6/1/2013

NORTH SMITHFIELD SCHOOL DEPARTMENT

MATHEMATICS CURRICULUM GRADE 7

North Smithfield Middle School
Curriculum Writers: 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

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

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

RESEARCH-BASED INSTRUCTIONAL STRATEGIES

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

- Use **formative assessment to** guide instruction
- 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 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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CATEGORIES, 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**	**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 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	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*	RESOURCE NOTES See resources in the introduction Textbook *Holt Mathematics Course 2,* • chapter 5,6 • chapter 4 *McDougal –Littell Pre-Algebra* • chapter 2, p. 76 • chapters 6,7,8 *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/curriculu	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
	M	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) **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). **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly			

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<table>
<tr><th>CATEGORIES, DOMAINS, CLUSTERS</th><th>UNIT</th><th>STANDARDS/BENCHMARKS
North Smithfield School Department</th><th>INSTRUCTIONAL STRATEGIES</th><th>RESOURCES</th><th>ASSESSMENTS</th></tr>
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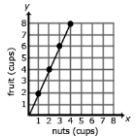
Unit rate is the slope of a proportional relationship that, when graphed, is a linear equation that goes through the origin.
Linear equations when graphed are straight lines.
Every point on a graph of a proportional relationship has a meaning in terms of the situation.

<u>Examples and Explanation</u>

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.

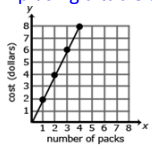
<table>
<tr><th>Serving Size</th><th>1</th><th>2</th><th>3</th><th>4</th></tr>
<tr><td>Cups of Nuts (x)</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>Cups of Fruit (y)</td><td>2</td><td>4</td><td>6</td><td>8</td></tr>
</table>



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.



(TUSD)

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

</td>
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continue to follow the thinking involved with rates and proportions. Solutions to problems can be found by 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)
</td>
<td>
m/index.asp

www.commoncore.org/maps
www.corestandards.org
www.khanacademy.com
www.ride.ri.gov

<u>Materials</u>

Advertisements in newspapers
Graph paper
Road maps
Unlimited manipulatives or tools (don’t restrict the tools to one or two, give students many options)

</td>
<td>

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

Argument
Informative
Research

</td>
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</table>

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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 knowledge and skills

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

Mathematical Practices

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

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

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 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

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		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 = | estimated value – actual value | x 100% actual value 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 = (2.50 liters – 2.38 liters) x 100% 2.50 liters = (.12 liters) x 100% 2.50 liters = .048 x 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) 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)			

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		• 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 • 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)			

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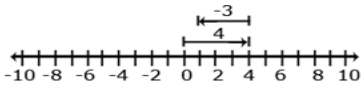
CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• Percents: Percent of change: word problems (Seventh grade - K.10) • Consumer math: Unit prices with unit conversions (Seventh grade - L.4) • Consumer math: Unit 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			
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)	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*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Mathematics Course 2,* Chapters 2, 3 • *McDougal –Littell Pre-Algebra,* Chapters 1,4,5 • *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

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

MATHEMATICS CURRICULUM Grade 7

Curriculum Writers: Carol Charest and Deborah Downes

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

		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.
		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)
		Mathematical Practices
		• Reason abstractly and quantitatively
		• Model with mathematics ★
		• Attend to precision
		• Look for and make use of structure
			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 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.*
				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
				• Assorted fraction models
				• Calculators
				• Dice/number cubes
				• Number lines
				• Two-color counters
				• Virtual manipulatives
					• 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

	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)			

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CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		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 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. • 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. **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics ★ • Attend to precision • Look for and make use of structure (TUSD)	*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.* • *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*		
	M	7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers.[1] **Major content** **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 **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly			

Equation	Number Line Model	Context
2 x 3 = 6	0 3 6	Selling two packages of apples at $3.00 per pack
2 x -3 = -6	-6 -3 0	Spending 3 dollars each on 2 packages of apples
-2 x 3 = -6	-6 -4 -2 0	Owing 2 dollars to each of your three friends
-2 x -3 = 6	0 2 4 6	Forgiving 3 debts of $2.00 each

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		below sea level from the surface. What was the rate of the descent? (TUSD) $\frac{-100 \text{ feet}}{20 \text{ seconds}} = \frac{-5 \text{ feet}}{1 \text{ second}} = -5 \text{ft/sec}$ and quantitatively • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning	*integers.* (ODE) *Computations with rational numbers extend the rules for manipulating fractions to complex fractions*		

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)

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

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

MATHEMATICS CURRICULUM Grade 7

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CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• 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) • 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			
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 ☐ 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** 7.EE.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. **Major content** **Essential knowledge and skills** • Properties of operations can be used to form equivalent forms of linear expressions. **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? **Mathematical Practices** • Reason abstractly and quantitatively • Attend to precision • Look for and make use of structure	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 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*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Mathematics Course 2,* Chapters 1,5,12 • *McDougal –Littell Pre-Algebra,* 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	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

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CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
	M	• Solution: $3(2x+5)$, therefore each side is $2x+5$ units long. 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 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. **Mathematical Practices** • Reason abstractly and quantitatively • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning **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? • 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 $9(J+T)+27$	*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. For example 5(3 + 2x) is equal to5●3 + 5●2x Let x = 6 and substitute 6 for x in both equations.*	• 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	• 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

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

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

- 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

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.p

5(3 + 2•6)
5(3 + 12)
5(15)
75

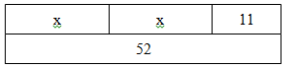
5•3 + 5•2•6
15 + 60
75

MATHEMATICS CURRICULUM Grade 7

Curriculum Writers: Carol Charest and Deborah Downes

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		df • 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 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** 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 $9\frac{3}{4}$ 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.* **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: **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 ★	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 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*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Mathematics Course 2,* Chapters 5,6,12 • *McDougal –Littell Pre-Algebra,* Chapters 2, 3,7 • *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	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 ★

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

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		○ 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 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) • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning	*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 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*	/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	• 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

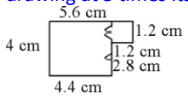
CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
	M	7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. **Major content** 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 knowledge and skills** • Real-world problems can be represented and solved using visual models, equations or inequalities. • 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 **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	*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)		

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

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

MATHEMATICS CURRICULUM Grade 7

Curriculum Writers: Carol Charest and Deborah Downes

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
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 ☐ 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.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 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. **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.  **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 *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 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*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Mathematics Course 2,* Chapters 8,9,10 • *McDougal –Littell Pre-Algebra,* 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 • http://www.tusd1.org/contents/distinfo/curriculum/index.asp • www.commoncore.org/maps • www.corestandards.org	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
	A	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 knowledge and skills** • Given constraints for triangles will determine whether a unique triangle, more than one triangle, or no triangle can be constructed. **Examples and Explanation** • Conditions may involve points, line segments, angles, parallelism, congruence, angles, and perpendicularity. Examples: **Mathematical Practices** • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express			

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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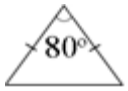
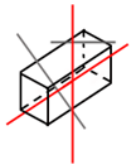
		• Is it possible to draw a triangle with a 90˚ angle and one leg that is 4 inches long and one leg that is 3 inches long? If so, draw one. Is there more than one such triangle? regularity in repeated reasoning
		• Draw a triangle with angles that are 60 degrees. Is this a unique triangle? Why or why not?
		• Draw an isosceles triangle with only one 80 degree angle. Is this the only possibility or can you draw another triangle that will also meet these conditions?
		 
		• Can you draw a triangle with sides that are 13 cm, 5 cm and 6cm?
		• Draw a quadrilateral with one set of parallel sides and no right angles. (TUSD)
			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?*
			
			• *Provide opportunities for students to use scale drawings of geometric figures with a given*
				• www.khanacademy.com
				• www.ride.ri.gov
				
				Materials
				• Compasses
				• Protractors
				• Road maps
				• Rulers
				• Tape measures
				• Virtual manipulatives
					• Oral presentations
					• Problem/Performance based/common tasks
					• Rubrics/checklists (mathematical practice, modeling)
					• Tests and quizzes
					• Technology
					• Think-alouds
					• Writing genres
					  ▫ Argument
					  ▫ Informative
					  ▫ Research

	A	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. (TUSD)  **Mathematical Practices** • Reason abstractly and quantitatively • Model with mathematics ★ • Use appropriate tools strategically • Look for and make use of structure **Academic vocabulary** • Area • Base • Circumference • Congruent • Diameter • Dimension • Height • Net • Orientation • Plane section • Radius • Scale			

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

Shape	Original Side Length	Created Side Length	Scale
Square	2.5 inches		
Parallelogram	3.25 cms		
Trapezoid	(Actual measurements)	Length 1 Length 2	

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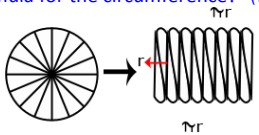
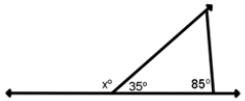
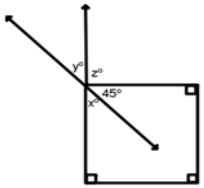
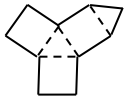
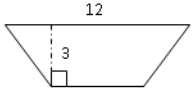
		ASSESSMENT PROBLEMS 7.G.1 Basic • Ratios and proportions: Scale drawings and scale factors (Seventh grade - J.13) • Geometry: Similar and congruent figures (Seventh grade - P.12) • Geometry: Similar figures: side lengths and angle measures (Seventh grade - P.13) • Geometry: Similar figures and indirect 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 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) 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	*scale that requires them to draw and label the dimensions of the new shape. Initially, measurements should be in whole numbers, progressing to measurements expressed with rational numbers. This will challenge students to apply their understanding of fractions and decimals.* (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	**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 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, **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* • *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*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Mathematics Course 2,* Chapters 8,9,10 • *McDougal –Littell Pre-Algebra,* Chapters 9,10 • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards,*	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM COMMON PROBLEMS/UNITS SUGGESTED FORMATIVE/

CATEGORIES, 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		**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 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)  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	*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 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*	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 • circular objects of several different sizes • compasses • grid paper • paper plates • protractors • scissors • string or yarn • tape measures, rulers	SUMMATIVE ASSESSMENTS • Anecdotal records • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. ☐ Role playing - bodily kinesthetic ☐ Graphic organizing - visual ☐ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Rubrics/checklists (mathematical practice, modeling) • Tests and quizzes • Technology
	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. **Additional content** **Essential knowledge and skills** • Equations can be written and used to find the value of missing angles in multi-step problems involving **Mathematical Practices** • Construct viable arguments and			

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		complementary, supplementary, adjacent and vertical angles **Examples and Explanation** • Set and solve an equation to find the value of angle x.  $x^{o} + 35^{o} = 180^{o}$ so m < x = 45^{0} Set and solve equations to find the missing angle measures  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 ∠ z = 90° (TUSD)	critique the reasoning of others • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision • Look for and make use of structure	*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 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*		• Think-alouds • Writing genres ▫ Argument ▫ Informative ▫ Research
	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 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? **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others			

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		 • 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 three units and a height of four units. • Find the area of the trapezoid shown below using the formulas for rectangles and triangles  (TUSD) • 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** • Area • Base • Circumference • Congruent • Diameter • Dimension • Height • Net • Orientation • Plane section • Radius • Scale ASSESSMENT PROBLEMS 7.G.4 Basic • Geometry: Parts of a circle (Seventh grade - P.21) • Geometry: Circles: calculate area, circumference, radius, and diameter (Seventh grade - P.22) • Geometry: Circles: word problems (Seventh grade - P.23) 7.G.4 Advanced • http://www.schools.utah.gov/CURR/mathsec/Core/7th-Grade-Core/7G2.aspx • http://www.illustrativemathematics.org/illustrations/34 • http://www.illustrativemathematics.org/illustrations/765 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	*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) •		

MATHEMATICS CURRICULUM Grade 7

Curriculum Writers: Carol Charest and Deborah Downes

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• 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			
STATISTICS AND PROBABILITY (7.SP) Use random sampling to draw inferences about a population. . 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.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 knowledge and skills** • Random samplings create sample populations, which mimic the demographics of a larger population, that are used to collect and generalize information. **Mathematical Practices** • Construct viable arguments and critique the reasoning of others • Attend to precision **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	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 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*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Mathematics Course 2,* Chapters 2, 3 • *McDougal –Littell Pre-Algebra,* Chapters 6,11 • *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	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

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

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

		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)
			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 population, including the statistical measures. Ask students guiding questions to help them make inferences from the sample.* (ODE)
				• 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
					• 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

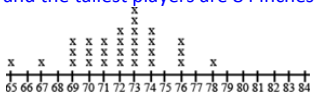
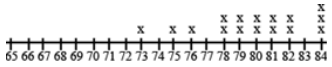
	S	7.SP.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. **Supporting content** ○ *For example, estimate the mean word 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 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 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 student sample / hamburgers / tacos / pizza / total #1: 12 / 14 / 74 / 100 #2: 12 / 11 / 77 / 100 **Mathematical Practices** • Make sense of problems and persevere in solving them • 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			

MATHEMATICS CURRICULUM Grade 7

Curriculum Writers: Carol Charest and Deborah Downes

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Academic vocabulary • Area model • Binomial probability • Categorical data • Deviation • Distribution • Expected value • Experimental • Inference • Mean absolute deviation (MAD) • Measures of center • Measures of variability • Outcome • Probability • Random • Random sample • Sample space • Theoretical probability • Variability of a set of numerical data ASSESSMENT PROBLEMS 7.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			
STATISTICS AND PROBABILITY (7.SP) Draw informal comparative inferences about two populations. 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 ★	**A**	**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.* **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. **Mathematical Practices** • Make sense of problems and persevere in solving them	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 inferences about one population from a random sampling of that population. Students continue using these skills to draw informal comparative inferences about two populations.*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Mathematics Course 2,* Chapters 11 • *McDougal –Littell Pre-Algebra,* Chapters 6,11 • *Exploration in Core Math* Holt McDougal • *Teaching the Common Core Math Standards,* Muschla et. al Supplementary Books, Teacher (T) Student (S)	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • MID-TERM EXAM • FINAL EXAM COMMON PROBLEMS/UNITS SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records

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

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
☐ 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** 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) • 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. • 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	• *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.* • *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.*	• 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 •	• 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

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

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		• 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). Soccer Players (n = 29) / Basketball Players (n = 16) Mean = 2090 ÷ 29 =72 inches Mean = 1276 ÷ 16 =80 inches MAD = 62 ÷ 29 = 2.13 inches MAD = 40 ÷ 16 = 2.5 inches			□ Informative □ Research

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

MATHEMATICS CURRICULUM Grade 7

Curriculum Writers: Carol Charest and Deborah Downes

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
	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 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 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) **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 **Academic vocabulary** • Area model • Binomial probability • Categorical data • Deviation • Distribution • Expected value • Experimental • Inference • Mean absolute deviation (MAD) • Measures of center • Measures of variability • Outcome • Probability • Random • Random sample • Sample space • Theoretical probability • Variability of a set of numerical data			

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

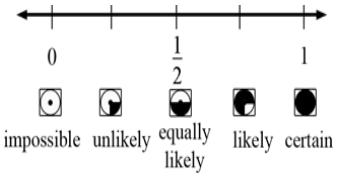
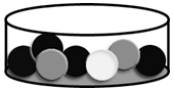
MATHEMATICS CURRICULUM Grade 7

Curriculum Writers: Carol Charest and Deborah Downes

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		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			
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	**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 $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. **Supporting content** **Essential knowledge and skills** — **Mathematical Practices** • 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.	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*	RESOURCE NOTES See resources in the introduction Textbook • *Holt Mathematics Course 2,* Chapters 11 • *McDougal –Littell Pre-Algebra,* 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	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

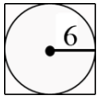
This curriculum was developed based on the Common Core State Standards utilizing examples and strategies from various websites including Tucson, Arizona, Ohio, and New Jersey.

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

regularity in repeated reasoning		• 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 each of your predictions. (TUSD)
		 
			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 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*
				• 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
				• Colored marbles
				• Coins
				• Dice
				• Spinners (can be student made)
					• 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

	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 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 **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Construct viable arguments and critique the reasoning of others			

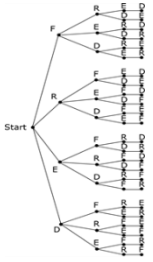
CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		conjectures about theoretical probabilities (How many green draws would you expect if you were to conduct 1000 pulls? 10,000 pulls?). • Students create another scenario 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. (TUSD) • Model with mathematics ★ • Use appropriate tools strategically • Attend to precision	*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 of compound probability.* • *Providing opportunities for students to match situations and sample spaces assists students in visualizing the sample spaces for situations.* (ODE)		
	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. ○ *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 observing frequencies in data generated from a chance process. ○ *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 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 **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly			

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		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?  • 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) 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	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 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 **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively			

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

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 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)

- 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

- Area model
- Binomial probability
- Categorical data
- Deviation
- Distribution
- Expected value
- Experimental
- Inference
- Mean absolute deviation (MAD)
- Measures of center
- Measures of variability
- Outcome
- Probability
- Random
- Random sample
- Sample space
- Theoretical probability
- Variability of a set of numerical data

ASSESSMENT PROBLEMS

7.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

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