6/1/2013

NORTH SMITHFIELD SCHOOL DEPARTMENT

MATHEMATICS CURRICULUM GRADE K

North Smithfield Elementary School
Curriculum Writers: Cynthia McLellan and Kim Sulfaro

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

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

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

Mission Statement

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

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

COMMON CORE STATE STANDARDS

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

Common Core State Standards components include:

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

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

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

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

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

RESEARCH-BASED INSTRUCTIONAL STRATEGIES

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

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

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

COMMON ASSESSMENTS

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

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

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RESOURCES FOR Grade K Mathematics

Textbook

- *enVisionMath*

Supplementary

- Literature books
- Informational books

Technology

- Computer lab
- Computers
- Interactive boards
- LCD projectors
- Student response systems

Websites

- http://curriculum.northsmithfieldschools.com
- http://www.achieve.org/http://my.hrw.com
- http://www.illustrativemathematics.org/standards/practice
- http://www.nj.gov/education/modelcurriculum/math/K.pdf
- http://www.ode.state.oh.us/GD/Templates/Pages/ODE/ODEDefaultPage.aspx?page=1
- http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S
- http://www.tusd1.org/contents/distinfo/curriculum/index.asp
- www.commoncore.org/maps
- www.corestandards.org
- www.illuminations.nctm.org
- www.ixL.com/standards/commom-core/math/gradeK
- www.K-5 teaching resources.com
- www.khanacademy.com
- www.mrmaffesoli.com/printables
- www.ride.ri.gov
- www.uen.org/commoncore

Materials

- 3-D solid figures
- Assorted shapes
- Atribute blocks
- Balance scales
- Balls
- Base 10 blocks
- Board games that require counting'Ten fram activities
- Books (literature and informational)
- Boxes that are cubes
- Cans of food
- Carpet squares or rectangles
- Clay
- Colored tiles
- Common two- and three-dimensional items
- Construction paper
- Counters
- Cubes
- Die cut shapes
- Dot Card and Ten Frame Activities
- Floor tiles
- Geoboards
- Graph paper
- Graphing activities
- Meter/yard stick
- Number charts
- Number lines
- Paper 3-D figures
- Paper plates
- Pattern blocks
- Pattern blocks
- Pattern blocks
- Place value charts
- Posters with number and quantitiy representations
- Rulers
- Sorting mats
- Straws
- Straws
- Tangrams
- Tangrams
- Textured numbers
- Three-dimensional models
- Three-dimensional models
- Unifix cubes
- White board markers
- White boards
- Wipe off place value charts
- Wooden sticks

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CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
COUNTING AND CARDINALITY (K.CC Know number names and the count sequence. . 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		**Students** K.CC .1 Count to 100 by ones and by tens. **Essential Question** • What *number patterns do you hear? Twenty-one, twenty-two, twenty-three,…* **Essential knowledge and skills** • Saying the number names in a count sequence is a rote process. While it is foundational to counting, it does not indicate understanding of the relationship between quantity and number. • Oral and written patterns exist in the counting sequence (e.g., +1 pattern, +10 pattern, etc.) **Teaching Examples** • The emphasis of this standard is on the counting sequence. • When counting by ones, students need to understand that the next number in the sequence is one more. When counting by tens, the next number in the sequence is "ten more" (or one more group of ten). • Instruction on the counting sequence should be scaffolded (e.g., 1-10, then 1-20, etc.). • Counting should be reinforced throughout the day, not in isolation. Examples: ○ Count the number of chairs of the students who are absent. ○ Count the number of stairs, shoes, etc. ○ Counting groups of ten such as "fingers in the classroom" (ten fingers per student). • When counting orally, students should recognize the patterns that exist from 1 to 100. They should also recognize the patterns that exist when counting by 10s. (TUSD) **Mathematical Practices** • Look for and make use of structure • Look for and express regularity in repeated reasoning K.CC .2 Count forward beginning from a given number within the known sequence (instead of having to begin at 1). . **Essential Question** • *What number patterns do you hear? Twenty-one, twenty-two, twenty-three,…* **Mathematical Practices** • Look for and make	TEACHER NOTES See instructional strategies in the introduction • *The Counting and Cardinality domain in Kindergarten contains standard statements that are connected to one another. Examine the three samples in this domain at the same time to obtain a more holistic view of the content.* • *Provide settings that connect mathematical language and symbols to the everyday lives of kindergarteners. Support students' ability to make meaning and mathematize the real world. Help them see patterns, make connections and provide repeated experiences that give students time and opportunities to develop understandings and increase fluency. Encourage students to explain their reasoning by asking probing questions such as "How do you know?".* • *Students view counting as a mechanism used to land on a number. Young students mimic counting often with initial lack of purpose or meaning. Coordinating the number words, touching or moving objects in a one-to-one correspondence may be little more than a matching activity. However, saying number words as a chant or a rote procedure plays a part in students constructing meaning for the conceptual idea of counting. They will*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath* Supplementary Books, Teacher (T) Student (S) • Technology • Computers • LCD projectors • Interactive boards Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.ride.ri.gov • www.math is fun • www.fun 4 the brain • www.funbrain • www.skills tutor Materials • Base ten blocks • Board games that require counting • Books (literature	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. □ Role playing - bodily kinesthetic □ Graphic organizing - visual □ Collaboration - interpersonal

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CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		use of structure **Essential knowledge and skills** • Counting can begin with any number and move forward (+1 pattern)**.** **Teaching Examples** • The emphasis of this standard is on the counting sequence to 100. Students should be able to count forward from any number, 1-99. (TUSD) K.CC .3 Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects). **Essential Question** • *What number patterns do you see? 11, 12, 13, …* **Essential knowledge and skills** • Number names can be written as numerals. **Teaching Examples** • Students should be given multiple opportunities to count objects and recognize that a number represents a specific quantity. Once this is established, students begin to read and write numerals (numerals are the symbols for the quantities). The emphasis should first be on quantity and then connecting quantities to the written symbols. • A sample unit sequence might include: 1. Counting up to 20 objects in many settings and situations over several weeks. 2. Beginning to recognize, identify, and read the written numerals, and match the numerals to given sets of objects. 3. Writing the numerals to represent counted objects. • Since the teen numbers are not written as they are said, teaching the teen numbers as one group of ten and extra ones is foundational to understanding both the concept and the symbol that represents each teen number. For example, when focusing on the number "14," students should count out fourteen objects using one-to-one correspondence and then use those objects to make one group of ten and four extra ones. Students should connect the representation to the symbol "14." (TUSD) **Mathematical Practices** • Reason abstractly and quantitatively • Look for and make use of structure • Look for and express regularity in repeated reasoning	*learn how to count before they understand cardinality, i.e. that the last count word is the amount of the set.* • *Counting on or counting from a given number conflicts with the learned strategy of counting from the beginning. In order to be successful in counting on, students must understand cardinality. Students often merge or separate two groups of objects and then re-count from the beginning to determine the final number of objects represented. For these students, counting is still a rote skill or the benefits of counting on have not been realized. Games that require students to add on to a previous count to reach a goal number encourage developing this concept. Frequent and brief opportunities utilizing counting on and counting back are recommended. These concepts emerge over time and cannot be forced.* • *Like counting to 100 by either ones or tens, writing numbers from 0 to 20 is a rote process. Initially, students mimic the actual formation of the written numerals while also assigning it a name. Over time, children create the understanding that number symbols signify the meaning of counting. Numerals are used to communicate across cultures and through time a certain meaning. Numbers have meaning when children*	and informational • Counters • Number lines • Number charts • Posters with number and quantity representations • Textured numbers • Unifix cubes • White board markers • White boards	• Oral presentations • Problem/Performance based/common tasks • Tests and quizzes • Technology • Think-alouds

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		Counting and Cardinality Academic vocabulary • Compare • Count • Counting sequence • Digit • Equal to • Greater than • Less than • Match • More than • Number • Numeral • Object • One more • Ones • Organize • Quantity • Remove • Tens • Total • Zero	*can see mental images of the number symbols and use those images with which to think. Practice count words and written numerals paired with pictures, representations of objects, and objects that represent quantities within the context of life experiences for kindergarteners. For example, dot cards, dominoes and number cubes all create different mental images for relating quantity to number words and numerals.* ODE)		
COUNTING AND CARDINALITY (K.CC) Count to tell the number of objects. Use **Mathematical Practices** to 1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others 4. Model with mathematics ★ 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning		**Students** K.CC.4 Understand the relationship between numbers and quantities; connect counting to cardinality. a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object. K.CC.4a b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted. K.CC.4b c. Understand that each successive number name refers to a quantity that is one larger. K.CC.4c **Essential Question** • *What does this numeral/number mean?* • *What strategy did you use to count? How did you make sure that you counted all the objects?* • *Why is it important to count each object only once?* **Essential knowledge and skills** • Counting tells us 'how many'. • Counting assigns a number name to an object or a set of objects. When counting, each object is paired with only one number name. • The last number counted states the total in the group. This is known as cardinality. **Mathematical Practices** • Reason abstractly and quantitatively • Look for and make use of structure • Look for and express regularity in repeated reasoning	TEACHER NOTES See instructional strategies in the introduction • *One of the first major concepts in a student's mathematical development is cardinality. Cardinality, knowing that the number word said tells the quantity you have and that the number you end on when counting represents the entire amount counted. The big idea is that number means amount and, no matter how you arrange and rearrange the items, the amount is the same. Until this concept is developed, counting is merely a routine procedure done when a number is needed. To determine if students have the cardinality rule, listen to their responses when you discuss counting tasks with them. For example, ask, "How many are here?". The student*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath* Supplementary Books, Teacher (T) Student (S) • Technology • Computers • LCD projectors • Interactive boards Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing • Exhibits • Interviews • Graphic organizers • Journals

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		Teaching Examples This standard focuses on one-to-one correspondence and how cardinality connects with quantity. • For example, when counting three bears, the student should use the counting sequence, "1-2-3," to count the bears and recognize that "three" represents the group of bears, not just the third bear. A student may use an interactive whiteboard /manipulatives to count objects, cluster the objects, and state, "This is three". In order to understand that each successive number name refers to a quantity that is one larger, students should have experience counting objects, placing one more object in the group at a time. • For example, using cubes, the student should count the existing group, and then place another cube in the set. Some students may need to re-count from one, but the goal is that they would count on from the existing number of cubes. S/he should continue placing one more cube at a time and identify the total number in order to see that the counting sequence results in a quantity that is one larger each time one more cube is placed in the group. (TUSD) K.CC.5 Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects. **Essential Question** • *How many are there? (Rearrange and ask again.)* • *How many are there? (Add another object) How many are there now? How do you know?* **Essential knowledge and skills** The quantity remains the same regardless of the arrangement of the objects or the order in which we count the objects. This is known as conservation of number **Mathematical Practices** • Reason abstractly and quantitatively • Look for and make use of structure • Look for and express regularity in repeated reasoning **Teaching Examples** Students should develop counting strategies to help them organize the counting process to avoid re-counting or skipping objects. Examples: • If items are placed in a circle, the student may mark	*counts correctly and says that there are seven. Then ask, "Are there seven?". Students may count or hesitate if they have not developed cardinality. Students with cardinality may emphasize the last count or explain that there are seven because they counted them. These students can now use counting to find a matching set.* • *Students develop the understanding of counting and cardinality from experience. Almost any activity or game that engages children in counting and comparing quantities, such as board games, will encourage the development of cardinality. Frequent opportunities to use and discuss counting as a means of solving problems relevant to kindergarteners is more beneficial than repeating the same routine day after day. For example, ask students questions that can be answered by counting up to 20 items before they change and as they change locations throughout the school building.* • *As students develop meaning for numerals, they also compare numerals to the quantities they represent. The models that can represent numbers, such as dot cards and dominoes, become tools for such comparisons. Students can concretely, pictorially or mentally look for similarities and differences in*	• www.corestandards.org • www.khanacademy.com • www.ride.ri.gov • www.math is fun • www.fun 4 the brain • www.funbrain • www.skills tutor Materials • Base ten blocks • Board games that require counting • Books (literature and informational • Counters • Number lines • Number charts • Posters with number and quantity representations • Textured numbers • Unifix cubes • White board markers • White boards	• Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. ▫ Role playing - bodily kinesthetic ▫ Graphic organizing - visual ▫ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Tests and quizzes • Technology • Think-alouds

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		or identify the starting object. • If items are in a scattered configuration, the student may move the objects into an organized pattern. • Counting up to 20 objects should be reinforced when collecting data to create charts and graphs. (TUSD) **Counting and Cardinality Academic vocabulary** • Compare • Match • Organize • Count • More than • Quantity • Counting sequence • Number • Remove • Digit • Numeral • Tens • Equal to • Object • Total • Greater than • One more • Zero • Less than • Ones ASSESSMENT PROBLEMS	*the representations of numbers. They begin to "see" the relationship of one more, one less, two more and two less, thus landing on the concept that successive numbers name quantities that are one larger. In order to encourage this idea, children need discussion and reflection of pairs of numbers from 1 to 10. Activities that utilize anchors of 5 and 10 are helpful in securing understanding of the relationships between numbers. This flexibility with numbers will build students' ability to break numbers into parts.* (ODE)		
COUNTING AND CARDINALITY (K.CC) Compare 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		**Students** K.CC.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies. **Essential Question** • *How do you know this group has more than the other group? What strategy did you use?* • *What would you have to do to make the two groups the same or equal?* **Essential knowledge and skills** • Two quantities can be compared to determine which quantity is more, less or equal to the other quantity. • The size of groups can be compared in multiple ways. **Teaching Examples** • Students should develop a strong sense of the relationship between quantities and numerals before they begin comparing numbers. **Mathematical Practices** • Reason abstractly and quantitatively • Look for and make use of structure • Look for and express regularity in repeated reasoning	TEACHER NOTES See instructional strategies in the introduction • *Include groups with up to ten objects.* • *As children develop meaning for numerals, they also compare these numerals to the quantities represented and their number words. The modeling numbers with manipulatives such as dot cards and five- and ten-frames become tools for such comparisons. Children can look for similarities and differences in these different representations of numbers. They begin to "see" the*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath* Supplementary Books, Teacher (T) Student (S) Technology • Computers • LCD projectors • Interactive boards Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing • Exhibits

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		• Other strategies: ○ Matching: Students use one-to-one correspondence, repeatedly matching one object from one set with one object from the other set to determine which set has more objects. ○ • Counting: Students count the objects in each set, and then identify which set has more, less, or an equal number of objects. ○ Observation: Students may use observation to compare two quantities (e.g., by looking at two sets of objects, they may be able to tell which set has more or less without counting). ○ Observations in comparing two quantities can be accomplished through daily routines of collecting and organizing data in displays. Students create object graphs and pictographs using data relevant to their lives (e.g., favorite ice cream, eye color, pets, etc.). Graphs may be constructed by groups of students as well as by individual students. ○ Benchmark Numbers: This would be the appropriate time to introduce the use of 0, 5 and 10 as benchmark numbers to help students further develop their sense of quantity as well as their ability to compare numbers. • Students state whether the number of objects in a set is more, less, or equal to a set that has 0, 5, or 10 objects. (TUSD) K.CC.7 Compare two numbers between 1 and 10 presented as written numerals. .**Essential Question** • *How do you know this numeral is more than the other numeral? What strategy did you use?* **Essential knowledge and skills** • Two numbers can be compared to determine which number is .more, less, or equal to the other. • Numbers can be compared in multiple ways. **Teaching Examples** • Given two numerals, students should determine which is greater or less than the other. (TUSD) **Mathematical Practices** • Reason abstractly and quantitatively	*relationship of one more, one less, two more and two less, thus landing on the concept that successive numbers name quantities where one is larger. In order to encourage this idea, children need discussion and reflection of pairs of numbers from 1 to 10. Activities that utilize anchors of 5 and 10 are helpful in securing understanding of the relationships between numbers. This flexibility with numbers will greatly impact children's ability to break numbers into parts.* • *Children demonstrate their understanding of the meaning of numbers when they can justify why their answer represents a quantity just counted. This justification could merely be the expression that the number said is the total because it was just counted, or a "proof" by demonstrating a one to-one match, by counting again or other similar means (concretely or pictorially) that makes sense. An ultimate level of understanding is reached when children can compare two numbers from 1 to10 represented as written numerals without counting.* • *Students need to explain their reasoning when they determine whether a number is greater than, less than, or equal to another number. Teachers need to ask probing questions such as "How do you know?" to elicit their*	• http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.ride.ri.gov • www.math is fun • www.fun 4 the brain • www.funbrain • www.skills tutor Materials • Board games • Books (literature and informational) • Counters • Graphing activities • Ten Frame Activities	• Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. □ Role playing - bodily kinesthetic □ Graphic organizing - visual □ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Tests and quizzes • Technology • Think-alouds

MATHEMATICS CURRICULUM Grade K

Curriculum Writers: Cynthia McLellan and Kim Sulfaro

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		Counting and Cardinality Academic Vocabulary • Compare • Count • Counting sequence • Digit • Equal to • Greater than • Less than • Match • More than • Number • Numeral • Object • One more • Ones • Organize • Quantity • Remove • Tens • Total • Zero	*thinking. For students, these comparisons increase in difficulty, from greater than to less than to equal. It is easier for students to identify differences than to find similarities.* (ODE)		
OPERATIONS AND ALGEBRAIC THINKING (K.OA) Work with addition and subtraction equations. . 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		**Students** K.OA.1 Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. **Essential Question** • *What is addition?* • *What is subtraction?* • *How does (one child's strategy) relate to (another child's strategy)?* **Essential knowledge and skills** • Addition is putting things together and adding to. • Subtraction is taking apart and taking from. **Teaching Examples** • Using addition and subtraction in a word problem context allows students to develop their understanding of what it means to add and subtract. • Students should use objects, fingers, mental images, drawing, sounds, acting out situations and verbal explanations in order to develop the concepts of addition and subtraction. Then, they should be introduced to writing expressions and equations using appropriate terminology and symbols which include "+," "–," and "=". ○ Addition terminology: add, join, put together, plus, combine, total ○ Subtraction terminology: minus, take away, separate, difference, compare • Students may use manipulatives or interactive **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Model with mathematics ★ • Use appropriate tools strategically	TEACHER NOTES See instructional strategies in the introduction • *Drawings need not show details, but should show the mathematics in the problem. (This applies wherever drawings are mentioned in the Standards)* • *Provide contextual situations for addition and subtraction that relate to the everyday lives of kindergarteners. A variety of situations can be found in children's literature books. Students then model the addition and subtraction using a variety of representations such as drawings, sounds, acting out situations, verbal explanations and numerical expressions. Manipulatives, like two-color counters, clothespins on hangers, connecting cubes and stickers can also be used for modeling these operations. Kindergarten students should see addition and subtraction*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath* Supplementary Books, Teacher (T) Student (S) • Technology • Computers • LCD projectors • Interactive boards Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices

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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		whiteboards to represent the concept of addition or subtraction. This gives them the opportunity to communicate their thinking. (TUSD) K.OA.2 Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem. **Essential Question** • *How do you know when to add or subtract?* • *How can different strategies be helpful when solving a story problem?* • *How can different models be helpful when solving a story problem?* • *How does (one child's strategy) relate to (another child's strategy)?* **Essential knowledge and skills** • Multiple strategies can be used for solving addition/subtraction story problems. • Models help us solve story problems and figure out what operation is involved in a problem. **Teaching Examples** • Using a word problem context allows students to develop their understanding about what it means to add and subtract. Addition is putting together and adding to. Subtraction is taking apart and taking from. Kindergarteners develop the concept of addition/subtraction by modeling the actions in word problems using objects, fingers, mental images, drawings, sounds, acting out situations, and/or verbal explanations. Students may use different representations based on their experiences, preferences, etc. They may connect their conceptual representations of the situation using symbols, expressions, and/or equations. Students should experience the following addition and subtraction problem types (see Table at end of document, p. 30). ○ Add To word problems, such as, "Mia had 3 apples. Her friend gave her 2 more. How many does she have now?" ▪ A student's "think aloud" of this problem might be, "I know that Mia has some apples and she's getting **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	*equations written by the teacher. Although students might struggle at first, teachers should encourage them to try writing the equations. Students' writing of equations in Kindergarten is encouraged, but it is not required.* • *Create written addition or subtraction problems with sums and differences less than or equal to 10 using the numbers 0 to 10 and Table 1 on page 88 of the Common Core State Standards (CCSS) for Mathematics for guidance. It is important to use a problem context that is relevant to kindergarteners. After the teacher reads the problem, students choose their own method to model the problem and find a solution. Students discuss their solution strategies while the teacher represents the situation with an equation written under the problem. The equation should be written by listing the numbers and symbols for the unknown quantities in the order that follows the meaning of the situation. The teacher and students should use the words equal and is the same as interchangeably.* • *Have students decompose numbers less than or equal to 5 during a variety of experiences to promote their fluency with sums and differences less than or equal to 5 that result from using the numbers 0 to 5. For example,*	• www.ride.ri.gov • www.math is fun • www.fun 4 the brain • www.funbrain • www.skills tutor Materials • Books (literature and informational) • Colored cubes • Counters • Linking cubes • Ten frames	• Modeling ★ • Multiple Intelligences assessments, e.g. ▫ Role playing - bodily kinesthetic ▫ Graphic organizing - visual ▫ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Tests and quizzes • Technology • Think-alouds

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		some more. So she's going to end up with more apples than she started with. ○ Take From problems such as: ▪ José had 8 markers and he gave 2 away. How many does he have now? When modeled, a student would begin with 8 objects and remove two to get the result. ○ Put Together/Take Apart problems with Total Unknown gives students opportunities to work with addition in another context such as: ▪ There are 2 red apples on the counter and 3 green apples on the counter. How many apples are on the counter? ○ Solving Put Together/Take Apart problems with Both Addends Unknown provides students with experiences with finding all the decompositions of a number and investigating the patterns involved. ▪ There are 10 apples on the counter. Some are red and some are green. How many apples could be green? How many apples could be red? • Students may use a manipulatives or interactive whiteboard to demonstrate addition or subtraction strategies. This gives them the opportunity to communicate and justify their thinking. (TUSD) K.OA.3 Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., 5 = 2 + 3 and 5 = 4 + 1). **Essential Question** • *How many different ways can you break a number into two groups (decompose it)?* • *How does (one child's strategy) relate to (another child's strategy)?* **Essential knowledge and skills** • Numbers can be composed and decomposed in many ways. **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Model with	*ask students to use different models to decompose 5 and record their work with drawings or equations. Next, have students decompose 6, 7, 8, 9, and 10 in a similar fashion. As they come to understand the role and meaning of arithmetic operations in number systems, students gain computational fluency, using efficient and accurate methods for computing.* *The teacher can use backmapping and scaffolding to teach students who show a need for more help with counting. For instance, ask students to build a tower of 5 using 2 green and 3 blue linking cubes while you discuss composing and decomposing 5. Have them identify and compare other ways to make a tower of 5. Repeat the activity for towers of 7 and 9. Help students use counting as they explore ways to compose 7 and 9.* (ODE)		

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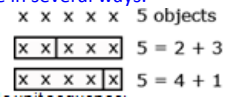
		Teaching Examples • This standard focuses on number pairs which add to a specified total, 1-10. These number pairs may be examined either in or out of context. • Students may use objects such as cubes, two-color counters, square tiles, etc. to show different number pairs for a given number. For example, for the number 5, students may split a set of 5 objects into 1 and 4, 2 and 3, etc. • Students may also use drawings to show different number pairs for a given number. For example, students may draw 5 objects, showing how to decompose in several ways.  • Sample unit sequence: ○ A contextual problem (word problem) is presented to the students such as, "Mia goes to Nan's house. Nan tells her she may have 5 pieces of fruit to take home. There are lots of apples and bananas. How many of each can she take?" ○ Students find related number pairs using objects (such as cubes or two-color counters), drawings, and/or equations. Students may use different representations based on their experiences, preferences, etc. ○ Students may write equations that equal 5 such as: 5=4+1 3+2=5 2+3=4+1 • This is a good opportunity for students to systematically list all the possible number pairs for a given number. For example, all the number pairs for 5 could be listed as 0+5, 1+4, 2+3, 3+2, 4+1, and 5+0. Students should describe the pattern that they see in the addends, e.g., each number is one less or one than the previous addend. (TUSD)	mathematics • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning		

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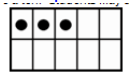
		K.OA.4 For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation. **Essential Question** • *How many different ways can you break a number into two groups (decompose it)?* • *How does (one child's strategy) relate to (another child's strategy)?* **Essential knowledge and skills** • Addition is putting things together and adding to. **Teaching Examples** • The number pairs that total ten are foundational for students' ability to work fluently within base-ten numbers and operations. Different models, such as ten-frames, cubes, two-color counters, etc., assist students in visualizing these number pairs for ten. Example 1: • Students place three objects on a ten frame and then determine how many more are needed to "make a ten." Students may use electronic versions of ten frames to develop this skill.  Example 2: • The student snaps ten cubes together to make a "train." ○ Student breaks the "train" into two parts. S/he counts how many are in each part and record the associated equation (10 = ___ + ___). ○ Student breaks the "train into two parts. S/he counts how many are in one part and determines how many are in the other part without directly counting that part. Then s/he records the associated equation (if the counted part has 4 cubes, the equation would be 10 = 4 + ___). ○ Student covers up part of the train, without counting the covered part. S/he counts the cubes that are showing and determines how many are covered up. Then s/he records the associated equation (if the counted part has 7 cubes, the equation **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Model with mathematics • Use appropriate tools strategically • Attend to precision • Look for and make use of structure • Look for and express regularity in repeated reasoning		

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		would be 10 = 7 + ___). Example 3: • The student tosses ten two-color counters on the table and records how many of each color are facing up. (TUSD) K.OA.5 Fluently add and subtract within 5. **Essential Question** • *What is addition?* • *What is subtraction?* • *How do you know when to add or subtract?* **Essential knowledge and skills** • A new value is produced by adding/subtracting one or more values from a quantity. **Teaching Examples** • This standard focuses on students being able to add and subtract numbers within 5. Adding and subtracting fluently refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently. • Strategies students may use to attain fluency include: ○ Counting on (e.g., for 3+2, students will state, "3," and then count on two more, "4, 5," and state the solution is "5") ○ Counting back (e.g., for 4-3, students will state, "4," and then count back three, "3, 2, 1" and state the solution is "1") ○ Counting up to subtract (e.g., for 5-3, students will say, "3," and then count up until they get to 5, keeping track of how many they counted up, stating that the solution is "2") ○ Using doubles (e.g., for 2+3, students may say, "I know that 2+2 is 4, and 1 more is 5") ○ Using commutative property (e.g., students may say, "I know that 2+1=3, so 1+2=3") ○ Using fact families (e.g., students may say, "I know that 2+3=5, so 5-3=2") (TUSD) **Mathematical Practices** • Reason abstractly and quantitatively • Look for and make use of structure • Look for and express regularity in repeated reasoning			

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		Operations and Algebraic Thinking Academic Vocabulary • Add to • Addend • Break apart • Combinations • Combine • Count back • Count on • Counting up to • Decompose • Equal to • Equation • How many? • Join • Make fives • Make tens • Mental image • Minus • Part • Plus • Put together • Remove • Separate • Strategies • Subtract • Sum • Symbols • Take away • Total • Use doubles • Whole			
NUMBER AND OPERATIONS IN BASE TEN (K.NBT Work with numbers 11–19 to gain foundations for place value. 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		**Students** K.NBT.1 Compose and decompose numbers from 11 to 19 into ten ones and some further ones, ○ For example, *by using objects or drawings, and record each composition or decomposition by a drawing or equation (e.g., 18 = 10 + 8); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.* **Essential Question** • *Consider the numerals 11-19: There are ten ones, and how many more?* • *What patterns do you see?* • *How do the teen numbers differ from the single-digit numbers?* • *How might your ten-frame help you count?* **Essential knowledge and skills** • Teen numbers compose and decompose into ten ones and some more (or further) ones. (• Moving from counting by ones to interpreting quantities as 'ten and some more' is foundational and a significant milestone in the understanding of the base-ten system. Tens are not yet understood as a unit; this quantity is seen as ten ones. • There are patterns in the ways numbers are formed. **Mathematical Practices** • Make sense of problems and persevere in solving them • Reason abstractly and quantitatively • Model with mathematics • Use appropriate tools strategically • Look for and make use of structure • Look for and express regularity in repeated reasoning	TEACHER NOTES • *See instructional strategies in the introduction* • *20 in Grade 1. Students need to construct their own base-ten ideas about quantities and their symbols by connecting to counting by ones. They should use a variety of manipulatives to model and connect equivalent representations for the numbers 11 to19. For instance, to represent 13, students can count by ones and show 13 beans. They can anchor to five and show one group of 5 beans and 8 beans or anchor to ten and show one group of 10 beans and 3 beans. Students need to eventually see a ten as different from 10 ones.* • *After the students are familiar with counting up to 19 objects by ones, have them explore different ways to group the objects that will make counting easier. Have them*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath* Supplementary Books, Teacher (T) Student (S) • Technology • Computers • LCD projectors • Interactive boards Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps • www.corestandards	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical

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		Teaching Examples • Special attention needs to be paid to this set of numbers as they do not follow a consistent pattern in the verbal counting sequence. ○ Eleven and twelve are special number words. ○ "Teen" means one "ten" plus ones. ○ The verbal counting sequence for teen numbers is backwards – we say the ones digit before the tens digit. For example "27" reads tens to ones (twenty-seven), but 17 reads ones to tens (seven-teen). ○ In order for students to interpret the meaning of written teen numbers, they should read the number as well as describe the quantity. For example, for 15, the students should read "fifteen" and state that it is one group of ten and five ones and record that 15 = 10 + 5. • Teaching the teen numbers as one group of ten and extra ones is foundational to understanding both the concept and the symbol that represent each teen number. For example, when focusing on the number "14," students should count out fourteen objects using one-to-one correspondence and then use those objects to make one group of ten ones and four additional ones. Students should connect the representation to the symbol "14." Students should recognize the pattern that exists in the teen numbers; every teen number is written with a 1 (representing one ten) and ends with the digit that is first stated. (TUSD)  **Number and Operations in Base Ten Academic vocabulary** • Break apart • Decompose • Pattern • Ten and some more	*estimate before they count and group. Discuss their groupings and lead students to conclude that grouping by ten is desirable. 10 ones make 1 ten makes students wonder how something that means a lot of things can be one thing. They do not see that there are 10 single objects represented on the item for ten in pregrouped materials, such as the rod in base-ten blocks. Students then attach words to materials and groups without knowing what they represent. Eventually they need to see the rod as a ten that they did not group themselves. Students need to first use groupable materials to represent numbers 11 to 19 because a group of ten such as a bundle of 10 straws or a cup of 10 beans makes more sense than a ten in pregrouped materials.* • *Kindergarteners should use proportional base-ten models, where a group of ten is physically 10 times larger than the model for a one. Nonproportional models such as an abacus and money should not be used at this grade level..* (ODE)	.org • www.khanacademy.com • www.ride.ri.gov • www.math is fun • www.fun 4 the brain • www.funbrain • www.skills tutor Materials • Books (literature and informational) Groupable models • Dried beans and small cups for holding groups of 10 dried beans • Linking cubes • Plastic chain links Pregrouped materials • Base-ten blocks • Dried beans and bean sticks (10 dried beans glued on a craft stick) • Five-frame and Ten-frame • Place-value mat with ten-frames • Strips (ten connected squares) and squares (singles)	Practices • Modeling ★ • Multiple Intelligences assessments, e.g. ▫ Role playing - bodily kinesthetic ▫ Graphic organizing - visual ▫ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Tests and quizzes • Technology • Think-alouds

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MEASUREMENT AND DATA (K.MD) Describe and compare measurable attributes. . Use **Mathematical Practices** to 1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others **4.** Model with mathematics ★ 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning		**Students** K.MD.1 Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. **Essential Question** • *What do you see?* • *Which is taller/shorter, heavier/lighter, longer/shorter? How do you know?* **Mathematical Practices** • Look for and make use of structure **Essential knowledge and skills** • Objects have multiple attributes. • Measurable attributes can be compared directly or indirectly. • Attributes are measured using a unit of measure. **Teaching Examples** • In order to describe attributes such as length and weight, students must have many opportunities to informally explore these attributes. ○ Students should compare objects verbally and then focus on specific attributes when making verbal comparisons for K.MD.2. They may identify measurable attributes such as length, width, height, and weight. For example, when describing a soda can, a student may talk about how tall, how wide, how heavy, or how much liquid can fit inside. These are all measurable attributes. Non-measurable attributes include: words on the object, colors, pictures, etc. • An interactive whiteboard or manipulatives may be used to model objects with measurable attributes. (TUSD) K.MD.2 Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. ○ *For example, directly compare the heights of two children and describe one child as taller/shorter.* **Essential Question** • *How can you tell which item is taller/shorter, heavier/lighter, longer/shorter?* **Mathematical Practices** • Attend to precision • Look for and make	TEACHER NOTES See instructional strategies in the introduction • *It is critical for students to be able to identify and describe measureable attributes of objects. An object has different attributes that can be measured, like the height and weight of a can of food. When students compare shapes directly, the attribute becomes the focus. For example, when comparing the volume of two different boxes, ask students to discuss and justify their answers to these questions: Which box will hold the most? Which box will hold least? Will they hold the same amount? Students can decide to fill one box with dried beans then pour the beans into the other box to determine the answers to these questions.* • *Have students work in pairs to compare their arm spans. As they stand back-to-back with outstretched arms, compare the lengths of their spans, then determine who has the smallest arm span. Ask students to explain their reasoning. Then ask students to suggest other measureable attributes of their bodies that they could directly compare, such as their height or the length of their feet.* • *Connect to other subject areas. For example, suppose that the students have been collecting rocks for classroom*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath* Supplementary Books, Teacher (T) Student (S) • Technology • Computers • LCD projectors • Interactive boards Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.ride.ri.gov • www.math is fun • www.fun 4 the brain • www.funbrain • www.skills tutor Materials • Balance scale • Books (literature and informational) • Dried beans	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. □ Role playing - bodily kinesthetic □ Graphic organizing - visual □ Collaboration - interpersonal

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		• *What happens to the attributes of a shape (or object) when I move it? Why?* use of structure **Essential knowledge and skills** • Measurable attributes can be compared directly or indirectly. • Attributes are measured using a unit of measure. • Attention to starting points, gaps, and overlaps is important to measure accurately. • Measurable attributes do not change when an object is moved (conservation). **Teaching Examples** • When making direct comparisons for length, students must attend to the "starting point" of each object. For example, the ends need to be lined up at the same point, or students need to compensate when the starting points are not lined up (conservation of length includes understanding that if an object is moved, its length does not change; an important concept when comparing the lengths of two objects). • Language plays an important role in this standard as students describe the similarities and differences of measurable attributes of objects (e.g., shorter than, taller than, lighter than, the same as, etc.). • An interactive whiteboard or manipulatives may be used to compare objects with measurable attributes. (TUSD) **Measurement and Data Academic Vocabulary** • Attribute • Height • Shorter (than) • Biggest • How long? • Similar • Category • Length • Smallest • Classify • Lighter • Sort • Compare • Longer than • Starting point • Different • Measurable • Taller • Equal • Pair • Weight • Greater than/less than • Same • Width • Heavier	*observation and they wanted to know if they have collected typical or unusual rocks. Ask students to discuss the measurable attributes of rocks. Lead them to first comparing the weights of the rocks. Have the class chose a rock that seems to be a "typical" rock. Provide the categories: Lighter Than Our Typical Rock and Heavier Than Our Typical Rock. Students can take turns holding a different rock from the collection and directly comparing its weight to the weight of the typical rock and placing it in the appropriate category. Some rocks will be left over because they have about the same weight as the typical rock. As a class, they count the number of rock in each category and use these counts to order the categories and discuss whether they collected "typical" rocks.* (ODE)	• Rice • Rulers • Two-and three-dimensional real-world objects	• Oral presentations • Problem/Performance based/common tasks • Tests and quizzes • Technology • Think-alouds
MEASUREMENT AND DATA (K.MD) Classify objects and count the number of		**Students** K.MD.3 Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.	TEACHER NOTES See instructional strategies in the introduction	RESOURCE NOTES See resources in the introduction Textbook	ASSESSMENT NOTES See assessments in the introduction

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objects in each category. 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		**Essential Question** • *How many are in this group?* • *What criteria did you use to sort the objects?* • *What name might you give this group of objects? Why?* • *Which group has more/less? How do you know?* • *What are all the attributes of this object?* **Essential knowledge and skills** • A single object can have multiple attributes. • Shapes can be sorted based on their attributes. • Objects in a group can be counted. **Teaching Examples** • Possible objects to sort include buttons, shells, shapes, beans, etc. After sorting and counting, it is important for students to: ○ explain how they sorted the objects; ○ label each set with a category; ○ answer a variety of counting questions that ask, "How many …"; and ○ compare sorted groups using words such as, "most", "least", "alike" and "different". (TUSD) **Mathematical Practices** • Reason abstractly and quantitatively • Look for and make use of structure **Measurement and Data Academic Vocabulary** • Attribute • Biggest • Category • Classify • Compare • Different • Equal • Greater than/less than • Heavier • Height • How long? • Length • Lighter • Longer than • Measurable • Pair • Same • Shorter (than) • Similar • Smallest • Sort • Starting point • Taller • Weight • Width	• *Limit category counts to be less than or equal to 10.* • *Provide categories for students to use to sort a collection of objects. Each category can relate to only one attribute, like Red and Not Red or Hexagon and Not Hexagon, and contain up to 10 objects. Students count how many objects are in each category and then order the categories by the number of objects they contain.* • *Ask questions to initiate discussion about the attributes of shapes. Then have students sort a collection of two-dimensional and three-dimensional shapes by their attributes. Provide categories like Circles and Not Circles or Flat and Not Flat. Have students count the objects in each category and order the categories by the number of objects they contain.* • *Have students infer the classification of objects by guessing the rule for a sort. First, the teacher uses one attribute to sort objects into two loops or regions without labels. Then the students determine how the objects were sorted, suggest labels for the two categories and explain their reasoning.* (ODE)	• *enVisionMath* Supplementary Books, Teacher (T) Student (S) Technology • Computers • LCD projectors • Interactive boards Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org/standards/practice • http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S • www.commoncore.org/maps • www.corestandards.org • www.khanacademy.com • www.ride.ri.gov • www.math is fun • www.fun 4 the brain • www.funbrain • www.skills tutor Materials • Attribute blocks • Books (literature and informational) • Objects to sort • Sorting mats	REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing • Exhibits • Interviews • Graphic organizers • Journals • Mathematical Practices • Modeling ★ • Multiple Intelligences assessments, e.g. □ Role playing - bodily kinesthetic □ Graphic organizing - visual □ Collaboration - interpersonal • Oral presentations • Problem/Performance based/common tasks • Tests and quizzes • Technology • Think-alouds

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 K

Curriculum Writers: Cynthia McLellan and Kim Sulfaro

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

GEOMETRY (K.G)
 	
Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).
 	
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
		Students
		
		K.G.1 Describe objects in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.
		. **Essential Question**
		• *Where is the book in relation to the table?*
		• *How can you use words to help me make your pattern block design when I can't see what you did?*
		
		Academic vocabulary
		
		Essential knowledge and skills
		• Objects in the environment have shapes that can be named.
		• Some shapes are flat (two-dimensional); some shapes are solid (three-dimensional).
		• Shape names do not change when the orientation is changed.
		• An object can be described in terms of its location relative to the position of another object.
		Mathematical Practices
		• Look for and make use of structure
		Teaching Examples
		• Examples of environments in which students would be encouraged to identify shapes would include nature, buildings, and the classroom using positional words in their descriptions. Teachers should work with children and pose four mathematical questions: Which way? How far? Where? And what objects? To answer these questions, children develop a variety of important skills contributing to their spatial thinking.
		Examples:
		• Teacher holds up an object such as an ice cream cone, a number cube, ball, etc. and asks students to identify the shape. Teacher holds up a can of soup and asks," What shape is this can?" Students respond "cylinder!"
		• Teacher places an object next to, behind, above, below, beside, or in front of another object and asks positional questions. Where is the water bottle? (water bottle is placed behind a book) Students say "The water bottle is behind the book."
		• Students should have multiple opportunities to identify shapes; these may be displayed as photographs, or pictures using interactive whiteboard. (TUSD)
			TEACHER NOTES
			
			See instructional strategies in the introduction
			
			• *Develop spatial sense by connecting geometric shapes to students' everyday lives. Initiate natural conversations about shapes in the environment. Have students identify and name two- and three-dimensional shapes in and outside of the classroom and describe their relative position.*
			• *Ask students to find rectangles in the classroom and describe the relative positions of the rectangles they see, e.g. This rectangle (a poster) is over the sphere (globe). Teachers can use a digital camera to record these relationships.*
			• *Hide shapes around the room. Have students say where they found the shape using positional words, e.g. I found a triangle UNDER the chair.*
			• *Have students create drawings involving shapes and positional words: Draw a window ON the door or Draw an apple UNDER a tree. Some students may be able to follow two- or three-step instructions to create their drawings.*
			• *Use a shape in different orientations and sizes along with non-examples of the shape so students can learn to focus on defining attributes of the shape.*
				RESOURCE NOTES
				
				See resources in the introduction
				Textbook
				• *enVisionMath*
				
				Supplementary Books, Teacher (T) Student (S)
				
				Technology
				• Computers
				• LCD projectors
				• Interactive boards
				
				Websites
				• http://curriculum.northsmithfieldschools.com
				• http://www.illustrativemathematics.org/standards/practice
				• http://www.parcconline.org/sites/parcc/files/PARCC%20Math%20S
				• www.commoncore.org/maps
				• www.corestandards.org
				• www.khanacademy.com
				• www.ride.ri.gov
				• www.math is fun
				• www.fun 4 the brain
				• www.funbrain
				• www.skills tutor
				
				Materials
				• Assorted shapes
				• Attribute blocks
				• Common two- and three-dimensional items
					ASSESSMENT NOTES
					
					See assessments in the introduction
					
					REQUIRED COMMON ASSESSMENTS
					• Common units
					• Common unit assessments
					
					SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS
					
					• Anecdotal records
					• Checklist
					• Conferencing
					• Exhibits
					• Interviews
					• Graphic organizers
					• Journals
					• Mathematical Practices
					• Modeling ★
					• Multiple Intelligences assessments, e.g.
					  ▫ Role playing - bodily kinesthetic
					  ▫ Graphic organizing - visual
					  ▫ Collaboration - interpersonal

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 K

Curriculum Writers: Cynthia McLellan and Kim Sulfaro

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		K.G.2 Correctly name shapes regardless of their orientations or overall size. **Essential Question** • *What shape is this book? How do you know?* • *(Rotate the item.) Now what shape is it?* **Essential knowledge and skills** • Shape names do not change when the orientation is changed. **Teaching Examples** • Students should be exposed to many types of triangles in many different orientations in order to eliminate the misconception that a triangle is always right-side-up and equilateral. • Students should also be exposed to many shapes in many different sizes.  Examples: ○ Teacher makes pairs of paper shapes that are different sizes. Each student is given one shape and the objective is to find the partner who has the same shape. • Teacher brings in a variety of spheres (tennis ball, basketball, globe, ping pong ball, etc.) to demonstrate that size doesn't change the name of a shape. (TUSD) **Mathematical Practices** • Look for and make use of structure	• *Manipulatives used for shape identification actually have three dimensions. However, Kindergartners need to think of these shapes as two-dimensional or "flat" and typical three-dimensional shapes as "solid." Students will identify two-dimensional shapes that form surfaces on three-dimensional objects. Students need to focus on noticing two and three dimensions, not on the words two-dimensional and three-dimensional.* (ODE)	• Die cut shapes • Pattern blocks • Tangrams • Three-dimensional models	• Oral presentations • Problem/Performance based/common tasks • Tests and quizzes • Technology • Think-alouds
		K.G.3 Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid"). **Essential Question** • *What shape is this book? How do you know?* **Essential knowledge and skills** • Some shapes are flat (two-dimensional); some shapes are solid (three-dimensional). **Teaching Examples** • Student should be able to differentiate between two-dimensional and three-dimensional shapes. ○ Student names a picture of a shape as two-dimensional because it is flat and can be **Mathematical Practices** • Look for and make use of structure			

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CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		measured in only two ways (length and width). ○ Student names an object as three dimensional because it is not flat (it is a solid object/shape) and can be measured in three different ways (length, width, height/depth). (TUSD) **Geometry Academic Vocabulary** • Above • Behind • Below • Beside • Between • Circle • Cone • Cube • Cylinder • Different • Edge • Face • Flat/ lying in plane • Hexagon • In front of • Next to • Octagon • Rectangle • Rhombus • Same • Side • Solid • Sphere • Square • Three-dimensional • Two-dimensional • Trapezoid • Triangle • Vertices "corners"			
GEOMETRY (K.G) Analyze, compare, create, and compose shapes. 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		**Students** K.G.4 Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length). **Essential Question** • *How many different ways can you sort these shapes?* • *What two-dimensional shapes do you see in this three-dimensional shape?* **Essential knowledge and skills** • Two-dimensional and three-dimensional shapes can be analyzed, compared and sorted based on their attributes. • When sorted, a single item may belong to more than one category. **Teaching Examples** • Spatial sense includes the ability to visualize objects and spatial relationships, to turn things around in your mind, and to compose and decompose objects or shapes. **Mathematical Practices** • Attend to precision • Look for and make use of structure	TEACHER NOTES See instructional strategies in the introduction *Use shapes collected from students to begin the investigation into basic properties and characteristics of two- and three-dimensional shapes. Have students analyze and compare each shape with other objects in the classroom and describe the similarities and differences between the shapes. Ask students to describe the shapes while the teacher records key descriptive words in common student language. Students need to use the word flat to describe two-dimensional shapes and the word solid to describe three-dimensional*	RESOURCE NOTES See resources in the introduction Textbook • *enVisionMath* Supplementary Books, Teacher (T) Student (S) Technology • Computers • LCD projectors • Interactive boards Websites • http://curriculum.northsmithfieldschools.com • http://www.illustrativemathematics.org	ASSESSMENT NOTES See assessments in the introduction REQUIRED COMMON ASSESSMENTS • Common units • Common unit assessments SUGGESTED FORMATIVE/ SUMMATIVE ASSESSMENTS • Anecdotal records • Checklist • Conferencing • Exhibits

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

		• Students analyze and compare two- and three-dimensional shapes by observations. Their visual thinking (spatial sense) enables them to determine if things are alike or different based on the appearance of the shape. Students sort objects based on appearance. Even in early explorations of geometric properties, they are introduced to how categories of shapes are subsumed within other categories. For instance, they will recognize that a square is a special type of rectangle.
		• Students should be exposed to shapes whose sides are not all congruent. They first begin to describe these shapes using everyday language and then refine their vocabulary to include sides and vertices/corners. Opportunities to work with pictorial representations, concrete objects, as well as technology, help students develop their understanding and descriptive vocabulary for both two- and three- dimensional shapes. (TUSD)
		
		K.G.5 Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.
		
		Essential Question
		• *How can you build this cube with clay?*
		Essential knowledge and skills
		• Two-dimensional and three-dimensional shapes can be analyzed, compared and sorted based on their attributes.
		• When sorted, a single item may belong to more than one category.
		Teaching Examples
		• Because two-dimensional shapes are flat and three-dimensional shapes are solid, students should draw two-dimensional shapes and build three-dimensional shapes. Shapes may be built using materials such as clay, toothpicks, marshmallows, gumdrops, straws, etc. (TUSD)
		
		Mathematical Practices
		• Make sense of problems and persevere in solving them
		• Model with mathematics
		• Look for and make use of structure
			shapes.
			Use the sides, faces and vertices of shapes to practice counting and reinforce the concept of one-to-one correspondence.
			The teacher and students orally describe and name the shapes found on a Shape Hunt. Students draw a shape and build it using materials regularly kept in the classroom such as construction paper, clay, wooden sticks or straws.
			Students can use a variety of manipulatives and real-world objects to build larger shapes with these and other smaller shapes: squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres. Kindergarteners can manipulate cardboard shapes, paper plates, pattern blocks, tiles, canned food, and other common items.
			Have students compose (build) a larger shape using only smaller shapes that have the same size and shape. The sides of the smaller shapes should touch and there should be no gaps or overlaps within the larger shape. For example, use one-inch squares to build a larger square with no gaps or overlaps. Have students also use different shapes to form a larger shape where the sides of the smaller shapes are touching and there are no gaps or overlaps. Ask students to describe the larger shape and the shapes that formed it. (ODE)
				/standards/practice
				• http://www.parcconline.org/sites/parc/files/PARCC%20Math%20S
				• www.commoncore.org/maps
				• www.corestandards.org
				• www.khanacademy.com
				• www.ride.ri.gov
				• www.math is fun
				• www.fun 4 the brain
				• www.funbrain
				• www.skills tutor
				
				Materials
				• Attribute blocks
				• Balls
				• Boxes that are cubes
				• Cans of food
				• Carpet squares or rectangles
				• Clay
				• Colored tiles
				• Construction paper
				• Cubes
				• Floor tiles
				• Paper plates
				• Pattern blocks
				• Straws
				• Tangrams
				• Three-dimensional models
				• Wooden sticks
					• Interviews
					• Graphic organizers
					• Journals
					• Mathematical Practices
					• Modeling ★
					• Multiple Intelligences assessments, e.g.
					  ▫ Role playing - bodily kinesthetic
					  ▫ Graphic organizing - visual
					  ▫ Collaboration - interpersonal
					• Oral presentations
					• Problem/Performance based/common tasks
					• Tests and quizzes
					• Technology
					• Think-alouds

CATEGORIES, DOMAINS, CLUSTERS	UNIT	STANDARDS/BENCHMARKS North Smithfield School Department	INSTRUCTIONAL STRATEGIES	RESOURCES	ASSESSMENTS
		K.G.6 Compose simple shapes to form larger shapes. ○ *For example, "Can you join these two triangles with full sides touching to make a rectangle?"* **Essential Question** • *How many new shapes can we make by combining these smaller shapes?* **Essential knowledge and skills** • Smaller shapes can be combined to make larger shapes. **Teaching Examples** • Students use pattern blocks, tiles, or paper shapes and technology to make new two- and three dimensional shapes. Their investigations allow them to determine what kinds of shapes they can join to create new shapes. They answer questions such as "What shapes can you use to make a square, rectangle, circle, triangle? …etc." (TUSD) **Mathematical Practices** • Make sense of problems and persevere in solving them • Construct viable arguments and critique the reasoning of others • Model with mathematics • Look for and make use of structure **Geometry Academic Vocabulary** • Above • Behind • Below • Beside • Between • Circle • Cone • Cube • Cylinder • Different • Edge • Face • Flat/ lying in plane • Hexagon • In front of • Next to • Octagon • Rectangle • Rhombus • Same • Side • Solid • Sphere • Square • Three-dimensional • Two-dimensional • Trapezoid • Triangle • Vertices "corners"			

Kindergarten. Common addition and subtraction situations.[6]

Table 1	**Result Unknown**	**Change Unknown**	**Start Unknown**
Add to	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ?	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? 2 + ? = 5	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? ? + 3 = 5
Take from	Five apples were on the table. I ate two apples. How many apples are on the table now? 5 – 2 = ?	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 5 – ? = 3	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? ? – 2 = 3
	Total Unknown	**Addend Unknown**	**Both Addends Unknown[1]**
Put Together / Take Apart[2]	Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ?	Five apples are on the table. Three are red and the rest are green. How many apples are green? 3 + ? = 5, 5 – 3 = ?	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? 5 = 0 + 5, 5 = 5 + 0 5 = 1 + 4, 5 = 4 + 1 5 = 2 + 3, 5 = 3 + 2
	Difference Unknown	**Bigger Unknown**	**Smaller Unknown**
Compare[3]	(“How many more?” version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy? (“How many fewer?” version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie? 2 + ? = 5, 5 – 2 = ?	(Version with “more”): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have? (Version with “fewer”): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? 2 + 3 = ?, 3 + 2 = ?	(Version with “more”): Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have? (Version with “fewer”): Lucy has 3 fewer apples than Julie. Julie has five apples. How many apples does Lucy have? 5 – 3 = ?, ? + 3 = 5

[6]Adapted from Box 2-4 of Mathematics Learning in Early Childhood, National Research Council (2009, pp. 32, 33).
[1]These take apart situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help children understand that the = sign does not always mean makes or results in but always does mean is the same number as.
[2]Either addend can be unknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of this basic situation, especially for small numbers less than or equal to 10.
[3]For the Bigger Unknown or Smaller Unknown situations, one version directs the correct operation (the version using more for the bigger unknown and using less for the smaller unknown). The other versions are more difficult.

MATHEMATICS CURRICULUM Grade K

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