6/1/2013

NORTH SMITHFIELD SCHOOL DEPARTMENT

MATHEMATICS CURRICULUM GRADE 4

North Smithfield Elementary School
Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

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.

MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

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

RESOURCES FOR Grade 4 Mathematics

Supplementary

Technology

- Calculators (for modification)
- Computer lab
- Computers
- Interactive boards
- LCD projectors
- Student response systems
- Smart boards

Websites

- http://curriculum.northsmithfieldschools.com
- http://www.achieve.org/http://my.hrw.com
- http://www.geogebra.com.
- http://www.illustrativemathematics.org/standards/practice
- http://www.nj.gov/education/modelcurriculum/math/4.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.pearsonsuccessnet.com (online tools for students)
- www.pearsonsucessnet.com
- www.ride.ri.gov

- Base 10 blocks
- Conversion charts
- Counters
- Decimal charts
- Decimal flip chart
- Equivalent fraction charts
- Fraction bars
- Graph paper
- Geoboards
- Laminated multiplication harts
- Measuring cups
- Measuring spoons
- Meter/yard stick
- Number lines (deimals, modeling of multiplication0
- Number cards
- Pattern blocks
- Place value charts
- Protractors
- Tens frames
- Rulers
- Straws
- Wipe off place value charts
- Yard sticks

MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
OPERATIONS AND ALGEBRAIC THINKING (4.OA) Use the four operations with whole numbers to solve problems. Use **Mathematical Practices** to 1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others **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** 4.OA.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as 35 is 5 times as many as 7 and 7 times as a statement that many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. **Major content** **Essential Question** • *In a situation where 'a is n times as much as b', which represents the quantity being multiplied, and which tells how many times?* **Essential knowledge and skills** • A multiplication equation can be interpreted as multiplicative comparison. **Teaching Examples** • A multiplicative comparison is a situation in which one quantity is multiplied by a specified number to get another quantity (e.g., "a is n times as much as b"). Students should be able to identify and verbalize which quantity is being multiplied and which number tells how many times. (TUSD) • Jen paid $5.00 for a t-shirt. Heather paid 3 times more for a sweatshirt. How much di Heather pay for her sweatshirt? (TUSD) ○ 3 x $5,00 = $15.00 **Academic vocabulary** • Array • Base ten • Commutative property of multiplication • Decimal points • Distributive property • Equation • Factors • Multiplicative comparison • Operation • Product **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Model with mathematics	TEACHER NOTES See instructional strategies in the introduction • *Students need experiences that allow them to connect mathematical statements and number sentences or equations.* • *Students need to solve word problems involving multiplicative comparison (product unknown, partition unknown) using multiplication or division.* • *They should use drawings or equations with a symbol for the unknown number to represent the problem.* • *Students need to be able to distinguish whether a word problem involves multiplicative comparison or additive comparison (solved when adding and subtracting in Grades 1 and 2).* • *Present multistep word problems with whole numbers and whole-number answers using the four operations.* • *Students should know which operations are needed to solve the problem.* • *Drawing pictures or using models will help students understand what the problem is asking. They should check the reasonableness of their answer using mental computation and estimation strategies.* (ODE)	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath*, lessons: ○ 3-1 ○ 3-3 ○ 3-7 ○ 5-8 Supplementary Books, Teacher (T) Student (S) • Technology • Computers • LCD projectors • Interactive boards Websites • http://curriculum.northsmithfieldschools.com • http://www.achieve.org/http://my.hrw.com • http://www.illustrativemathematics.org/standards/practice • http://www.ode.state.oh.us/GD/Templates/Pages/ODE/ODEDefaultPage.aspx?page=1 • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • http://www.tusd1.org/contents/distinfo/curriculum/index.asp • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.ride.ri.gov	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. □ Role playing - bodily kinesthetic □ Graphic organizing - visual □ Collaboration - interpersonal • Oral presentations
	M	4.OA.2 Multiply or divide to solve word problems involving multiplicative comparison , e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. (see below) **Major content** (see enlarged chart on page 44)			

MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

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)
	$3 \times 6 = ?$	$3 \times ? = 18$, 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.

Essential Question

- *How are additive comparison problems different from multiplicative comparison problem?*

Essential knowledge and skills

- Additive comparison answers the question, how many more?
- Multiplicative comparison answers the question, how many times as much or how many times as many?

Teaching Examples

- "A blue hat costs $6. A red hat costs 3 times as much as the blue hat.
- How much does the red hat cost?"
- In solving this problem, the student should identify $6 as the quantity that is being multiplied by 3. The student should write the problem using a symbol to represent the unknown.
- ($6 x 3 = ☐)

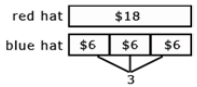
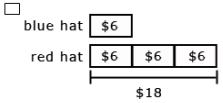
Academic vocabulary

- **Additive comparison**
- Array
- Base ten
- Commutative property of multiplication
- Decimal points
- Distributive property
- **Dividend**
- **Divisor**
- Equation
- Factors
- **Inverse operation**
- Multiplicative comparison
- Operation
- Products
- **Quotient**

- *enVisionMath*, lessons:
  - 3-1
  - 3-7
  - 5-8

Materials
- Grid paper

- Problem/Performance based/common tasks
- Rubrics/checklists (mathematical practice, modeling)
- Tests and quizzes
- Technology
- Think-alouds
- Writing genres
  - Arguments/ opinion
  - Informative

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		 • Table 2 includes the following division problem: ○ 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? • In solving this problem, the student should identify $18 as the quantity being divided into shares of $6. • The student should write the problem using a symbol to represent the unknown. ($18 ÷ $6 = □)  • When distinguishing multiplicative comparison from additive comparison, students should note that ○ additive comparisons focus on the difference between two quantities (e.g., Deb has 3 apples and Karen has 5 apples. How many more apples does Karen have?). A simple way to remember this is, "How many more?" ○ multiplicative comparisons focus on comparing two quantities by showing that one quantity is a specified number of times larger or smaller than the other (e.g., Deb ran 3 miles. Karen ran 5 times as many miles as Deb. How many miles did Karen run?). A simple way to remember this is "How many times as much?" or "How many times as many?" (TUSD) **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics • Attend to precision • Look for and express regularity in repeated reasoning			
	M	4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. **Major content**		• *enVisionMath*, lessons: ○ 2-1 ○ 2-2 ○ 5-2 ○ 5-4 ○ 6-1 ○ 6-4 ○ 7-2 ○ 7-3a ○ 7-7	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		. **Essential Question** • *How can different strategies be helpful when solving a problem?* • *What does the remainder represent? How do you know?* • *How can estimation be useful when solving problems?* **Essential knowledge and skills** • To determine what the remainder represents you must understand the context of the problem. **Teaching Examples** **Example:** • Chris bought clothes for school. She bought 3 shirts for $12 each and a skirt for $15. How much money did Chris spend on her new school clothes? 3 x $12 + $15 = *a* • In division problems, the remainder is the whole number left over when as large a multiple of the divisor as possible has been subtracted. **Example**: • Kim is making candy bags. There will be 5 pieces of candy in each bag. She had 53 pieces of candy. She ate 14 pieces of candy. How many candy bags can Kim make now? (7 bags with 4 leftover) • Kim has 28 cookies. She wants to share them equally between herself and 3 friends. How many cookies will each person get? (7 cookies each) 28 ÷ 4 = *a* • There are 29 students in one class and 28 students in another class going on a field trip. Each car can hold 5 students. How many cars are needed to get all the students to the field trip? (12 cars, one possible explanation is 11 cars holding 5 students and the 12th holding the remaining 2 students) 29 + 28 = 11 x 5 + 2 Estimation skills include identifying when estimation is appropriate, determining the level of accuracy needed, selecting the appropriate method of estimation, and verifying solutions or determining the reasonableness of situations using various estimation strategies. Estimation strategies include, but are not limited to: **Academic vocabulary** • Additive comparison • Array • Base ten • Commutative property of multiplication • Decimal points • Distributive property • Dividend • Divisor • Equation • Estimate • Factors • Inverse operation • Multiplicative comparison • Operation • Operation • Products • Quotient • Remainder • Rounding **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 express regularity in repeated reasoning		○ 8-2 ○ 8-2a ○ 8-3 ○ 8-10 ○ 16-12 ○ 18-1 ○ 18-2 ○ 18-3 ○ 18-5	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• 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), • clustering around an average (when the values are close together an average value is selected and multiplied by the number of values to determine an estimate), • rounding and adjusting (students round down or round up and then adjust their estimate depending on how much the rounding affected the original values), • using compatible numbers such as factors (students seek to fit numbers together - e.g., rounding to factors and grouping numbers together that have round sums like 100 or 1000), • using benchmark numbers that are easy to compute (students select close whole numbers for fractions or decimals to determine an estimate). (TUSD) ASSESSMENT PROBLEMS 4.OA.1 Basic • http://www.k-5mathteachingresources.com/support-files/representing-multiplicative-comparison-problems.pdf 4.OA.2 Basic • http://www.k-5mathteachingresources.com/support-files/multiplicativecomparisonproblems.pdf 4.OA.2 Advanced • http://www.k-5mathteachingresources.com/support-files/multiplicativecomparisonproblems.pdf 4.OA.3 Basic • http://www.illustrativemathematics.org/illustrations/1289 • http://www.k-5mathteachingresources.com/support-files/4oa3multistepwordproblems.pdf • http://www.k-5mathteachingresources.com/support-files/aremainderofone.pdf (test resource) 4.OA.3 Advanced • http://www.illustrativemathematics.org/illustrations/1289			

MATHEMATICS CURRICULUM Grade 4

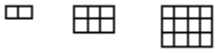
Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
OPERATIONS AND ALGEBRAIC THINKING (4.OA) Gain familiarity with factors and multiples. Use **Mathematical Practices** to 1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others **4.** Model with mathematics ★ 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning	**S**	**Students** 4. OA.4 Find all factor pairs for a whole number in the range 1–100. **Supporting content** Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite. **Essential Question** • *In what ways are factors and multiples related to each other?* • *How are prime and composite numbers the same and how are they different?* **Essential knowledge and skills** • A whole number is a multiple of each of its factors. • Some numbers are prime because they only have one factor pair; some numbers are composite because they have more than one factor pair. **Teaching Examples** • Students should understand the process of finding factor pairs so they can do this for any number 1 - 100, Example: • Factor pairs for 96: 1 and 96, 2 and 48, 3 and 32, 4 and 24, 6 and 16, 8 and 12. • Multiples can be thought of as the result of skip counting by each of the factors. When skip counting, students should be able to identify the number of factors counted e.g., 5, 10, 15, 20 (there are 4 fives in 20). Example: **Academic vocabulary** • Composite number • Factor • Factor pairs • Multiple • Prime number **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Model with mathematics • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning	TEACHER NOTES See instructional strategies in the introduction • *Students need to develop an understanding of the concepts of number theory; such as prime numbers, composite numbers, and the relationship of factors and multiples.* • *Students need to develop strategies for determining if a number is prime or composite, e.g. divisibility rules, and area models using counters and/or grid paper.* • *Using area models will also enable students to analyze numbers and arrive at an understanding of whether a number is prime or composite. Have students construct rectangles with an area equal to a given number. They should see an association between the number of rectangles and the given number for the area as to whether this number is a prime or composite number.* • *Provide students with counters to find the factors of numbers. Have them find ways to separate the counters into equal subsets. For example, have them find several factors of 10, 14, 25 or 32, and write multiplication expressions for the numbers.* • *The idea that a product of*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 3-2 ○ 3-4 ○ 3-5 ○ 3-6 ○ 8-8 ○ 8-9 • Counters • Grid papers	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

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Factors of 24: 1, 2, 3, 4, 6, 8,12, 24 Multiples : 1,2,3,4,5…24 2,4,6,8,10,12,14,16,18,20,22,24 3,6,9,12,15,18,21,24 4,8,12,16,20,24 8,16,24 12,24 24 • To determine if a number between1-100 is a multiple of a given one-digit number, some helpful hints include the following: ○ all even numbers are multiples of 2 ○ all even numbers that can be halved twice (with a whole number result) are multiples of 4 ○ all numbers ending in 0 or 5 are multiples of 5 Prime vs. Composite: • A prime number is a number greater than 1 that has only 2 factors, 1 and itself. Composite numbers have more than 2 factors. Students investigate whether numbers are prime or composite by ○ building rectangles (arrays) with the given area and finding which numbers have more than two rectangles (e.g. 7 can be made into only 2 rectangles, 1 x 7 and 7 x 1, therefore it is a prime number) ○ finding factors of the number (TUSD) ASSESSMENT PROBLEMS 4.OA.4 Basic • http://www.illustrativemathematics.org/illustrations/959 • http://www.k-5mathteachingresources.com/support-files/findingmultiples.pdf (hands-on activity) 4.OA.4 Advanced • http://www.illustrativemathematics.org/illustrations/959 • http://www.k-5mathteachingresources.com/support-files/findingmultiples.pdf (hands-on activity)	*any two whole numbers is a common multiple of those two numbers is a difficult concept to understand. For example. 5 x 8 is 40; the table below shows the multiples of each factor.* • *Ask students what they notice about the number 40 in each set of multiples; 40 is the 8th multiple of 5, and the 5th multiple of 8.* • *Knowing how to determine factors and multiples is the foundation for finding common multiples and factors in Grade 6.* • *Writing multiplication expressions for numbers with several factors and for numbers with a few factors will help students in making conjectures about the numbers. Students need to look for commonalities among the numbers.* (ODE)		○ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Tests and quizzes • Technology • Think-alouds • Writing genres ○ Opinion ○ Informative

MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
OPERATIONS AND ALGEBRAIC THINKING (4.OA) Generate and analyze patterns. Use **Mathematical Practices** to 1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others 4. Model with mathematics ★ 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning	**A**	**Students** 4. OA.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. **Additional content** ○ *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.* **Essential Question** • *How are patterns and rules related?* • *How can a pattern help you define a rule?* • *How can a rule help you define a pattern?* **Essential knowledge and skills** • A pattern is a sequence that repeats the same process over and over based on a rule. • Given a pattern you can generate a rule; given a rule you can generate a pattern. **Teaching Examples** • Patterns involving numbers or symbols either repeat or grow. Students need multiple opportunities creating and extending number and shape patterns. Numerical patterns allow students to reinforce facts and develop fluency with operations. • Patterns and rules are related. A pattern is a sequence that repeats the same process over and over. A rule dictates what that process will look like. Students investigate different patterns to find rules, identify features in the patterns, and justify the reason for those features. Examples: Pattern: 3, 8, 13, 18, 23, 28, …; Rule: Start with 3, add 5; Feature(s): The numbers alternately end with a 3 or 8 Pattern: 5, 10, 15, 20 …; Rule: Start with 5, add 5; Feature(s): The numbers are multiples of 5 and end with either 0 or 5. The numbers that end with 5 are products of 5 and an odd number. The numbers that end in 0 are products of 5 and an even number. After students have identified rules and features from patterns, they need to generate a numerical or shape pattern from a given rule. **Academic vocabulary** • Patterns • Variable **Mathematical Practices** • Reason abstractly and quantitatively • 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	TEACHER NOTES See instructional strategies in the introduction • *Understanding patterns is fundamental to algebraic thinking. Students have experience in identifying arithmetic patterns, especially those included in addition and multiplication tables.* • *Students should generate numerical or geometric patterns that follow a given rule. They should look for relationships in the patterns and be able to describe and make generalizations.* • *As students generate numeric patterns for rules, they should be able to "undo" the pattern to determine if the rule works with all of the numbers generated.* • *Students should also determine if there are other relationships in the patterns..* • *Provide patterns that involve shapes so that students can determine the rule for the pattern. For example,*  • *Students may state that the rule is to multiply the previous number of squares by 3.* (ODE)	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 3-2 ○ 6-2 ○ 6-3 ○ 9-7	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 -

MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Example: • Rule: Starting at 1, create a pattern that starts at 1 and multiplies each number by 3. Stop when you have 6 numbers. • Students write 1, 3, 9, 27, 81, 243. Students notice that all the numbers are odd and that the sums of the digits of the 2 digit numbers are each 9. Some students might investigate this beyond 6 numbers. Another feature to investigate is the patterns in the differences of the numbers (3 – 1 = 2, 9 – 3 = 6, 27 – 9 = 18, etc.) (TUSD) ASSESSMENT PROBLEMS 4.OA.5 Basic • http://www.illustrativemathematics.org/illustrations/487 • http://www.k-5mathteachingresources.com/support-files/square-numbers.pdf (hands-on activity) 4.OA.5 Advanced • http://www.illustrativemathematics.org/illustrations/487			visual Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Tests and quizzes • Technology • Think-alouds • Writing genres Opinion Informative
NUMBER AND OPERATIONS IN BASE TEN (5.NBT) Generalize place value under-standing for multi-digit whole 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** 4.NBT.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. **Major content** ○ *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.* **Essential Question** • *What role does the zero play in place value?* • *How does knowing the value of each digit help you understand the value of the number?* • *How can you explain the patterns in place value?* **Essential knowledge and skills** • A digit in one place is ten times more than the same digit in a place to the right. **Teaching Examples** • Students should be familiar with and use place value as they work with numbers. Some activities that will help students develop understanding of this standard are: ○ Investigate the product of 10 and any number, then justify why the number now has a 0 at **Academic vocabulary** • Compose • Decompose **Mathematical Practices** • Look for and make use of structure • Look for and express regularity in repeated reasoning	TEACHER NOTES See instructional strategies in the introduction • *Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.* • *Provide multiple opportunities in the classroom setting and use real-world context for students to read and write multi-digit whole numbers.* • *Students need to have opportunities to compare numbers with the same number of digits, e.g., compare 453, 698 and 215; numbers that have the same number in the leading digit position, e.g.,*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 1.3a • Number cards • Place value boxes • Place value flip charts	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing • Exhibits

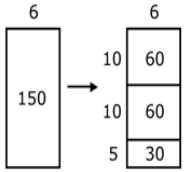
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		the end. (7 x 10 = 70 because 70 represents 7 tens and no ones, 10 x 35 = 350 because the 3 in 350 represents 3 hundreds, which is 10 times as much as 3 tens, and the 5 represents 5 tens, which is 10 times as much as 5 ones.) While students can easily see the pattern of adding a 0 at the end of a number when multiplying by 10, they need to be able to justify why this works. ○ Investigate the pattern, 6, 60, 600, 6,000, 60,000, 600,000 by dividing each number by the previous number. • The expanded form of 275 is 200 + 70 + 5. Students use place value to compare numbers. For example, in comparing 34,570 and 34,192, a student might say, both numbers have the same value of 10,000s and the same value of 1000s however, the value in the 100s place is different so that is where I would compare the two numbers. (TUSD)	*compare 45, 495 and 41,223; and numbers that have different numbers of digits and different leading digits, e.g., compare 312, 95, 5245 and 10,002.* • *Students also need to create numbers that meet specific criteria. For example, provide students with cards numbered 0 through 9. Ask students to select 4 to 6 cards; then, using all the cards make the largest number possible with the cards, the smallest number possible and the closest number to 5000 that is greater than 5000 or less than 5000.* • *Grade 3 skill is rounding to the nearest 10 or 100 to include larger numbers and place value. Grade 4 is rounding to digits other than the leading digit, e.g., round 23,960 to the nearest hundred. This requires greater sophistication than rounding to the nearest ten thousand because the digit in the hundreds place represents 900 and when rounded it becomes 1000, not just zero.* • *Students should also begin to develop some rules for rounding, building off the basic strategy of; "Is 48 closer to 40 or 50?" Since 48 is only 2 away from 50 and 8 away from 40, 48 would round to 50. Now students need to generalize the rule for*		• 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	4.NBT.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. **Major content** Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons. **Essential Question** • *How does knowing the value of each digit help you understand the value of the number?* • *How can you explain the patterns in place value?* **Essential knowledge and skills** • Numbers up to or equal to 1,000,000 can be composed and decomposed. • Numbers can be represented in many forms, including: expanded notation, written form, models/pictures, and standard notation. **Teaching Examples** • Students should be familiar with and use place value as they work with numbers. Some activities that will help students develop understanding of this standard are: ○ Investigate the product of 10 and any number, then justify why the number now has a 0 at **Academic vocabulary** • Standard form • Expanded form • Written form **Mathematical Practices** • Model with mathematics • Look for and make use of structure		• *enVisionMath*, lessons: ○ 1-1 ○ 1-2 ○ 1-3a ○ 1-3	

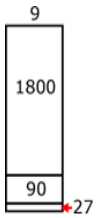
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		the end. (7 x 10 = 70 because 70 represents 7 tens and no ones, 10 x 35 = 350 because the 3 in 350 represents 3 hundreds, which is 10 times as much as 3 tens, and the 5 represents 5 tens, which is 10 times as much as 5 ones.) While students can easily see the pattern of adding a 0 at the end of a number when multiplying by 10, they need to be able to justify why this works. ○ Investigate the pattern, 6, 60, 600, 6,000, 60,000, 600,000 by dividing each number by the previous number. • The expanded form of 275 is 200 + 70 + 5. Students use place value to compare numbers. For example, in comparing 34,570 and 34,192, a student might say, both numbers have the same value of 10,000s and the same value of 1000s however, the value in the 100s place is different so that is where I would compare the two numbers. (TUSD)	*much larger numbers and rounding to values that are not the leading digit.* (ODE)		
	M	4.NBT.3 Use place value understanding to round multi-digit whole numbers to any place any place **Major content** **Essential Question** • *What role does place value play in rounding numbers?* • *How are estimating and rounding similar to and different from each other?* **Essential knowledge and skills** • A digit in one place is ten times more than the same digit in a place to the right. **Teaching Examples** • When students are asked to round large numbers, they first need to identify which digit is in the appropriate place. Example: Round 76,398 to the nearest 1000. • Step 1: Since I need to round to the nearest 1000, then the answer is either 76,000 or 77,000. • Step 2: I know that the halfway point between these two numbers is 76,500. • Step 3: I see that 76,398 is between 76,000 and 76,500. **Academic vocabulary** • Rounding • Estimating **Mathematical Practices** • Attend to precision		• *enVisionMath*, lessons: ○ 1-4 ○ 2-1 ○ 5-2 ○ 5-3 ○ 5-4	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• Step 4: Therefore, the rounded number would be 76,000. (TUSD) ASSESSMENT PROBLEMS 4.NBT.1 Basic • http://www.k-5mathteachingresources.com/support-files/place-value-problems.pdf 4.NBT.2Basic • http://www.illustrativemathematics.org/illustrations/459 4.NBT.3 Basic http://www.k-5mathteachingresources.com/support-files/roundtothenearest10game.pdf (game)			
NUMBER AND OPERATIONS IN BASE TEN (4.NBT) 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	**M**	**Students** 4.NBT.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm. **Major content** **Essential Question** • *How are addition, subtraction, multiplication and division related?* • *What role does place value play in your strategy for computation?* • *How is your strategy similar to or different from someone else's?* **Essential knowledge and skills** • There is a relationship between the four operations. • Efficient procedures and strategies to find products, quotients, sums, and differences, involve the use of properties of operations (commutative, associative, distributive and identity properties), place value understanding, and/or flexibility with numbers. **Teaching Examples** • Students build on their understanding of addition and subtraction, their use of place value and their flexibility with multiple strategies to make sense of the standard algorithm. They continue to use place value in describing and justifying the processes they use to add and subtract. **Academic vocabulary** • Algorithm **Mathematical Practices** • Attend to precision • Express regularity in repeated reasoning	TEACHER NOTES See instructional strategies in the introduction • *Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000.* • *A crucial theme in multi-digit arithmetic is encouraging students to develop strategies that they understand, can explain, and can think about, rather than merely follow a sequence of directions that they don't understand.* • *It is important for students to have seen and used a variety of strategies and materials to broaden and deepen their understanding of place value before they are required to use standard algorithms.* • *It is very important for some students to talk*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 2-4 ○ 2-5 ○ 2-6 ○ 2-7 • base ten blocks • Place-value mats • Smartboard • tens frames	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

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• When students begin using the standard algorithm their explanation may be quite lengthy. After much practice with using place value to justify their steps, they will develop fluency with the algorithm. Students should be able to explain why the algorithm works. 3892 + 1567 • Student explanation for this problem: 1. Two ones plus seven ones is nine ones. 2. Nine tens plus six tens is 15 tens. 3. I am going to write down five tens and think of the10 tens as one more hundred.(notates with a 1 above the hundreds column) 4. Eight hundreds plus five hundreds plus the extra hundred from adding the tens is 14 hundreds. 5. I am going to write the four hundreds and think of the 10 hundreds as one more 1000. (notates with a 1 above the thousands column) 6. Three thousands plus one thousand plus the extra thousand from the hundreds is five thousand. (TUSD)	*through their understanding of connections between different strategies and standard addition and subtractions algorithms. Give students many opportunities to talk with classmates about how they could explain standard algorithms. Think-Pair-Share is a good protocol for all students.* • *When asking students to gain understanding about multiplying larger numbers, provide frequent opportunities to engage in mental math exercises. When doing mental math, it is difficult to even attempt to use a strategy that one does not fully understand. Also, it is a natural tendency to use numbers that are 'friendly' (multiples of 10) when doing mental math, and this promotes its understanding.* ODE • *As students developed an understanding of multiplying a whole number up to four digits by a one-digit whole number, and multiplying two two-digit numbers through various strategies, they should do the same when finding whole-number quotients and remainders. By relating division to multiplication and repeated subtraction, students can find partial quotients. An explanation*		• 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	4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Major content** **Essential Question** • *How do the different models, such as, an open array, an open number line, or base ten blocks, relate to each other?* • *What real-world word problem can you write for 182 ÷ 12 =__ ?* • *What role does place value play in your strategy for computation?* **Essential knowledge and skills** • Efficient procedures and strategies to find products, quotients, sums, and differences, involve the use of properties of operations (commutative, associative, distributive and identity properties), place value understanding, and/or flexibility with numbers. **Academic vocabulary** • Product • Factor • Distributive property **Mathematical Practices** • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision		• *enVisionMath*, lessons: ○ 5-1 ○ 5-2 ○ 5-3 ○ 5-4 ○ 5-5 ○ 5-6 ○ 5-7 ○ 5-8a ○ 5-8 ○ 7-1 ○ 7-3a ○ 7-3 ○ 7-4a ○ 7-4b ○ 7-4 ○ 7-5	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Teaching Examples • Students use base ten blocks, area models, partitioning, compensation strategies, etc. when multiplying whole numbers and use words and diagrams to explain their thinking. Multiple strategies enable students to develop fluency with multiplication and transfer that understanding to division. • Use of place value and the distributive property are applied in the scaffold examples below. ○ To illustrate 154 x 6 students use base 10 blocks or use drawings to show 154 six times. Seeing 154 six times will lead them to understand the distributive property, 154 X 6 = (100 + 50 + 4) x 6 = (100 x 6) + (50 X 6) + (4 X 6) = 600 + 300 + 24 = 924. ○ The area model shows partial products. 14 x 16 = 224 (TUSD)	*of partial quotients can be viewed at http://www.teachertube.com , search for Outline of partial quotients. This strategy will help them understand the division algorithm.* • *Students should be able to illustrate and explain multiplication and division calculations by using equations, rectangular arrays and the properties of operations.* (ODE)		
	M	4.NBT.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. **Major content** Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. **Essential Question** • *What are properties of multiplication? Of division? Why do they work?* • *What real-world word problem can you write for 182 ÷ 12 =__ ?* • *What role does place value play in your strategy for computation?* **Academic vocabulary** • Divisor • Dividend • Quotient • Remainder **Mathematical Practices** **Essential knowledge and skills** • There is a relationship between the four operations. • Efficient procedures and strategies to find products, quotients, sums, and differences, involve the use of properties of operations (commutative, associative, distributive and identity properties), place value understanding, and/or flexibility with numbers.		• *enVisionMath*, lessons: ○ 4-1 ○ 4-2 ○ 4-3 ○ 4-5 ○ 8-1 ○ 8-3a ○ 8-3b ○ 8-3c ○ 8-3 ○ 8-4 ○ 8-5 ○ 8-6 ○ 8-7a ○ 8-7	

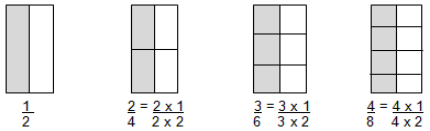
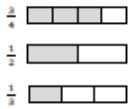
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Teaching Examples Examples: • A 4th grade teacher bought 4 new pencil boxes. She has 260 pencils. She wants to put the pencils in the boxes so that each box has the same number of pencils. How many pencils will there be in each box? ○ Using Base 10 Blocks: Students build 260 with base 10 blocks and distribute them into 4 equal groups. Some students may need to trade the 2 hundreds for tens but others may easily recognize that 200 divided by 4 is 50. ○ Using Place Value: 260 ÷ 4 = (200 ÷ 4) + (60 ÷ 4) ○ Using Multiplication: 4 x 50 = 200, 4 x 10 = 40, 4 x 5 = 20; 50 + 10 + 5 = 65; so 260 ÷ 4 = 65 • Using an Open Array or Area Model After developing an understanding of using arrays to divide, students begin to use a more abstract model for division. This model connects to a recording process that will be formalized in the 5th grade. Example: 150 ÷ 6  • Students make a rectangle and write 6 on one of its sides. They express their understanding that they need to think of the rectangle as representing a total of 150. 1. Students think, 6 times what number is a number close to 150? They recognize that 6 x 10 is 60 so they record 10 as a factor and partition the rectangle into 2 rectangles and label the area aligned to the factor of 10 with 60. They express that they have only used 60 of the 150 so they have 90 left.			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		2. Recognizing that there is another 60 in what is left they repeat the process above. They express that they have used 120 of the 150 so they have 30 left. 3. Knowing that 6 x 5 is 30. They write 30 in the bottom area of the rectangle and record 5 as a factor. 4. Students express their calculations in various ways: a. 150 50 ÷ 6 = 10 + 10 + 5 = 25 - 60 (6 x 10) 90 - 60 (6 x 10) 30 - 30 (6 x 5) 0 b. 50 ÷ 6 = (60 ÷ 6) + (60 ÷ 6) + (30 ÷ 6) = 10 + 10 + 5 = 25 Example 2: 1917 ÷ 9  • A student's description of his or her thinking may be: I need to find out how many 9s are in 1917. I know that 200 x 9 is 1800. So if I use 1800 of the 1917, I have 117 left. I know that 9 x 10 is 90. So if I have 10 more 9s, I will have 27 left. I can make 3 more 9s. I have 200 nines, 10 nines and 3 nines. So I made 213 nines. 1917 ÷ 9 = 213. (TUSD) ASSESSMENT PROBLEMS 4.NBT.4 Basic • http://www.illustrativemathematics.org/illustrations/1189 4.NBT.4 Advanced • http://www.illustrativemathematics.org/illustrations/1189			

MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		4.NBT.5 Basic • http://www.k-5mathteachingresources.com/support-files/multiplication-strategy-doubling-and-halving.pdf 4.NBT.6 Advanced • http://www.k-5mathteachingresources.com/support-files/Estimate-the-Quotient.pdf (game)			
NUMBER AND OPERATIONS—FRACTIONS (5.NF) Extend understanding of fraction equivalence and ordering. 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** 4.NF.1 Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. **Major content** Use this principle to recognize and generate equivalent fractions. **Essential Question** • *How can equivalencies among fractions be determined?* • *Why are comparisons of fractions valid only when the two fractions refer to the same size whole?* • *What models and strategies can you use to order and compare fractions?* • *Why does the whole matter when you compare fractions?* **Essential knowledge and skills** • Visual fraction models can illustrate a principle for generating equivalent fractions. Attention must be paid to how the number and size of the parts differ even though the fractions are the same size. • A fundamental property of equivalent fractions is: multiplying the numerator and denominator by the same non-zero whole number results in an equivalent fraction. • Fractions can be compared by using benchmark fractions, and by creating common denominators or common numerators. • Comparisons are only valid when the two fractions refer to the same whole. **Teaching Examples** • This standard extends the work in third grade by using additional denominators (5, 10, 12, and 100). **Academic vocabulary** • Fractional part • Numerator • Denominator • Equivalent fraction • Benchmark fraction • Fraction number line • Partition **Mathematical Practices** • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics • Use appropriate tools strategically	TEACHER NOTES See instructional strategies in the introduction • *Grade* 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100. • *Students extend their understanding of unit fractions to compare two fractions with different numerators and different denominators.* • *Students should use models to compare two fractions with different denominators by creating common denominators or numerators. The models should be the same (both fractions shown using fraction bars or both fractions using circular models) so that the models represent the same whole. The models should be represented in drawings. Students should also use benchmark fractions such as $\frac{1}{2}$ to compare two fractions. The result of the comparisons should be recorded using >, < and = symbols.* (ODE)	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 10-4 ○ 10-5a ○ 10-5 ○ 10-9 • Pattern blocks • Fraction bars or strips	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

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• Students can use visual models to generate equivalent fractions. • All the models show 1/2. The second model shows 2/4 but also shows that 1/2 and 2/4 are equivalent fractions because their areas are equivalent. When a horizontal line is drawn through the center of the model, the number of equal parts doubles and size of the parts is halved. • Students will begin to notice connections between the models and fractions in the way both the parts and wholes are counted and begin to generate a rule for writing equivalent fractions. (TUSD) 1/2 x 2/2 = 2/4  $\frac{1}{2}$ $\frac{2}{4} = \frac{2 \times 1}{2 \times 2}$ $\frac{3}{6} = \frac{3 \times 1}{3 \times 2}$ $\frac{4}{8} = \frac{4 \times 1}{4 \times 2}$			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	4.NF.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. **Major content** Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. **Essential Question** • *What models and strategies can you use to order and compare fractions?* • *In what ways can you compare fractions with different denominators?* • *How can benchmark fractions help with comparing fractions?* • *Why does the whole matter when you compare fractions?* **Essential knowledge and skills** • Visual fraction models can illustrate a principle for generating equivalent fractions. Attention must be paid to how the number and size of the parts differ even though the fractions are the same size. **Academic vocabulary** • Fractional part • Numerator • Denominator • Equivalent fraction • Benchmark fraction • Fraction number line • Partition **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics		• *enVisionMath*, lessons: ○ 10-5a ○ 10-7 ○ 10-8 ○ 10-9	

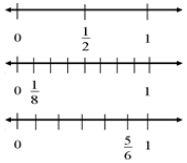
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS

- Fractions can be compared by using benchmark fractions, and by creating common denominators or common numerators.
- Comparisons are only valid when the two fractions refer to the same whole.

- Use appropriate tools strategically

Teaching Examples

- Benchmark fractions include common fractions between 0 and 1 such as halves, thirds, fourths, fifths, sixths, eighths, tenths, twelfths, and hundredths.
- Fractions can be compared using benchmarks, common denominators, or common numerators. Symbols used to describe comparisons include <, >, =.
- Fractions may be compared using $\frac{1}{2}$ as a benchmark.



- Possible student thinking by using benchmarks:
- $\frac{1}{8}$ 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.
- Possible student thinking by creating common denominators:

$\frac{5}{6} > \frac{1}{2}$ because $\frac{3}{6} = \frac{1}{2}$ and $\frac{5}{6} > \frac{3}{6}$

- Fractions with common denominators may be compared using the numerators as a guide.

$\frac{2}{6} < \frac{3}{6} < \frac{5}{6}$

- Fractions with common numerators may be compared and ordered using the denominators as a guide. (TUSD)

$\frac{3}{10} \quad \frac{3}{8} < \frac{3}{4}$

ASSESSMENT PROBLEMS

4.NF.1 Basic

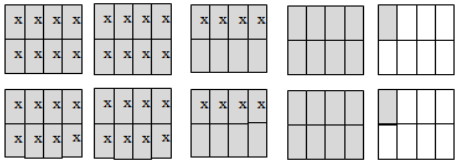
- http://www.illustrativemathematics.org/illustrations/743
- http://www.k-5mathteachingresources.com/support-files/fractionwallgame.pdf (Hands-

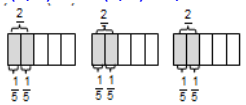
MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		On Activity) 4.NF.2 Basic • http://www.k-5mathteachingresources.com/support-files/birthday-fractions-4nf2.pdf (Activity Cards: see additional cards on same website) 4.NF.2 Advanced • http://www.illustrativemathematics.org/illustrations/811			
NUMBER AND OPERATIONS—FRACTIONS (4.NF) Build fractions from unit fractions by applying and extending previous understandings of operations on whole 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** 4.NF.3 Understand a fraction a/b with a > 1 as a sum of fractions 1/b.. **Major content** a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. 4.NF.3a Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8. 4.NF.3b b. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. 4.NF.3c *c.* Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem. 4.NF.3d **Essential Question** • *How can we add and subtract fractions with like denominators?* • *Does ¼ + 2/4 = 3/8? Defend your thinking.* • *What models and strategies can we use to add mixed numbers?* **Essential knowledge and skills** • Adding and subtracting fractions is the process of joining or separating parts that refer to the same whole. • Fractions, with the exception of unit fractions, can be decomposed into the sum of fractions with the same denominator in more than one way. **Academic vocabulary** • Unit fraction • Fractional part • Numerator • Denominator • Equivalent fraction • Benchmark fraction • Fraction number line • Partition • Mixed Numbers **Mathematical Practices** • Make sense of	TEACHER NOTES See instructional strategies in the introduction • *Grade 4 expectations in this domain are limited to fractions with denominators 2,3, 4, 5, 6, 8, 10, 12, and 100.* • *In Grade 3, students added unit fractions with the same denominator. Now, they begin to represent a fraction by decomposing the fraction as the sum of unit fraction and justify with a fraction model. For example,* $\frac{3}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$. • *Students also represented whole numbers as fractions. They use this knowledge to add and subtract mixed numbers with like denominators using properties of number and appropriate fraction models. It is important to*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 11-1a ○ 11-1 ○ 11-4 • Fraction tiles/bars • Number lines • Rulers with markings of $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{8}$	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 ★

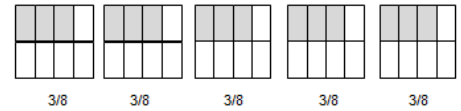
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• A mixed number is a whole number plus a fraction smaller than one. • Fractions with like denominators can be added and subtracted by using properties of operations and the relationship between addition and subtraction. **Teaching Examples** • A fraction with a numerator of one is called a unit fraction. When students investigate fractions other than unit fractions, such as 2/3, they should be able to decompose the non-unit fraction into a combination of several unit fractions. Example: 2/3 = 1/3 + 1/3 • Being able to visualize this decomposition into unit fractions helps students when adding or subtracting fractions. Students need multiple opportunities to work with mixed numbers and be able to decompose them in more than one way. Students may use visual models to help develop this understanding. Example: ○ 1 ¼ - ¾ = ☐ ○ 4/4 + ¼ = 5/4 ○ 5/4 – ¾ = 2/4 or ½ Example of word problem: ○ Mary and Lacey decide to share a pizza. Mary ate 3/6 and Lacey ate 2/6 of the pizza. How much of the pizza did the girls eat together? Solution: The amount of pizza Mary ate can be thought of a 3/6 or 1/6 and 1/6 and 1/6. The amount of pizza Lacey ate can be thought of a 1/6 and 1/6. The total amount of pizza they ate is 1/6 + 1/6 + 1/6 + 1/6 + 1/6 or 5/6 of the whole pizza. • A separate algorithm for mixed numbers in addition and subtraction is not necessary. Students will tend to add or subtract the whole numbers first and then work with the fractions using the same strategies they have applied to problems that contained only fractions. Example: ○ Susan and Maria need 8 3/8 feet of ribbon to package gift baskets. Susan has 3 1/8 feet of ribbon and Maria has 5 3/8 feet of ribbon. How much ribbon do they have altogether?	problems and persevere in solving them • Reason abstractly and quantitatively • Model with mathematics	*stress that whichever model is used, it should be the same for the same whole. For example, a circular model and a rectangular model should not be used in the same problem.* • *Understanding of multiplication of whole numbers is extended to multiplying a fraction by a whole number. Allow students to use fraction models and drawing to show their understanding.* • *Present word problems involving multiplication of a fraction by a whole number. Have students solve the problems using visual models and write equations to represent the problems.* (ODE)		• 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

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Will it be enough to complete the project? Explain why or why not. The student thinks: I can add the ribbon Susan has to the ribbon Maria has to find out how much ribbon they have altogether. Susan has 3 1/8 feet of ribbon and Maria has 5 3/8 feet of ribbon. I can write this as 3 1/8 + 5 3/8. I know they have 8 feet of ribbon by adding the 3 and 5. They also have 1/8 and 3/8 which makes a total of 4/8 more. Altogether they have 8 4/8 feet of ribbon. 8 4/8 is larger than 8 3/8 so they will have enough ribbon to complete the project. They will even have a little extra ribbon left, 1/8 foot. Example: ○ Trevor has 4 1/8 pizzas left over from his soccer party. After giving some pizza to his friend, he has 2 4/8 of a pizza left. How much pizza did Trevor give to his friend? Solution: Trevor had 4 1/8 pizzas to start. This is 33/8 of a pizza. The x's show the pizza he has left which is 2 4/8 pizzas or 20/8 pizzas. The shaded rectangles without the x's are the pizza he gave to his friend which is 13/8 or 1 5/8 pizzas. (TUSD)  4.NF.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. **Major content** a. Understand a fraction a/b as a multiple of 1/b. For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4). 4.NF.4a b. Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.) 4.NF.4b		• *enVisionMath*, lessons:	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		c. Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. ○ *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers oes your answer lie*? 5.NF.4c **Essential Question** • *What models and strategies can we use to multiply a fraction by a whole number?* • *How is multiplication of fractions alike and different from multiplications of whole numbers?* **Essential knowledge and skills** • Multiplication of a fraction by a whole number can be modeled as repeated addition of the unit fraction. **Teaching Examples** Students need many opportunities to work with problems in context to understand the connections between models and corresponding equations. Contexts involving a whole number times a fraction lend themselves to modeling and examining patterns. Examples: • 3 x (2/5) = 6 x (1/5) = 6/5  • If each person at a party eats 3/8 of a pound of roast beef, and there are 5 people at the party, how many pounds of roast beef are needed? Between what two whole numbers does your answer lie? A student may build a fraction model to represent this problem. (TUSD) **Academic vocabulary** • Benchmark fraction • Denominator • Equivalent fraction • Fraction number line • Fractional part • Mixed Numbers • Numerator • Partition • Unit fraction **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Model with mathematics • Look for and make use of structure			

MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

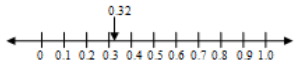
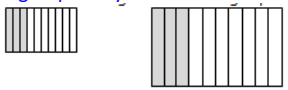
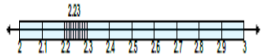
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		 3/8 + 3/8 + 3/8 + 3/8 + 3/8 = 15/8 = 1 7/8 ASSESSMENT PROBLEMS 4.NF.3 Basic • http://www.illustrativemathematics.org/illustrations/837 • http://www.k-5mathteachingresources.com/support-files/sense-or-nonsense.pdf • http://www.k-5mathteachingresources.com/support-files/decomposingfractions4nf3b.pdf • http://www.k-5mathteachingresources.com/support-files/mixed-numbers-word-problems-same-denominator.pdf 4.NF.4 Basic • http://www.k-5mathteachingresources.com/support-files/multiplying-a-number-by-a-fraction.pdf 4.NF.4 Advanced • http://www.illustrativemathematics.org/illustrations/857			
NUMBER AND OPERATIONS—FRACTIONS (4.NF) Understand decimal notation for fractions, and compare decimal fractions. Use **Mathematical Practices** to 1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others 4. Model with mathematics	M	**Students** 4.NF.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.4 **Major content** ○ *For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.* **Essential Question** • *What do benchmark fractions look like in decimal form?* **Essential knowledge and skills** • Fractions with denominators of 10 can be expressed as equivalent fractions with the denominator of 100, and can be used as a strategy for adding decimal fractions **Academic vocabulary** • Benchmark fraction • **Decimal** • **Decimal notation** • **Decimal point** • Denominator	TEACHER NOTES See instructional strategies in the introduction • *Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.* • *Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 12-3 ○ 12-4 ○ 12-51 • 10 x 10 square on a grid • Base-ten blocks • Decimal place-value mats • Length or area models • Number lines	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records

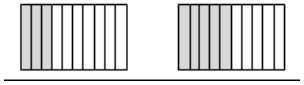
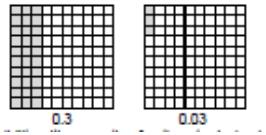
MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
★ 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning	M	**Teaching Examples** • Students can use base ten blocks, graph paper, and other place value models to explore the relationship between fractions with denominators of 10 and denominators of 100. • Students may represent 3/10 with 3 longs and may also write the fraction as 30/100 with the whole in this case being the flat (the flat represents one hundred units with each unit equal to one hundredth). Students begin to make connections to the place value chart as shown in 4.NF.6. • This work in fourth grade lays the foundation for performing operations with decimal numbers in fifth grade. (TUSD) • Equivalent fraction • Fraction number line • Fractional part • Mixed Numbers • Numerator • Partition • Unit fraction **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics • Look for and make use of structure 4.NF.6 Use decimal notation for fractions with denominators 10 or 100. **Major content** ○ *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.* **Essential Question** • *How are fractions with a denominator of 10 or 100 represented as decimals?* • *How can I order decimals on a number line?* **Essential knowledge and skills** • Decimal fractions can be recorded with decimal notation and can be illustrated on a number line. **Teaching Examples** • Students make connections between fractions with denominators of 10 and 100 and the place value chart. By reading fraction names, students say 32/100 as thirty-two hundredths and rewrite this as 0.32 or represent it on a place value model as shown below. • Students use the representations explored in 4.NF.5 to understand 32/100 can be expanded to 3/10 and 2/100. **Academic vocabulary** • Benchmark fraction • Decimal • Decimal notation • Decimal point • Denominator • Equivalent fraction • Fraction number line • Fractional part • **Hundredths** • Mixed Numbers • Numerator • Partition • **Tenths** • Unit fraction **Mathematical Practices** • Reason abstractly and quantitatively • Model with	*not a requirement at this grade* • *The place-value system developed for whole numbers extends to decimals. The concept of one whole used in fractions is extended to models of decimals.* • *Students can use base-ten blocks to represent decimals. A 10 x 10 block can be assigned the value of one whole to allow other blocks to represent tenths and hundredths. They can show a decimal representation from the base-ten blocks by shading on a 10 x 10 grid.* • *Students need to make connections between fractions and decimals. They should be able to write decimals for fractions with denominators of 10 or 100. Have students say the fraction with denominators of 10 and 100 aloud. For example $\frac{4}{10}$ would "four tenths" or $\frac{27}{100}$ would be "twenty-seven hundredths." Also, have students represent decimals in word form with digits and the decimal place value, such as $\frac{4}{10}$ would be 4 tenths.* • *Students should be able to express decimals in word form, standard form, and expanded form, e.g.* • *0.32* • *Thirty two*	• *enVisionMath*, lessons: ○ 12-1 ○ 12-3 ○ 12-5a	• 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

Hundreds	Tens	Ones	•	Tenths	Hundredths
			•	3	2

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		 • Students represent values such as 0.32 or 32/100 on a number line. 32/100 is more than 30/100 (or 3/10) and less than 40/100 (or 4/10). It is closer to 30/100 so it would be placed on the number line near that value. (TUSD) mathematics • Use appropriate tools strategically • Look for and make use of structure	*hundredths* • $(\frac{3}{10}+\frac{2}{100})$ • *In decimal numbers, the value of each place is 10 times the value of the place to its immediate right. Students need an understanding of decimal notations before they try to do conversions in the metric system. Understanding of the decimal place value system is important prior to the generalization of moving the decimal point when performing operations involving decimals.*		☐ Opinion ☐ Informative
	M	4.NF.7 Compare two decimals to hundredths by reasoning about their size. **Major content** Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model. **Essential Question** • *What is the relationship between a decimal fraction and its decimal representation?* **Essential knowledge and skills** • Comparisons are only valid when the two decimals refer to the same whole. **Teaching Examples** • Students build area and other models to compare decimals. Through these experiences and their work with fraction models, they build the understanding that comparisons between decimals or fractions are only valid when the whole is the same for both cases. Each of the models below shows 3/10 but the whole on the right is much bigger than the whole on the left. They are both 3/10 but the model on the right is a much larger quantity than the model on the left.  • When the wholes are the same, the decimals or fractions can be compared. **Academic vocabulary** • Benchmark fraction • Decimal • Decimal notation • Decimal point • Denominator • Equivalent fraction • Fraction number line • Fractional part • Mixed Numbers • Numerator • Partition • Unit fraction • Tenths • Hundredths **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics • Use appropriate tools	 • *Students extend fraction equivalence from Grade 3 with denominators of 2, 3 4, 6 and 8 to fractions with a denominator of 10. Provide fraction models of tenths and hundredths so that students can express a fraction with a denominator of 10 as an equivalent fraction with a denominator of 100.* • *When comparing two decimals, remind students that as in comparing two fractions, the decimals need to refer to the same whole. Allow students to use visual models to compare two decimals. They can shade in a representation of each decimal on a 10 x 10 grid. The 10 x 10 grid is defined*	• *enVisionMath*, lessons: ○ 12-2	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Example: • Draw a model to show that 0.3 < 0.5. (Students would sketch two models of approximately the same size to show the area that represents three-tenths is smaller than the area that represents five-tenths. (TUSD)  • Look for and make use of structure strategically ASSESSMENT PROBLEMS 4.NF.5 Basic • http://www.k-5mathteachingresources.com/support-files/equivalent-fractions-with-a-denominator-of-100-problems.pdf 4.NF.5 Advanced • http://www.illustrativemathematics.org/illustrations/153 4.NF.6 Basic • http://www.illustrativemathematics.org/illustrations/152 • http://www.k-5mathteachingresources.com/support-files/decimalriddles.pdf 4.NF.7 Basic • http://www.illustrativemathematics.org/illustrations/182 • http://www.k-5mathteachingresources.com/support-files/decimalsort4.nf7.pdf	*as one whole. The decimal must relate to the whole.*  • *Flexibility with converting fractions to decimals and decimals to fractions provides efficiency in solving problems involving all four operations in later grades.* (ODE)		
MEASUREMENT AND DATA (5.MD) Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.. 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	**S**	**Students** 4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. **Supporting content** Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table. ○ *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36), ...* **Essential Question** • *Why does "what" we measure influence "how" we measure?* • *Describe the relationship between kilograms and grams.* **Academic vocabulary** • Centimeter • Conversation table • Convert • Degree	TEACHER NOTES See instructional strategies in the introduction • *In order for students to have a better understanding of the relationships between units, they need to use measuring devices in class. The number of units needs to relate to the size of the unit. They need to discover that there are 12 inches in 1 foot and 3 feet in 1 yard. Allow students to use rulers and yardsticks to*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 16-1 ○ 16-3 ○ 16-4 ○ 16-6 ○ 16-7 ○ 16-8 ○ 16-9 • Conversion charts • Grid paper • Area models • Graduated measuring	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning		• *Why would you want to convert centimeters to meters when measuring?* **Essential knowledge and skills** • There are two distinct systems of measurement with unique units of measure for each one, Metric and Customary (sometimes referred to as U.S. Customary). • Units of measure can be expressed as whole numbers, decimals and fractions, (e.g., one inch equals 1/12th of a foot, 1 gram is .01 kilogram). • Measurements can be converted into different sized standard unit measurements within a given measurement system (i.e. cm to m) **Teaching Examples** • The units of measure that have not been addressed in prior years are pounds, ounces, kilometers, milliliters, and seconds. Students' prior experiences were limited to measuring length, mass, liquid volume, and elapsed time. Students did not convert measurements. Students need ample opportunities to become familiar with these new units of measure. • Students may use a two-column chart to convert from larger to smaller units and record equivalent measurements. They make statements such as, if one foot is 12 inches, then 3 feet has to be 36 inches because there are 3 groups of 12. Example: kg | g: 1 | 1000; 2 | 2000; 3 | 3000 ft | in: 1 | 12; 2 | 24; 3 | 36 lb | oz: 1 | 16; 2 | 32; 3 | 48 • Foot/feet • Gram • Hour • Inch • Kilogram • Length • Liter • Milliliter • Minute • Ounce • Pound • Second • Width **Mathematical Practices** • Use appropriate tools strategically • Attend to precision • Look for and make use of structure	*discover these relationships among these units of measurements. Using 12-inch rulers and yardstick, students can see that three of the 12-inch rulers, which is the same as 3 feet since each ruler is 1 foot in length, are equivalent to one yardstick. Have students record the relationships in a two column table or t-charts. A similar strategy can be used with rulers marked with centimeters and a meter stick to discover the relationships between centimeters and meters.* • *Present word problems as a source of students' understanding of the relationships among inches, feet and yards.* • *Students are to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit.* • *Present problems that involve multiplication of a fraction by a whole number (denominators are 2, 3, 4, 5 6, 8, 10, 12 and 100). Problems involving addition and subtraction of fractions should have the same denominators. Allow*	cups (marked with customary and metric units) • Teaspoons and tablespoons • Yardsticks(meter sticks) and rulers (marked with customary and metric units)	• 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
	S	4.MD.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. **Supporting content** Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.		• *enVisionMath*, lessons: ○ 1-7a ○ 11-4 ○ 12-6 ○ 13-7 ○ 16-4 ○ 16-8 ○ 16-9 ○ 16-12a ○ 16-12	

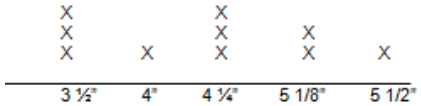
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Essential Question • *Why does "what" we measure influence "how" we measure?* • *Describe the relationship between kilograms and grams.* • *Why would you want to convert centimeters to meters when measuring?* **Essential knowledge and skills** • There are two distinct systems of measurement with unique units of measure for each one, Metric and Customary (sometimes referred to as U.S. Customary). • Units of measure can be expressed as whole numbers, decimals and fractions, (e.g., one inch equals 1/12th of a foot, 1 gram is .01 kilogram). • Measurements can be converted into different sized standard unit measurements within a given measurement system (i.e. cm to m) **Teaching Examples** Examples: • Division/fractions: Susan has 2 feet of ribbon. She wants to give her ribbon to her 3 best friends so each friend gets the same amount. How much ribbon will each friend get? • Students may record their solutions using fractions or inches. (The answer would be 2/3 of a foot or 8 inches. Students are able to express the answer in inches because they understand that 1/3 of a foot is 4 inches and 2/3 of a foot is 2 groups of 1/3.) • Addition: Mason ran for an hour and 15 minutes on Monday, 25 minutes on Tuesday, and 40 minutes on Wednesday. What was the total number of minutes Mason ran? • Subtraction: A pound of apples costs $1.20. Rachel bought a pound and a half of apples. If she gave the clerk a $5.00 bill, how much change will she get back? • Multiplication: Mario and his 2 brothers are selling lemonade. Mario brought one and a half liters, Javier brought 2 liters, and Ernesto brought 450 milliliters. How many total milliliters of lemonade did the boys have? • Number line diagrams that feature a measurement scale can represent measurement **Academic vocabulary** • Centimeter • Conversation table • Convert • Degree • Foot/feet • Gram • Hour • Inch • **Interval** • Kilogram ounce • Length • Liter • Milliliter • Minute • Pound • Second • Width **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Model with mathematics • Attend to precision • Look for and make use of structure	*students to use strategies learned with these concepts.* • *Students used models to find area and perimeter in Grade 3. They need to relate discoveries from the use of models to develop an understanding of the area and perimeter formulas to solve real-world and mathematical problems.* (ODE)		☐ Opinion ☐ Informative

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		quantities. Examples include: ruler, diagram marking off distance along a road with cities at various points, a timetable showing hours throughout the day, or a volume measure on the side of a container. (TUSD)			
	S	4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems. **Supporting content** ○ *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.* **Essential Question** • *What operations could you use to calculate the area and the perimeter of a rectangle?* • *How are the area and perimeter of a rectangle related?* • *Why does multiplying a rectangle's length by its width give you its area?* • *How can you determine the lengths of all the sides of a rectangle if you just know the length of one side and its area?* • *Why do we measure perimeter with linear units and area with square units?* **Essential knowledge and skills** • The area of a rectangular can be calculated when the lengths of two of the sides of the rectangle are known. • Knowing the area and the length of one side of a rectangle enables one to determine the lengths of the other three sides. **Teaching Examples** • Students developed understanding of area and perimeter in 3rd grade by using visual models. • While students are expected to use formulas to calculate area and perimeter of rectangles, they need to understand and be able to communicate their understanding of why the formulas work. • The formula for area is l x w and the answer will always be in square units. • The formula for perimeter can be 2 l + 2 w or 2 (l + w) and the answer will be in linear units. (TUSD) **Academic vocabulary** • Perimeter • Area **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics • Look for and make use of structure		• *enVisionMath*, lessons: ○ 14-2 ○ 14-6 ○ 14-7a	

MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		ASSESSMENT PROBLEMS 4.MD.1 Basic • http://www.k-5mathteachingresources.com/support-files/conversionwordproblems.pdf • http://www.k-5mathteachingresources.com/support-files/measurementconcentration4thgd.pdf (game) 4.MD.2 Basic • http://www.k-5mathteachingresources.com/support-files/4thgrademeasproblems.pdf 4.MD.3 Advanced • http://www.k-5mathteachingresources.com/support-files/designingazooenclosure.pdf			
MEASUREMENT AND DATA (4.MD) Represent and interpret data. Use **Mathematical Practices** to 1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others 4. Model with mathematics ★ 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning	S	**Students** 4.MD.4 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). **Supporting content** Solve problems involving addition and subtraction of fractions by using information presented in line plots. ○ *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.* **Essential Question** • *Why does "what" we measure influence "how" we measure?* • *How does the smallest data entry compare to the largest data entry?* • *How is adding/subtracting fractions similar to or different from adding/subtracting whole numbers?* **Essential knowledge and skills** • Data can be collected and represented in many ways, including graphs or line plots. • Data can be interpreted, analyzed and compared using graphs or line plots. • The foundation of a line plot is a number line. Data sets of measurements are recorded with an 'X' above the corresponding value. **Teaching Examples** Example: **Academic vocabulary** • Line plot • Numerical data • Interval **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics • Use appropriate tools strategically • Attend to precision • Look for and make use of structure	TEACHER NOTES See instructional strategies in the introduction • *Data has been measured and represented on line plots in units of whole numbers, halves or quarters. Students have also represented fractions on number lines. Now students are using line plots to display measurement data in fraction units and using the data to solve problems involving addition or subtraction of fractions.* • *Have students create line plots with fractions of a unit ($\frac{1}{2}, \frac{1}{4}, \frac{1}{8}$) and plot data showing multiple data points for each fraction.* • *Pose questions that students may answer, such as "How many one-eighths are shown on the line plot?" Expect "two one-eighths" as the answer. Then ask, "What is the*	RESOURCE NOTES See resources in the introduction • *enVisionMath*, lessons: ○ 16-12b • Fraction bars or strips	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

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Ten students in Room 31 measured their pencils at the end of the day. They recorded their results on the line plot below.  Possible questions: • What is the difference in length from the longest to the shortest pencil? • If you were to line up all the pencils, what would the total length be? If the 5 1/8" pencils are placed end to end, what would be their total length? (TUSD) ASSESSMENT PROBLEMS 4.MD.4 Advanced • http://www.k-5mathteachingresources.com/support-files/objectsinmydesklineplot.pdf (hands on activity)	*total of these two one-eighths?" Encourage students to count the fractional numbers as they would with whole-number counting, but using the fraction name.* • *"What is the total number of inches for insects measuring $\frac{3}{8}$ inches?" Students can use skip counting with fraction names to find the total, such as, "three-eighths, six-eighths, nine-eighths. The last fraction names the total. Students should notice that the denominator did not change when they were saying the fraction name. have them make a statement about the result of adding fractions with the same denominator.* • *"What is the total number of insects measuring $\frac{1}{8}$ inch or $\frac{5}{8}$ inches?" Have students write number sentences to represent the problem and solution such as, $\frac{1}{8} + \frac{1}{8} + \frac{5}{8} = + \frac{7}{8}$ inches.* • *Use visual fraction strips and fraction bars to represent problems to solve problems involving addition and subtraction of fractions.* (ODE)		• 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
MEASUREMENT AND DATA (4.MD) Geometric Measurement: understand concepts of	**A**	**Students** 4.MD.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: **Additional content**	TEACHER NOTES See instructional strategies in the introduction	RESOURCE NOTES See resources in the introduction	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON

MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

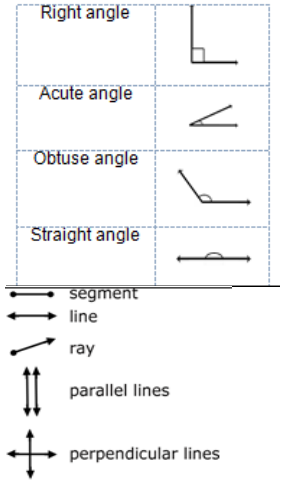
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
angle and measure angles. Use **Mathematical Practices** to 1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable 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. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. 4.MD.5a b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees. 4.MD.5b **Essential Question** • *Why does "what" we measure influence "how" we measure?* • *Where can we find angles in the world around us? How are they alike or different?* • *Who measures angles in the real world, and why do they need to measure them?* • *How can you identify and describe benchmark angles?* **Essential knowledge and skills** • An angle is formed when two rays share a common endpoint. • Angles can be measured using tools and can refer to the turn around the center of a circle. • An angle's measure is not related to the area between the two rays. • Benchmark angles include 45, 90, 180 and 360 degree angles. • Angles can be classified and sorted by the degrees of their angles (acute, obtuse, right, and straight). • Knowledge of benchmark angles can be used to find the measure of an unknown angle. • A 360 degree rotation around a point makes a complete circle. (TUSD) **Teaching Examples** **Academic vocabulary** • Angle • Benchmark angle • Degree • Endpoint • Protractor • Ray **Mathematical Practices** • Use appropriate tools strategically • Attend to precision	• *Have students draw representations of each type of angle. They also need to be able to identify angles in two-dimensional figures.* • *Students can also create an angle explorer (two strips of cardboard attached with a brass fastener) to learn about angles*  • *Students can compare angles to determine whether an angle is acute or obtuse. This will allow them to have a benchmark reference for what an angle measure should be when using a tool such as a protractor or an angle ruler.* • *Another way to compare angles is to place one angle over the other angle. Provide students with a transparency to compare two angles to help them conceptualize the spread of the rays of an angle. Students can make this comparison by tracing one angle and placing it over another angle. The side lengths of the angles to be compared need to be compared need to be different.* (ODE)	• *enVisionMath*, lessons: ○ 9-2 ○ 9-3a ○ 9-3 ○ 9-3b ○ 9-4a • Angle explorers • Angle ruler • Brass fasteners • Cardboard cut in strips to make an angle explorer • Protractor • Straws • Transparencies	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	4.MD.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure. **Additional content** **Essential Question** • *What tools could one use to make or measure angles?* **Academic vocabulary** • Rotation • Straight angle		• *enVisionMath*, lessons: ○ 9-3 ○ 9-4a	

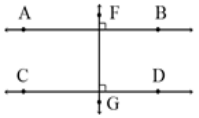
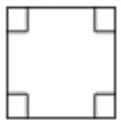
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS

		Essential knowledge and skills
		• Angles can be measured using tools and can refer to the turn around the center of a circle.
		Teaching Examples
		• Before students begin measuring angles with protractors, they need to have some experiences with benchmark angles. They transfer their understanding that a 360º rotation about a point makes a complete circle to recognize and sketch angles that measure approximately 90º and 180º. They extend this understanding and recognize and sketch angles that measure approximately 45º and 30º. They use appropriate terminology (acute, right, and obtuse) to describe angles and rays (perpendicular). (TUSD)
		• Acute angle
		• Obtuse angle
		• Right angle
		Mathematical Practices
		• Use appropriate tools strategically
		• Attend to precision
					• Problem/Performance based/common tasks
					• Tests and quizzes
					• Technology
					• Think-alouds
					• Writing genres
					  ▫ Opinion
					  ▫ Informative

	A	4.MD.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. **Additional content** Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure. **Essential Question** • *How can the measurement of a benchmark angle help you determine the measurement of an unknown angle(s)?* **Essential knowledge and skills** • Knowledge of benchmark angles can be used to find the measure of an unknown angle. **Teaching Examples** Examples • If the two rays are perpendicular, what is the value of m?  Examples: • Joey knows that when a clock's hands are exactly on 12 and 1, the angle formed by the clock's hands measures 30º. What is the measure of the angle formed when a clock's hands are exactly on the 12 and 4? **Academic vocabulary** • Rotation • Straight angle • Acute angle • Obtuse angle • Right angle **Mathematical Practices** • Make sense of problems and persevere in solving them • Model with mathematics • Attend to precision		• *enVisionMath*, lessons: ○ 9-4a	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• The five shapes in the diagram are the exact same size. Write an equation that will help you find the measure of the indicated angle. Find the angle measurement. (TUSD)  ASSESSMENT PROBLEMS 4.MD.5 Basic • http://www.k-5mathteachingresources.com/support-files/anglesinnames.pdf 4.MD.6 Basic • http://www.k-5mathteachingresources.com/support-files/predictingandmeasuringangles.pdf 4.MD.7 Basic • http://www.illustrativemathematics.org/illustrations/1168 • http://www.k-5mathteachingresources.com/support-files/anglewordproblems.pdf 4.MD.7 Advanced • http://www.k-5mathteachingresources.com/support-files/anglewordproblems.pdf			
GEOMETRY (4.G) Draw and identify lines and angles, and classify shapes by properties of their lines and angles. Use **Mathematical Practices** to 1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others	**A**	**Students** 4.G.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. **Additional content** **Essential Question** • *Which properties distinguish two-dimensional shapes from each other?* • *What tools can you use to build, draw, and analyze two-dimensional shapes?* • *How can these benchmark angles help you estimate or identify an unknown angle?* **Essential knowledge and skills** • Two-dimensional geometric figures can be analyzed, classified and compared based on their properties (i.e., symmetry, parallel sides, particular angle measures, and perpendicular **Academic vocabulary** • Acute • Angle • Benchmark angle • Degree • Hexagon • Intersecting • Line • Line segment • Obtuse	TEACHER NOTES See instructional strategies in the introduction • *Students can and should make geometric distinctions about angles without measuring or mentioning degrees. Angles should be classified in comparison to right angles, such as larger than, smaller than or the same size as a right angle.* ***Angles*** • *Students can use the corner of a sheet of paper*	RESOURCE NOTES See resources in the introduction • Geoboards • GeoGebra (a free software for learning and teaching); • Mirrors • Pattern blocks • Rulers • http://www.geogebra.com. • www.pearsonsuccessnet.com (online tools for students)	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
4. Model with mathematics ★ 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning		sides). **Teaching Examples** • Examples of points, line segments, lines, angles, parallelism, and perpendicularity can be seen daily. Students do not easily identify lines and rays because they are more abstract.  (TUSD) • Parallelogram • Pentagon • Perpendicular • Point • Polygon • Quadrilateral • Ray parallel • Rectangle • Right • Square • Straight angle • Vertex/vertices **Mathematical Practices** • Construct viable arguments and critique the reasoning of others • Use appropriate tools strategically • Look for and make use of structure	*as a benchmark for a right angle. They can use a right angle to determine relationships of other angles.* • *When introducing line of symmetry, provide examples of geometric shapes with and without lines of symmetry. Shapes can be classified by the existence of lines of symmetry in sorting activities. This can be done informally by folding paper, tracing, creating designs with tiles or investigating reflections in mirrors.* • *Two-**dimensional shapes** Informal understanding of the characteristics of triangles is developed through angle measures and side length relationships. Triangles are named according to their angle measures (right, acute or obtuse) and side lengths (scalene, isosceles or equilateral). These characteristics are used to draw triangles.* ***Symmetry*** • *With the use of a dynamic geometric program, students can easily construct points, lines and geometric figures. They can also draw lines perpendicular or parallel to other line segments.* • *Two-dimensional shapes are classified based on relationships by the angles*	• *enVisionMath*, lessons: ○ 9-1 ○ 9-2 ○ 9-3a ○ 9-3b	• 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
	A	4.G.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles. **Additional content** **Essential Question** • *Which properties distinguish two-dimensional shapes from each other?* • *How are these two lines (or these two angles) the same and/or different?* • *How can these benchmark angles help you estimate or identify an unknown angle?* **Essential knowledge and skills** • Two-dimensional geometric figures can be analyzed, classified and compared based on their properties (i.e., symmetry, parallel sides, particular angle measures, and perpendicular sides). **Academic vocabulary** • Angle • Benchmark angle • Degree • **Equilateral triangle** • Hexagon • Intersecting • **Isosceles right triangle** • Line • Line segment		• *enVisionMath*, lessons: ○ 9-4 ○ 9-5 ○ 9-6 ○ 9-7	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• Benchmark angles such as 45 degree, 90 degree, 180 degree, and 360 degree angles support the development of an understanding of all angle measurements. **Teaching Examples** • Two-dimensional figures may be classified using different characteristics such as, parallel or perpendicular lines or by angle measurement. Parallel or Perpendicular Lines: • Students should become familiar with the concept of parallel and perpendicular lines. Two lines are parallel if they never intersect and are always equidistant. Two lines are perpendicular if they intersect in right angles (90º). • Students may use transparencies with lines to arrange two lines in different ways to determine that the 2 lines might intersect in one point or may never intersect. Further investigations may be initiated using geometry software. These types of explorations may lead to a discussion on angles. • Parallel and perpendicular lines are shown below:  ○ Identify which of these shapes have perpendicular or parallel sides and justify your selection.  • A possible justification that students might give is: The square has perpendicular lines because the sides meet at a corner, forming right angles. 	• Obtuse • Parallelogram • Pentagon • Perpendicular • Point • Polygon • Quadrilateral • Ray parallel • Rectangle • Right • **Right triangle** • **Scalene right triangle** • Square • Straight angle • Vertex/vertices **Mathematical Practices** • Construct viable arguments and critique the reasoning of others • Use appropriate tools strategically • Look for and make use of structure	*and sides. Students can determine if the sides are parallel or perpendicular, and classify accordingly. Characteristics of rectangles (including squares) are used to develop the concept of parallel and perpendicular lines. The characteristics and understanding of parallel and perpendicular lines are used to draw rectangles. Repeated experiences in comparing and contrasting shapes enable students to gain a deeper understanding about shapes and their properties.* (ODE)		☐ Opinion ☐ Informative

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• Angle Measurement: • This expectation is closely connected to 4.MD.5, 4.MD.6, and 4.G.1. Students' experiences with drawing and identifying right, acute, and obtuse angles support them in classifying two-dimensional figures based on specified angle measurements. They use the benchmark angles of 90°, 180°, and 360° to approximate the measurement of angles. • Right triangles can be a category for classification. A right triangle has one right angle. There are different types of right triangles. An isosceles right triangle has two or more congruent sides and a scalene right triangle has no congruent sides. (TUSD)			
	A	4.G.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. **Additional content** **Essential Question** • *Which properties distinguish two-dimensional shapes from each other?* • *How are these two lines (or these two angles) the same and/or different?* **Essential knowledge and skills** • A line of symmetry is made when a shape or figure is folded so that the two halves match. • Spatial sense is an intuition about shapes and their relationships, including mentally visualizing objects, determining the relationships of objects to each other in space, and turning and rotating objects in the mind. **Teaching Examples** • Polygons with an odd number of sides have lines of symmetry that go from a midpoint of a side through a vertex. (TUSD) •  Triangle  Polygon  Hexagon **Academic vocabulary** • Angle • Benchmark angle • Degree • Equilateral triangle • Hexagon • Intersecting • Isosceles right triangle • Line • Line segment • Obtuse • **Orientation** • Parallelogram • Pentagon • Perpendicular • Point • Polygon • Quadrilateral		• *enVisionMath*, lessons: ○ 19-5	

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• Ray parallel • Rectangle • Right • Right triangle • Scalene right triangle • Square • Straight angle • **Symmetrical** • Vertex/vertices **Mathematical Practices** • Look for and make use of structure • Look for and express regularity in repeated reasoning ASSESSMENT PROBLEMS 4.G.1 Advanced • http://www.k-5mathteachingresources.com/support-files/anglebarriergame.pdf (game) 4.G.2 Basic • http://www.illustrativemathematics.org/illustrations/1273 4.G.3 Basic • http://www.illustrativemathematics.org/illustrations/1059 (quadrilaterals) • http://www.illustrativemathematics.org/illustrations/1058 (triangles) 4.G.3 Advanced • http://www.illustrativemathematics.org/illustrations/1060 **(circles)**			

MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

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.

	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.

MATHEMATICS CURRICULUM Grade 4

Curriculum Writers: Jennifer Hawley, Heather Ingram and Amy Wright

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.