6/1/2013

NORTH SMITHFIELD SCHOOL DEPARTMENT

MATHEMATICS CURRICULUM ACCELERATED GRADE 7

North Smithfield Middle School

Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

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

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

- *Common Core 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,* Marzano
- Differentiated Instructional Strategies
- Goals for the district
- High School Traditional Plus Model Course Sequence, Achieve, Inc.
- Khan Academy
- Numerous state curriculum Common Core frameworks, e.g. Ohio Department of Education (ODE), Tucson Unified School District, Arizona (TUSD), New Jersey and Connecticut
- PARCC Model Content Frameworks
- The Illustrative Mathematics Project
- Third International Mathematics and Science 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

The **Common Core State Standards** (**CCSS):**

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

Common Core State Standards components include:

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

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

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

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

RESEARCH-BASED INSTRUCTIONAL STRATEGIES

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

- Use **formative assessment to** guide instruction
- Use ***Classroom Instruction That Works*** (Marzano)
  - 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
- Provide opportunities for **independent, partner** and **collaborative group work**
- 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
- Provide **rubrics** and **models**

- Facilitate integration of the **Applied Learning Standards (SCANS):**
  - communication
  - critical thinking
  - problem solving
  - reflection/evaluation
  - research
- Employ strategies of "best practice" (student-centered, experiential, holistic, authentic, expressive, reflective, social, collaborative, democratic, cognitive, developmental, constructivist/heuristic, and challenging)
- 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
  - MID-TERM EXAM
  - FINAL EXAM
  - COMMON PROBLEMS/UNITS
- **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
  - Conferencing
  - Exhibits
  - Interviews
  - Graphic organizers
  - Journals
  - Mathematical Practices
  - Modeling
  - Multiple Intelligences assessments, e.g.
    - Role playing - bodily kinesthetic
    - Graphic organizing - visual
    - Collaboration - interpersonal
  - Oral presentations
  - Problem/Performance based/common tasks
  - Rubrics/checklists (mathematical practice, modeling)
  - Tests and quizzes
  - Technology
  - Think-alouds
  - Writing genres
    - Argument
    - Informative
    - Research

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RESOURCES FOR Grade 7 Accelerated Mathematics

Textbooks

- *Holt Mathematics Course 2*
- *McDougal –Littell Pre-Algebra*
- *Teaching the Common Core Math Standards,* Muschla et. al
- *Exploration in Core Math* , Holt McDougal

Supplementary

Technology

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

Websites

- http://curriculum.northsmithfieldschools.com
- http://www.achieve.org/http://my.hrw.com
- http://www.illustrativemathematics.org/standards/practice
- http://www.ixl.com/standards/common-core/math/grade-8
- http://www.ode.state.oh.us/GD/Templates/Pages/ODE/ODEDefaultPage.aspx?page=1
- http://www.ode.state.or.us/search/page/?id=3747
- http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S
- http://www.schools.utah.gov/CURR/mathsec/Core.aspx
- http://www.tusd1.org/contents/distinfo/curriculum/index.asp
- www.commoncore.org/maps
- www.corestandards.org
- www.khanacademy.com
- www.ride.ri.gov

Materials

- Algebra tiles
- Assorted fraction models
- Compasses
- Dice/number cubes or blocks
- Geometry solids
- Graph paper
- Isometric graph paper
- Number lines
- Protractors
- Road maps
- Rulers
- Tape measures
- Two color counters

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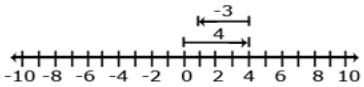
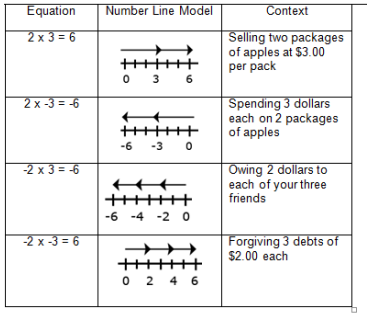
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
THE NUMBER SYSTEM (7NS) Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. Use **Mathematical Practices** 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** 7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. **Major content** a. Describe situations in which opposite quantities combine to make ○ *For example, a hydrogen atom has 0 charge because its two constituents are oppositely charged.* (7.NS.1a) b. Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts. (7.NS.1b) c. Understand subtraction of rational numbers as adding the additive inverse, $p – q = p + (–q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. (7.NS.1c) d. Apply properties of operations as strategies to add and subtract rational numbers. (7.NS.1d) **Essential question** **Essential knowledge and skills** • When opposites are combined the sum is always 0. • A positive number is represented by moving right on a number line, a negative number is represented moving left on a number line. • Absolute value is the distance that number is away from zero on a number line, also referred to as the magnitude of a number in real-world contexts. • Addition of rational numbers (p + q) is the number located a distance |q| from p, in the positive or negative direction depending on whether q is positive or negative. • Subtraction of rational numbers is the same as adding the additive inverse, p – q = p + (–q). • Distance between two rational numbers on the number line is the absolute value of their difference. **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics ★ • Attend to precision • Look for and make use of structure	TEACHER NOTES See instructional strategies in the introduction • This cluster builds upon the *understandings of rational numbers in Grade 6:* *• quantities can be shown using + or – as having opposite directions or values,* *• points on a number line show distance and direction,* *• opposite signs of numbers indicate locations on opposite sides of 0 on the number line,* *• the opposite of an opposite is the number itself,* *• the absolute value of a rational number is its distance from 0 on the number line,* *• the absolute value is the magnitude for a positive or negative quantity, and* *• locating and comparing locations on a coordinate grid by using negative and positive numbers.* • *Using both contextual and numerical problems, students should explore what happens when negatives and positives are combined. Number lines present a visual image for students to explore and record addition and subtraction results. Two-color counters or colored*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Mathematics Course 2* ○ Chapters 2, 3 • *McDougal –Littell Pre-Algebra* ○ Chapters 1,4,5 • *Teaching the Common Core Math Standards,* Muschla et. al • *Exploration in Core Math Holt McDougal* 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 Materials	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS 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

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Examples and Explanation • A hydrogen atom has 0 charge because its two constituents are oppositely charged. • You have $4 and you need to pay a friend $3. What will you have after paying your friend? 4 + (-3) = 1 or (-3) + 4 = 1 (TUSD)  (TUSD)	*chips can be used as a physical and kinesthetic model for adding and subtracting integers. With one color designated to represent positives and a second color for negatives, addition/subtraction can be represented by placing the appropriate numbers of chips for the addends and their signs on a board. Using the notion of opposites, the board is simplified by removing pairs of opposite colored chips. The answer is the total of the remaining chips with the sign representing the appropriate color. Repeated opportunities over time will allow students to compare the results of adding and subtracting pairs of numbers, leading to the generalization of the rules. Fractional rational numbers and whole numbers should be used in computations and explorations. Students should be able to give contextual examples of integer operations, write and solve equations for real-world problems and explain how the properties of operations apply. Real-world situations could include: profit/loss, money, weight, sea level, debit/credit, football yardage, etc.*	• Assorted fraction models • Calculators • Dice/number cubes • Number lines • Two-color counters • Virtual manipulatives	• Oral presentations • Problem/Performance based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres Arguments Informative Research
	M	7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. **Major content** a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts. (7.NS.2a) b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If *p* and *q* are integers, then $-\frac{p}{q}=\frac{-p}{q}=\frac{p}{-q}$. Interpret quotients of rational numbers by describing real world contexts. (7.NS.2b) c. Apply properties of operations as strategies to multiply and divide rational numbers. (7.NS.2c) d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats. (7.NS.2d) **Essential question** **Essential knowledge and skills** • Patterns and properties of operations are used to generate rules for multiplying and dividing positive and negative rational numbers. • Any rational number can be written as a fraction, decimal, percent or quotient of integers with a non-0 divisor. **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics ★ • Attend to precision • Look for and make use of structure			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• Rational numbers can be converted to a decimal that either ends in 0 or repeat. **Examples and Explanation** • Examine the family of equations. What patterns do you see? Create a model and context for each of the products. Write and model the family of equations related to 3 x 4 = 12.  (TUSD)	• *Using what students already know about positive and negative whole numbers and multiplication with its relationship to division, students should generalize rules for multiplying and dividing rational numbers. Multiply or divide the same as for positive numbers, then designate the sign according to the number of negative factors. Students should analyze and solve problems leading to the generalization of the rules for operations with integers.* (ODE)		
	M	7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers.[1] **Major content** **Essential question** **Essential knowledge and skills** • Properties of operations are used as strategies to compute real- world problems with rational numbers. **Examples and Explanation** • It took a submarine 20 seconds to drop to 100 feet below sea level from the surface. What was the rate of the descent? $\frac{-100\text{ feet}}{20\text{ seconds}} = \frac{-5\text{ feet}}{1\text{ second}} = -5\text{ft/sec}$ **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning	*Computations with rational numbers extend the rules for manipulating fractions to complex fractions*		

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Associative property of addition $(a + b) + c = a + (b + c)$

Commutative property of addition $a + b = b + a$

Additive identity property of 0 $a + 0 = 0 + a = a$

Existence of additive inverses For every a there exists $-a$ so that $a + (-a) = (-a) + a = 0$

Associative property of multiplication $(a \times b) \times c = a \times (b \times c)$

Commutative property of multiplication $a \times b = b \times a$

Multiplicative identity property of 1 $a \times 1 = 1 \times a = a$

Existence of multiplicative inverses For every $a \neq 0$ there exists $1/a$ so that $a \times 1/a = 1/a \times a = 1$

Distributive property of multiplication over addition $a \times (b + c) = a \times b + a \times c$

Academic vocabulary

- Absolute value
- Additive inverse
- Associative property distributive property, integers
- Commutative property
- Magnitude
- Opposites
- Order of operations
- Rational numbers

ASSESSMENT PROBLEMS

7.NS.1 Basic

- Integers: Absolute value and opposite integers (Seventh grade - D.3)
- Decimal numbers: Decimal number lines (Seventh grade - B.3)
- Integers: Integers on number lines (Seventh grade - D.2)
- Integers: Absolute value and opposite integers (Seventh grade - D.3)
- Integers: Integer inequalities with absolute values (Seventh grade - D.5)
- Operations with integers: Integer addition and subtraction rules (Seventh grade - E.1)
- Operations with integers: Add and subtract integers (Seventh grade - E.3)
- Operations with integers: Complete addition and subtraction sentences with integers (Seventh grade - E.4)
- Operations with integers: Add and subtract integers: word problems (Seventh grade - E.5)
- Rational numbers: Absolute value of rational numbers (Seventh grade - H.3)
- Rational numbers: Add and subtract rational numbers (Seventh grade - H.6)
- Decimal numbers: Decimal number lines (Seventh grade - B.3)
- Integers: Understanding integers (Seventh grade - D.1)
- Integers: Integers on number lines (Seventh grade - D.2)
- Operations with integers: Integer addition and subtraction rules (Seventh grade - E.1)
- Operations with integers: Add and subtract integers (Seventh grade - E.3)
- Operations with integers: Complete addition and subtraction sentences with integers (Seventh grade - E.4)
- Operations with integers: Add and subtract integers: word problems (Seventh grade - E.5)
- Rational numbers: Add and subtract rational numbers (Seventh grade - H.6)

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		• Operations with decimals: Add and subtract decimals (Seventh grade - C.1) • Operations with decimals: Simplify expressions involving decimals (Seventh grade - C.11) • Operations with integers: Simplify expressions involving integers (Seventh grade - E.9) • Operations with fractions: Add and subtract fractions (Seventh grade - G.1) • Operations with fractions: Add and subtract mixed numbers (Seventh grade - G.3) • Properties: Properties of addition and multiplication (Seventh grade - Y.1) • http://engageny.org/sites/default/files/resource/attachments/math-grade-7.pdf 7.NS.1 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7NS.aspx • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.07.sr.1.000ns.b.163_v1.pdf • http://www.illustrativemathematics.org/illustrations/310 • http://www.illustrativemathematics.org/illustrations/46 7.NS.2 Basic • Operations with integers: Integer multiplication and division rules (Seventh grade - E.6) • Operations with integers: Multiply and divide integers (Seventh grade - E.7) • Operations with integers: Complete multiplication and division sentences with integers (Seventh grade - E.8) • Rational numbers: Multiply and divide rational numbers (Seventh grade - H.7) • Properties: Distributive property (Seventh grade - Y.2) • Number theory: Multiplicative inverses (Seventh grade - A.3) • Number theory: Divisibility rules (Seventh grade - A.4) • Operations with decimals: Divide decimals by whole numbers: word problems (Seventh grade - C.6) • Operations with integers: Integer multiplication and division rules (Seventh grade - E.6) • Operations with integers: Multiply and divide integers (Seventh grade - E.7) • Operations with integers: Complete multiplication and division sentences with integers (Seventh grade - E.8) • Fractions and mixed numbers: Understanding fractions (Seventh grade - F.3) • Operations with fractions: Divide fractions and mixed numbers: word problems (Seventh grade - G.13) • Rational numbers: Multiply and divide rational numbers (Seventh grade - H.7) • Operations with decimals: Multiply decimals (Seventh grade - C.3) • Operations with decimals: Divide decimals (Seventh grade - C.5) • Operations with decimals: Simplify expressions involving decimals (Seventh grade - C.11) • Operations with integers: Simplify expressions involving integers (Seventh grade - E.9) • Operations with fractions: Multiply fractions (Seventh grade - G.7) • Operations with fractions: Multiply fractions and whole numbers (Seventh grade - G.8) • Operations with fractions: Multiply mixed numbers (Seventh grade - G.9) • Operations with fractions: Divide fractions (Seventh grade - G.11) • Operations with fractions: Divide mixed numbers (Seventh grade - G.12) • Properties: Properties of addition and multiplication (Seventh grade - Y.1)			

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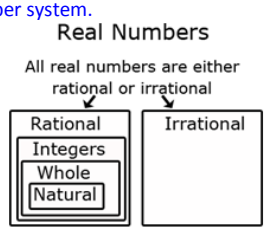
		• Number theory: Classify numbers (Seventh grade - A.10) • Rational numbers: Convert between decimals and fractions or mixed numbers (Seventh grade - H.2) • http://engageny.org/sites/default/files/resource/attachments/math-grade-7.pdf 7.NS.2 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7NS.aspx • http://www.illustrativemathematics.org/illustrations/604 • http://www.illustrativemathematics.org/illustrations/593 7.NS.3 Basic • Operations with decimals: Add and subtract decimals (Seventh grade - C.1) • Operations with decimals: Add and subtract decimals: word problems (Seventh grade - C.2) • Operations with decimals: Multiply decimals (Seventh grade - C.3) • Operations with decimals: Multiply decimals and whole numbers: word problems (Seventh grade - C.4) • Operations with decimals: Divide decimals (Seventh grade - C.5) • Operations with decimals: Divide decimals by whole numbers: word problems (Seventh grade - C.6) • Operations with decimals: Add, subtract, multiply, and divide decimals: word problems (Seventh grade - C.8) • Operations with integers: Add and subtract integers (Seventh grade - E.3) • Operations with integers: Complete addition and subtraction sentences with integers (Seventh grade - E.4) • Operations with integers: Add and subtract integers: word problems (Seventh grade - E.5) • Operations with integers: Integer multiplication and division rules (Seventh grade - E.6) • Operations with integers: Multiply and divide integers (Seventh grade - E.7) • Operations with integers: Complete multiplication and division sentences with integers (Seventh grade - E.8) • Operations with fractions: Add and subtract fractions (Seventh grade - G.1) • Operations with fractions: Add and subtract fractions: word problems (Seventh grade - G.2) • Operations with fractions: Add and subtract mixed numbers (Seventh grade - G.3) • Operations with fractions: Add and subtract mixed numbers: word problems (Seventh grade - G.4) • Operations with fractions: Inequalities with addition and subtraction of fractions and mixed numbers (Seventh grade - G.5) • Operations with fractions: Multiply fractions (Seventh grade - G.7) • Operations with fractions: Multiply fractions and whole numbers (Seventh grade - G.8) • Operations with fractions: Multiply mixed numbers (Seventh grade - G.9) • Operations with fractions: Multiply fractions and mixed numbers: word problems (Seventh grade - G.10) • Operations with fractions: Divide fractions (Seventh grade - G.11)			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• Operations with fractions: Divide mixed numbers (Seventh grade - G.12) • Operations with fractions: Divide fractions and mixed numbers: word problems (Seventh grade - G.13) • Operations with fractions: Add, subtract, multiply, and divide fractions and mixed numbers: word problems (Seventh grade - G.15) • Rational numbers: Add and subtract rational numbers (Seventh grade - H.6) • Rational numbers: Multiply and divide rational numbers (Seventh grade - H.7) • Consumer math: Add, subtract, multiply, and divide money amounts: word problems (Seventh grade - L.1) • Consumer math: Price lists (Seventh grade - L.2) 7.NS.3 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7NS.aspx • http://www.illustrativemathematics.org/illustrations/298			
THE NUMBER SYSTEM **The Real Number System (N-RN)** Know that there are numbers that are not rational, and approximate them by rational numbers	**S**	**Students** 8.NS.1 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. **Supporting content** **Essential question** **Essential knowledge and skills** • The real numbers system contains both rational and irrational numbers. The set of rational numbers contain subsets of numbers that build on each other. • Every rational number can be written as a ratio of two quantities $\frac{a}{b}$ and as a decimal. • Every real number has a decimal expansion; rational numbers have a decimal expansion that will either terminate or repeat, where as irrational numbers have a decimal expansion that will not terminate or repeat. • Square roots of perfect squares are rational numbers; where as square roots of non-perfect squares are irrational numbers. **Teaching Examples** • Students can use graphic organizers to show the relationship between the subsets of the real **Mathematical Practices** • Reason abstractly and quantitatively • Attend to precision • Look for and make use of structure	TEACHER NOTES See instructional strategies in the introduction • *The distinction between rational and irrational numbers is an abstract distinction, originally based on ideal assumptions of perfect construction and measurement. In the real world, however, all measurements and constructions are approximate. Nonetheless, it is possible to see the distinction between rational and irrational numbers in their decimal representations.* • *A rational number is of the form a/b, where a and b are both integers, and b is not 0. In the elementary grades, students learned processes that can be used to locate any rational number on the number*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* • *McDougal –Littell Algebra 1* • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al* 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	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		number system.  • Students convert the fraction $\frac{2}{3}$ to a decimal and determine if the number is rational or irrational $\frac{2}{3} = 3\overline{)2.00} = 0.\overline{66}$ s So this is rational because it repeats itself . (TUSD)	*line: Divide the interval from 0 to 1 into b equal parts; then, beginning at 0, count out a of those parts. The surprising fact, now, is that there are numbers on the number line that cannot be expressed as a/b, with a and b both integers, and these are called irrational numbers.* (ODE)	• 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 Materials • Calculator • Number lines	• Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. ▫ Role playing - bodily kinesthetic ▫ Graphic organizing - visual ▫ Collaboration - interpersonal • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ▫ Arguments ▫ Informative ▫ Research
	S	8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). **Supporting content** • For example, by truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$, is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations. **Essential question** **Essential knowledge and skills** • Irrational numbers (such as π *or* $\sqrt{2}$) are estimated using truncated decimal expansions, in order to be able to compare and place them on a number line in order from least to greatest. **Teaching Examples** • Students approximate square roots by iterative processes. *Examples*: • Approximate the value of to the nearest hundredth. Solution: Students start with a rough estimate based upon perfect squares. $\sqrt{5}$ falls between 2 and 3 because 5 falls between $2^2 = 4$ and $3^2 = 9$. **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics ★ • Look for and make use of structure • Look for and express regularity in repeated reasoning		

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

The value will be closer to 2 than to 3. Students continue the iterative process with the tenths place value. $\sqrt{5}$ falls between 2.22 and 2.3 because 5 falls between $2.2^2 = 4.84$ and $2.3^2 = 5.29$. The value is closer to 2.2. Further iteration shows that the value of $\sqrt{5}$ is between 2.23 and 2.24 since 2.23^2 is 4.9729 and 2.242 is 5.0176.

- By truncating the decimal expansion of $\sqrt{2}$, show that $\sqrt{2}$ is between 1and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.
- Compare $\sqrt{2}$and $\sqrt{3}$by estimating their values, plotting them on a number line, and making comparative statements. (TUSD)

Academic vocabulary

- Decimal expansion
- Estimate
- Fraction
- Integer
- Irrational number
- Iterative process
- Natural Number
- Number line
- Perfect Square
- Ratio
- Rational number
- Real Number
- Repeating decimal
- Square (x^2)
- Subset
- Terminating decimal
- Whole Number

ASSESSMENT PROBLEMS

8.NS.1 Basic

- Rational numbers: Identify rational and irrational numbers (Eighth grade - D.1)
- Rational numbers: Convert between decimals and fractions or mixed numbers (Eighth grade - D.6)

8.NS.1 Advanced

- http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-NS-1.aspx
- http://www.illustrativemathematics.org/illustrations/334

8.NS.2 Basic

- Exponents and roots: Estimate positive and negative square roots (Eighth grade - F.15)
- Exponents and roots: Estimate cube roots (Eighth grade - F.19)

8.NS.2 Advanced

- http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-NS-1.aspx
- http://www.illustrativemathematics.org/illustrations/337
- http://www.illustrativemathematics.org/illustrations/336

MATHEMATICS CURRICULUM Accelerated 7

Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
EXPRESSIONS AND EQUATIONS (8.EE) Work with radicals and integer exponents. Use **Mathematical Practices** to ☐ 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	**M** **M**	**Students** 8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. **Major content** • *For example,* $3^2 \times 3^{-5} = 3^{-3} = \frac{1}{3^3} = \frac{1}{27}$. **Essential question** **Essential knowledge and skills** • Properties of integer exponents are used to simplify and create equivalent forms of numerical expressions. **Teaching Examples** • $\frac{4^3}{5^2} = \frac{64}{25}$ • $\frac{4^3}{4^7} = 4^{3-7} = 4^{-4} = \frac{1}{4^4} = \frac{1}{256}$ • $\frac{4^{-3}}{5^2} = 4^{-3} \times \frac{1}{5^2} = \frac{1}{4^3} \times \frac{1}{5^2} = \frac{1}{64} \times \frac{1}{25} = \frac{1}{16,000}$ **Mathematical Practices** • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Use appropriate tools strategically • Attend to precision • Look for and make use of structure 8.EE.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. **Major content** Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational **Essential question** **Essential knowledge and skills** • The inverse operation of squaring a number is finding the square root. • The inverse operation of cubing a number is finding the cube root. **Teaching Examples** **Mathematical Practices** • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Use appropriate tools strategically • Attend to precision • Look for and make	TEACHER NOTES See instructional strategies in the introduction • *Although students begin using whole-number exponents in Grades 5 and 6, it is in Grade 8 when students are first expected to know and use the properties of exponents and to extend the meaning beyond counting-number exponents. It is no accident that these expectations are simultaneous, because it is the properties of counting-number exponents that provide the rationale for the properties of integer exponents. In other words, students should not be told these properties but rather should derive them through experience and reason.* • *For counting-number exponents (and for nonzero bases), the following properties follow directly from the meaning of exponents.* $a^m a^n = a^{m+n}$ $(a^m)n = a^{m+n}$ $a^m b^m = (ab)^m$ *Students should have experience simplifying numerical expressions with exponents so that these properties become natural and obvious. For example,*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* • *McDougal –Littell Algebra 1* • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al* 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 • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS 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

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Examples: • $3^2 = 9$ and $\sqrt{9} = \pm 3$ • $\left(\frac{1}{3}\right)^3 = \left(\frac{1^3}{3^3}\right) = \frac{1}{27}$ and $\sqrt[3]{\frac{1}{27}} = \frac{\sqrt[3]{1}}{\sqrt[3]{27}} = \frac{1}{3}$ • Solve $x^2 = 9$ Solution: $x^2 = 9$ $\sqrt{x^2} = \pm\sqrt{9}$ $x = \pm 3$ • Solve $x^3 = 8$ Solution: $x^3 = 8$ $\sqrt[3]{x^3} = \sqrt[3]{8}$ $x = 2$ use of structure Know that $\sqrt{2}$ is a rational (TUSD)			
	M	8.EE.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. **Major content** • *For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.* **Essential question** **Essential knowledge and skills** • Very large and very small numbers are represented using a single digit times an integer power of 10 (scientific notation). • Decimal form can be converted to scientific notation and vice-versa. **Teaching Examples** • Students have previously worked with powers of 10 and decimal placement in 5th grade. For example in 5th grade they look at the patterns on placement of the decimal points when a decimal is multiplied or divided by a positive power of ten. ○ Example from 5th grade document page 7 "Students should be able to use the same type of reasoning as above to explain why the following multiplication and division problem by powers of 10 make sense. **Mathematical Practices** • Reason abstractly and quantitatively • Use appropriate tools strategically • Attend to precision	$2^3 \cdot 2^5 = (2 \cdot 2 \cdot 2)(2 \cdot 2 \cdot 2 \cdot 2 \cdot 2) = 2^8$ $(5^3)^4 = (5 \cdot 5 \cdot 5)\ (5 \cdot 5 \cdot 5)\ (5 \cdot 5 \cdot 5)\ (5 \cdot 5 \cdot 5) = 5^{12}$ $(3 \cdot 7)^4 = (3 \cdot 7)\ (3 \cdot 7)\ (3 \cdot 7)\ (3 \cdot 7) = (3 \cdot 3 \cdot 3 \cdot 3)\ (7 \cdot 7 \cdot 7) = 3^4 \cdot 7^4$ • *If students reason about these examples with a sense of generality about the numbers, they begin to articulate the properties. For example, "I see that 3 twos is being multiplied by 5 twos, and the results is 8 twos being multiplied together, where the 8 is the sum of 3 and 5, the number of twos in each of the original factors. That would work for a base other than two (as long as the bases are the same)."* (ODE)	Materials • Calculators to verify and explore patterns • Number lines • Place value charts to connect the digit value to the exponent (negative and positive) • Square tiles and cubes to develop understanding of squared and cubed numbers	• Collaboration - interpersonal • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ○ Arguments ○ Informative ○ Research

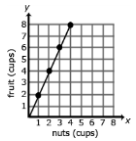
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• $523 \times 10^3 = 523{,}000$ The place value of 523 is increased by 3 places. • $5.223 \times 10^2 = 522.3$ The place value of 5.223 is increased by 2 places. • $52.3 \div 10^1 = 5.23$ The place value of 52.3 is decreased by one place." (TUSD)			
	M	8.EE.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology. **Major content** **Essential question** **Essential knowledge and skills** • Operations and rules for exponents are used to determine the value and/or compare numbers in both decimal and scientific notation. • Calculators and computers display scientific notation in different formats. **Teaching Examples** • Students can convert decimal forms to scientific notation and apply rules of exponents to simplify expressions. • In working with calculators or spreadsheets, it is important that students recognize scientific notation. Students should recognize that the output of 2.45E+23 is 2.45 x 1023 and 3.5E-4 is 3.5 x 10-4. Students enter scientific notation using E or EE (scientific notation), * (multiplication), and ^ (exponent) symbols. (TUSD) **Mathematical Practices** • Reason abstractly and quantitatively • Use appropriate tools strategically • Attend to precision ASSESSMENTS 8.EE.1 Basic • Exponents and roots: Understanding exponents (Eighth grade - F.1) • Exponents and roots: Evaluate exponents (Eighth grade - F.2) • Exponents and roots: Exponents: solve for the variable (Eighth grade - F.3) • Exponents and roots: Exponents with negative bases (Eighth grade - F.4) • Exponents and roots: Exponents with decimal and fractional bases (Eighth grade - F.5)			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• Exponents and roots: Understanding negative exponents (Eighth grade - F.6) • Exponents and roots: Evaluate negative exponents (Eighth grade - F.7) • Exponents and roots: Multiplication with exponents (Eighth grade - F.8) • Exponents and roots: Division with exponents (Eighth grade - F.9) • Exponents and roots: Multiplication and division with exponents (Eighth grade - F.10) • Exponents and roots: Power rule (Eighth grade - F.11) • Exponents and roots: Simplify expressions involving exponents (Eighth grade - F.12) • Monomials and polynomials: Multiply monomials (Eighth grade - Z.6) • Monomials and polynomials: Divide monomials (Eighth grade - Z.7) • Monomials and polynomials: Multiply and divide monomials (Eighth grade - Z.8) • Monomials and polynomials: Powers of monomials (Eighth grade - Z.9) 8.EE.1 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-EE-1.aspx • http://www.illustrativemathematics.org/illustrations/823 • http://www.illustrativemathematics.org/illustrations/395 8.EE.2 Basic • Rational numbers: Identify rational and irrational numbers (Eighth grade - D.1) • Exponents and roots: Square roots of perfect squares (Eighth grade - F.13) • Exponents and roots: Positive and negative square roots (Eighth grade - F.14) • Exponents and roots: Relationship between squares and square roots (Eighth grade - F.16) • Exponents and roots: Evaluate variable expressions involving squares and square roots (Eighth grade - F.17) • Exponents and roots: Cube roots of perfect cubes (Eighth grade - F.18) 8.EE.2 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-EE-1.aspx 8.EE.3 Basic • Scientific notation: Convert between standard and scientific notation (Eighth grade - G.1) • Scientific notation: Compare numbers written in scientific notation (Eighth grade - G.2) 8.EE.3 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-EE-1.aspx • http://www.illustrativemathematics.org/illustrations/476 8.EE.4 Basic • Scientific notation: Convert between standard and scientific notation (Eighth grade - G.1) • Scientific notation: Multiply numbers written in scientific notation (Eighth grade - G.3) • Scientific notation: Divide numbers written in scientific notation (Eighth grade - G.4) 8.EE.4 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-EE-1.aspx • http://www.illustrativemathematics.org/illustrations/823 • http://www.illustrativemathematics.org/illustrations/113			

MATHEMATICS CURRICULUM Accelerated 7

Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
RATIOS AND PROPORTIONAL RELATIONSHIPS (7.RP) Analyze proportional relationships and use them to solve real-world and mathematical problems. Use **Mathematical Practices** to ☐ 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	**M** **M**	**Students** 7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. **Major content** ○ *For example, if a person walks $\frac{1}{2}$ mile in each $\frac{1}{4}$ hour, compute the unit rate as the complex fraction $\frac{\frac{1}{2}}{\frac{1}{4}}$ miles per hour, equivalently 2 miles per hour.* **Essential question** **Essential knowledge and skills** • A ratio is a comparison of two quantities (by division) and usually represents a part-to-part comparison. • A fraction is usually a part to whole comparison or represents a division problem. • A quotient of a ratio is a unit rate. (TUSD) **Mathematical Practices** • Reason abstractly and quantitatively • Look for and make use of structure 7.RP.2 Recognize and represent proportional relationships between quantities. **Major content** a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. (7.RP.2a) b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. (7.RP.2b) c. Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn. (7.RP.2c) d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate. (7.RP.2d)	TEACHER NOTES See instructional strategies in the introduction • Building *from the development of rate and unit concepts in Grade 6, applications now need to focus on solving unit-rate problems with more sophisticated numbers: fractions per fractions.* • Proportional *relationships are further developed through the analysis of graphs, tables, equations and diagrams. Ratio tables serve a valuable purpose in the solution of proportional problems. This is the time to push for a deep understanding of what a representation of a proportional relationship looks like and what the characteristics are: a straight line through the origin on a graph, a "rule" that applies for all ordered pairs, an equivalent ratio or an expression that describes the situation, etc. (This is not the time for students to rely solely on cross products to solve proportions).* • Because *percents have been introduced as rates in Grade 6, the work with percents should continue to follow the thinking involved with rates and proportions. Solutions to problems can be found by*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* ○ chapter 5,6 ○ chapter 4 • *McDougal –Littell Algebra 1* ○ chapter 2, p. 76 ○ chapters 6,7,8 • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al* 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	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS 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 -

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Essential question **Essential knowledge and skills** • Proportionality can be determined by equivalent ratios, a constant of proportionality, or a unit rate. • Proportionality can be determined from a graph, table, or equation by finding a constant of proportionality (unit rate). • Unit rate is the slope of a proportional relationship that, when graphed, is a linear equation that goes through the origin. • Linear equations when graphed are straight lines. • Every point on a graph of a proportional relationship has a meaning in terms of the situation. **Examples and Explanation** • A student is making trail mix. Create a graph to determine if the quantities of nuts and fruit are proportional for each serving size listed in the table. If the quantities are proportional, what is the constant of proportionality or unit rate that defines the relationship? Explain how you determined the constant of proportionality and how it relates to both the table and graph. • <table><tr><td>**Serving Size**</td><td>**1**</td><td>**2**</td><td>**3**</td><td>**4**</td></tr><tr><td>Cups of Nuts (x)</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Cups of Fruit (y)</td><td>2</td><td>4</td><td>6</td><td>8</td></tr></table>  The relationship is proportional. For each of the other serving sizes there are 2 cups of fruit for every 1 cup of nuts (2:1). The constant of proportionality is shown in the first column of the table and by the slope of the line on the graph. • The graph below represents the cost of gum packs as a unit rate of $2 dollars for every pack of gum. The unit rate is represented as $2/pack. Represent the relationship using a table and an equation. **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning	*using the same strategies for solving rates, such as looking for equivalent ratios or based upon understandings of decimals. Previously, percents have focused on "out of 100"; now percents above 100 are encountered.* • Providing *opportunities to solve problems based within contexts that are relevant to seventh graders will connect meaning to rates, ratios and proportions. Examples include: researching newspaper ads and constructing their own question(s), keeping a log of prices (particularly sales) and determining savings by purchasing items on sale, timing students as they walk a lap on the track and figuring their rates, creating open-ended problem scenarios with and without numbers to give students the opportunity to demonstrate conceptual understanding, inviting students to create a similar problem to a given problem and explain their reasoning.* (ODE)	• http://www.tusd1.org/contents/distinfo/curriculum/index.asp • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.ride.ri.gov Materials • Advertisements in newspapers • Graph paper • Road maps • Unlimited manipulatives or tools (don't restrict the tools to one or two, give students many options)	interpersonal • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ▫ Arguments ▫ Informative ▫ Research

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

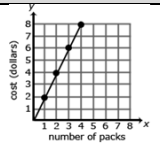


Table:

Number of Packs of Gum (*g*)	Cost in Dollars (*d*)
0	0
1	2
2	4
3	6
4	8

Equation: d = 2g, where d is the cost in dollars and g is the packs of gum

- If total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.
- A common error is to reverse the position of the variables when writing equations. Students may find it useful to use variables specifically related to the quantities rather than using x and y. Constructing verbal models can also be helpful. A student might describe the situation as "the number of packs of gum times the cost for each pack is the total cost in dollars". They can use this verbal model to construct the equation. Students can check their equation by substituting values and comparing their results to the table. The checking process helps student revise and recheck their model as necessary. The number of packs of gum times the cost for each pack is the total cost (g x 2 = d). (TUSD)

M 7.RP.3 Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error. **Major content**

Essential question

Essential knowledge and skills

- Ratio can be extended into solving single and multi-step proportionality problems and percent

Mathematical Practices

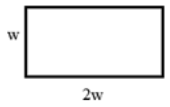
- Model with mathematics ★
- Use appropriate tools

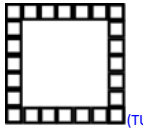
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		problems. **Examples and Explanation** • Gas prices are projected to increase 124% by April 2015. A gallon of gas currently costs $4.17. What is the projected cost of a gallon of gas for April 2015? • A student might say: "The original cost of a gallon of gas is $4.17. An increase of 100% means that the cost will double. I will also need to add another 24% to figure out the final projected cost of a gallon of gas. Since 25% of $4.17 is about $1.04, the projected cost of a gallon of gas should be around $9.40." $4.17 + $4.17 + (0.24 • $4.17) = $2.24 x $4.17 100% | 100% | 24% $4.17 | $4.17 | ? • A sweater is marked down 33%. Its original price was $37.50. What is the price of the sweater before sales tax? 37.50 Original Price of Sweater 33% of 37.50 | 67% of 37.50 Sale price of sweater • The discount is 33% times $37.50. The sale price of the sweater is the original price minus the discount or 67% of the original price of the sweater, or Sale Price = 0.67 x Original Price. • A shirt is on sale for 40% off. The sale price is $12. What was the original price? What was the amount of the discount? Discount 40% of original price | Sale Price - $12 60% of original price Original Price (p) • At a certain store, 48 television sets were sold in April. The manager at the store wants to encourage the sales team to sell more TVs and is going to give all the sales team members a bonus if the number of TVs sold increases by 30% in May. How many TVs must the sales team sell in May to receive the bonus? Justify your solution. • After eating at a restaurant, your bill before tax is $52.60 The sales tax rate is 8%. You decide to leave a 20% tip for the waiter based on the pre-tax amount. How much is the tip you leave for the	strategically • Attend to precision • Look for and make use of structure		

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		waiter? How much will the total bill be, including tax and tip? Express your solution as a multiple of the bill. • The amount paid = 0.20 x $52.50 + 0.08 x $52.50 = 0.28 x $52.50 • Finding the percent error is the process of expressing the size of the error (or deviation) between two measurements. To calculate the present error, students determine the absolute deviation (positive difference) between an equal measurement and the accepted value and then divide by the accepted value. Multiplying by 100 will give the percent error. (Note the similarity between percent and percent of increase or decrease) % error = $\frac{\lvert \text{estimated value} - \text{actual value} \rvert}{\text{actual value}} \times 100\%$ Example: A student measures the volume of a 2.50 liter container to be 2.38 liters. What is the percent error in the student's measurement? • Answer: % error = $\frac{(2.50 \text{ liters} - 2.38 \text{ liters})}{2.50 \text{ liters}} \times 100\%$ $= \frac{(.12 \text{ liters})}{2.50 \text{ liters}} \times 100\%$ $= .048 \times 100\%$ (TUSD) **Academic vocabulary** • Dependent • Equivalent ratios • Independent • Linear relationship • Proportion • Rate • Ratio • Rise • Run • Scale/scale factor • Scale/scale factor • Steepness • Unit rate • X-intercept • Y-intercept ASSESSMENT PROBLEMS 7.RP.1 Basic • Operations with fractions: Divide fractions and mixed numbers: word problems (Seventh grade - G.13) • Ratios and proportions: Understanding ratios (Seventh grade - J.1) • Ratios and proportions: Unit rates (Seventh grade - J.5) • Consumer math: Unit prices (Seventh grade - L.3) • Consumer math: Unit prices with unit conversions (Seventh grade - L.4)			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		7.RP.1 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7RP.aspx • http://www.illustrativemathematics.org/illustrations/470 7.RP.2 Basic • Operations with fractions: Divide fractions and mixed numbers: word problems (Seventh grade - G.13) • Ratios and proportions: Understanding ratios (Seventh grade - J.1) • Ratios and proportions: Unit rates (Seventh grade - J.5) • Consumer math: Unit prices (Seventh grade - L.3) • Consumer math: Unit prices with unit conversions (Seventh grade - L.4) • Ratios and proportions: Equivalent ratios (Seventh grade - J.2) • Ratios and proportions: Equivalent ratios: word problems (Seventh grade - J.3) • Ratios and proportions: Do the ratios form a proportion? (Seventh grade - J.6) • Ratios and proportions: Do the ratios form a proportion: word problems (Seventh grade - J.7) • Linear functions: Identify proportional relationships (Seventh grade - X.1) • Linear functions: Find the constant of variation (Seventh grade - X.2) • Ratios and proportions: Solve proportions (Seventh grade - J.8) • Ratios and proportions: Solve proportions: word problems (Seventh grade - J.9) • Proportional relationships: Write an equation for a proportional relationship (Eighth grade - I.5) • Ratios and proportions: Estimate population size using proportions (Seventh grade - J.10) • Percents: Estimate percents of numbers (Seventh grade - K.4) • Percents: Percents of numbers and money amounts (Seventh grade - K.5) • Percents: Percents of numbers: word problems (Seventh grade - K.6) • Percents: Solve percent equations (Seventh grade - K.7) • Percents: Solve percent equations: word problems (Seventh grade - K.8) • Percents: Percent of change (Seventh grade - K.9) • Percents: Percent of change: word problems (Seventh grade - K.10) • Consumer math: Unit prices with unit conversions (Seventh grade - L.4) • Consumer math: Unit prices: find the total price (Seventh grade - L.5) • Consumer math: Percent of a number: tax, discount, and more (Seventh grade - L.6) • Consumer math: Find the percent: tax, discount, and more (Seventh grade - L.7) • Consumer math: Sale prices: find the original price (Seventh grade - L.8) • Consumer math: Multi-step problems with percents (Seventh grade - L.9) • Consumer math: Estimate tips (Seventh grade - L.10) • Consumer math: Simple interest (Seventh grade - L.11) • Consumer math: Compound interest (Seventh grade - L.12) • Probability: Experimental probability (Seventh grade - Z.3) • http://engageny.org/sites/default/files/resource/attachments/math-grade-7.pdf 7.RP.2 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7RP.aspx			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.07.sr.1.0000g.e.161_v1.pdf • http://www.illustrativemathematics.org/illustrations/100 • http://www.illustrativemathematics.org/illustrations/104 7.RP.3 Basic • Ratios and proportions: Estimate population size using proportions (Seventh grade - J.10) • Percents: Estimate percents of numbers (Seventh grade - K.4) • Percents: Percents of numbers and money amounts (Seventh grade - K.5) • Percents: Percents of numbers: word problems (Seventh grade - K.6) • Percents: Solve percent equations (Seventh grade - K.7) • Percents: Solve percent equations: word problems (Seventh grade - K.8) • Percents: Percent of change (Seventh grade - K.9) • Percents: Percent of change: word problems (Seventh grade - K.10) • Consumer math: Unit prices with unit conversions (Seventh grade - L.4) • Consumer math: Unit prices: find the total price (Seventh grade - L.5) • Consumer math: Percent of a number: tax, discount, and more (Seventh grade - L.6) • Consumer math: Find the percent: tax, discount, and more (Seventh grade - L.7) • Consumer math: Sale prices: find the original price (Seventh grade - L.8) • Consumer math: Multi-step problems with percents (Seventh grade - L.9) • Consumer math: Estimate tips (Seventh grade - L.10) • Consumer math: Simple interest (Seventh grade - L.11) • Consumer math: Compound interest (Seventh grade - L.12) • Probability: Experimental probability (Seventh grade - Z.3) • http://engageny.org/sites/default/files/resource/attachments/math-grade-7.pdf 7.RP.3 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7RP.aspx • http://www.illustrativemathematics.org/illustrations/765 • http://www.illustrativemathematics.org/illustrations/266			
EXPRESSIONS AND EQUATIONS (7.EE) Use properties of operations to generate equivalent expressions Use **Mathematical Practices** to ☐ Make sense of problems and persevere in solving them	**M**	**Students** 7.EE.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. **Major content** **Essential question** **Essential knowledge and skills** • Properties of operations can be used to form equivalent forms of linear expressions. **Mathematical Practices** • Reason abstractly and quantitatively • Attend to precision	TEACHER NOTES See instructional strategies in the introduction • *Have students build on their understanding of order of operations and use the properties of operations to rewrite equivalent numerical expressions that were*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* ○ Chapters 1,5,12 • *McDougal –Littell Algebra 1*	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
☐ 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		**Examples and Explanation** • Suzanne thinks the two expressions 2(3a-2)+4 and 10a – 2 are equivalent? Is she correct? Explain why or why not? • A rectangle is twice as long as wide. One way to write an expression to find the perimeter would be . Write the expression in two other ways. • Solution: $6w$ OR $2(w)+2(2w)$.  • An equilateral triangle has a perimeter of 6x+15 . What is the length of each of the sides of the triangle? • Solution: $3(2x+5)$, therefore each side is $2x+5$ units long. (TUSD) • Look for and make use of structure	*developed in Grade 6. Students continue to use properties that were initially used with whole numbers and now develop the understanding that properties hold for integers, rational and real numbers.* • *Provide opportunities to build upon this experience of writing expressions using variables to represent situations and use the properties of operations to generate equivalent expressions. These expressions may look different and use different numbers, but the values of the expressions are the same.* • *Provide opportunities for students to experience expressions for amounts of increase and decrease. In Standard 2, the expression is rewritten and the variable has a different coefficient. In context, the coefficient aids in the understanding of the situation. Another example is this situation which represents a 10% decrease: b - 0.10b = 1.00b - 0.10b which equals 0.90b or 90% of the amount.* • *One method that students can use to become convinced that expressions are equivalent is by substituting a numerical value for the variable and evaluating the expression.*	○ Chapters 2, 5,7 • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al* 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 Materials • Algebra tiles or on-line • Algebra tiles • Calculators	PROBLEMS/UNITS SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. ☐ Role playing - bodily kinesthetic ☐ Graphic organizing - visual ☐ Collaboration - interpersonal • Oral presentations • Problem based/common tasks • Rubrics/checklists
	M	7.EE.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. **Major content** ○ For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05." **Essential question** **Essential knowledge and skills** • Different forms of equivalent expression show different aspects of a problem. • Expressions and equations can be written in different forms depending on the context of the problem and how the quantities within it are related. **Examples and Explanation** Examples: • Jamie and Ted both get paid an equal hourly wage of $9 per hour. This week, Ted made an additional $27 dollars in overtime. Write an expression that represents the weekly wages of both if J = the number of hours that Jamie worked this week and T = the number of hours Ted worked this week? Can you write the expression in another way? **Mathematical Practices** • Reason abstractly and quantitatively • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning			

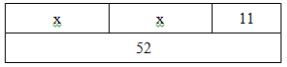
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• Example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05." Students may create several different expressions depending upon how they group the quantities in the problem. One student might say: To find the total wage, I would first multiply the number of hours Jamie worked by 9. Then I would multiply the number of hours Ted worked by 9. I would add these two values with the $27 overtime to find the total wages for the week. The student would write the expression $9J+9T+27$. Another student might say: To find the total wages, I would add the number of hours that Ted and Jamie worked. I would multiply the total number of hours worked by 9. I would then add the overtime to that value to get the total wages for the week. The student would write the expression $9(J+T)+27$ A third student might say: To find the total wages, I would need to figure out how much Jamie made and add that to how much Ted made for the week. To figure out Jamie's wages, I would multiply the number of hours she worked by 9. To figure out Ted's wages, I would multiply the number of hours he worked by 9 and then add the $27 he earned in overtime. My final step would be to add Jamie and Ted wages for the week to find their combined total wages. The student would write the expression $(9J)+(9T+27)$ • Given a square pool as shown in the picture, write four different expressions to find the total number of tiles in the border. Explain how each of the expressions relates to the diagram and demonstrate that the expressions are equivalent. Which expression do you think is most useful? Explain your thinking.  (TUSD) **Academic vocabulary**	*For example 5(3 + 2x) is equal to5●3 + 5●2x Let x = 6 and substitute 6 for x in both equations.* (ODE) 5(3 + 2•6) 5(3 + 12) 5(15) 75 5•3 + 5•2•6 15 + 60 75		(mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ▫ Arguments ▫ Informative ▫ Research

MATHEMATICS CURRICULUM Accelerated 7

Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		ASSESSMENT PROBLEMS 7.EE.1 Basic • Variable expressions: Add and subtract like terms (Seventh grade - U.6) • Properties: Properties of addition and multiplication (Seventh grade - Y.1) • Properties: Distributive property (Seventh grade - Y.2) • Properties: Simplify variable expressions using properties (Seventh grade - Y.3) • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.07.sr.1.000ee.c.162_v1.pdf • http://engageny.org/sites/default/files/resource/attachments/math-grade-7.pdf 7.EE.1 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7EE1.aspx • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.07.cr.1.000ee.c.296_v1.pdf • http://engageny.org/sites/default/files/resource/attachments/math-grade-7.pdf • http://www.opusmath.com/common-core-standards/7.ee.1-apply-properties-of-operations-as-strategies-to-add-subtract-factor-and 7.EE.2 Basic • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.07.sr.1.000ee.c.162_v1.pdf 7.EE.2 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7EE1.aspx • http://www.illustrativemathematics.org/illustrations/433			
EQUATIONS (7.EE) Solve real-life and mathematical problems using numerical and algebraic expressions and equations. Use **Mathematical Practices** to ☐ Make sense of problems and persevere in solving them ☐ Reason abstractly and quantitatively ☐ Construct viable arguments and critique the reasoning of	**M**	**Students** 7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. **Major content** Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. ○ *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*	TEACHER NOTES See instructional strategies in the introduction • *To assist students' assessment of the reasonableness of answers, especially problem situations involving fractional or decimal numbers, use whole-number approximations for the computation and then compare to the actual computation. Connections between performing the inverse operation and*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* ○ Chapters 5,6,12 • *McDougal –Littell Algebra 1* ○ Chapters 3,7 • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al*	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
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		**Essential question** **Essential knowledge and skills** • Mental math and estimation strategies for calculations in problem solving contexts extend from students' work with whole number operations and are used to check reasonableness of answers. • Students can fluently move between fractions, decimals and percents in order to solve multi-step real world and mathematical problems. **Examples and Explanation** • Estimation strategies for calculations with fractions and decimals extend from students' work with whole number operations. Estimation strategies include, but are not limited to: ○ 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 friendly or compatible numbers such as factors (students seek to fit numbers together - i.e., rounding to factors and grouping numbers together that have round sums like 100 or 1000), and • Using benchmark numbers that are easy to compute (students select close whole numbers for fractions or decimals to determine an estimate). • Example: • The youth group is going on a trip to the state fair. The trip costs $52. Included in that price is $11 for a concert ticket and the cost of 2 passes, one for the rides and one for the game booths. Each of the **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning	*undoing the operations are appropriate here. It is appropriate to expect students to show the steps in their work. Students should be able to explain their thinking using the correct terminology for the properties and operations.* • *Continue to build on students' understanding and application of writing and solving one-step equations from a problem situation to multi-step problem situations. This is also the context for students to practice using rational numbers including: integers, and positive and negative fractions and decimals. As students analyze a situation, they need to identify what operation should be completed first, then the values for that computation. Each set of the needed operation and values is determined in order. Finally an equation matching the order of operations is written. For example, Bonnie goes out to eat and buys a meal that costs $12.50 that includes a tax of $.75. She only wants to leave a tip based on the cost of the food. In this situation, students need to realize that the tax must be subtracted from the total cost before being multiplied by the percent*	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 Materials • Calculators • Graph paper	• 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 based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		passes cost the same price. Write an equation representing the cost of the trip and determine the price of one pass.  $2x + 11 = 52$ $2x = 41$ $x = \$20.5$ • If a woman making \$25 an hour gets a 10% raise, she will make an additional $\frac{1}{10}$ of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. (TUSD)	*of tip and then added back to obtain the final cost. C = (\$12.50 - .75)(1 + T) + .75 = \$11.75(1 +T) + .75 where C = cost and T = tip.* • *Provide multiple opportunities for students to work with multi-step problem situations that have multiple solutions and therefore can be represented by an inequality. Students need to be aware that values can satisfy an inequality but not be appropriate for the situation, therefore limiting the solutions for that particular problem.* (ODE)		• Think-alouds • Writing genres ▫ Arguments ▫ Informative ▫ Research
	M	7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. a. Solve word problems leading to equations of the form $px + q = r$ $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. ○ *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* (7.EE.4a) b. Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. ○ *For example: As a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality for the number of sales you need to make, and describe the solutions.* (7.EE.4b) **Essential question** **Essential knowledge and skills** • Real-world problems can be represented and solved using visual models, equations or inequalities. **Mathematical Practices** • Make sense of problems and persevere in solving them			

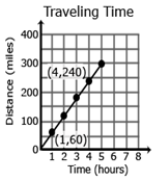
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• Real-world situations can be represented and solved using linear equations with rational numbers of the form px+q = r and p(x+q) =r. • Real-world situations can be represented and solved using linear inequalities with rational numbers of the form px+q < r and p(x+q) > r. • Solutions sets for inequalities are graphed on number lines. **Examples and Explanation** • The sum of three consecutive even numbers is 48. What is the smallest of these numbers? • Solve: $\frac{5}{4}n+5=20$ • Florencia has at most $60 to spend on clothes. She wants to buy a pair of jeans for $22 dollars and spend the rest on t-shirts. Each t-shirt costs $8. Write an inequality for the number of t-shirts she can purchase. • Steven has $25 dollars. He spent $10.81, including tax, to buy a new DVD. He needs to set aside $10.00 to pay for his lunch next week. If peanuts cost $0.38 per package including tax, what is the maximum number of packages that Steven can buy? Write an equation or inequality to model the situation. Explain how you determined whether to write an equation or inequality and the properties of the real number system that you used to find a solution. • The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width? • As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions. (TUSD) **Academic vocabulary** • Break-even point • Coefficient, constant term • Equation of a line • Function • Linear function • Linear relationship • Point of intersection • Rise • Run • Slope • Steepness • X-intercept • Y-intercept	• Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning		

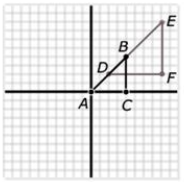
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		ASSESSMENT PROBLEMS 7.EE.3 Basic • Number theory: Scientific notation (Seventh grade - A.8)Number theory: Compare numbers written in scientific notation (Seventh grade - A.9) • Decimal numbers: Round decimals (Seventh grade - B.4) • Operations with decimals: Estimate sums, differences, and products of decimals (Seventh grade - C.7) • Operations with decimals: Multi-step inequalities with decimals (Seventh grade - C.9) • Operations with decimals: Maps with decimal distances (Seventh grade - C.10) • Operations with decimals: Simplify expressions involving decimals (Seventh grade - C.11) • Operations with integers: Simplify expressions involving integers (Seventh grade - E.9) • Fractions and mixed numbers: Equivalent fractions (Seventh grade - F.1) • Fractions and mixed numbers: Simplify fractions (Seventh grade - F.2) • Fractions and mixed numbers: Compare and order fractions (Seventh grade - F.5) • Fractions and mixed numbers: Compare fractions: word problems (Seventh grade - F.6) • Fractions and mixed numbers: Convert between mixed numbers and improper fractions (Seventh grade - F.7) • Fractions and mixed numbers: Compare mixed numbers and improper fractions (Seventh grade - F.8) • Fractions and mixed numbers: Round mixed numbers (Seventh grade - F.9) • Operations with fractions: Estimate sums and differences of mixed numbers (Seventh grade - G.6) • Operations with fractions: Estimate products and quotients of fractions and mixed numbers (Seventh grade - G.14) • Operations with fractions: Maps with fractional distances (Seventh grade - G.16) • Rational numbers: Convert between decimals and fractions or mixed numbers (Seventh grade - H.2) • Ratios and proportions: Compare ratios: word problems (Seventh grade - J.4) • Percents: Convert between percents, fractions, and decimals (Seventh grade - K.2) • Percents: Compare percents to fractions and decimals (Seventh grade - K.3) • Consumer math: Unit prices with unit conversions (Seventh grade - L.4) • Consumer math: Unit prices: find the total price (Seventh grade - L.5) • Problem solving and estimation: Estimate to solve word problems (Seventh grade - M.1) • Problem solving and estimation: Multi-step word problems (Seventh grade - M.2) • Problem solving and estimation: Guess-and-check word problems (Seventh grade - M.3) • Problem solving and estimation: Use Venn diagrams to solve problems (Seventh grade - M.4)			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• Problem solving and estimation: Find the number of each type of coin (Seventh grade - M.5) • Problem solving and estimation: Elapsed time word problems (Seventh grade - M.6) 7.EE.3 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7EE2.aspx • http://engageny.org/sites/default/files/resource/attachments/math-grade-7.pdf • http://www.illustrativemathematics.org/illustrations/478 • http://www.illustrativemathematics.org/illustrations/712 • http://www.illustrativemathematics.org/illustrations/108 7.EE.4 Basic • Inequalities: Inequalities on number lines (Seventh grade - W.1) • Inequalities: Solutions to variable inequalities (Seventh grade - W.2) • Inequalities: Graph inequalities on number lines (Seventh grade - W.3) • Inequalities: Solve one-step linear inequalities (Seventh grade - W.4) • Inequalities: Graph solutions to one-step linear inequalities (Seventh grade - W.5) • Inequalities: Solve two-step linear inequalities (Seventh grade - W.6) • Inequalities: Graph solutions to two-step linear inequalities (Seventh grade - W.7) • http://engageny.org/sites/default/files/resource/attachments/math-grade-7.pdf 7.EE.4 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7EE2.aspx • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.07.cr.1.000ee.d.165_v1.pdf • http://engageny.org/sites/default/files/resource/attachments/math-grade-7.pdf • http://www.illustrativemathematics.org/illustrations/643 • http://www.illustrativemathematics.org/illustrations/986			
EQUATIONS (8.EE) Understand the connections between proportional relationships, lines, and linear equations. Use **Mathematical**	**M**	**Students** 8.EE.5 Graph proportional relationships, interpreting the unit rate as the slope of the graph. **Major content** Compare two different proportional relationships represented in different ways. • *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.* **Essential question** **Mathematical Practices**	TEACHER NOTES See instructional strategies in the introduction • *This cluster focuses on extending the understanding of ratios and proportions. Unit rates have been explored in Grade 6 as the comparison of two different quantities with the second unit a unit*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* ○ Chapters 5,6,12 • *McDougal –Littell Algebra 1* ○ Chapters 3,7 • *Exploration in Core*	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS

MATHEMATICS CURRICULUM Accelerated 7

Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
Practices to ☐ 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		**Essential knowledge and skills** • A proportional relationship has a constant rate of change (or unit rate), known as the slope. • Equations for proportional relationships are linear equations of the form y=mx, where m is the unit rate or slope. • Linear equations when graphed are straight lines. • Proportional relationships can be compared using graphs, tables, and equations by analyzing the slopes (unit rates). **Teaching Examples** • Using graphs of experiences that are familiar to students' increases accessibility and supports understanding and interpretation of proportional relationship. Students are expected to both sketch and interpret graphs. Example: • Compare the scenarios to determine which represents a greater speed. Include a description of each scenario including the unit rates in your explanation. Scenario 1:  Scenario 2: $y = 50x$ x is time in hours y is distance in miles (TUSD) • 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	*of one, (unit rate). In seventh grade unit rates were expanded to complex fractions and percents through solving multistep problems such as: discounts, interest, taxes, tips, and percent of increase or decrease. Proportional relationships were applied in scale drawings, and students should have developed an informal understanding that the steepness of the graph is the slope or unit rate. Now unit rates are addressed formally in graphical representations, algebraic equations, and geometry through similar triangles.* • *Distance time problems are notorious in mathematics. In this cluster, they serve the purpose of illustrating how the rates of two objects can be represented, analyzed and described in different ways: graphically and algebraically. Emphasize the creation of representative graphs and the meaning of various points. Then compare the same information when represented in an equation.* • *By using coordinate grids and various sets of three similar triangles, students can prove that the slopes of the corresponding sides are equal, thus making the unit rate of change equal.*	*Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al* 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 Materials • Calculator • Graph paper • Rulers	SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. ☐ Role playing - bodily kinesthetic ☐ Graphic organizing - visual ☐ Collaboration - interpersonal • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice,
	M	8.EE.6 Use similar triangles to explain why the slope *m* is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at *b*. **Major content** **Essential question** **Essential knowledge and skills** • Proportional relationship when graphed, are straight lines that goes through the origin. • Equations for linear relationship are of the form y=mx, where m is the unit rate or slope and goes **Mathematical Practices** • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		through the origin or y=mx+b for a line intercepting the vertical axis at b. • Proportional relationships are a special form of a linear relationship. • The slope m is the same between any two distinct points on a non-vertical line in the coordinate plane. (This is shown using similar triangles.) **Teaching Examples** Example: • If you take two pairs of points on the same line, and then draw the corresponding triangles, the triangles will be similar. Because the triangles are similar the ratio of side length must therefore be the same, thus showing that slope between either pair of points is the same. • Explain why ΔACB is similar to Δ DFE and deduce that AB has the same slope as BE . Express each line as an equation. (TUSD)  **Academic vocabulary** ASSESSMENT PROBLEMS 8.EE.5 Basic • Ratios and proportions: Unit rates (Eighth grade - H.5) • Ratios and proportions: Do the ratios form a proportion? (Eighth grade - H.6) • Ratios and proportions: Do the ratios form a proportion: word problems (Eighth grade - H.7) • Ratios and proportions: Solve proportions (Eighth grade - H.8) • Ratios and proportions: Solve proportions: word problems (Eighth grade - H.9) • Proportional relationships: Find the constant of variation: graphs (Eighth grade - I.2) • Proportional relationships: Graph a proportional relationship (Eighth grade - I.4) • Proportional relationships: Proportional relationships: word problems (Eighth grade - I.6)	• Model with mathematics ★ • Use appropriate tools strategically • Look for and make use of structure • Look for and express regularity in repeated reasoning	*After proving with multiple sets of triangles, students can be led to generalize the slope to y = mx for a line through the origin and y = mx + b for a line through the vertical axis at b.* (ODE)		modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ▫ Argument ▫ Informative ▫ Research

MATHEMATICS CURRICULUM Accelerated 7

Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

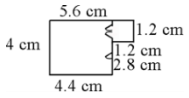
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		8.EE.5 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-EE-5.aspx • http://www.illustrativemathematics.org/illustrations/129 • http://www.illustrativemathematics.org/illustrations/471 8.EE.6 Basic • Proportional relationships: Write an equation for a proportional relationship (Eighth grade - I.5) • Linear functions: Graph a line from an equation (Eighth grade - V.7) • Linear functions: Find the slope of a graph (Eighth grade - V.9) • Linear functions: Find slope from two points (Eighth grade - V.10) • Linear functions: Find slope from an equation (Eighth grade - V.11) • Linear functions: Graph a line using slope (Eighth grade - V.12) 8.EE.6 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-EE-5.aspx • http://www.illustrativemathematics.org/illustrations/471			
EXPRESSIONS AND EQUATIONS (8.EE) Analyze and solve linear equations and pairs of simultaneous linear equations. Use **Mathematical Practices** to ☐ 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	**M**	**Students** 8.EE.7 Solve linear equations in one variable. **Major content** a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). (8.EE.7a) b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. (8.EE.7b) **Essential question** **Essential knowledge and skills** • Linear equations in one variable have one solution, infinitely many solutions or no solutions. • Linear equations can be expanded and simplified using the distributive property and combining like terms. **Mathematical Practices** • Reason abstractly and quantitatively • Use appropriate tools strategically • Attend to precision • Look for and make	TEACHER NOTES See instructional strategies in the introduction • *Problems should be structured so that students also experience equations that represent parallel lines and equations that are equivalent. This will help them to begin to understand the relationships between different pairs of equations: When the slope of the two lines is the same, the equations are either different equations representing the same line (thus resulting in many solutions), or the equations are different equations representing two not intersecting, parallel, lines that do not have common*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* ○ Chapters 5,6,12 • *McDougal –Littell Algebra 1* ○ Chapters 3.1-3.6 • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al* Supplementary Books, Teacher (T) Student (S) • Technology • Computers • LCD projectors • Interactive boards	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Teaching Examples use of structure • As students transform linear equations in one variable into simpler forms, they discover the equations can have one solution, infinitely many solutions, or no solutions. • When the equation has one solution, the variable has one value that makes the equation true as in 12-4y=16. The only value for y that makes this equation true is -1. • When the equation has infinitely many solutions, the equation is true for all real numbers as in 7x + 14 = 7 (x+2). As this equation is simplified, the variable terms cancel leaving 14 = 14 or 0 = 0. Since the expressions are equivalent, the value for the two sides of the equation will be the same regardless which real number is used for the substitution. • When an equation has no solutions it is also called an inconsistent equation. This is the case when the two expressions are not equivalent as in 5x - 2 = 5(x+1). When simplifying this equation, students will find that the solution appears to be two numbers that are not equal or -2 = 1. In this case, regardless which real number is used for the substitution, the equation is not true and therefore has no solution. (TUSD) Examples: • Solve for x: o $-3(x+7)=4$ o $3x-8=4x-8$ o $3(x+1)-5=3x-2$ • Solve: o $7(m-3)=7$ o $\frac{1}{4}-\frac{2}{3}y=\frac{3}{4}-\frac{1}{3}y$ **Academic vocabulary** • Base • Cube • Cube Root • Exponent • Exponential form • Perfect Square • Power • Radical • Base • Cube • Cube Root • Exponent	*solutions.* • *System-solving in Grade 8 should include estimating solutions graphically, solving using substitution, and solving using elimination. Students again should gain experience by developing conceptual skills using models that develop into abstract skills of formal solving of equations. Provide opportunities for students to change forms of equations (from a given form to slope-intercept form) in order to compare equations* (ODE)	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 Materials • Algebra tiles • Calculator • Graph paper • Rulers	• Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. o Role playing - bodily kinesthetic o Graphic organizing - visual o Collaboration - interpersonal • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres o Argument o Informative o Research

MATHEMATICS CURRICULUM Accelerated 7

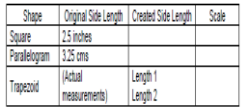
Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

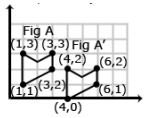
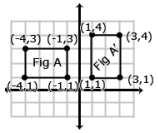
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		ASSESSMENT PROBLEMS 8.EE.7 Basic • Single-variable equations: Identities and equations with no solutions (Eighth grade - U.9) • Single-variable equations: Model and solve equations using algebra tiles (Eighth grade - U.2) • Single-variable equations: Write and solve equations that represent diagrams (Eighth grade - U.3) • Single-variable equations: Solve one-step linear equations (Eighth grade - U.4) • Single-variable equations: Solve two-step linear equations (Eighth grade - U.5) • Single-variable equations: Solve equations involving squares and square roots (Eighth grade - U.6) • Single-variable equations: Solve multi-step equations (Eighth grade - U.7) • Single-variable equations: Solve equations involving like terms (Eighth grade - U.8) • Properties: Properties of addition and multiplication (Eighth grade - AA.1) • Properties: Distributive property (Eighth grade - AA.2) • Properties: Simplify variable expressions using properties (Eighth grade - AA.3 8.EE.7 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-EE-7.aspx • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.08.sr.1.000ee.d.201-final_v1.pdf • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.08.sr.1.000ee.d.204-final_v1.pdf • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.08.cr.1.0000g.g.129_v1.pdfhttp://www.illustrativemathematics.org/illustrations/392 • http://www.illustrativemathematics.org/illustrations/553			
GEOMETRY (7.G) Draw, construct, and describe geometrical figures and describe the relationships between them. Use **Mathematical Practices** to ☐ Make sense of problems and persevere in solving them ☐ Reason abstractly and quantitatively ☐ Construct viable arguments and critique the reasoning of others	**A**	**Students** 7.G.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. **Additional content** Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. **Essential question** **Essential knowledge and skills** • Scale drawings are images that are proportional to the original object by a multiplicative relationship. • Scale drawings can be reproduced using different ratios of side lengths, making them larger or smaller through multiplication. **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable	TEACHER NOTES See instructional strategies in the introduction *Focus on constructing triangles* • *This cluster focuses on the importance of visualization in the understanding of Geometry. Being able to visualize and then represent geometric figures on paper is essential to solving geometric problems.* • *Scale drawings of geometric figures connect understandings*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* ○ Chapters 8, 9, 10 • *McDougal –Littell Algebra 1* ○ Chapters 9, 10 • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al*	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS

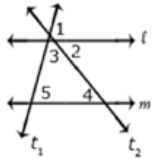
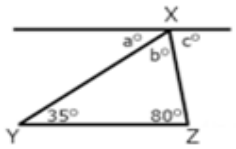
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
☐ Model with mathematics ★ ☐ Use appropriate tools strategically ☐ Attend to precision ☐ Look for and make use of structure ☐ Look for and express regularity in repeated reasoning		• Actual side length and areas of figures can be found from scale drawings. **Examples and Explanation** Example: • Julie showed you the scale drawing of her room. If each 2 cm on the scale drawing equals 5 ft, what are the actual dimensions of Julie's room? Reproduce the drawing at 3 times its current size. (TUSD)  **Academic vocabulary** ASSESSMENT PROBLEMS 7.G.2 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7G1.aspx • http://www.opusmath.com/common-core-standards/7.g.2-draw-freehand-with-ruler-and-protractor-and-with-technology-geometric 7.G.3 Basic • Geometry: Front, side, and top view (Seventh grade - P.25) • Geometry: Names and bases of 3-dimensional figures (Seventh grade - P.26)	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	*of proportionality to geometry and lead to future work in similarity and congruence. As an introduction to scale drawings in geometry, students should be given the opportunity to explore scale factor as the number of time you multiple the measure of one object to obtain the measure of a similar object. It is important that students first experience this concept concretely progressing to abstract contextual situations. Pattern blocks (not the hexagon) provide a convenient means of developing the foundation of scale. Choosing one of the pattern blocks as an original shape, students can then create the next-size shape using only those same-shaped blocks. Questions about the relationship of the original block to the created shape should be asked and recorded. A sample of a recording sheet is shown.* Shape | Original Side Length | Created Side Length | Scale Relationship of Created to Original Square | 1 unit Triangle | 1 unit Rhombus | 1 unit • *This can be repeated for multiple iterations of each shape by comparing each side length to the original's side length. An extension would be for students to compare the later iterations to the previous. Students should also be expected to use side lengths equal to fractional and decimal parts. In other words, if the original side can be stated to represent 2.5 inches, what would be the new lengths and what would be the scale?*	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 Materials • Compasses • Protractors • Road maps • Rulers • Tape measures • Virtual manipulatives	• Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments. • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ☐ Argument ☐ Informative ☐ Research

MATHEMATICS CURRICULUM Accelerated 7

Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
			 (ODE)		
GEOMETRY (8.G) Understand congruence and similarity using physical models, transparencies, or geometry software.	**M**	8.G.1 Verify experimentally the properties of rotations, reflections, and translations **Major content** a. Lines are taken to lines, and line segments to line segments of the same length (8.G.1a). b. Angles are taken to angles of the same measure (8.G.1b). c. Parallel lines are taken to parallel lines (8.G.1c). **Essential question** **Essential knowledge and skills** • Translating a point, line, line segment or angle does not change any attributes of that object, it will just move the object to a new location. • When a point is reflected across a line that reflected point stays the same distance from the line of reflection as the original point. • When a line segment or angle is rotated, reflected or translated, the length of that line segment and measure of the angle will not change. **Teaching Examples:** • Students need multiple opportunities to explore the transformation of figures so that they can appreciate that points stay the same distance apart and lines stay at the same angle after they have been rotated, reflected, and/or translated. (TUSD) **Mathematical Practices** • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision	TEACHER NOTES See instructional strategies in the introduction *Scale drawings* • *A major focus in Grade 8 is to use knowledge of angles and distance to analyze two- and three-dimensional figures and space in order to solve problems. This cluster interweaves the relationships of symmetry, transformations, and angle relationships to form understandings of similarity and congruence. Inductive and deductive reasoning are utilized as students forge into the world of proofs. Informal arguments are justifications based on known facts and logical reasoning. Students should be able to appropriately label figures, angles, lines, line segments, congruent parts, and images (primes or double primes). Students are expected to use logical thinking, expressed in words using correct terminology. They are NOT expected to use theorems, axioms, postulates or a formal format of proof as*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* ○ Chapters 5, 7 • *McDougal –Littell Algebra 1* ○ Chapters 9, 10 • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al* 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	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. □ Role playing -
	M	8.G.2 Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. **Major content** **Essential question** **Mathematical Practices** • Reason abstractly			

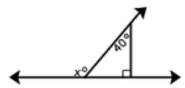
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Essential knowledge and skills • A sequence of rotations, reflections, and/or translations to a two-dimensional figure will create a congruent two-dimensional figure. **Teaching Examples:** Examples: • Is Figure A congruent to Figure A'? Explain how you know.  • Describe the sequence of transformations that results in the transformation of Figure A to Figure A'.  and quantitatively • Model with mathematics ★ • Attend to precision • Look for and make use of structure	*in two-column proofs.* • *Transformational geometry is about the effects of rigid motions, rotations, reflections and translations on figures. Initial work should be presented in such a way that students understand the concept of each type of transformation and the effects that each transformation has on an object before working within the coordinate system. For example, when reflecting over a line, each vertex is the same distance from the line as its corresponding vertex. This is easier to visualize when not using regular figures. Time should be allowed for students to cut out and trace the figures for each step in a series of transformations. Discussion should include the description of the relationship between the original figure and its image(s) in regards to their corresponding parts (length of sides and measure of angles) and the description of the movement, including the attributes of transformations (line of symmetry, distance to be moved, center of rotation, angle of rotation and the amount of dilation).The case of distance – preserving transformation*	• http://www.tusd1.org/contents/distinfo/curriculum/index.asp • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.ride.ri.gov Materials • Grid paper • Mirrors • Virtual manipulative	bodily kinesthetic Graphic organizing - visual Collaboration - interpersonal • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres Argument Informative Research
	M	8.G.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. **Major content** • *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.* **Essential question** **Essential knowledge and skills** • Parallel lines cut by a transversal will create pairs of angles that are either congruent or supplementary. • The relationships between the angles made by parallel lines cut by a transversal can be used to informally prove that the interior angles of a triangle will add up to 180°. **Teaching Examples:** • Angle relationships that can be explored include but are not limited to: **Mathematical Practices** • 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			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		○ Same-side (consecutive) interior and same-side (consecutive) exterior angles are supplementary. ○ Corresponding, Alternate interior angles and alternate exterior angles. Examples: • Arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so. • Students can informally prove relationships with transversals. (TUSD) Show that m∠3 + m∠4 + m∠5 = 180° if l and m are parallel lines and transversals. ∠1 + ∠2 + ∠3 = 180°. Angle 1 and Angle 5 are congruent because t corresponding angles (∠5 ≅ ∠1). ∠1 can be substituted for ∠5. ∠4 ≅ ∠2 : because alternate interior angles are congruent. ∠4 can be substituted for ∠2 Therefore m∠3 + m ∠4 + m ∠5 = 180°  • Students can informally conclude that the sum of a triangle is 180º (the angle-sum theorem) by applying their understanding of lines and alternate interior angles. In the figure below, line x is parallel to line yz:  $\overline{X} \parallel \overline{YZ}$	*leads to the idea of congruence.* (ODE)		

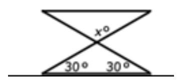
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS

- Angle a is 35º because it alternates with the angle inside the triangle that measures 35º. Angle c is 80º because it alternates with the angle inside the triangle that measures 80º. Because lines have a measure of 180º, and angles a + b + c form a straight line, then angle b must be 65 º (180 – 35 + 80 = 65). Therefore, the sum of the angles of the triangle are 35º + 65 º + 80 º

  Examples:
- Write and solve an equation to find the measure of angle x.



- Write and solve an equation to find the measure of angle x.



(TUSD)

Academic vocabulary

ASSESSMENT PROBLEMS
- Transformations: Identify reflections, rotations, and translations (Eighth grade - R.1)
- Transformations: Translations: graph the image (Eighth grade - R.2)
- Transformations: Reflections: graph the image (Eighth grade - R.4)
- Transformations: Rotations: graph the image (Eighth grade - R.6)
- Transformations: Identify reflections, rotations, and translations (Eighth grade - R.1)
- Transformations: Translations: graph the image (Eighth grade - R.2)
- Transformations: Reflections: graph the image (Eighth grade - R.4)
- Transformations: Rotations: graph the image (Eighth grade - R.6)
- Transformations: Identify reflections, rotations, and translations (Eighth grade - R.1)
- Transformations: Translations: graph the image (Eighth grade - R.2)
- Transformations: Reflections: graph the image (Eighth grade - R.4)
- Transformations: Rotations: graph the image (Eighth grade - R.6)

8.G.1 Advanced
- http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-G-1.aspx

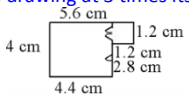
MATHEMATICS CURRICULUM Accelerated 7

Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		8.G.2 Basic • Geometry: Similar and congruent figures (Eighth grade - Q.9) • Geometry: Congruent figures: side lengths and angle measures (Eighth grade - Q.11) • Geometry: Congruence statements and corresponding parts (Eighth grade - Q.12) 8.G.2 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-G-1.aspx • http://www.illustrativemathematics.org/illustrations/1231 • http://www.illustrativemathematics.org/illustrations/1230 8.G.5 Basic • Geometry: Identify complementary, supplementary, vertical, adjacent, and congruent angles (Eighth grade - Q.1) • Geometry: Find measures of complementary, supplementary, vertical, and adjacent angles (Eighth grade - Q.2) • Geometry: Transversal of parallel lines (Eighth grade - Q.3) • Geometry: Find missing angles in triangles and quadrilaterals (Eighth grade - Q.6) • Geometry: Interior angles of polygons (Eighth grade - Q.8) • Geometry: Congruent triangles: SSS, SAS, and ASA (Eighth grade - Q.13) 8.G.5 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-G-1.aspx • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.08.cr.1.0000g.g.129_v1.pdf • http://www.illustrativemathematics.org/illustrations/59 • http://www.illustrativemathematics.org/illustrations/56			
GEOMETRY (7.G) Draw, construct, and describe geometrical figures and describe the relationships between them. Use **Mathematical Practices** to ☐ Make sense of problems and persevere in solving them ☐ Reason abstractly and quantitatively	**A**	**Students** 7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. **Additional content** **Essential question** **Essential knowledge and skills** • Scale drawings are images that are proportional to the original object by a multiplicative relationship. • Scale drawings can be reproduced using different ratios of side lengths, making them larger or smaller through multiplication. • Actual side length and areas of figures can be found from scale drawings. **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others	TEACHER NOTES See instructional strategies in the introduction • *This cluster focuses on the importance of visualization in the understanding of Geometry. Being able to visualize and then represent geometric figures on paper is essential to solving geometric problems.* • *Scale drawings of geometric figures connect understandings of proportionality to geometry and lead to future work in similarity and congruence. As an introduction to scale drawings in geometry, students should be given the*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* ○ Chapters 8,9,10 • *McDougal –Littell Algebra 1* ○ Chapters 9, 10 • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al*	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records

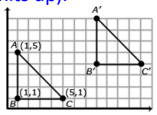
MATHEMATICS CURRICULUM Accelerated 7

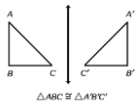
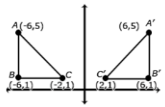
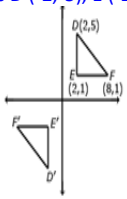
Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

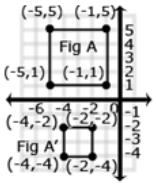
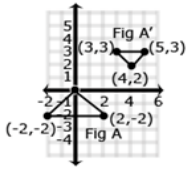
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
☐ Construct viable arguments and critique the reasoning of others ☐ Model with mathematics ★ ☐ Use appropriate tools strategically ☐ Attend to precision ☐ Look for and make use of structure Look for and express		**Examples and Explanation** Example: • Julie showed you the scale drawing of her room. If each 2 cm on the scale drawing equals 5 ft, what are the actual dimensions of Julie's room? Reproduce the drawing at 3 times its current size.  • 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 **Academic vocabulary** ASSESSMENT PROBLEMS 7.G.1 Basic • Ratios and proportions: Scale drawings and scale factors (Seventh grade - J.13) • Geometry: Similar and congruent figures (Seventh grade - P.12) • Geometry: Similar figures: side lengths and angle measures (Seventh grade - P.13) • Geometry: Similar figures and indirect measurement (Seventh grade - P.14) • Geometry: Congruent figures: side lengths and angle measures (Seventh grade - P.15) • Geometry: Congruence statements and corresponding parts (Seventh grade - P.16) • Geometry: Perimeter, area, and volume: changes in scale (Seventh grade - P.30) • http://engageny.org/sites/default/files/resource/attachments/math-grade-7.pdf 7.G.1 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7G1.aspx • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.07.sr.1.0000g.e.161_v1.pdf • http://www.opusmath.com/common-core-standards/7.g.1-solve-problems-involving-scale-drawings-of-geometric-figures-including	*opportunity to explore scale factor as the number of time you multiple the measure of one object to obtain the measure of a similar object. It is important that students first experience this concept concretely progressing to abstract contextual situations. Pattern blocks (not the hexagon) provide a convenient means of developing the foundation of scale. Choosing one of the pattern blocks as an original shape, students can then create the next-size shape using only those same-shaped blocks. Questions about the relationship of the original block to the created shape should be asked and recorded. A sample of a recording sheet is shown.* | Shape	Original Side Length	Created Side Length	Scale Relationship of Created to Original
---	---	---	---
Square	1 unit		
Triangle	1 unit		
Rhombus	1 unit		| • *This can be repeated for multiple iterations of each shape by comparing each side length to the original's side length. An extension would be for students to compare the later iterations to the previous. Students should also be expected to use side lengths equal to fractional and decimal parts. In other words, if the original side can be stated to represent 2.5 inches, what would be the new lengths and what would be the scale?* | Shape	Original Side Length	Created Side Length	Scale
---	---	---	---
Square	2.5 inches		
Parallelogram	3.25 cms		
Trapezoid	(Actual measurements)	Length 1 Length 2	| (ODE)	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 Materials • Compasses • Protractors • Road maps • Rulers • Tape measures • Virtual manipulatives	• Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ☐ Argument ☐ Informative ☐ Research

MATHEMATICS CURRICULUM Accelerated 7

Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
GEOMETRY (8.G) Understand congruence and similarity using physical models, transparencies, or geometry software. Use **Mathematical Practices** to ☐ 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	**M**	**Students** 8.G.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. **Major content** **Essential question** **Essential knowledge and skills** • An image is the figure created by doing a transformation on the pre-image (or original object). • A dilation of a two-dimensional figure will create an image that is a similar figure to the original by a multiplicative relationship. • A translated, reflected or rotated two-dimensional figure will create an image that is a congruent figure to the original. **Teaching Examples:** • A dilation is a transformation that moves each point along a ray emanating from a fixed center, and multiplies distances from the center by a common scale factor. In dilated figures, the dilated figure is similar to its pre-image. • Translation: A translation is a transformation of an object that moves the object so that every point of the object moves in the same direction as well as the same distance. In a translation, the translated object is congruent to its pre-image. Example: • ΔABC has been translated 7 units to the right and 3 units up. To get from A (1,5) to A' (8,8), move A 7 units to the right (from x = 1 to x = 8) and 3 units up (from y = 5 to y = 8). Points B + C also move in the same direction (7 units to the right and 3 units up).  • Reflection: A reflection is a transformation that flips an object across a line of reflection (in a coordinate grid the line of reflection may be the x or y axis). In a reflection, the reflected object is **Mathematical Practices** • 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	TEACHER NOTES See instructional strategies in the introduction • *A major focus in Grade 8 is to use knowledge of angles and distance to analyze two- and three-dimensional figures and space in order to solve problems. This cluster interweaves the relationships of symmetry, transformations, and angle relationships to form understandings of similarity and congruence. Inductive and deductive reasoning are utilized as students forge into the world of proofs. Informal arguments are justifications based on known facts and logical reasoning. Students should be able to appropriately label figures, angles, lines, line segments, congruent parts, and images (primes or double primes). Students are expected to use logical thinking, expressed in words using correct terminology. They are NOT expected to use theorems, axioms, postulates or a formal format of proof as in two-column proofs.* • *Transformational geometry is about the effects of rigid motions, rotations, reflections and translations on figures. Initial work should be*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* ○ Chapters 5, 7 • *McDougal –Littell Algebra 1* • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al* 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 • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS 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

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		congruent to its pre-image.  △ABC ≅ △A'B'C' • When an object is reflected across the y axis, the reflected x coordinate is the opposite of the pre-image x coordinate.  • Rotation: A rotated figure is a figure that has been turned about a fixed point. This is called the center of rotation. A figure can be rotated up to 360˚. Rotated figures are congruent to their pre-image figures. • Consider when is rotated 180˚ clockwise about the origin. The coordinates of are D(2,5), E(2,1), and F(8,1). When rotated 180˚, has new coordinates D'(-2,-5), E'(-2,-1) (TUSD)  and F'(-8,-1). Each coordinate is the opposite of its pre-image.	*presented in such a way that students understand the concept of each type of transformation and the effects that each transformation has on an object before working within the coordinate system. For example, when reflecting over a line, each vertex is the same distance from the line as its corresponding vertex. This is easier to visualize when not using regular figures. Time should be allowed for students to cut out and trace the figures for each step in a series of transformations. Discussion should include the description of the relationship between the original figure and its image(s) in regards to their corresponding parts (length of sides and measure of angles) and the description of the movement, including the atributes of transformations (line of symmetry, distance to be moved, center of rotation, angle of rotation and the amount of dilation).The case of distance – preserving transformation leads to the idea of congruence.* (ODE)	Materials • Grid paper • Mirrors • Virtual manipulative	□ Collaboration - interpersonal • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres □ Argument □ Informative □ Research
	M	8.G.4 Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. **Major content** **Essential question** **Mathematical Practices**			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Essential knowledge and skills • Similar figures are produced by doing a sequence of rotations, reflections, translations AND dilations. The sequence of transformation must include dilation in order to produce a similar figure. • Similar figures are figures that have the same angles and proportional side lengths. **Teaching Examples:** • Is Figure A similar to Figure A'? Explain how you know.  • Describe the sequence of transformations that results in the transformation of Figure A to Figure A'.  (TUSD) 8.G.5 Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. • *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.* **Essential question** **Mathematical Practices** • Construct viable arguments and • Reason abstractly and quantitatively • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure			
	M				

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

Essential knowledge and skills

- Parallel lines cut by a transversal will create pairs of angles that are either congruent or supplementary.
- The relationships between the angles made by parallel lines cut by a transversal can be used to informally prove that the interior angles of a triangle will add up to 180°.

Teaching Examples:

- Angle relationships that can be explored include but are not limited to:
  - Same-side (consecutive) interior and same-side (consecutive) exterior angles are supplementary.
  - Corresponding, Alternate interior angles and alternate exterior angles.

Examples:

- Arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.
- Students can informally prove relationships with transversals.

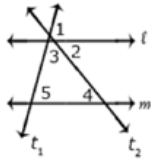
(TUSD)

Show that m∠3 + m∠4 + m∠5 = 180° if l and *m* are parallel lines and transversals.

∠1 + ∠2 + ∠3 = 180°. Angle 1 and Angle 5 are congruent because t corresponding angles (∠5 ≅ ∠1). ∠1 can be substituted for ∠5.

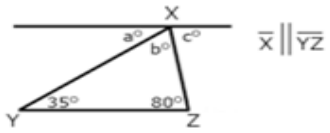
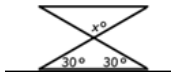
∠4 ≅ ∠2 : because alternate interior angles are congruent.
∠4 can be substituted for ∠2

Therefore m∠3 + m ∠4 + m ∠5 = 180°



- Students can informally conclude that the sum of a triangle is 180º (the angle-sum theorem) by applying their understanding of lines and

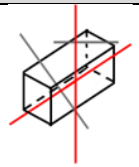
critique the reasoning of others
- Model with mathematics ★
- Use appropriate tools strategically
- Attend to precision
- Look for and make use of structure

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		alternate interior angles. In the figure below, line x is parallel to line yz:  $\overline{X} \parallel \overline{YZ}$ • Angle a is 35º because it alternates with the angle inside the triangle that measures 35º. Angle c is 80º because it alternates with the angle inside the triangle that measures 80º. Because lines have a measure of 180º, and angles a + b + c form a straight line, then angle b must be 65 º (180 – 35 + 80 = 65). Therefore, the sum of the angles of the triangle are 35º + 65 º + 80 º Examples: • Write and solve an equation to find the measure of angle x.  • Write and solve an equation to find the measure of angle x.  (TUSD) **Academic vocabulary** ASSESSMENT PROBLEMS 8.G.3 Basic • Transformations: Translations: find the coordinates (Eighth grade - R.3) • Transformations: Reflections: find the coordinates (Eighth grade - R.5) • Transformations: Rotations: find the coordinates (Eighth grade - R.7) • Transformations: Dilations: graph the image (Eighth grade - R.8) • Transformations: Dilations: find the coordinates (Eighth grade - R.9) 8.G.3 Advanced			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-G-1.aspx • http://www.illustrativemathematics.org/illustrations/1243 • http://www.illustrativemathematics.org/illustrations/995 8.G.4 Basic • Geometry: Similar and congruent figures (Eighth grade - Q.9) • Geometry: Similar figures: side lengths and angle measures (Eighth grade - Q.10) • Geometry: Similar solids (Eighth grade - Q.30) 8.G.4 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-G-1.aspx 8.G.5 Basic • Geometry: Identify complementary, supplementary, vertical, adjacent, and congruent angles (Eighth grade - Q.1) • Geometry: Find measures of complementary, supplementary, vertical, and adjacent angles (Eighth grade - Q.2) • Geometry: Transversal of parallel lines (Eighth grade - Q.3) • Geometry: Find missing angles in triangles and quadrilaterals (Eighth grade - Q.6) • Geometry: Interior angles of polygons (Eighth grade - Q.8) • Geometry: Congruent triangles: SSS, SAS, and ASA (Eighth grade - Q.13) 8.G.5 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-G-1.aspx • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.08.cr.1.0000g.g.129_v1.pdf • http://www.illustrativemathematics.org/illustrations/59 • http://www.illustrativemathematics.org/illustrations/56			
GEOMETRY (7.G) Draw, construct, and describe geometrical figures and describe the relationships between them. Use **Mathematical Practices** to ☐ Make sense of problems and persevere in solving them	**A**	Students 7.G.3 Describe the two-dimensional figures that result from slicing three- dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. **Additional content** **Essential knowledge and skills** • **Examples and Explanation** Example: • Using a clay model of a rectangular prism, describe the shapes that are created when planar cuts are made diagonally, perpendicularly, and parallel to the base. **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics ★ • Use appropriate tools strategically • Look for and make use of structure	TEACHER NOTES See instructional strategies in the introduction *Slicing 3-D figures* • *This cluster focuses on the importance of visualization in the understanding of Geometry. Being able to visualize and then represent geometric figures on paper is essential to solving geometric problems.* • *Scale drawings of geometric figures connect understandings of proportionality to geometry*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* ○ Chapters 8,9,10 • *McDougal –Littell Algebra 1* ○ Chapters 9, 10 • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al*	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS

MATHEMATICS CURRICULUM Accelerated 7

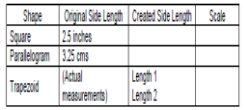
Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

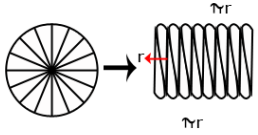
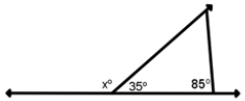
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
☐ Reason abstractly and quantitatively ☐ Construct viable arguments and critique the reasoning of others ☐ Model with mathematics ★ ☐ Use appropriate tools strategically ☐ Attend to precision ☐ Look for and make use of structure ☐ Look for and express regularity in repeated reasoning		 (TUSD) **Academic vocabulary** ASSESSMENT PROBLEMS .G.3 Basic • Geometry: Front, side, and top view (Seventh grade - P.25) • Geometry: Names and bases of 3-dimensional figures (Seventh grade - P.26) 7.G.3 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7G1.aspx • http://www.opusmath.com/common-core-standards/7.g.3-describe-the-two-dimensional-figures-that-result-from-slicing	*and lead to future work in similarity and congruence. As an introduction to scale drawings in geometry, students should be given the opportunity to explore scale factor as the number of time you multiple the measure of one object to obtain the measure of a similar object. It is important that students first experience this concept concretely progressing to abstract contextual situations. Pattern blocks (not the hexagon) provide a convenient means of developing the foundation of scale. Choosing one of the pattern blocks as an original shape, students can then create the next-size shape using only those same-shaped blocks. Questions about the relationship of the original block to the created shape should be asked and recorded. A sample of a recording sheet is shown.* • *This can be repeated for multiple iterations of each shape by comparing each side length to the original's side length. An extension would be for students to compare the later iterations to the previous. Students should also be expected to use side lengths equal to fractional and decimal parts. In other words, if the original side can be stated to represent 2.5 inches, what would be the new lengths and what would be the scale?*	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 Materials • Compasses • Protractors • Road maps • Rulers • Tape measures • Virtual manipulatives	• Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ☐ Argument ☐ Informative ☐ Research

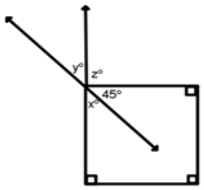
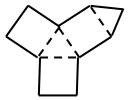
Shape	Original Side Length	Created Side Length	Scale Relationship of Created to Original
Square	1 unit		
Triangle	1 unit		
Rhombus	1 unit		

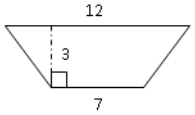
MATHEMATICS CURRICULUM Accelerated 7

Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
			 (ODE)		
GEOMETRY (7.G) Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. Use **Mathematical Practices** to ☐ 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	**A**	**Students** 7.G.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. **Additional content** **Essential question** **Essential knowledge and skills** • Pi is derived by finding the ratio of the circumference to the diameter for any circle. • The circumference of a circle is $2\pi r$ or πd . • Using the fact that circumference of a circle is $2\pi r$;the area formula of a circle can be derived to be πr^2 . See example below, **Examples and Explanation** Examples: • The seventh grade class is building a mini golf game for the school carnival. The end of the putting green will be a circle. If the circle is 10 feet in diameter, how many square feet of grass carpet will they need to buy to cover the circle? How might you communicate this information to the salesperson to make sure you receive a piece of carpet that is the correct size? • Students measure the circumference and diameter of several circular objects in the room (clock, trash can, door knob, wheel, etc.). Students organize their information and discover the relationship between circumference and diameter by noticing the pattern in the ratio of the measures. Students write an expression that could be used to find the circumference of a circle with any diameter and check their expression on other circles. • Students will use a circle as a model to make several equal parts as you would in a pie model. The greater number the cuts, the better. The pie pieces **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning	TEACHER NOTES • See instructional strategies in the introduction • *This is the students' initial work with circles. Knowing that a circle is created by connecting all the points equidistant from a point (center) is essential to understanding the relationships between radius, diameter, circumference, pi and area. Students can observe this by folding a paper plate several times, finding the center at the intersection, then measuring the lengths between the center and several points on the circle, the radius. Measuring the folds through the center, or diameters leads to the realization that a diameter is two times a radius. Given multiple-size circles, students should then explore the relationship between the radius and the length measure of the circle (circumference) finding an approximation of pi and ultimately deriving a formula for circumference. String or yarn laid over the circle*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* ○ Chapters 8,9,10 • *McDougal –Littell Algebra 1* ○ Chapters 9, 10 • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al* 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/si	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g.

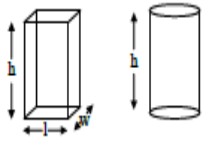
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		are laid out to form a shape similar to a parallelogram. Students will then write an expression for the area of the parallelogram related to the radius (note: the length of the base of the parallelogram is half the circumference, or πr, and the height is r, resulting in an area of πr2. Extension: If students are given the circumference of a circle, could they write a formula to determine the circle's area or given the area of a circle, could they write the formula for the circumference?  (TUSD)	*and compared to a ruler is an adequate estimate of the circumference. This same process can be followed in finding the relationship between the diameter and the area of a circle by using grid paper to estimate the area.* • *Another visual for understanding the area of a circle can be modeled by cutting up a paper plate into 16 pieces along diameters and reshaping the pieces into a parallelogram. In figuring area of a circle, the squaring of the radius can also be explained by showing a circle inside a square. Again, the formula is derived and then learned. After explorations, students should then solve problems, set in relevant contexts, using the formulas for area and circumference.* • *In previous grades, students have studied angles by type according to size: acute, obtuse and right, and their role as an attribute in polygons. Now angles are considered based upon the special relationships that exist among them: supplementary, complementary, vertical and adjacent angles. Provide students the opportunities to explore these relationships first*	tes/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 Materials • circular objects of several different sizes • compasses • grid paper • paper plates • protractors • scissors • string or yarn • tape measures, rulers	▫ Role playing - bodily kinesthetic ▫ Graphic organizing - visual ▫ Collaboration - interpersonal • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ▫ Argument ▫ Informative ▫ Research
	A	7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. problem to write and solve simple equations for an unknown angle in a figure. **Additional content** **Essential question** **Essential knowledge and skills** • Equations can be written and used to find the value of missing angles in multi-step problems involving complementary, supplementary, adjacent and vertical angles **Examples and Explanation** • Set and solve an equation to find the value of angle x.  $x^{\circ} + 35^{\circ} = 180^{\circ}$ so m < x = 45^{0} Set and solve equations to find the missing angle measures **Mathematical Practices** • 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			

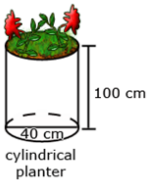
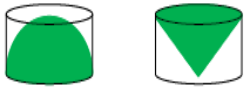
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		 Possible solutions: $x+45^\circ=90^\circ$ $m\angle x=45^\circ$ $m\angle x=m\angle y$ $45^\circ=m\angle y$ $y+z+45^\circ=180^\circ$ $45^\circ+z+45^\circ=180^\circ$ $m\angle z=90^\circ$ (TUSD)	*through measuring and finding the patterns among the angles of intersecting lines or within polygons, then utilize the relationships to write and solve equations for multi-step problems.* • *Real-world and mathematical multi-step problems that require finding area, perimeter, volume, surface area of figures composed of triangles, quadrilaterals, polygons, cubes and right prisms should reflect situations relevant to seventh graders. The computations should make use of formulas and involve whole numbers, fractions, decimals, ratios and various units of measure with same system conversions.* (ODE)		
	A	7.G.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. **Additional content** **Essential question** **Essential knowledge and skills** • The volume of a prism is calculated by taking the area of the base times the height (V = B x h). • Surface area of prisms and pyramids is calculated by finding the sum of the area of each of its faces. **Examples and Explanation** Examples: • Choose one of the figures shown below and write a step by step procedure for determining the area. Find another person that chose the same figure as you did. How are your procedures the same and different? Do they yield the same result?   • A cereal box is a rectangular prism. What is the volume of the cereal box? What is the surface area of the cereal box? (Hint: Create a net of the cereal box and use the net to calculate the surface area.) Make a poster explaining your work to share with the class. • Find the area of a triangle with a base length of **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning			

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		three units and a height of four units. • Find the area of the trapezoid shown below using the formulas for rectangles and triangles  (TUSD) **Academic vocabulary** • Area • Base • Circumference • Congruent • Diameter • Dimension • Height • Net • Orientation • Plane section • Radius • Scale ASSESSMENT PROBLEMS 7.G.5 Basic • Geometry: Identify complementary, supplementary, vertical, adjacent, and congruent angles (Seventh grade - P.4) • Geometry: Find measures of complementary, supplementary, vertical, and adjacent angles (Seventh grade - P.5) 7.G.5 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7G2.aspx • http://www.opusmath.com/common-core-standards/7.g.5-use-facts-about-supplementary-complementary-vertical-and-adjacent 7.G.6 Basic • Geometry: Area of rectangles and parallelograms (Seventh grade - P.18) • Geometry: Area of triangles and trapezoids (Seventh grade - P.19) • Geometry: Area and perimeter: word problems (Seventh grade - P.20) • Geometry: Nets of 3-dimensional figures (Seventh grade - P.27) • Geometry: Surface area (Seventh grade - p.28) • Geometry: Volume (Seventh grade - P.29) 7.G.6Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7G2.aspx • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.07.cr.1.0000g.f.488_v1.pdf • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.07.te.1.0000g.f.286_v1.pdf • http://www.illustrativemathematics.org/illustrations/266 • http://www.opusmath.com/common-core-standards/7.g.6-solve-real-world-and-mathematical-problems-involving-area-volume-and			

MATHEMATICS CURRICULUM Accelerated 7

Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
GEOMETRY (8.G) Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. Use **Mathematical Practices** to ☐ 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	**A**	**Students** 8.G.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. **Additional content** **Essential question** **Essential knowledge and skills** • The volume of a cylinder is the area of the base multiplied the height (circle x height) that is $V = \pi r^2 \times h$ • The volume of the cone is 1/3 the volume of a cylinder. $V = \frac{1}{3}(\pi r^2 \times h)$ *or* $V = \frac{\pi r^2 \times h}{3}$ • The volume of a sphere is $V = \frac{4}{3}\pi r^3$ • The formulas for finding the volume of three-dimensional figures are used to solve real world problems that involve filling three-dimensional figures. **Teaching Examples:** • Volume of a cylinder: $V = \pi r^2 \times h$ • Volume of a Cone: $V = \frac{1}{3}(\pi r^2 \times h)$ *or* $V = \frac{\pi r^2 \times h}{3}$ • Volume of a sphere is: $V = \frac{4}{3}\pi r^3$ Example: • James wanted to plant pansies in his new planter. He wondered how much potting soil he should buy to fill it. Use the measurements in the diagram below to determine the planter's volume. (TUSD) **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning	TEACHER NOTES See instructional strategies in the introduction • *Begin by recalling the formula, and its meaning, for the volume of a right rectangular prism: V = l ×w ×h. Then ask students to consider how this might be used to make a conjecture about the volume formula for a cylinder:*  • *Most students can be readily led to the understanding that the volume of a right rectangular prism can be thought of as the area of a "base" times the height, and so because the area of the base of a cylinder is π r2 the volume of a cylinder is Vc = π r2h. To motivate the formula for the volume of a cone, use cylinders and cones with the same base and height. Fill the cone with rice or water and pour into the cylinder. Students will discover/experience that 3 cones full are needed to fill the cylinder. This non-mathematical derivation of the formula for the volume*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* • *McDougal –Littell Algebra 1* • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al* 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 • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS 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

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		 cylindrical planter (TUSD) **Academic vocabulary** Adjacent angles Alternate interior angles Cone Congruent Corresponding angles Cylinder Dilation Exterior angles Hypotenuse Interior angles Parallel Lines Perpendicular lines Prism Pythagorean Theorem Reflection Right angle Rotation Similar Skew lines Sphere Transformation Translation Transversal Triangle Sum Theorem Vertical angles Volume ASSESSMENT PROBLEMS 8.G.9 Basic • Geometry: Volume of prisms and cylinders (Eighth grade - Q.27) • Geometry: Volume of pyramids and cones (Eighth grade - Q.28) • Geometry: Volume and surface area of spheres (Eighth grade - Q.29) 8.G.9 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/8th-Grade-Core/8-G-9.aspx • http://www.illustrativemathematics.org/illustrations/521	*of a cone, V = 1/3 π r²h, will help most students remember the formula. In a drawing of a cone inside a cylinder, students might see that that the triangular cross-section of a cone is $\frac{1}{2}$ the rectangular cross-section of the cylinder. Ask them to reason why the volume (three dimensions) turns out to be less than $\frac{1}{2}$ the volume of the cylinder. It turns out to be $\frac{1}{3}$* (ODE) 	Materials • Grid paper • Mirrors • Virtual manipulative	▫ Collaboration - interpersonal • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ▫ Argument ▫ Informative ▫ Research
STATISTICS AND PROBABILITY (7.SP) Use random sampling to draw inferences about a population. Use **Mathematical Practices** to ▫ Make sense of problems and	**S**	**Students** 7.SP.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. **Supporting content** Understand that random sampling tends to produce representative samples and support valid inferences. **Essential question** **Mathematical Practices** • Construct viable	TEACHER NOTES See instructional strategies in the introduction • *In Grade 6, students used measures of center and variability to describe data. Students continue to use this knowledge in Grade 7 as they use random samples to make*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* ○ Chapters 2,3 • *McDougal –Littell Algebra 1* ○ Chapters 6,11	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
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		**Essential knowledge and skills** • Random samplings create sample populations, which mimic the demographics of a larger population, that are used to collect and generalize information. **Examples and Explanation** Example: • The school food service wants to increase the number of students who eat hot lunch in the cafeteria. The student council has been asked to conduct a survey of the student body to determine the students' preferences for hot lunch. They have determined two ways to do the survey. The two methods are listed below. Identify the type of sampling used in each survey option. Which survey option should the student council use and why? 1. Write all of the students' names on cards and pull them out in a draw to determine who will complete the survey. 2. Survey the first 20 students that enter the lunchroom. (TUSD) arguments and critique the reasoning of others • Attend to precision	*predictions about an entire population and judge the possible discrepancies of the predictions. Providing opportunities for students to use real-life situations from science and social studies shows the purpose for using random sampling to make inferences about a population.* • *Make available to students the tools needed to develop the skills and understandings required to produce a representative sample of the general population. One key element of a representative sample is understanding that a random sampling guarantees that each element of the population has an equal opportunity to be selected in the sample. Have students compare the random sample to population, asking questions like "Are all the elements of the entire population represented in the sample?" and "Are the elements represented proportionally?" Students can then continue the process of analysis by determining the measures of center and variability to make inferences about the general population based on the analysis.* • *Provide students with random samples from a*	• *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al* 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 Materials • Books	SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. ☐ Role playing - bodily kinesthetic ☐ Graphic organizing - visual ☐ Collaboration - interpersonal • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice,
	S	7.SP.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. **Supporting content** ○ *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.* **Essential question** **Essential knowledge and skills** • Data from random samplings can be used to create valid inferences about an unknown characteristic of interest. **Examples and Explanation** Example: • Estimate the mean word length in a book by randomly sampling words from the book; predict **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the			

<table>
<tr><th>DOMAINS, CLUSTERS</th><th>UNIT</th><th>STANDARDS/BENCHMARKS
North Smithfield School Department</th><th>INSTRUCTIONAL STRATEGIES</th><th>RESOURCES</th><th>ASSESSMENTS</th></tr>
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the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be
• Below is the data collected from two random samples of 100 students regarding student's school lunch preference. Make at least two inferences based on the results. (TUSD)
Lunch Preferences
<table>
<tr><th>student sample</th><th>hamburgers</th><th>tacos</th><th>pizza</th><th>total</th></tr>
<tr><td>#1</td><td>12</td><td>14</td><td>74</td><td>100</td></tr>
<tr><td>#2</td><td>12</td><td>11</td><td>77</td><td>100</td></tr>
</table>
reasoning of others
• Use appropriate tools strategically
• Attend to precision
• Look for and make use of structure

<u>Academic vocabulary</u>

ASSESSMENT PROBLEMS
.SP.1 Basic
• http://www.ixl.com/math/grade-7/identify-representative-random-and-biased-samples
7.SP.1 Advanced
• http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7SP1.aspx
• http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.07.sr.1.000sp.g.289_v1.pdf
• http://www.illustrativemathematics.org/illustrations/974

7.SP.2 Basic
• http://www.ixl.com/math/grade-7/estimate-population-size-using-proportions
7.SP.2 Advanced
• http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7SP1.aspx
• http://www.illustrativemathematics.org/illustrations/1339
</td>
<td>
population, including the statistical measures. Ask students guiding questions to help them make inferences from the sample. (ODE)
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modeling)

• Tests and quizzes

• Technology

• Think-alouds

• Writing genres
□ Argument
□ Informative
□ Research
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<tr>
<td>STATISTICS AND PROBABILITY (7.SP)

Draw informal comparative inferences about two populations.

Use Mathematical Practices to
□ Make sense of problems and</td>
<td>A</td>
<td>
Students

7.SP.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. Additional content
○ For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.
</td>
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TEACHER NOTES

See instructional strategies in the introduction
• In Grade 6, students used measures of center and variability to describe sets of data. In the cluster "Use random sampling to draw inferences about a population" of Statistics and Probability in Grade 7, students learn to draw
</td>
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RESOURCE NOTES

See resources in the introduction

<u>Textbook</u>
• Holt Course 3
○ Chapter 11
• McDougal –Littell Algebra 1
• Exploration in Core Math Holt McDougal
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ASSESSMENT NOTES

See assessments in the introduction

<u>REQUIRED COMMON ASSESSMENTS</u>
• MID-TERM EXAM
• FINAL EXAM
• COMMON PROBLEMS/UNITS
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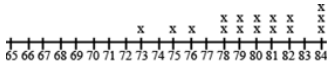
DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
persevere in solving them ☐ Reason abstractly and quantitatively ☐ Construct viable arguments and critique the reasoning of others ☐ Model with mathematics ★ ☐ Use appropriate tools strategically ☐ Attend to precision ☐ Look for and make use of structure ☐ Look for and express regularity in repeated reasoning		**Essential question** **Essential knowledge and skills** • Measures of center and measures of variability are used to determine informal (generalizations) or formal (numerical) differences between two data sets with similar variability. **Examples and Explanation** Example: • Jason wanted to compare the mean height of the players on his favorite basketball and soccer teams. He thinks the mean height of the players on the basketball team will be greater but doesn't know how much greater. He also wonders if the variability of heights of the athletes is related to the sport they play. He thinks that there will be a greater variability in the heights of soccer players as compared to basketball players. He used the rosters and player statistics from the team websites to generate the following lists. • Basketball Team – Height of Players in inches for 2010-2011 Season 75, 73, 76, 78, 79, 78, 79, 81, 80, 82, 81, 84, 82, 84, 80, 84 • Soccer Team – Height of Players in inches for 2010 73, 73, 73, 72, 69, 76, 72, 73, 74, 70, 65, 71, 74, 76, 70, 72, 71, 74, 71, 74, 73, 67, 70, 72, 69, 78, 73, 76, 69 • To compare the data sets, Jason creates a two dot plots on the same scale. The shortest player is 65 inches and the tallest players are 84 inches  Height of Soccer Players (in)  Height of Basketball Players (in) **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure	*inferences about one population from a random sampling of that population. Students continue using these skills to draw informal comparative inferences about two populations.* • *Provide opportunities for students to deal with small populations, determining measures of center and variability for each population. Then have students compare those measures and make inferences. The use of graphical representations of the same data (Grade 6) provides another method for making comparisons. Students begin to develop understanding of the benefits of each method by analyzing data with both methods.* • *When students study large populations, random sampling is used as a basis for the population inference. This build on the skill developed in the Grade 7 cluster "Use random sampling to draw inferences about a population" of Statistics and Probability. Measures of center and variability are used to make inferences on each of the general populations. Then the students have make comparisons for the two populations based on those inferences.*	• *Teaching the Common Core Math Standards, Muschla et. al* 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 Materials •	SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. ☐ Role playing - bodily kinesthetic ☐ Graphic organizing - visual ☐ Collaboration - interpersonal • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice,

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		• In looking at the distribution of the data, Jason observes that there is some overlap between the two data sets. Some players on both teams have players between 73 and 78 inches tall. Jason decides to use the mean and mean absolute deviation to compare the data sets. Jason sets up a table for each data set to help him with the calculations. • The mean height of the basketball players is 79.75 inches as compared to the mean height of the soccer players at 72.07 inches, a difference of 7.68 inches. • The mean absolute deviation (MAD) is calculated by taking the mean of the absolute deviations for each data point. The difference between each data point and the mean is recorded in the second column of the table. Jason used rounded values (80 inches for the mean height of basketball players and 72 inches for the mean height of soccer players) to find the differences. The absolute deviation, absolute value of the deviation, is recorded in the third column. The absolute deviations are summed and divided by the number of data points in the set. The mean absolute deviation is 2.14 inches for the basketball players and 2.53 for the soccer players. These values indicate moderate variation in both data sets. There is slightly more variability in the height of the soccer players. The difference between the heights of the teams is approximately 3 times the variability of the data sets (7.68 ÷ 2.53 = 3.04).	• *This is a great opportunity to have students examine how different inferences can be made based on the same two sets of data. Have students investigate how advertising agencies uses data to persuade customers to use their products. Additionally, provide students with two populations and have them use the data to persuade both sides of an argument.* (ODE)		modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres Argument Informative Research

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

Soccer Players (n = 29)			Basketball Players (n = 16)		
Height (in)	Deviation from Mean (in)	Absolute Deviation (in)	Height (in)	Deviation from Mean (in)	Absolute Deviation (in)
65	-7	7	73	-7	7
67	-5	5	75	-5	5
69	-3	3	76	-4	4
69	-3	3	78	-2	2
69	-3	3	78	-2	2
70	-2	2	79	-1	1
70	-2	2	79	-1	1
70	-2	2	80	0	0
71	-1	1	80	0	0
71	-1	1	81	1	1
71	-1	1	81	1	1
72	0	0	82	2	2
72	0	0	82	2	2
72	0	0	84	4	4
72	0	0	84	4	4
73	+1	1	84	4	4
73	+1	1			
73	+1	1			
73	+1	1			
73	+1	1			
73	+1	1			
74	+2	2			
74	+2	2			
74	+2	2			
74	+2	2			
76	+4	4			
76	+4	4			
76	+4	4			
78	+6	6			
Σ = 2090		Σ = 62	Σ = 1276		Σ = 40

Mean = 2090 ÷ 29 =72 inches Mean = 1276 ÷ 16 =80 inches
MAD = 62 ÷ 29 = 2.13 inches MAD = 40 ÷ 16 = 2.5 inches
(TUSD)

A 7.SP.4 Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

Additional content

- *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*

Essential question

Essential knowledge and skills

- Measures of center and measures of variability are used to determine informal (generalizations) or formal (numerical) differences between two data sets with similar variability.

Examples and Explanation

- Measures of center include mean, median, and mode. The measures of variability include range, mean absolute deviation, and interquartile range.

Example:

- The two data sets below depict random samples of

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 ★

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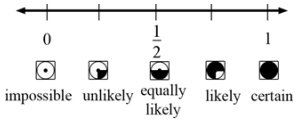
		the housing prices sold in the King River and Toby Ranch areas of Arizona. Based on the prices below which measure of center will provide the most accurate estimation of housing prices in Arizona? Explain your reasoning. ○ TBD current RI data {1.2 million, 242000, 265500, 140000, 281000, 265000, 211000} ○ TBD current RI data {5million, 154000, 250000, 250000, 200000, 160000, 190000} • Decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book. (TUSD) **Academic vocabulary** ASSESSMENT PROBLEMS 7.SP.3 Advanced • http://www.illustrativemathematics.org/illustrations/1340 • http://www.illustrativemathematics.org/illustrations/1341 7.SP.4 Basic • http://www.ixl.com/math/grade-7/calculate-mean-median-mode-and-range • http://www.ixl.com/math/grade-7/interpret-charts-to-find-mean-median-mode-and-range • http://www.ixl.com/math/grade-7/mean-median-mode-and-range-find-the-missing-number • http://www.ixl.com/math/grade-7/changes-in-mean-median-mode-and-range 7.SP.4 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7SP2.aspx • http://www.ode.state.or.us/wma/teachlearn/commoncore/mat.07.sr.1.000sp.h.164_v1.pdf • http://www.illustrativemathematics.org/illustrations/1340 • http://www.illustrativemathematics.org/illustrations/1341	• Use appropriate tools strategically • Attend to precision • Look for and make use of structure		

MATHEMATICS CURRICULUM Accelerated 7

Curriculum Writers: Amanda Bednarczyk, Carol Charest and Deborah Downes

DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
STATISTICS AND PROBABILITY (7.SP) Investigate chance processes and develop, use, and evaluate probability models. Use **Mathematical Practices** to ☐ 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	**S**	**Students** 7.SP.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. **Supporting content** **Essential question** **Mathematical Practices** **Essential knowledge and skills** • A number between 0 and 1 represents the probability of the likelihood of an event occurring, where 0 is impossible and 1 is certain the event will occur. **Examples and Explanation** • Probability can be expressed in terms such as impossible, unlikely, likely, or certain or as a number between 0 and 1 as illustrated on the number line. Students can use simulations such as Marble Mania on AAAS or the Random Drawing Tool on NCTM's Illuminations to generate data and examine patterns. • Marble Mania http://www.sciencenetlinks.com/interactives/marble/marblemania.html • Random Drawing Tool - http://illuminations.nctm.org/activitydetail.aspx?id=67  Example: • The container below contains 2 gray, 1 white, and 4 black marbles. Without looking, if you choose a marble from the container, will the probability be closer to 0 or to 1 that you will select a white marble? A gray marble? A black marble? Justify	TEACHER NOTES See instructional strategies in the introduction • *Grade 7 is the introduction to the formal study of probability. Through multiple experiences, students begin to understand the probability of chance (simple and compound), develop and use sample spaces, compare experimental and theoretical probabilities, develop and use graphical organizers, and use information from simulations for predictions.* • *Help students understand the probability of chance is using the benchmarks of probability: 0, 1 and ½. Provide students with situations that have clearly defined probability of never happening as zero, always happening as 1 or equally likely to happen as to not happen as 1/2. Then advance to situations in which the probability is somewhere between any two of these benchmark values. This builds to the concept of expressing the probability as a number between 0 and 1. Use this understaind to build the understanding that the closer the probability is to 0, the more likely it will not happen, and the closer to*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Course 3* ○ Chapter 11 • *McDougal –Littell Algebra 1* ○ Chapters 2,3 • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards, Muschla et. al* 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	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM • COMMON PROBLEMS/UNITS 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

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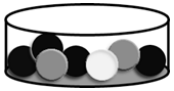
		each of your predictions.  (TUSD)	*1, the more likely it will happen. Students learn to make predictions about the relative frequency of an event by using simulations to collect, record, organize and analyze data. Students also develop the understanding that the more the simulation for an event is repeated, the closer the experimental probability approaches the theoretical probability.* • *Have students develop probability models to be used to find the probability of events. Provide students with models of equal outcomes and models of not equal outcomes are developed to be used in determining the probabilities of events.* • *Students should begin to expand the knowledge and understanding of the probability of simple events, to find the probabilities of compound events by creating organized lists, tables and tree diagrams. This helps students create a visual representation of the data; i.e., a sample space of the compound event. From each sample space, students determine the probability or fraction of each possible outcome. Students continue to build on the use of simulations for simple probabilities and now expand the simulation*	• www.ride.ri.gov Materials • Colored marbles • Coins • Dice • Spinners (can be student made)	▫ Collaboration - interpersonal • Oral presentations • Problem based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology • Think-alouds • Writing genres ▫ Argument ▫ Informative ▫ Research
	S	7.SP.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. **Supporting content** ○ *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly200 times.* **Essential question** **Essential knowledge and skills** • Experiments and simulations are used to collect data to determine the chance probability. **Examples and Explanation** Example: • Each group receives a bag that contains 4 green marbles, 6 red marbles, and 10 blue marbles. Each group performs 50 pulls, recording the color of marble drawn and replacing the marble into the bag before the next draw. Students compile their data as a group and then as a class. They summarize their data as experimental probabilities and make conjectures about theoretical probabilities (How many green draws would you expect if you were to conduct 1000 pulls? 10,000 pulls?). • Students create another scenario with a different ratio of marbles in the bag and make a conjecture about the outcome of 50 marble pulls with replacement. (An example would be 3 green marbles, 6 blue marbles, 3 blue marbles.) • Students try the experiment and compare their predictions to the experimental outcomes to continue to explore and refine conjectures about theoretical probability. • When rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times. **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision		

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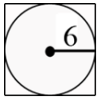
		(TUSD) **S** 7.SP.7 Develop a probability model and use it to find probabilities of events. **Supporting content** Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. o *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.* (7.SP.7a) b. Develop a probability model (which may not be uniform) by observin g frequencies in data generated from a chance process. o *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?* (7.SP.7b) **Essential question** **Essential knowledge and skills** • Actual probabilities, simple or compound, are the fraction of outcomes in the sample space for which the event or compound event occurs. • The more times an experiment or simulation is done the closer the chance probability should be to the actual probability, simple or compound **Examples and Explanation** Example: • If a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected. • If you choose a point in the square, what is the probability that it is not in the circle?  **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in	*of compound probability.* • *Providing opportunities for students to match situations and sample spaces assists students in visualizing the sample spaces for situations.* (ODE)		

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		repeated reasoning • Find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies? (TUSD)			
	S	7.SP.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. **Supporting content** a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. (7.SP.8a) b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. (7.SP.8b) c. Design and use a simulation to generate frequencies for compound events. ○ *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?* (7.SP.8c) **Essential question** **Essential knowledge and skills** • Sample spaces for compound events are represented using organized lists, tables and tree diagrams. **Examples and Explanation** Examples: • Students conduct a bag pull experiment. A bag contains 5 marbles. There is one red marble, two blue marbles and two purple marbles. Students will draw one marble without replacement and then draw another. What is the sample space for this situation? Explain how you determined the sample space and how you will use it to find the probability of drawing one blue marble followed by another **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning			

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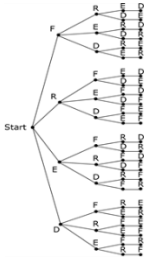
		blue marble. • Use random digits as a simulation tool to approximate the answer to the question: • If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood? • Show all possible arrangements of the letters in the word FRED using a tree diagram. If each of the letters is on a tile and drawn at random, what is the probability that you will draw the letters F-R-E-D in that order? What is the probability that your "word" will have an F as the first letter  (TUSD) **Academic vocabulary** ASSESSMENT PROBLEMS PARCC (problem number) .SP.5 Basic • http://www.ixl.com/math/grade-7/probability-of-simple-events 7.SP.5 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7SP3.aspx • http://www.opusmath.com/common-core-standards/7.sp.5-understand-that-the-probability-of-a-chance-event-is-a-number-between-0 7.SP.6 Basic • http://www.ixl.com/math/grade-7/experimental-probability • http://www.ixl.com/math/grade-7/make-predictions 7.SP.6 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7SP3.aspx • http://www.illustrativemathematics.org/illustrations/1216 • http://www.illustrativemathematics.org/illustrations/1047 7.SP.7a Basic • http://www.ixl.com/math/grade-7/probability-of-simple-events			

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		7.SP.7a Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7SP3.aspx 7.SP.7b Basic • http://www.ixl.com/math/grade-7/experimental-probability 7.SP.7b Advanced • http://www.illustrativemathematics.org/illustrations/1216 7.SP.8a Basic • http://www.ixl.com/math/grade-7/probability-of-opposite-mutually-exclusive-and-overlapping-events • http://www.ixl.com/math/grade-7/identify-independent-and-dependent-events • http://www.ixl.com/math/grade-7/probability-of-independent-and-dependent-events 7.SP.8a Advanced • http://www.illustrativemathematics.org/illustrations/343 7.SP.8b Basic • http://www.ixl.com/math/grade-7/compound-events-find-the-number-of-outcomes • http://www.ixl.com/math/grade-7/factorials • http://www.ixl.com/math/grade-7/permutations • http://www.ixl.com/math/grade-7/combinations • http://www.ixl.com/math/grade-7/combination-and-permutation-notation 7.SP.8b Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7SP3.aspx • http://engageny.org/sites/default/files/resource/attachments/math-grade-7.pdf			