.NBT)</td>
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<td>Students</td>
<td>TEACHER NOTES

See instructional strategies in the introduction</td>
<td>RESOURCE NOTES

See resources in the introduction</td>
<td>ASSESSMENT NOTES

See assessments in the introduction</td>
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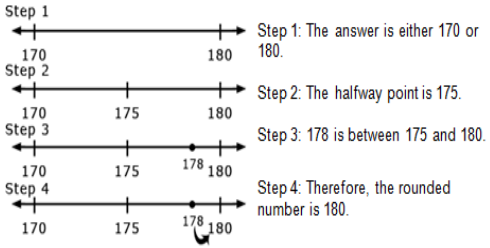
MATHEMATICS CURRICULUM Grade 3

Curriculum Writers: Amy Kraus and Clarissa Russell

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
Use place value understanding and properties of operations to perform multi-digit arithmetic. . 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**	3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100. **Additional content** **Essential Question** • How can you round numbers? • What does place value mean? How does it affect its value? For example: what is 10 *more than 43?* **Essential knowledge and skills** • Students round up to 4 digit whole numbers to the nearest tens or hundreds using place value. **Teaching Examples** • Students learn when and why to round numbers. They identify possible answers and halfway points. Then they narrow where the given number falls between the possible answers and halfway points. They also understand that by convention if a number is exactly at the halfway point of the two possible answers, the number is rounded up. • Example: Round 178 to the nearest 10  **Academic vocabulary** • Estimate • Round • Base ten • Halfway point • Place value • Landmark numbers **Mathematical Practices** • Use appropriate tools strategically • Look for and make use of structure • Look for and express regularity in repeated reasoning	• *A range of algorithms may be used.* • *Prior to implementing rules for rounding students need to have opportunities to investigate place value. A strong understanding of place value is essential for the developed number sense and the subsequent work that involves rounding numbers.* • *Building on previous understandings of the place value of digits in multi-digit numbers, place value is used to round whole numbers. Dependence on learning rules can be eliminated with strategies such as the use of a number line to determine which multiple of 10 or of100, a number is nearest (5 or more rounds up, less than 5 rounds down). As students' understanding of place value increases, the strategies for rounding are valuable for estimating, justifying and predicting the reasonableness of solutions in problem-solving.* • *Strategies used to add and subtract two-digit numbers are now applied to fluently add and subtract whole numbers within 1000. These strategies should be discussed so that students can make comparisons and move toward efficient methods.* • *Understanding what each number in a multiplication expression represents is important. Multiplication problems need to be modeled with pictures, diagrams or*	Textbook • *enVisionMath,* ○ Topics 1, 2-4 (3.NBT.1) ○ Topics 2,3,4 (3.NBT.2) ○ Topics 5-7. 18-1 (3.NBT.3) Supplementary Books, Teacher (T) Student (S) • *Newmark Learning Common Core Math Grade 3,* ○ p.p. 6-10 (3.NBT.1) ○ p.p. 11-25 (3.NBT.2) ○ p.p. 46-50 (3.NBT.3) Technology • Computers • LCD projectors • Interactive boards Read Alouds • *Shark Swimathon* by Stewart Murphy • *The Action of Subtraction* by Brian Cleary • *The Mission of Addition* by Brian Clearly Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.o	REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • 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
	A	3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **Additional content** **Essential Question** • *How can you use addition or subtraction to solve problems?* **Essential knowledge and skills** • Add and subtract numbers fluently within 1000 with and without regrouping • There is a relationship between addition and subtraction (inverse operations) **Teaching Examples** **Academic vocabulary** • Regroup • Base ten • Equation • Rounding • Estimate • Place value • Value • Digits			

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

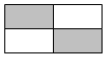
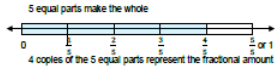
		• Eva has 1,186 beads. She uses 134 beads to make a necklace. About how many beads does she have left over? (TUSD)
		• Sum
		• Difference
		• Total
		Mathematical Practices
		• Reason abstractly and quantitatively
		• Look for and make use of structure
		• Look for and express regularity in repeated reasoning
			concrete materials to help students understand what the factors and products represent. The effect of multiplying numbers needs to be examined and understood.
			• *The use of area models is important in understanding the properties of operations of multiplication and the relationship of the factors and its product. Composing and decomposing area models is useful in the development and understanding of the distributive property in multiplication.*
			• *Continue to use manipulatives like hundreds charts and place-value charts.*
			• *Rounding can be expanded by having students identify all the numbers that will round to 30 or round to 200.* (ODE)
				rg/maps
				• www.corestandards.org
				• www.khanacademy.com
				• www.commoncoresheets.com
				• www.pearsonsucessnet.com
				• www.K-5mathteachingresources.com
				• www.learnzillion.com
				• www.ride.ri.gov
				
				Materials
				• Number lines
				• 100s chart
					• Problem/Performance based/common tasks
					• Tests and quizzes
					• Technology
					• Think-alouds
					• Writing genres
					  Opinion
					  Informative

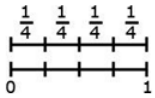
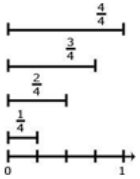
	A	3.NBT.3 Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations. **Additional content** **Essential Question** • *How can you multiply by multiples of 10,100, 1,000?* **Essential knowledge and skills** • Students will use patterns and mental math to multiply by multiples of 10,100, 1,000? **Teaching Examples** • Students use base ten blocks, diagrams, or hundreds charts to multiply one-digit numbers by multiples of 10 from 10-90. They apply their understanding of multiplication and the meaning of the multiples of 10. For example, 30 is 3 tens and 70 is 7 tens. They can interpret 2 x 40 as 2 groups of 4 tens or 8 groups of ten. They understand that 5 x 60 is 5 groups of 6 tens or 30 tens and know that 30 tens is 300. After developing this understanding they begin to recognize the patterns in multiplying by multiples of 10. • Students may use manipulatives, drawings, or interactive whiteboard to demonstrate their understanding. (TUSD) **Academic vocabulary** • Multiple • Place value • Multiply • Pattern • Product • Factor **Mathematical Practices** • Reason abstractly and quantitatively • Look for and make use of structure • Look for and express regularity in repeated reasoning ASSESSMENT PROBLEMS 3. NBT.1 Basic • http://www.k-5mathteachingresources.com/support-files/round-up-or-down.pdf • http://www.illustrativemathematics.org/illustrations/71 (part A) 3. NBT.1 Advanced • http://www.illustrativemathematics.org/illustrations/745		

MATHEMATICS CURRICULUM Grade 3

Curriculum Writers: Amy Kraus and Clarissa Russell

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• http://www.illustrativemathematics.org/illustrations/156 • http://www.illustrativemathematics.org/illustrations/71 (parts B and C) 3. NBT.2 Basic • http://www.khanacademy.org/math/arithmetic/addition-subtraction/sub_borrowing/e/subtraction_4 (subtraction) • http://www.k-5mathteachingresources.com/support-files/3-digit-addition-split.pdf (addition) • http://www.k-5mathteachingresources.com/support-files/doublingto1000.pdf 3. NBT.3 Basic • http://www.khanacademy.org/math/arithmetic/multiplication-division/multi_digit_multiplication/e/multiplication_1.5 • http://www.k-5mathteachingresources.com/support-files/multiplying-multiples-of-ten-problems.pdf 3. NBT.3 Advanced • http://www.khanacademy.org/math/arithmetic/multiplication-division/multi_digit_multiplication/e/multiplication_2			
NUMBER AND OPERATIONS—FRACTIONS (3.NF) Develop understanding of fractions as numbers 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** 3.NF.1 Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by *a* parts of size 1/*b*. **Major content** **Essential Question** • *How can you show and name part of a whole and part of a set?* **Essential knowledge and skills** • Students will identify and name with models, symbols, and words, regions that have been divided into equal parts. • A fraction is a quantity when a whole is partitioned into equal parts. **Teaching Examples** • Some important concepts related to developing understanding of fractions include: ○ Understand fractional parts must be equal-sized ○ The number of equal parts tell how many make a whole ○ As the number of equal pieces in the whole increases, the size of the fractional pieces decreases **Academic vocabulary** • Fraction • Numerator • Denominator • Whole • Part • Halves • Thirds • Fourths • Sixths • Eights • Tenths • Twelfths • Partition **Mathematical Practices** • Make sense of problems and	TEACHER NOTES See instructional strategies in the introduction • *Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.* • *This is the initial experience students will have with fractions and is best done over time. Students need many opportunities to discuss fractional parts using concrete models to develop familiarity and understanding of fractions.* • *Understanding that a fraction is a quantity formed by part of a whole is essential to number sense with fractions. Fractional parts are the building blocks for all fraction concepts. Students need to relate dividing a shape into equal parts and representing this relationship*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath,* ○ Topics 12-1, 12-2, 12-3 (3.NF.1) ○ Topics 12-7 (3.NF.2) ○ Topics 12-5, 12-6 (3.NF.3) Supplementary Books, Teacher (T) Student (S) • *Newmark Learning Common Core Math Grade 3,* ○ p.p. 71-75 (3.NF.1) ○ p.p. 12-7 (3.NF.2) ○ p.p. 86-90 (3.NF.3) Technology • Computers • LCD projectors • Interactive boards	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing • Exhibits • Interviews

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		○ The size of the fractional part is relative to the whole ▪ The number of children in one-half of a classroom is different than the number of children in one-half of a school. (the whole in each set is different therefore the half in each set will be different) ○ When a whole is cut into equal parts, the denominator represents the number of equal parts ○ The numerator of a fraction is the count of the number of equal parts ▪ ¾ means that there are 3 one-fourths ▪ Students can count *one fourth, two fourths, three fourths* • Students express fractions as fair sharing, parts of a whole, and parts of a set. They use various contexts (candy bars, fruit, and cakes) and a variety of models (circles, squares, rectangles, fraction bars, and number lines) to develop understanding of fractions and represent fractions. Students need many opportunities to solve word problems that require fair sharing. • To develop understanding of fair shares, students first participate in situations where the number of objects is greater than the number of children and then progress into situations where the number of objects is less than the number of children. Examples: • Four children share six brownies so that each child receives a fair share. How many brownies will each child receive? • Six children share four brownies so that each child receives a fair share. What portion of each brownie will each child receive? • What fraction of the rectangle is shaded? How might you draw the rectangle in another way but with the same fraction shaded? (TUSD)  Solution: $\frac{2}{4}$ or $\frac{1}{2}$	persevere in solving them • Model with mathematics ★ • Look for and make use of structure	*on a number line, where the equal parts are between two whole numbers. Help students plot fractions on a number line, by using the meaning of the fraction. For example, to plot $\frac{4}{5}$ on a number line, there are 5 equal parts with 4 copies of the 5 equal parts.*  • *As students counted with whole numbers, they should also count with fractions. Counting equal-sized parts helps students determine the number of parts it takes to make a whole and recognize fractions that are equivalent to whole numbers.* • *Students need to know how big a particular fraction is and can easily recognize which of two fractions is larger. The fractions must refer to parts of the same whole. Benchmarks such as $\frac{1}{2}$ and 1 are also useful in comparing fractions.* • *Equivalent fractions can be recognized and generated using fraction models. Students should use different models and decide when to use a particular model. Make transparencies to show how equivalent fractions measure up on the number line.* • *Venn diagrams are useful in helping students organize and compare fractions to determine the relative size of the fractions, such as more than $\frac{1}{2}$,*	Read Alouds • *Apple Fractions* by Gerry Pallotta • *Hershey Fractions* by Gerry Pallotta • *Fraction Fun* by David Adler Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.commoncoresheets.com • www.pearsonsucessnet.com • www.K-5mathteachingresources.com • www.learnzillion.com • www.ride.ri.gov Materials • Fraction bars or strips • Geoboards • Grid or dot paper (draw pictures to explore fraction ideas) • Length or measurement models • Region or area	• 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

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
	M	3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram. **Major content** ○ Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line. 3.NF.2a ○ Represent a fraction *a*/*b* on a number line diagram by marking off *a* lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line. 3.NF.2b **Essential Question** • *How can you locate and compare fractions on a number line?* **Essential knowledge and skills** • Students will find and write fractions and mixed numbers on a number line, by determining how many equal parts on a number line. • Students will compare and order fractions and mixed numbers. **Teaching Examples** Students transfer their understanding of parts of a whole to partition a number line into equal parts. There are two new concepts addressed in this standard which students should have time to develop. 1. On a number line from 0 to 1, students can partition (divide) it into equal parts and recognize that each segmented part represents the same length.  2. Students label each fractional part based on how far it is from zero to the endpoint. (TUSD)  **Academic vocabulary** • Denominator • Equivalent • Mixed numbers • Number line • Numerator • Whole number **Mathematical Practices** • Make sense of problems and persevere in solving them. • Model with mathematics • Look for and make use of structure	*exactly $\frac{1}{2}$ or less than $\frac{1}{2}$. Fraction bars showing the same sized whole can also be used as models to compare fractions. Students are to write the results of the comparisons with the symbols >, =, or <, and justify the conclusions with a model.* (ODE)	models • Set models	

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
	M	3.NF.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size. **Major content** ○ Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line. 3.NF.3a ○ Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model. 3.NF.3b ○ Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. ○ *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.* 3.NF.3c ○ Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. 3.NF.3d			

MATHEMATICS CURRICULUM Grade 3

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CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Essential Question • *How can you compare fractions?* • *How can different fractions name the same part of a whole?* **Essential knowledge and skills** • Students will use models to compare and find equivalent fractions. **Teaching Examples** • *An* important concept when comparing fractions is to look at the size of the parts and the number of the parts. For example, $\frac{1}{8}$ is smaller than $\frac{1}{2}$ because when 1 whole is cut into 8 pieces, the pieces are much smaller than when 1 whole is cut into 2 pieces. • Students recognize when examining fractions with common denominators, the wholes have been divided into the same number of equal parts. So the fraction with the larger numerator has the larger number of equal parts. $\frac{2}{6} < \frac{5}{6}$ • To compare fractions that have the same numerator but different denominators, students understand that each fraction has the same number of equal parts but the size of the parts are different. They can infer that the same number of smaller pieces is less than the same number of bigger pieces. (TUSD) $\frac{3}{8} < \frac{3}{4}$ Assessment Problems 3. NF.1 Basic • http://www.illustrativemathematics.org/illustrations/833 (part A) • http://www.k-5mathteachingresources.com/support-files/findonehalfofagroup.pdf 3. NF.1 Advanced • http://www.illustrativemathematics.org/illustrations/833 (part B, skip c) 3. NF.2 Basic • http://www.illustrativemathematics.org/illustrations/168 • http://www.illustrativemathematics.org/illustrations/169 • http://www.illustrativemathematics.org/illustrations/171 • http://www.k-5mathteachingresources.com/support-files/fraction-strips.pdf 3. NF.2 Advanced • http://www.illustrativemathematics.org/illustrations/172	**Academic vocabulary** • Equal to • Equivalent • Greater than >* • Less than <* **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 • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning		

MATHEMATICS CURRICULUM Grade 3

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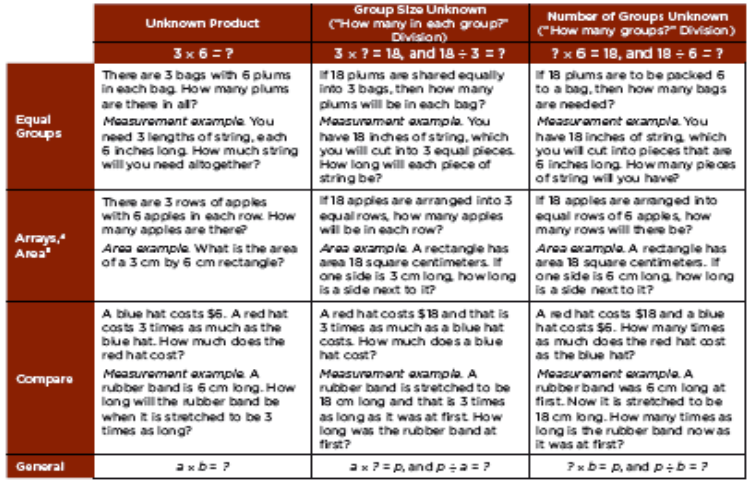
CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• http://www.illustrativemathematics.org/illustrations/170 • http://www.k-5mathteachingresources.com/support-files/number-line-roll.pdf 3. NF.3 Basic • http://www.illustrativemathematics.org/illustrations/460 • http://www.illustrativemathematics.org/illustrations/871 • http://www.illustrativemathematics.org/illustrations/1353 • http://www.illustrativemathematics.org/illustrations/880 • http://www.illustrativemathematics.org/illustrations/875 • http://www.k-5mathteachingresources.com/support-files/pizza-for-dinner-3nf3a.pdf • http://www.k-5mathteachingresources.com/support-files/exploring-equivalent-fractions.pdf • http://www.k-5mathteachingresources.com/support-files/compare-and-order.pdf 3. NF.3 Advanced • http://www.illustrativemathematics.org/illustrations/460 • http://www.illustrativemathematics.org/illustrations/1354 • http://www.k-5mathteachingresources.com/support-files/buildahexag.pdf • http://www.k-5mathteachingresources.com/support-files/creatingequivalentfractions.pdf • http://www.k-5mathteachingresources.com/support-files/who-ate-more-3nf3d.pdf			
MEASUREMENT AND DATA (3.MD) Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. 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** 3.MD.1 Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. **Major content** **Essential Question** • *How do you tell time to the nearest minute?* • *How can you find elapsed time in intervals of minutes?* **Essential knowledge and skills** • Students will tell time to the nearest half hour and quarter hour • Students will tell time to the nearest minute. • Students will find elapsed time in intervals of minutes **Teaching Examples** • Students in second grade learned to tell time to the nearest five minutes. In third grade, they extend telling time and measure elapsed time both in and out of context using clocks and number lines. (TUSD) **Academic vocabulary** • Analog • Clock • Digital • Elapsed time • Half-hour • Hour • Hour hand • Minute hand • Minutes • Quarter-hour • Seconds **Mathematical Practices** • Make sense of problems and persevere in solving	TEACHER NOTES See instructional strategies in the introduction • *A clock is a common instrument for measuring time. Learning to tell time has much to do with learning to read a dial-type instrument and little with time measurement.* • *Students have experience in telling and writing time from analog and digital clocks to the hour and half hour in Grade 1 and to the nearest five minutes, using a.m. and p.m. in Grade 2. Now students will tell and write time to the nearest minute and measure time intervals in minutes.* • *Provide analog clocks that allow students to move the minute hand.*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath,* ○ Topics 17-1, 17-2, 17-3, 17-4 (3.MD.1) ○ Topics 15-3, 15-4 (3.MD.2) Supplementary Books, Teacher (T) Student (S) • *Newmark Learning Common Core Math Grade 3,* ○ p.p. 91-95 (3.MD.1) ○ p.p. 96-100 (3.MD.2) Technology • Computers • LCD projectors • Interactive boards	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing • Exhibits

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

		them
		• Model with mathematics
		• Attend to precision
			• *Students need experience representing time from a digital clock to an analog clock and vice versa.*
			• *Provide word problems involving addition and subtraction of time intervals in minutes. Have students represent the problem on a number line. Student should relate using the number line with subtraction from Grade 2.*
			• *Provide opportunities for students to use appropriate tools to measure and estimate liquid volumes in liters only and masses of objects in grams and kilograms. Students need practice in reading the scales on measuring tools since the markings may not always be in intervals of one. The scales may be marked in intervals of two, five or ten.*
			• *Allow students to hold gram and kilogram weights in their hand to use as a benchmark. Use water colored with food coloring so that the water can be seen in a beaker.*
			• *Students should estimate volumes and masses before actually finding the measuring. Show students a group containing the same kind of objects. Then, show them one of the objects and tell them its weight. Fill a container with more objects and ask students to estimate the weight of the objects.* (ODE)
				Read Alouds
				
				Websites
				• http://curriculum.northsmithfieldschools.com
				• http://www.illustrativemathematics.org/standards/practice
				• http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S
				• www.commoncore.org/maps
				• www.corestandards.org
				• www.khanacademy.com
				• www.commoncoresheets.com
				• www.pearsonsucessnet.com
				• www.K-5mathteachingresources.com
				• www.learnzillion.com
				• www.ride.ri.gov
				
				Materials
				• Balance scales
				• Beakers with whole number measures
				• Food coloring
				• Graduated cylinders
				• Measuring cups with liter markings
				• Objects to weigh
				• Pan or bucket balances
				• Student clocks
				• Water
				• Weights in grams and kilograms
					• 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

	M	3.MD.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). **Major content** Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. **Essential Question** • *How can we describe how much a container holds?* • *How can you describe the mass of an object?* **Essential knowledge and skills** • Students measure liquid volume and describe the relationship between liters and milliliters. • Students measure the mass of an object and describe the relationship between grams and kilograms. **Teaching Examples** • Students need multiple opportunities weighing classroom objects and filling containers to help them develop a basic understanding of the size and weight of a liter, a gram, and a kilogram. Milliliters may also be used to show amounts that are less than a liter. Example: • Students identify 5 things that weigh about one gram. They record their findings with words and pictures. (Students can repeat this for 5 grams and 10 grams.) This activity helps develop gram benchmarks. One large paperclip weighs about one gram. A box of large paperclips (100 clips) weighs about 100 grams so 10 boxes would weigh one kilogram. (TUSD) **Academic vocabulary** • Balance scale • Kilograms • Liquid • Liters • Mass • Milliliters • Grams • Unit • Volume **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Model with mathematics • Use appropriate tools strategically • Attend to precision			

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



	Unknown Product	Group Size Unknown ("How many in each group?" Division)	Number of Groups Unknown ("How many groups?" Division)
	3 × 6 = ?	3 × ? = 18, and 18 ÷ 3 = ?	? × 6 = 18, and 18 ÷ 6 = ?
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example.* You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example.* You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example.* You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Arrays,[4] Area[5]	There are 3 rows of apples with 6 apples in each row. How many apples are there? *Area example.* What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? *Area example.* A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? *Area example.* A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
Compare	A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? *Measurement example.* A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? *Measurement example.* A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? *Measurement example.* A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	$a \times b = ?$	$a \times ? = p$, and $p \div a = ?$	$? \times b = p$, and $p \div b = ?$

[4]The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.

[5]Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.

ASSESSMENT PROBLEMS

3. MD.1 Basic
- http://www.k-5mathteachingresources.com/support-files/elapsedtimewordproblems.pdf

3. MD.1 Advanced
- http://www.k-5mathteachingresources.com/support-files/elapsedtimewordproblems.pdf

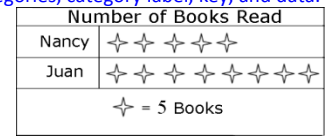
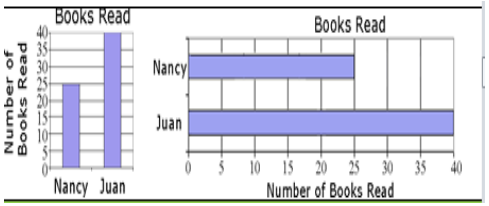
3. MD.2 Basic
- http://www.k-5mathteachingresources.com/support-files/capacity-mass-word-problems.pdf

3. MD.2 Advanced
- http://www.k-5mathteachingresources.com/support-files/measuring-one-liter.pdf
- http://www.k-5mathteachingresources.com/support-files/weigh-it-twice.pdf

MEASUREMENT AND DATA (3.MD) Represent and interpret data.	**S**	**Students** 3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. **Supporting content**	TEACHER NOTES See instructional strategies in the introduction • *Representation of a data set is*	RESOURCE NOTES See resources in the introduction Textbook	ASSESSMENT NOTES See assessments in the introduction REQUIRED

MATHEMATICS CURRICULUM Grade 3

Curriculum Writers: Amy Kraus and Clarissa Russell

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
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		○ *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.* **Essential Question** • *How can a graph be used to interpret and represent data?* **Essential knowledge and skills** • Graphs can be read to compare and contrast information. • Students will read and interpret from a picture graph and a bar graph **Teaching Examples** • Students should have opportunities reading and solving problems using scaled graphs before being asked to draw one. The following graphs all use five as the scale interval, but students should experience different intervals to further develop their understanding of scale graphs and number facts. • Pictographs: Scaled pictographs include symbols that represent multiple units. Below is an example of a pictograph with symbols that represent multiple units. Graphs should include a title, categories, category label, key, and data.  How many more books did Juan read than Nancy? • Single Bar Graphs: Students use both horizontal and vertical bar graphs. Bar graphs include a title, scale, scale label, categories, category label, and data. (TUSD)  **Academic vocabulary** • Bar graph • Data • Graph • Horizontal • Intervals • key • Picture graph • Scale • Survey • Title • x-axis • y- axis **Mathematical Practices** • Make sense of problems and persevere in solving them • Model with mathematics • Attend to precision • Look for and make use of structure	*extended from picture graphs and bar graphs with single-unit scales to scaled picturegraphs and scaled bar graphs. Intervals for the graphs should relate to multiplication and division with 100 (product is 100 or less and numbers used in division are 100 or less). In picture graphs, use values for the icons in which students are having difficulty with multiplication facts. For example, ▯ represents 7 people. If there are three ▯, students should use known facts to determine that the three icons represents 21 people. The intervals on the vertical scale in bar graphs should not exceed 100.* • *Students are to draw picture graphs in which a symbol or picture represents more than one object. Bar graphs are drawn with intervals greater than one. Ask questions that require students to compare quantities and use mathematical concepts and skills. Use symbols on picture graphs that student can easily represent half of, or know how many half of the symbol represents.* • *Students are to measure lengths using rulers marked with halves and fourths of an inch and record the data on a line plot. The horizontal scale of the line plot is marked off in whole numbers, halves or fourths. Students can create rulers with appropriate markings and use the ruler to create the line plots.* (ODE)	• *enVisionMath,* ○ Topics 20-2, 20-3, 20-4 (3.MD.3) ○ Topics 12-7, 14-2, 20-8 (3.MD.4) Supplementary Books, Teacher (T) Student (S) • *Newmark Learning Common Core Math Grade 3,* ○ p.p. 106-110 (3.MD.3) ○ p.p. 111-115 (3.MD.3) ○ p.p. 101-105 (3.MD.4) Technology • Computers • LCD projectors • Interactive boards Read Alouds Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.commoncoresheets.com • www.pearsonsucessnet.com • www.K-	COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • 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/Performa

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
	S	3.MD.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters. **Supporting content**		5mathteachingresources.com • www.learnzillion.com • www.ride.ri.gov Materials • Chart/graph paper • Rulers	nce based/common tasks • Tests and quizzes • Technology • Think-alouds • Writing genres Opinion Informative

Essential Question

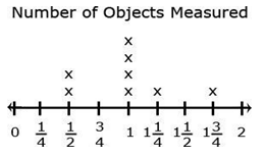
- *How can you use a line plot graph to organize data?*

Essential knowledge and skills

- Students will make a line plot to organize and interpret data.

Teaching Examples

- Students in second grade measured length in whole units using both metric and U.S. customary systems. It's important to review with students how to read and use a standard ruler including details about halves and quarter marks on the ruler. Students should connect their understanding of fractions to measuring to one-half and one-quarter inch. Third graders need many opportunities measuring the length of various objects in their environment.
- Some important ideas related to measuring with a ruler are:
  - The starting point of where one places a ruler to begin measuring
  - Measuring is approximate. Items that students measure will not always measure exactly ¼, ½ or one whole inch. Students will need to decide on an appropriate estimate length.
  - Making paper rulers and folding to find the half and quarter marks will help students develop a stronger understanding of measuring length
- Students generate data by measuring and create a line plot to display their findings. An example of a line plot is shown below:



(TUSD)

Academic vocabulary

- Data
- Fractions
- Horizontal
- Line plot
- Number line
- Scale
- Title
- Vertical

Mathematical Practices

- Make sense of problems and persevere in solving them
- Model with mathematics
- Attend to precision

MATHEMATICS CURRICULUM Grade 3

Curriculum Writers: Amy Kraus and Clarissa Russell

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		ASSESSMENT PROBLEMS 3. MD.3 Basic • http://www.k-5mathteachingresources.com/support-files/buttonbargraph.pdf • http://www.k-5mathteachingresources.com/support-files/buttonpictograph.pdf 3. MD.3 Advanced • http://www.k-5mathteachingresources.com/support-files/buttonpictograph.pdf • http://www.k-5mathteachingresources.com/support-files/collectingandrepresentingdata.pdf 3. MD.4 Basic • http://www.k-5mathteachingresources.com/support-files/measuring-to-the-nearest-half-inch.pdf • http://www.k-5mathteachingresources.com/support-files/measuring-to-the-nearest-quarter-inch.pdf 3. MD.4 Advanced • http://www.k-5mathteachingresources.com/support-files/measuringstripslineplot.pdf			
MEASUREMENT AND DATA (3.MD) Understand concepts of area and relate area to multiplication and to addition (geometric measurement). 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** 3.MD.5 Recognize area as an attribute of plane figures and understand concepts of area measurement. **Major content** ○ A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area. 3.MD.5a ○ A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units. 3.MD.5b **Essential Question** • *How do you find area of a plane figure?* **Essential knowledge and skills** • Area is the two-dimensional space inside a region. • Area is the attribute of plane figures and is measured in square units **Teaching Examples** Students develop understanding of using square units to measure area by: • Using different sized square units • Filling in an area with the same sized square units and counting the number of square units **Academic vocabulary** • Area • Equal part • Plane • Squares • Units **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics	TEACHER NOTES See instructional strategies in the introduction • *Students can cover rectangular shapes with tiles and count the number of units (tiles) to begin developing the idea that area is a measure of covering. Area describes the size of an object that is two-dimensional. The formulas should not be introduced before students discover the meaning of area.* • *The area of a rectangle can be determined by having students lay out unit squares and count how many square units it takes to completely cover the rectangle completely without overlaps or gaps. Students need to develop the meaning for computing the area of a*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath,* ○ Topics 16-5, 16-6 (3.MD.5) ○ Topics 16-5, 16-6, 16-8 (3.MD.6) Supplementary Books, Teacher (T) Student (S) • *Newmark Learning Common Core Math Grade 3,* ○ p.p. 121-130 (3.MD.5), (3.MD.6) Technology • Computers • LCD projectors • Interactive boards	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing • Exhibits

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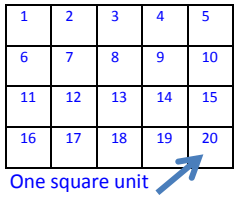
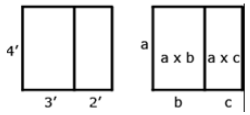
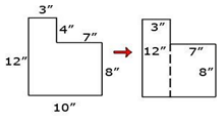
		• An interactive whiteboard would allow students to see that square units can be used to cover a plane figure. (TUSD) • Attend to precision  	*rectangle. A connection needs to be made between the number of squares it takes to cover the rectangle and the dimensions of the rectangle. Ask questions such as:* *• What does the length of a rectangle describe about the squares covering it?* *• What does the width of a rectangle describe about the squares covering it?* • *The concept of multiplication can be related to the area of rectangles using arrays. Students need to discover that the length of one dimension of a rectangle tells how many squares are in each row of an array and the length of the other dimension of the rectangle tells how many squares are in each column. Ask questions about the dimensions if students do not make these discoveries. For example:* *• How do the squares covering a rectangle compare to an array?* *• How is multiplication used to count the number of objects in an array?*  • *Students should also make the connection of the area of a rectangle to the area model used to represent multiplication.* • *This connection justifies the formula for the area of a rectangle.* • *Provide students with the area of a rectangle (i.e., 42 square*	Read Alouds Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.commoncoresheets.com • www.pearsonsucessnet.com • www.K-5mathteachingresources.com • www.learnzillion.com • www.ride.ri.gov Materials • Graph paper • Square tiles	• 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
	M	3.MD.6 Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). **Major content** **Essential Question** • *How can you use grid/graph paper to find the access of a plane figure?* **Essential knowledge and skills** • Students use grid/graph paper to count the area of a plane figure in square units **Teaching Examples** • Using different sized graph paper, students can explore the areas measured in square centimeters and square inches. An interactive whiteboard may also be used to display and count the unit squares (area) of a figure. (TUSD) **Academic vocabulary** • Array • Graph paper • Square units **Mathematical Practices** • Use appropriate tools strategically • Attend to precision			
	M	3.MD.7 Relate area to the operations of multiplication and addition. **Major content** ○ Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. 3.MD.7a ○ Multiply side lengths to find areas of rectangles with whole number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. 3.MD.7b ○ Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning. 3.MD.7c ○ Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non -overlapping parts, applying this technique to solve real world problems.			

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		3.MD.7d . **Essential Question** • *How can we find the area of a rectangle using multiplication?* **Essential knowledge and skills** • There is a relationship between area and the operations of multiplication and addition? **Teaching Examples** • Students tile areas of rectangles, determine the area, record the length and width of the rectangle, investigate the patterns in the numbers, and discover that the area is the length times the width. Example: • Joe and John made a poster that was 4' by 3'. Mary and Amir made a poster that was 4' by 2'. They placed their posters on the wall side-by-side so that that there was no space between them. How much area will the two posters cover? • Students use pictures, words, and numbers to explain their understanding of the distributive property in this context.  (4 x 3) + (4 x 2) = 20 4 x (3+2) = 20 4 x 5 = 20 Example: • Students can decompose a rectilinear figure into different rectangles. They find the area of the figure by adding the areas of each of the rectangles together.  area is 12 x 3 + 8 x 7 = 92 sq inches (TUSD) **Academic vocabulary** • Area • Array • Length • Multiplication • Rectangle • Width **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Model with mathematics • Use appropriate tools strategically • Attend to precision	*inches) and have them determine possible lengths and widths of the rectangle. Expect different lengths and widths such as, 6 inches by 7 inches or 3 inches by 14 inches.* (ODE)		

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		ASSESSMENT PROBLEMS 3. MD.5 Basic • http://www.khanacademy.org/math/geometry/basic-geometry/perimeter_area_basics/e/area_1 • http://www.k-5mathteachingresources.com/support-files/exploringarea.pdf 3. MD.5 Advanced • http://www.k-5mathteachingresources.com/support-files/areaonthegeobaord.pdf 3. MD.6 Basic • http://www.k-5mathteachingresources.com/support-files/find-the-area.pdf 3. MD.6 Advanced • http://www.k-5mathteachingresources.com/support-files/rectangles-with-color-tiles.pdf • http://www.k-5mathteachingresources.com/support-files/rectangulareareacards.pdf 3. MD.7 Basic • http://www.k-5mathteachingresources.com/support-files/developingaformulaforthe areaofarectangle.pdf • http://www.k-5mathteachingresources.com/support-files/area-word-problems-3md7.pdf 3. MD.7 Advanced • http://www.k-5mathteachingresources.com/support-files/designingaflowerbed.pdf • http://www.k-5mathteachingresources.com/support-files/rectangular-robot.pdf			
MEASUREMENT AND DATA (3MD) Recognize perimeter as an attribute of plane figures and distinguish between linear and area measures (geometric measurement). 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	**M**	**Students** 3.MD.8 Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. **Major content** **Essential Question** • *How are arrays used to determine area and perimeter?* • *Can two shapes with the same perimeter have the same area? If so, will this always be the case? Explain your reasoning.* • *Can two shapes with the same area have the same perimeter? If so, will this always be the case? Explain your reasoning.* **Essential knowledge and skills** • Perimeter is an attribute of plane figures that can be measured. • There is a relationship between area and perimeter; area is the space within the perimeter, perimeter is the border of an area. **Academic vocabulary** • Area • Arrays • Chart/table • Commutative property • Length • Perimeter • Polygon • Rectangle • Width **Mathematical Practices** • Make sense of	TEACHER NOTES See instructional strategies in the introduction • *Students have created rectangles before when finding the area of rectangles and connecting them to using arrays in the multiplication of whole numbers. To explore finding the perimeter of a rectangle, have students use nonstretchy string. They should measure the string and create a rectangle before cutting it into four pieces. Then, have students use four pieces of the nonstretchy string to make a rectangle. Two pieces of the string should be of the same length and the other two pieces should have a different length that is the same.*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath,* ○ Topic 16 (3.MD.8) Supplementary Books, Teacher (T) Student (S) • *Newmark Learning Common Core Math Grade 3,* ○ p.p. 116-120 (3.MD.8) Technology • Computers • LCD projectors • Interactive boards Read Alouds	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing

MATHEMATICS CURRICULUM Grade 3

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CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning		• Two or more shapes with the same area do not necessarily have the same perimeter. Two or more shapes with the same perimeter do not necessarily have the same area. **Teaching Examples** • Students develop an understanding of the concept of perimeter by walking around the perimeter of a room, using rubber bands to represent the perimeter of a plane figure on a geoboard, or tracing around a shape on an interactive whiteboard. They find the perimeter of objects; use addition to find perimeters; and recognize the patterns that exist when finding the sum of the lengths and widths of rectangles. • Students use geoboards, tiles, and graph paper to find all the possible rectangles that have a given perimeter (e.g., find the rectangles with a perimeter of 14 cm.) They record all the possibilities using dot or graph paper, compile the possibilities into an organized list or a table, and determine whether they have all the possible rectangles. • Given a perimeter and a length or width, students use objects or pictures to find the missing length or width. They justify and communicate their solutions using words, diagrams, pictures, numbers, and an interactive whiteboard. • Students use geoboards, tiles, graph paper, or technology to find all the possible rectangles with a given area (e.g. find the rectangles that have an area of 12 square units.) They record all the possibilities using dot or graph paper, compile the possibilities into an organized list or a table, and determine whether they have all the possible rectangles. Students then investigate the perimeter of the rectangles with an area of 12. • The patterns in the chart allow the students to identify the factors of 12, connect the results to the commutative property, and discuss the differences in perimeter within the same area. problems and persevere in solving them • Model with mathematics • Look for and make use of structure	*Students should be able to make the connection that perimeter is the total distance around the rectangle.* • *Geoboards can be used to find the perimeter of rectangles also. Provide students with different perimeters and have them create the rectangles on the geoboards. Have students share their rectangles with the class. Have discussions about how different rectangles can have the same perimeter with different side lengths.* • *Students experienced measuring lengths of inches and centimeters in Grade 2. They have also related addition to length and writing equations with a symbol for the unknown to represent a problem.* • *Once students know how to find the perimeter of a rectangle, they can find the perimeter of rectangular-shaped objects in their environment. They can use appropriate measuring tools to find lengths of rectangular-shaped objects in the classroom. Present problems situations involving perimeter, such as finding the amount of fencing needed to enclose a rectangular shaped park, or how much ribbon is needed to decorate the edges of a picture frame. Also present problem situations in which the perimeter and two or three of the side lengths are known, requiring students to find the unknown side length.* • *Students need to know when a problem situation requires*	• *Spaghetti and Meatballs for All* by Marilyn Burns • *Perimeter, Area, and Volume* by David Adler Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.commoncoresheets.com • www.pearsonsucessnet.com • www.K-5mathteachingresources.com • www.learnzillion.com • www.ride.ri.gov Materials • 1-inch or 1-centimeter grid paper • Geoboards and rubber bands • Nonstretchy string • Square tiles	• 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

Area	Length	Width	Perimeter
12 sq. in.	1 in.	12 in.	26 in.
12 sq. in.	2 in.	6 in.	16 in.
12 sq. in	3 in.	4 in.	14 in.
12 sq. in	4 in.	3 in.	14 in.
12 sq. in	6 in.	2 in.	16 in.
12 sq. in	12 in.	1 in.	26 in.

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		This chart can also be used to investigate rectangles with the same perimeter. It is important to include squares in the investigation. (TUSD) ASSESSMENT PROBLEMS 3. MD.8 Basic • http://www.khanacademy.org/math/geometry/basic-geometry/perimeter_area_basics/e/perimeter_1 • http://www.k-5mathteachingresources.com/support-files/measuringperimeter.pdf • http://www.k-5mathteachingresources.com/support-files/theareastaysthesame.pdf 3. MD.8 Advanced • http://www.khanacademy.org/math/geometry/basic-geometry/perimeter_area_basics/e/perimeter_of_squares_and_rectangles • http://www.k-5mathteachingresources.com/support-files/perimeteronthegeoboard.pdf • http://www.k-5mathteachingresources.com/support-files/designingarabbitenclosure.pdf • http://www.k-5mathteachingresources.com/support-files/perim-word-problems.pdf	*them to know that the solution relates to the perimeter or the area. They should have experience with understanding area concepts when they recognize it as an attribute of plane figures. They also discovered that when plane figures are covered without gaps by n unit squares, the area of the figure is n square units.* • *Students need to explore how measurements are affected when one attribute to be measured is held constant and the other is changed. Using square tiles, students can discover that the area of rectangles may be the same, but the perimeter of the rectangles varies. Geoboards can also be used to explore this same concept.* (ODE)		
GEOMETRY (3G) Will reason with shapes and their attributes. 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. , 10-7, 10-8 Look for and make use of structure 8. Look for and express regularity in repeated	**S**	**Students** 3.G.1 Understand that shapes in different categories , e.g. **Supporting content** ○ rhombuses, rectangles, and others) may share attributes ○ having four sides, and that the shared attributes can define a larger category, quadrilaterals. Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. **Essential Question** • *How can you name quadrilaterals and sort them by attributes into different categories?* **Essential knowledge and skills** • Students will identify and classify quadrilaterals. **Teaching Examples** • In second grade, students identify and draw triangles, quadrilaterals, pentagons, and hexagons. Third graders build on this experience and further **Academic vocabulary** • Acute angle • Angles • Attribute • Closed figure • Congruent • Line segments • obtuse angle	TEACHER NOTES See instructional strategies in the introduction • *In earlier grades, students have experiences with informal reasoning about particular shapes through sorting and classifying using their geometric attributes. Students have built and drawn shapes given the number of faces, number of angles and number of sides.* • *The focus now is on identifying and describing properties of two-dimensional shapes in more precise ways using properties that are shared rather than the appearances of*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath,* ○ Topics 10-5, 10-7, 10-8 (3.G.1) ○ Topic 12-1 (3.G.2) Supplementary Books, Teacher (T) Student (S) • *Newmark Learning Common Core Math Grade 3,* ○ p.p. 131-135 (3.G.1) ○ p.p. 136-140 (3.G.2)	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist

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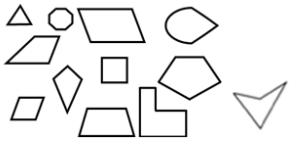
reasoning		investigate quadrilaterals (technology may be used during this exploration). Students recognize shapes that are and are not quadrilaterals by examining the properties of the geometric figures. They conceptualize that a quadrilateral must be a closed figure with four straight sides and begin to notice characteristics of the angles and the relationship between opposite sides. Students should be encouraged to provide details and use proper vocabulary when describing the properties of quadrilaterals. They sort geometric figures (see examples below) and identify squares, rectangles, and rhombuses as quadrilaterals. (TUSD)
		 
		• Parallel
		• Parallelogram
		• Right angle
		• Sides
		• square
		• Vertices
		Mathematical Practices
		• Use appropriate tools strategically
		• Attend to precision
		• Look for and make use of structure
			individual shapes. These properties allow for generalizations of all shapes that fit a particular classification. Development in focusing on the identification and description of shapes' properties should include examples and non-examples, as well as examples and non-examples drawn by students of shapes in a particular category. For example, students could start with identifying shapes with right angles. An explanation as to why the remaining shapes do not fit this category should be discussed. Students should determine common characteristics of the remaining shapes.
			 
				Technology
				• Computers
				• LCD projectors
				• Interactive boards
				Read Alouds
				• *If You Were a Quadrilateral* by Molly Blaisdell
				Websites
				• http://curriculum.northsmithfieldschools.com
				• http://www.illustrativemathematics.org/standards/practice
				• http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S
				• www.commoncore.org/maps
				• www.corestandards.org
				• www.khanacademy.com
				• www.commoncoresheets.com
				• www.pearsonsucessnet.com
				• www.K-5mathteachingresources.com
				• www.learnzillion.com
				• www.ride.ri.gov
				Materials
				• Rulers
					• 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

	S	3.G.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. **Supporting content** ○ *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.* **Essential Question** • *How can shapes be partitioned into equal parts with equal areas?* **Essential knowledge and skills** • Students will partition shapes into equal sized parts. • Students will compare different ways to portion the same shape into equal parts. **Teaching Examples** • Given a shape, students partition it into equal parts, recognizing that these parts all have the same area. They identify the fractional name of each part as "one of four" and "one-fourth," and are able to partition a shape into parts with equal areas in several different ways. **Academic vocabulary** • Area • Denominator • Eighths • Equal • Fifths • Fourths • Fraction • Halves • Numerator • Partitioned • Sixths • Thirds • whole **Mathematical Practices** • Reason abstractly	• *In Grade 2, students partitioned rectangles into two, three or four equal shares, recognizing that the equal shares need not have the same shape. They described the shares using words such as, halves, thirds, half of, a third of, etc., and described the whole as two halves, three thirds or four fourths. In Grade 4, students will partition shapes into parts with equal areas (the spaces in the whole of the shape). These equal areas need to be expressed as unit fractions of the whole shape, i.e., describe each part of a shape partitioned into four parts as **1/4** of the area of the shape.*		

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		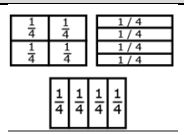 (TUSD) and quantitatively • Model with mathematics ★ • Use appropriate tools strategically ASSESSMENT PROBLEMS 3.G.1 Basic • http://www.k-5mathteachingresources.com/support-files/2dshapesort.pdf 3.G.1 Advanced • http://www.k-5mathteachingresources.com/support-files/comparingquadrilaterals.pdf 3.G.2 Basic • http://www.k-5mathteachingresources.com/support-files/comparingquadrilaterals.pdf • http://www.k-5mathteachingresources.com/support-files/fractionswithcolortiles.pdf 3.G.2 Advanced • http://www.illustrativemathematics.org/illustrations/1014 • http://www.illustrativemathematics.org/illustrations/1061 • http://www.k-5mathteachingresources.com/support-files/congruenteighths.pdf	 • *Have students draw different shapes and see how many ways they can partition the shapes into parts with equal area.* (ODE)		

	Unknown Product	Group Size Unknown ("How many in each group?" Division)	Number of Groups Unknown ("How many groups?" Division)
	$3 \times 6 = ?$	$3 \times ? = 18$, and $18 \div 3 = ?$	$? \times 6 = 18$, and $18 \div 6 = ?$
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example.* You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example.* You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example.* You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Arrays,[4] Area[5]	There are 3 rows of apples with 6 apples in each row. How many apples are there? *Area example.* What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? *Area example.* A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? *Area example.* A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
Compare	A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? *Measurement example.* A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? *Measurement example.* A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? *Measurement example.* A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	$a \times b = ?$	$a \times ? = p$, and $p \div a = ?$	$? \times b = p$, and $p \div b = ?$

[4]The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.
[5]Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.

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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.