South Brunswick School District

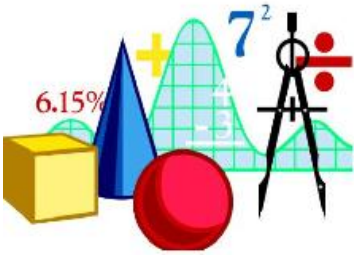
Curriculum Guide for Grades K-2 Mathematics
A Parent's Guide

Curriculum edited: August 2012

District Mission

The South Brunswick School District will prepare students to be lifelong learners, critical thinkers, effective communicators and wise decision makers. This will be accomplished through the use of the New Jersey Core Curriculum Content Standards (NJCCCS) and/or the Common Core State Standards (CCSS) at all grade levels. The schools will maintain an environment that promotes intellectual challenge, creativity, social and emotional growth and the healthy physical development of each student.

~Adopted 8.22.11



Annual Board Approval of Mathematics Curriculum
August 2013

This curriculum is approved for all regular education programs as specified and for adoption or adaptation by all Special Education Programs in accordance with Board of Education Policy.

Mathematics Acknowledgments

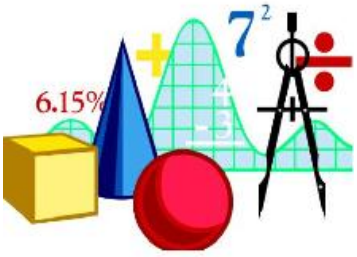
We are appreciative of the leadership provided by our curriculum specialists and the knowledge, skills, work and effort of the teachers who served on our curriculum writing teams. In many cases, our units are "home-grown." While aligning with state and national standards, they are designed with the needs of the South Brunswick student population in mind.

Articulation

The Supervisors, Specialists, Curriculum Chairpersons, Technology Staff Developers, Directors and the Assistant Superintendent for Curriculum and Instruction meet for articulation at bi-monthly roundtables and ongoing content meetings throughout the year.

Among the topics of discussion are the following: curriculum review cycle, curriculum mapping, resources (ordering, budgeting, inventory), lesson plans, observation look-fors, professional development, NJ Quality Single Accountability Continuum and academic achievement, placement, acceleration, enrichment, basic skills, instructional support, technology proficienciences and content-specific technologies, formative and summative assessments, and various curriculum tasks.

Mathematics Curriculum Development Teams comprised of teachers at every grade level along with representative special education meet together throughout the year as needed. In a time period of major revision, the teams will meet with greater frequency.



Go down deep enough into anything and you will find mathematics.
~Dean Schlicter

TABLE OF CONTENTS

PREAMBLE TO THE MATHEMATICS CURRICULUM

Mission Statement

The South Brunswick Mathematics Program will be based on a well-articulated curriculum that is aligned with standards, has interwoven technology, is connected in meaningful ways to other curriculum and real life, that provides for differentiated needs of students, that is taught by teachers who are well-grounded in and comfortable with both content and methodology, and that leads to equity and excellence in math achievement for all children.

South Brunswick's Beliefs

1. Develop concepts concretely, pictorially, and then abstractly. Students use manipulatives to model abstract ideas, to represent the models as pictures, and finally to translate the model and/or picture into symbolic notation. Sometimes the transition from concrete to abstract takes years, as in the case of multi-digit addition computation; other times the transition may take a few class sessions, as in the case of multiplying fractions.

2. Require students to justify their answers. During class discussions and in written work students should always be asked *why*. Students should be able to verbalize, model, and to write the reason an answer has been given.

3. Provide time for students to write and talk mathematics. Students keep a math journal and discuss mathematical ideas as part of cooperative groups and as part of the whole class. Writing and talking mathematics allows students to clarify and explain thinking, justify answers, explain strategies, ask questions, listen to others, and react to ideas.

4. Develop problem situations from other content areas and from everyday experiences. Science, social studies, and language content are integrated into mathematics lessons. For example, when introducing 2-digit addition, the initial concrete model might be developed out of a social studies unit on Community Helpers. If the class has graphed the number of people going into different municipal buildings, finding the number of people going into 2 or 3 of the buildings together can begin the development of a 2-digit addition algorithm.

5. Give attention to connections among topics in math, between math and other content areas, and between math and daily life. Students should recognize, for example, that the array model of multiplication, the area of a rectangle, and paper folding to multiply fractions are all based on the same idea. Students should use strategies developed in math lessons in their work with other content and in their daily lives

6. Always encourage use of multiple strategies. For example, a large number of objects can be counted in several ways: by ones, by twos, by grouping into tens or by matching with a hundred-number board. Along with traditional algorithms, students should explore alternate methods of computation, including computational strategies developed by the students themselves.

7. Have students estimate quantities. Students then use that estimate to check reasonableness of answers. Estimate lengths, weights, and so on before measuring. Put out a handful of cubes and estimate the quantity.

8. Make mental math a part of any computation. Encourage students to calculate mentally. Help them to take the risk of giving an answer without using pencil and paper first. Mental math

strategies are treated as just another way, together with pencil and paper, calculators, concrete models, and pictorial models to calculate an answer.

9. Urge students to choose their tools and methods. Students are encouraged to choose among many different methods for problem solving (draw a picture, guess and check, write an equation, and so on), for calculating answers (mental math, paper and pencil, estimation, calculator), and for modeling (base ten blocks, money, geo-boards, counters, and so on).

10. Integrate computers and calculators into mathematics lessons. Students need to begin to choose technology as a tool. Graphing programs are one way to display data; spreadsheet programs are used to solve problems; calculators allow students to deal with more complicated numbers. Students should be offered the opportunity to use online virtual manipulatives, Internet resources and interactive whiteboards when available. Calculators allow students to deal with more complex problem solving.

11. Have students work in a variety of settings. The choice of settings - cooperative groups, pairs of students, individuals, and whole groups - depends on the teacher's objective and the specific content of the lesson. Students should be exposed to each kind of setting throughout the school year.

12. Design, develop, implement and evaluate digital-age learning experiences and assessments. For example, use of classroom technologies such as interactive whiteboards, projection devices, digital hardware and software.

Program Delivery

Our math classrooms are effective standards-based environments that foster understanding of big mathematical ideas, help students make connections between learning experiences, and enable students to see themselves as mathematicians. There are varied "math paths" that students follow during their course of study in South Brunswick.

Elementary School:

- Grade Level Math & Differentiation
- Accelerated Math K-5
- Math for All Kinds of Minds Enrichment K-5

Middle School:

- 6th: Unit Math or Math Transitions (accelerated math)
- 7th-8th: Middle School Math, Pre-Algebra, Algebra, Geometry

High School:

- Core Courses (3-Year Sequence): Algebra I[1], Geometry, Algebra II
- Math Electives: Pre-Calculus, Calculus, Statistics, Discrete Math, Computer Science[2]
- Note: Many students begin the core sequence during their middle school years, which allows for them to take up to three Advanced Placement level courses. Although only three years of mathematics is required for graduation, the majority of South Brunswick

[1] Algebra I is a graduation requirement.

[2] Computer Science for the 21st Century also meets the mandate for 21st Century.

students take four years of math. Recognizing the differing needs of our students, all of the courses offered have several levels, including Elements, Regular, Advanced, and Honors/AP

Resources

The following are resources used in our mathematics programs.

Elementary School

- Investigations in Data, Number, and Space
- Scott Foresman-Addison Wesley Mathematics
- On Core Mathematics (Houghton Mifflin Harcourt)
- Manipulatives: Hands-on and virtual
- Technologies: Scott Foresman and Calculators (Grades K-1: Calc-U-Vue; Grades 2-5: TI-108)
- Investigations Software: Shapes, LogoPaths
- ExamView Pro Test Generator
- SMART Boards (interactive whiteboards)
- Model classroom technologies: projectors, DVD players, speakers
- Study Island (Grades 3-5)
- Accelerated 5th Grade Math- MathScape, Connected Math

Middle School

- 6th Connected Math and OnCore Mathematics Workbook
- Accelerted 6th Grade Math- MathScape and OnCore Mathematics Workbook
- 7th-8th Holt Middle School Math, McDougal Littell Pre-Algebra, McDougal Littell Algebra, McDougal Littell Geometry
- Manipulatives; Hands-on equations, communicators (mini-whiteboards), integer tiles, and 3-D prisms and cubes
- Technologies: SMARTBoards (interactive whiteboards); document camera; Texts Web sites & Homework Helplines; Calculators (TI 30SX II, TI-84); Study Island

High School

- Anchor Texts: McDougal Littell Texts, Houghton Mifflin Texts
- Technologies: Graphing Calculators (TI 84 and TI 89); Geometer Sketchpad and TI Navigator
- SMART Board (interactive white boards)

Assessments

There are multiple and varied forms of assessment at each grade level. What follows is a list of the key assessment tools used at each level.

Assessments at the Elementary Level

- District-made Beginning of Year Math Assessment for Kindergarten
- Mid-Year Check In for Kindergarten
- District-made End of Year Competency Tests K-5
- District-made End of Year Math Acceleration Tests K-5
- District-made Pre and Posttests for grades 1-5
- NJASK Grades 3-5
- Mad Minute Drills/Otter Creek Drills
- Teacher-Made Tests, Projects

Assessments at the Middle Level:

- Teacher-made Tests, Quizzes & Projects
- District-made Pre and Post-Test Trimester Assessments for Unit, Transitions, MS Math, Pre-Algebra, and Algebra
- Mid terms and final exams for Geometry
- District Placement Tests
- Algebra Predictive Test for placement
- State Assessments (NJASK 6-8)

Assessments at the High School Level

- Teacher-made tests, quizzes and projects
- Mid terms and final exams
- HSPA in 11th Grade
- SAT and PSAT
- AP exams

Curriculum Content Standards for Mathematics

The South Brunswick mathematics curriculum was developed to meet the objectives as stated in the NJ State Department of Education Core Curriculum Content Standards 2009 and/or the Common Core State Standards 2010. Technology Education, 21st Century Life and Career Education, and Character Education lessons are embedded where meaningful. Cross-curricular connections are purposely and explicitly noted.

The curriculum is written in the Understanding by Design format and is based on enduring understandings (broad concepts) with essential questions and both formative and summative assessments.

As per state mandate, the mathematics curriculum in the State of New Jersey is under revision according to the following timetable:

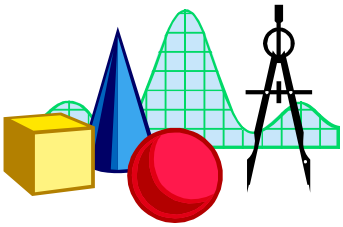
- The K-2 Program was aligned with the Common Core State Standards (CCSS) by August 2011.
- The 3-5 Program was aligned with the Common Core State Standards (CCSS) by August 2012.
- The 6-8 Program will be aligned with the Common Core State Standards (CCSS) by August 2013.
- The 9-12 Program was aligned with the Common Core State Standards (CCSS) by August 2012.

Until the full revision noted above occurs, the curriculum for Mathematics in Grades 6-8 remains anchored to the 2004 NJCCCS. Due the staggered revision plan, each level of curriculum is housed in a separate curriculum guide.

Only the K-2 math curriculum is included in this document. It has been revised to meet the timeline above and is tied to the CCSS.

Complete copies of the standards for mathematics may be found at:
Common Core State Standards Initiative (CCSSI)
http://www.state.nj.us/education/cccs/

ELEMENTARY
K-2



Elementary Math Curriculum Overview Statement

The South Brunswick elementary mathematics program is based on a rigorous curriculum that provides our students with the mathematical skills and flexible thinking that will enable them to be strong mathematical thinkers. Our program promotes deep conceptual understanding that goes beyond calculations - challenging students to be flexible with numbers, to adapt their skills to multiple mathematical situations, and to communicate their strategies and justify their solutions.

In line with the Common Core State Standards, our K-5 students will be provided with a solid foundation in number sense and encouraged to develop meaningful strategies which will be retained, developed, and refined as they develop more complex skills. Students are encouraged to develop their own problem-solving strategies, engage in mental math, and solve problems and perform calculations in more than one way.

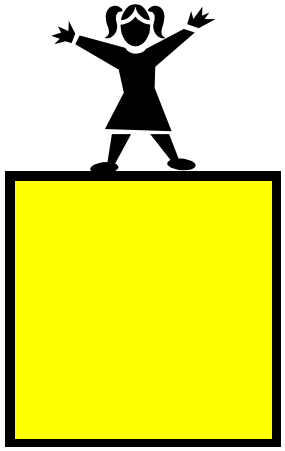
The District has adopted three standards-based math programs, *Investigations in Number, Data, and Space, On Core Mathematics,* and *Scott Foresman Mathematics*. These resources are used in combination to deliver a balanced math program. These, along with other resources, including manipulatives, games, computer software, and calculators, help the teachers deliver a program with high levels of rigorous mathematical thinking skills.

CURRICULUM MAP: K-2

Kindergarten	Essential Questions	Enduring Understandings
Number Sense	• How do numbers represent and define value? • How do we use numbers in every day life?	• Numbers have relative value. • There are many ways to represent a number.
Numerical Operations	• Numbers have relative value. • There are many ways to represent a number.	• Relationships between numbers can be expressed with words or symbols. • There are a variety of ways to represent quantities.
Measurement & Data	• What important information does a chart or table provide? • How do charts, tables, and graphs help you interpret data? • How do you use measurement in your life?	• Everyday objects have variety of attributes that can be measured in many ways. • Data can be organized in meaningful ways so it can be interpreted and analyzed.
Geometry	• Where in the real world would I find patterns? • Where in the real world would I find shapes? • In what ways can I match geometric figures to real-world objects? • How can I put shapes together and take them apart to form other shapes?	• Objects can be described, compared, and classified by geometric attributes. • Patterns are a way to recognize order and to organize the world.
1st Grade	Essential Questions	Enduring Understandings
Number Sense & Base 10	• How do numbers represent and define value? • What are the relationships between numbers?	• Numbers have relative value. • There are many ways to represent a number. • Quantities can be counted and compared.
1st Grade Operations & Algebraic Thinking	• How do addition and subtraction relate to each other? • How do I know which operation to use to solve a problem? • How do I determine which computational strategy to use?	• Mathematical expressions represent relationships. • In everyday life, we combine and separate quantities to solve problems. • `More efficient computation occurs when using combinations of 10.
Measurement & Data	• Why do we use measurement? • Why is telling time essential for our daily lives? • How & why do we organize	• Everyday objects have a variety of attributes that can be measured in many ways. • Measurement can be used to compare

	information?	lengths. • Time is measured in hours and minutes. • Data can be organized in meaningful ways so that it can be interpreted and analyzed.
Geometry	• How are geometric properties used to solve problems in everyday life?	• Objects can be described, compared, and classified by geometric attributes. • Many geometric shapes can be divided into equal parts.
2nd Grade	Essential Questions	Enduring Understandings
Place Value	• How does a number's position affect its value? • How are place value patterns repeated in numbers?	• Our Base 10 number system determines a digits value.
Addition & Subtraction/Numbers and Operations in Base 10	• What strategies can be used to find sums and differences? • How do mathematical operations relate to each other? • What are strategies for making a reasonable estimation?	• Flexible methods of computation involve grouping numbers in strategic ways. • Estimation is a way to get an approximate answer. • Proficiency with basic facts aids estimation and computation of larger and smaller numbers.
Foundations for Multiplication	• How are patterns used to communicate mathematical concepts? • What is the relationship between products and sums?	• There is a relationship between multiplication and addition. • Multiplication can be a more efficient strategy for solving problems. • There is a connection between the numerical concept of multiplication and the geometric concept of area (arrays).
Measurement & Time	• Why is it important to use standard units of measure? • How and why do we organize information? • How is telling time used in our daily lives?	• Standard units provide a common language for communicating measurement accurately. • Data can be organized in meaningful ways so that it can be interpreted and analyzed. • Time is measured in hours and minutes.
Geometry	• How are geometric properties used to solve problems in everyday life?	• Objects can be described, compared, and classified by geometric attributes. • Many geometric shapes can be divided into equal parts.

KINDERGARTEN
Units of Study



Number Sense
Numerical Operations
Measurement & Data
Geometry

KINDERGARTEN MATH

Content: Kindergarten Math

Content Overview:

Kindergarten students will use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set, counting out a given number of objects, and comparing sets or numerals. Students choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away. Students will practice foundational skills such as rote counting, along with practicing counting skills forward and backward, and from numbers other than 1. Students will work deeply with the numbers 1-20, in order to promote a deep conceptual understanding of those numbers and the relationships between them.

Students will begin modeling simple joining and separating situations with sets of objects. Kindergarten students should see and explore addition and subtraction equations. Student writing of equations in kindergarten is encouraged, but not required.

In measurement, students will describe objects in terms of attributes, such as length and weight. They will then compare objects by their attributes, and will classify and sort them. Students will use observable and numerical data to organize information into Venn Diagrams, pictographs, and bar graphs. Early geometry learning will include students describing their physical world using geometric ideas (shape, orientation, spatial relations) and vocabulary. They will identify, name, and describe basic two-dimensional shapes, such as squares, triangles, circles, rectangles, and hexagons, presented in a variety of ways (with different sizes and orientations), as well as three-dimensional shapes such as cubes, cones, cylinders, and spheres. They will use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

Common Core State Standards (CCSS):

- Number Sense- K.CC.1, K.CC.2, K.CC.3, K.CC.4, K.CC.5, K.CC.6. K.CC.7
- Numerical Operations- K.OA.1, K.OA.2, K.OA.3, K.OA.4, K.01.5, K.NBT.A
- Measurement & Data- K.MD.1, K.MD.2, K.MD.3
- Geometry- K.G.1, K.G.2, K.G.3, K.G.4, K.G.5, K.G.6

Enduring Understandings:

Number Sense:

Numbers have relative value.

There are many ways to represent a number.

Numerical Operations:

- Relationships between numbers can be expressed with words or symbols.
- There are a variety of ways to represent quantities

Measurement & Data

- Everyday objects have variety of attributes that can be measured in many ways.
- Data can be organized in meaningful ways so it can be interpreted and analyzed.

Geometry

- Objects can be described, compared, and classified by geometric attributes.
- Patterns are a way to recognize order and to organize the world.

Essential Questions:

Number Sense:

- How do numbers represent and define value?
- How do we use numbers in every day life?

Numerical Operations:

- How do I take apart and recombine numbers in a variety of ways for finding sums and differences?
- How are quantities are represented?

Measurement & Data:

- What important information does a chart or table give you?
- How do charts, tables, and graphs help you interpret data?

Geometry:

- Where in the real world would I find patterns?
- Where in the real world would I find shapes?
- In what ways can I match geometric figures to real-world objects?
- How can I put shapes together and take them apart to form other shapes?

Knowledge and Skills:

Students will know and be able to

Number Sense:

- Knowledge & Skills
- Rote count to 100 by ones and by tens.
- Count forward beginning from a given number within a known sequence.
- Count backward from 20 to 0.
- Show quantities up to 20 using manipulatives and/or drawings.
- Understand that counting is a growing pattern.
- Understand that when counting forward, each subsequent number is worth one more than the number before or that it includes all the numbers before and one more.
- Understand that when counting backward, each number is worth one less than the number said before.
- Be able to determine the number that is one more or one less, two more or two less, than a given number to 20.
- Recognize and write all numbers to 20.
- Represent a number of objects with a written numeral 0-20.
- Count to answer “how many?” questions about as many as 20 things arranged in a line, a rectangular array, or a circle
- Count to answer “how many” for as many as 10 things in a scattered configuration

- Given a number from 1-20, count out that many objects.
- 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.
- Compare two numbers between 1 and 10 presented as written numerals. Understand that 0-9 are digits and that digits partner to create numbers.

Numerical Operations:

- Understand that counting forward is adding.
- Understand that counting backward is subtracting.
- Combine parts to make a whole.
- Separate a part from the whole and then determine the remaining part.
- Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g. claps), acting out situations, verbal explanations, expressions, or equations.
- Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.
- 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).
- 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.
- Fluently add and subtract within 5.
- Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., 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.

Measurement & Data:

- Describe measurable attributes of objects, such as length or weight.
- Describe several measurable attributes of a single object.
- 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.*
- Classify objects into given categories; count the numbers of objects in each category and sort the categories by count.
- Use comparative terms to compare and describe (bigger, smaller, larger, same size, wider, longer).
- Use class constructed Venn Diagram to find similarities and differences.
- Select figures concretely and pictorially that are the same and different and explain why.
- As a class, create and read pictographs and bar graphs, comparing two or more groups.
- Read and interpret pictographs and bar graphs to describe, more, fewer, and same.
- Identify, name, and sort coins by physical characteristics. (Coin values are taught in 1st grade)

Geometry

- 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*.

- Correctly name shapes regardless of their orientations or overall size.
- Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").
- 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).
- Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.
- Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*
- Relate shapes to everyday life.
- Name and sort squares, circles, rectangles, ovals, triangles, hexagons, cubes, cones, cylinders and spheres.
- Create and extend repeating patterns.
- Discriminate between patterns and random arrangements or designs.

Terminology:

See pacing charts.

Assessments:

Unit-specific formative assessments

Kindergarten Fall Test

Kindergarten Mid-Year Check-In

Kindergarten End of the Year Test

21st Century Connections:

8.1 Technology: All students will use digital tools to access, manage, evaluate, and synthesize, information in order to solve problems individually and collaboratively and to create and communicate knowledge.

8.2 Technology: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the design world, as they relate to the individual, global society, and the environment.

9.1 Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

9.3 Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Character Education:

The elementary core values of cooperation, assertion, responsibility, empathy, and self-control are addressed and stressed throughout each unit of study.

Cross Curricular / Interdisciplinary:

Integrated Math-Based Literature

Science/Social Studies counting objects, observing, sorting and classifying, observing scientific & natural patterns
Morning Meeting-counting classmates, counting forward and backward, graphing, calendar activities, Today's Question
Technology – Investigations Shapes software

Course Resources:

Technologies:	*Investigations Shapes software*
Text:	*TERC Investigations in Numbers, Data, and Space*
	Scott Foresman Mathematics
Other:	*South Brunswick Kindergarten suggested assessments*
	South Brunswick K-2 Number Sense Binder

Pacing Chart:

See Unit plans for Year-Long Pacing Chart and Assessments

Units of Study:

Number Sense
Numerical Operations
Measurement & Data
Geometry

FIRST GRADE
Units of Study

Number Sense and Base 10
Measurement & Data
Operations & Algebraic Thinking
Geometry

FIRST GRADE MATH

Content: 1st Grade Math

Course Description or Content Overview:

1st Grade students will work with numbers within 100, developing a deep understanding of place value and the base 10 system. They will explore counting in different ways and explore the meaning of digits in different places and the importance and power of the digit 0. They will compare whole numbers (at least to 100) to develop understanding of, and solve problems involving their relative values. They will think of whole numbers between 10 and 100 in terms of tens and ones (especially recognizing the numbers 11 to 19 as composed of a ten and some ones). Through activities that build number sense, they will understand the order of counting numbers and their relative magnitudes.

In measurement, students will develop an understanding of the meaning and processes of measurement. Students will practice measuring with non-standard units and will compare numerous objects to another specific object to determine if the items are longer or shorter than the specific object. Students will order objects by measureable attributes. Telling time to the hour and half hour will be introduced in this unit. Additionally, students will record data using tally tables, bar graphs, and pictographs and will analyze and ask questions about the data that is presented.

In geometry, students will compose and decompose plane or solid figures (e.g., put two triangles together to make a quadrilateral) and build understanding of part-whole relationships as well as the properties of the original and composite shapes. As they combine shapes, they will recognize them from different perspectives and orientations, describe their geometric attributes, and determine how they are alike and different, to develop the background for measurement and for initial understandings of properties such as congruence and symmetry.

Common Core State Standards (CCSS):

- Number Sense & Base 10- 1. NBT.1, 1.NBT.2, 1.NBT.3
- Operations & Algebraic Thinking- 1.OA.1, 1.OA.2, 1.OA.3, 1.OA.4, 1.OA.5, 1.OA.6, 1.OA.7, 1.OA.8, 1. NBT.4, 1.NBT.5, 1.NBT.6
- Measurement & Data- 1.MD.1, 1.MD.2, 1.MD.3, 1.MD.4
- Geometry- 1.G.1, 1.G.2, 1.G.3

Enduring Understandings:

Number Sense & Base 10:

- Numbers have relative value.
- There are many ways to represent a number.
- Quantities can be counted and compared.

Operations & Algebraic Thinking:

- Mathematical expressions represent relationships.
- In everyday life, we combine and separate quantities to solve problems.

- More efficient computation occurs when using combinations of 10.

Measurement & Data:

- Everyday objects have a variety of attributes that can be measured in many ways.
- Measurement can be used to compare lengths.
- Time is measured in hours and minutes.
- Data can be organized in meaningful ways so that it can be interpreted and analyzed.

Geometry

- Objects can be described, compared, and classified by geometric attributes.
- Many geometric shapes can be divided into equal parts.

Essential Questions:

Number Sense & Base 10:

- How do numbers represent and define value?
- What are the relationships between numbers?

Operations & Algebraic Thinking:

- How do addition and subtraction relate to each other?
- How do I know which operation to use to solve a problem?
- How do I determine which computational strategy to use?

Measurement & Data:

- Why do we use measurement?
- Why is telling time essential for our daily lives?
- How & why do we organize information?

Geometry:

- How are geometric properties used to solve problems in everyday life?

Knowledge and Skills:

Students will know and be able to:

Number Sense & Base 10:

- Understand that 0-9 are digits and that digits partner to create numbers.
- Understand that there are only 10 digits and that those digits create all the numbers in the world (0-9).
- Understand the importance and power of the digit 0.
- Count to 120, starting at any number less than 120 (i.e. start at 65 and continue to 100). In this range, read and write numerals and represent a number of objects with a written numeral.
- Determine whether a number/group of objects is odd or even.
- Understand that the value or worth of a digit is determined by its place. (Place Value)
- Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following:
    - 10 can be thought of as a bundle of ten ones — called a “ten.”
    - The numbers from 11 to 19 are composed of a ten and one, two, three, four, five,

six, seven, eight, or nine ones.
    - The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).
- Understand that the = sign is a relationship (meaning "the same as") and not an operation.
- Be able to determine the value of a digit in a two or three digit number.
- Represent 2 digit numbers as their two parts (92 as 90 and 2).
- Construct many models (concretely, pictorially, symbolically) for one number Example 34 can be 3 tens 4 ones, 2 tens 14 ones, 1 ten 24 ones.
- Know all combinations (number bonds) up to and including 10 with automaticity.
- Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, < and explain reasoning.

Operations & Algebraic Thinking:

- Know that number patterns can grow by any consistent amount.
- See counting forward as a growing pattern and as addition
- See counting backward as a shrinking pattern and as subtraction
- Skip count by 2, 5, and 10.
- Understand that the = sign is a relationship (meaning "the same as") and not an operation.
- Use a number line to add or subtract
- Use counting on as a strategy for addition
- Use counting backwards as a strategy for subtraction
- Use the "combinations of 10" strategy to solve addition problems (5 + 7 = 5 +5 + 2)
- Use "doubles," "doubles +1," "doubles -1" to solve addition problems (8+9= 8+8+1 or 9+9-1)
- Use "number decomposition" to solve addition problems (13-4 can "decompose" as (13-3)-1=9)
- Use models to solve math problems
- Solve word problems (addition and subtraction) and equations (with unknowns in all positions) using 2 or more addends whose sum or difference is less than or equal to 20
- Create math stories which include a question and a number sentence
- Solve multiple addend problems by using combinations that make ten or doubles.
- Apply associative and commutative properties to addition
- Solve double digit addition problems using concrete models or drawings
- Solve double digit addition problems using strategies based on place value (Adding tens to tens and ones to ones, then add together – 35 + 7 = (35+5)+2 = 40 + 2 = 42 or 35 + 20 = 30+20 + 5 = 55
- Given a two-digit number mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used
- Add and subtract multiples of 10 within the range of 10-90 mentally and explain reasoning.
- Understand the = sign to mean "the same as" and determine if equations are true or false (5+3=9) (10+2=9+3)

Measurement & Data:

- Measure objects using nonstandard units (paper clips, tiles, unifix cubes, popsicle sticks, hands, feet, etc.)
- Order three objects by length

- Find objects that are longer than, shorter than, the same as a given object (Example: Compare objects in the room to the length of a marker)
- Tell and write times in hours and half-hours using analog and digital clocks.
- Organize, represent and interpret data with up to three categories in tally tables, bar graphs, and pictographs
- Ask and answer questions about the total number in each category on a graph
- Determine how many more or less in each category, and how many in total on a graph.
- Identify coins and their value

Geometry

- Identify the defining attributes of 2D shapes (e.g. triangles are closed and three-sided)
- Name the 3D shapes (cubes, rectangular prisms, cones, cylinders, spheres)
- Build and draw shapes to possess defining attributes
- Make a composite shape from two or more smaller shapes and compose new shapes or designs from the composite shape
- Partition circles and rectangles into two and four equal shares
- Describe the shares using the words halves, fourths, and quarters and use the phrase half of, fourth of, and quarter of.
- Describe the whole as two of, or four of the share
- Understand that when dividing a shape, the more equal shares a shape is divided into, the smaller the share.

Terminology:

See pacing charts.

Assessments:

Unit-specific formative assessments

Unit Pre & Posttests (See pacing charts & Unit Guides)

1st Grade End of the Year Test

21st Century Connections:

8.1 Technology: All students will use digital tools to access, manage, evaluate, and synthesize, information in order to solve problems individually and collaboratively and to create and communicate knowledge.

8.2 Technology: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the design world, as they relate to the individual, global society, and the environment.

9.1 Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

9.3 Career Awareness, Exploration, and Preparation: All students will apply knowledge about and engage in the process of career awareness, exploration, and preparation in order to navigate the globally competitive work environment of the information age.

Character Education:

The elementary core values of cooperation, assertion, responsibility, empathy, and self-control are addressed and stressed throughout each unit of study.

Cross Curricular / Interdisciplinary:

Integrated math-based literature
Morning Meeting math activities
Science – sorting, classifying, measurement, observing scientific & natural patterns
Social Studies - classifying, measurement, collecting and analyzing data
Technology – Investigations Shapes software

Course Resources:

Technologies:	*Investigations Shapes software*
Text:	*TERC Investigations in Numbers, Data, and Space* *Scott Foresman Mathematics*
Other:	*South Brunswick First Grade suggested assessments* *South Brunswick K-2 Number Sense Binder*

Pacing Chart:

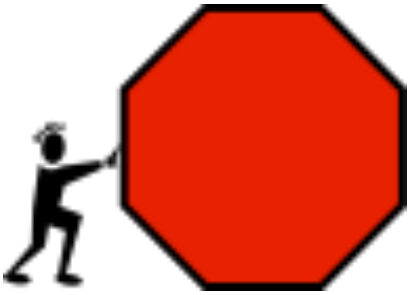
See Unit plans for Year-Long Pacing Chart and Assessments

Units of Study:

Number Sense & Base 10
Operations & Algebraic Thinking
Measurement & Data
Geometry

SECOND GRADE

Units of Study



Place Value
Addition & Subtraction
Number & Operations in Base 10
Foundations for Multiplication
Measurement & Time
Geometry

SECOND GRADE MATH

Content: 2nd Grade Math

Course Description or Content Overview:

In second grade, students will extend their understanding of the base-ten system. This includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones. They will spend time examining number relationships involving these units, including comparing and sequencing numbers within 1000. Students will understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones). Students will use their understanding of numerical operations to develop fluency with addition and subtraction within 100. They will then solve problems within 1000 by applying their understanding of models for addition and subtraction. Students will develop, discuss, and use efficient, accurate, and generalize-able methods to compute sums and differences of whole numbers in base-ten notation, using their understanding of place value and the properties of operations. They will select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences for numbers Building on these ideas, students will explore number relationships and patterns to form the foundations for multiplication in later grades. Students will participate in this early exploration of multiplication through exploring hundreds charts, rectangular arrays, and repeated addition.

In measurement, students will recognize the need for standard units of measure (centimeter and inch) from classroom exploration with measurement. They will use rulers and other measurement tools with the understanding that linear measure involves a repetition of units. They will recognize that the smaller the unit, the more repetitions they need to cover a given length.

In geometry, students will describe and analyze shapes by examining their sides and angles. Students will investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing, and analyzing two- and three-dimensional shapes, students will develop a foundation for understanding area, volume, congruence, similarity, and symmetry in later grades. Students will also begin to explore fractions by segmenting shapes into equal pieces.

Common Core State Standards (CCSS):

- Place Value- 1.NBT.1, 1.NBT.2, 1.NBT.3, 1.NBT.4
- Geometry- 2.G.1, 2.G.2, 2.G.3
- Foundations for Multiplication- 2.OA.3, 2.OA.4
- Measurement & Time- 2.MD.1, 2.MD.2, 2.MD.3, 2.MD.4, 2.MD.5, 2.MD.6, 2.MD.7, 2.MD.9, 2.MD.10
- Addition & Subtraction/Number & Operations in Base 10 – 2.OA.1, 2.OA.2, 2. NBT.5, 2.NBT.6, 2.NBT.7, 2.NBT.8, 2.NBT.9, 2.MD.6, 2.MD.8

Enduring Understandings:

Place Value:

- Our Base 10 number system determines a digits value.

Addition & Subtraction/Number & Operations in Base 10:

- Flexible methods of computation involve grouping numbers in strategic ways.
- Estimation is a way to get an approximate answer.
- Proficiency with basic facts aids estimation and computation of larger and smaller numbers.

Foundations for Multiplication:

- There is a relationship between multiplication and addition.
- Multiplication can be a more efficient strategy for solving problems.
- There is a connection between the numerical concept of multiplication and the geometric concept of area (arrays).

Measurement & Time:

- Standard units provide a common language for communicating measurement accurately.
- Data can be organized in meaningful ways so that it can be interpreted and analyzed.
- Time is measured in hours and minutes.

Geometry:

- Objects can be described, compared, and classified by geometric attributes.
- Many geometric shapes can be divided into equal parts.

Essential Questions:

Place Value:

- How does a number's position affect its value?
- How are place value patterns repeated in numbers?

Addition & Subtraction/Number & Operations in Base 10:

- Flexible methods of computation involve grouping numbers in strategic ways.
- Estimation is a way to get an approximate answer.
- Proficiency with basic facts aids estimation and computation of larger and smaller numbers.

Foundations for Multiplication

- How are patterns used to communicate mathematical concepts?
- What is the relationship between products and sums?

Measurement & Time:

- Why is it important to use standard units of measure?
- How and why do we organize information?
- How is telling time used in our daily lives?

Geometry:

- How are geometric properties used to solve problems in everyday life?

Knowledge and Skills:

Students will know and be able to:

Place Value:

- Understand that each "place" in a number can only be occupied by one digit
- Determine that the value of a digit is based upon its place
- Understand that a digit's place determines the size of the group it represents.
- Understand that the 0's after a digit increase its value.
- Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones.
- Understand the following:
    - a. 100 can be thought of as a bundle of ten tens — called a "hundred."
    - b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).
- Model concretely or pictorially whole numbers within 1000 (3 digit numbers).
- Read and write numbers through 1000 from a model.
- Read and write numbers within 1000 using standard form (base-ten numerals), written form (number names), and expanded form.
- Identify place value within 1000 and identify the number of hundreds, tens, and ones.
- Identify the place value position or the value of a digit in a number.
- Compare, order, and sequence whole numbers within 1000 using >, =, and < symbols to record the comparisons.

Addition & Subtraction/Number & Operations in Base 10:

- Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.
- Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
- Explain why addition and subtraction strategies work, using place value and the properties of operations (Explanations may be supported by drawings or objects)
- Add up to four two-digit numbers using strategies based on place value and properties of operations.
- Round to the nearest 10 and 100.
- Use estimation as a strategy for determining the reasonableness of an answer in computation.
- Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing.
- Use addition and subtraction within 100 to solve word problems involving unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- Write addition and subtraction problems based on everyday life situations
- Add and subtract within 1000 (3 digit numbers), using concrete models or drawings.

- Fluently add and subtract within 1000 (3 digit numbers) using multiple strategies based on place value, number lines, properties of operations, and/or the relationship between addition and subtraction.
- Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
- Solve problems involving dollar bills, quarters, dimes, nickels and pennies, using $ and ¢ symbols appropriately. Example: If you have two dollars, 1 quarter, a dime, and a nickel, how much money do you have?

Foundations for Multiplication

- Identify, create, describe, and extend increasing and decreasing number patterns.
- Understanding that repeated addition is a growing patterns (foundation for multiplication)
- Count within 1000; skip-count by 5s, 10s, and 100s
- Identify and describe different types of increasing numerical patterns
- Find patterns on a hundreds chart (e.g. odd/even/skip counting).
- Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.
- Solve number stories (word problems) about equal groups using geometric models/rectangular arrays and repeated addition.
- Use repeated addition to solve problems with equal group scenarios
- Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns.
- Write an equation to express the total as a sum of equal addends.

Measurement & Time:

- Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
- Measure the length of an object using inches and centimeters. Understand that with smaller units of measure, you will have more, and with larger units of measure, you will have less. (An object will yield a greater number of centimeters than inches, because the unit of measure is smaller. Explain why the total number of units in the measurement is not the same.)
- Estimate lengths of using units of inches, feet, centimeters, and meters.
- Measure the lengths of two objects. Tell the difference in the length in a standard length unit.
- Solve word problems within 100 involving measurement.
- Generate measurement data by measuring lengths of several objects to the nearest whole unit. Show the measurements by making a line plot.
- Draw a picture graph and a bar graph (with single unit scale) to represent a data set with up to 4 categories. Solve simple put-together, take-apart, and compare problems using information presented in the bar graph.
- Tell/write time from analog and digital clocks to the nearest 5 minutes using AM/PM.

Geometry

- Identify angles, vertices, and edges, and faces of plane figures and 3-D.

- Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.
- Identify triangles, quadrilaterals, pentagons, hexagons, cubes, cones, cylinders & spheres.
- In order to find the area of a rectangle, partition a rectangle into rows and columns of same-size squares and count to find the total number.
- Partition circles and rectangles into 2, 3, or 4 equal shares. Describe the shares using the words halves, thirds, half of, a third of, etc.
- Describe the whole as 2 halves, 3 thirds, 4 fourths.
- Recognize that equal shares of identical wholes need not have the same shape. (Partitioning a rectangle in half using different lines of symmetry).

Terminology:

See pacing charts.

Assessments:

Unit-specific formative assessments

Unit Pre & Posttests (See pacing charts & Unit Guides)

2nd Grade End of the Year Test

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Health – graphing and data analysis
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Geometry