

The Scholars Summer Guide

Math – Rising 1st Grader

Overview of the mathematical concepts and skills that students explored throughout kindergarten:

- **Counting and Cardinality** Students use numbers, including written numerals and counting, to develop concepts about quantity. Students use numbers to solve contextual problems and represent quantities, such as counting objects in a set, counting out a given number of objects, and comparing sets or numerals.
- **Operations and Algebraic Thinking** Students develop an understanding of addition and subtraction and determine when to add or subtract in a given context. Students should solve a variety of problem types. Students choose from multiple representations. By the end of Kindergarten, students should fluently add and subtract within 10.
- **Number and Operations in Base Ten** Students understand that numbers from 11 to 19 represent ten ones and some more ones by using objects or drawing, and record each composition or decomposition by a drawing and/or write an equation to represent this relationship.
- **Measurement and Data** Students describe and sort objects in many different ways. This includes length, weight, and coins. They classify objects in categories and compare measurable attributes. Students begin to learn to graph and analyze collections of objects. Students learn to identify the penny, nickel, dime, and quarter and know the value of each.
- **Geometry:** Students classify two-dimensional figures into categories. Students describe their physical world using geometric ideas, vocabulary, and positional words. Regardless of orientation, students name two-dimensional and three-dimensional shapes, compare shapes, and combine shapes to create new shapes. Students identify patterns they discover in numbers, counting, and shapes.

Next year, students will explore:

- **Operations and Algebraic Thinking** Students extend previous understanding of addition and subtraction to solve contextual problems within 20, add three addends, and recognize subtraction as an unknown addend problem. By the end of 1st grade, students should know from memory sums of 10 and fluently add and subtract within 20.
- **Numbers and Operations in Base Ten** Students read, write, and represent a given number of objects numerically and extend the counting sequence to 120. They demonstrate the ability to count from any number up to 120 and count backward from 20.
- **Measurement and Data** Students compare two objects using a third object as a benchmark and also order objects by length. Students are introduced to writing and telling time to the nearest hour and half-hour. Students build on their previous work in kindergarten and count the value of like coins using the ¢ symbol. Students interpret data to answer questions such as how many more or less.
- **Geometry** Students build on previous knowledge to explore attributes of shapes and to build, draw, and identify two-dimensional shapes. Two and three-dimensional shapes are used to create composite shapes. This is the first time students partition circles and rectangles to create halves and fourths/quarters.

Suggestions to prepare for next year:

- Continue to work on fluency of addition and subtraction facts within 10.
- Practice identifying coins.
- Practice counting to 100 and number recognition.

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Math – Rising 2nd Grader

Overview of the mathematical concepts and skills that students explored throughout 1st grade:

- **Operations and Algebraic Thinking** Students extend previous understanding of addition and subtraction to solve contextual problems within 20, add three addends, and recognize subtraction as an unknown addend problem. By the end of 1st grade, students should know from memory sums of 10 and fluently add and subtract within 20.
- **Numbers and Operations in Base Ten** Students read, write, and represent a given number of objects numerically and extend the counting sequence to 120. They demonstrate the ability to count from any number up to 120 and count backward from 20.
- **Measurement and Data** Students compare two objects using a third object as a benchmark and also order objects by length. Students are introduced to writing and telling time to the nearest hour and half-hour. Students build on their previous work in kindergarten and count the value of like coins using the ¢ symbol. Students interpret data to answer questions such as how many more or less.
- **Geometry** Students build on previous knowledge to explore attributes of shapes and to build, draw, and identify two-dimensional shapes. Two and three-dimensional shapes are used to create composite shapes. This is the first time students partition circles and rectangles to create halves and fourths/quarters.

Next year, students will explore:

- **Operations and Algebraic Thinking** Students solve one- and two-step addition and subtraction contextual problems within 100 with an unknown in any position. Students build upon previously taught strategies to mentally add and subtract within 30. Students know from memory all sums of two one-digit numbers and related subtraction facts.
- **Numbers and Operations in Base Ten** Students extend their understanding of the base-ten place value system to 1,000. Students extend their understanding of place value, properties of operations, and the relationship between addition and subtraction to add and subtract within 1,000 and fluently add and subtract within 100. They add up to four two-digit numbers. They should also be able to explain why these strategies work. Students mentally add and subtract 10 or 100 from a given number 100-900.
- **Measurement and Data** In previous grades, students measured with non-standard units. Students in 2nd grade measure with standard units (centimeter and inch) using rulers and other measurement tools.
- **Geometry** Students describe and analyze shapes by examining their sides and angles. Students recognize and draw shapes based on given attributes, such as draw a shape with 3 vertices. Students also are able to partition circles and rectangles into two, three, and four equal shares and rectangles into rows and columns, laying the foundation for fractions and area.

Suggestions to prepare for next year:

- Continue to work on fluency of addition and subtraction facts within 20.
- Practice adding like coins up to 99 cents.
- Practice skip counting by 5s up to 120.

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Math – Rising 3rd Grader

Overview of the mathematical concepts and skills that students explored throughout 2nd grade:

- **Operations and Algebraic Thinking** Students solve one- and two-step addition and subtraction contextual problems within 100 with an unknown in any position. Students build upon previously taught strategies to mentally add and subtract within 30. Students know from memory all sums of two one-digit numbers and related subtraction facts.
- **Numbers and Operations in Base Ten** Students extend their understanding of the base-ten place value system to 1,000. Students extend their understanding of place value, properties of operations, and the relationship between addition and subtraction to add and subtract within 1,000 and fluently add and subtract within 100. They add up to four two-digit numbers. They should also be able to explain why these strategies work. Students mentally add and subtract 10 or 100 from a given number 100-900.
- **Measurement and Data** In previous grades, students measured with non-standard units. Students in 2nd grade measure with standard units (centimeter and inch) and they use rulers and other measurement tools with the understanding that linear measure involves an iteration of units.
- **Geometry** Students describe and analyze shapes by examining their sides and angles. Students recognize and draw shapes based on given attributes, such as draw a shape with 3 vertices. Students also are able to partition circles and rectangles into two, three, and four equal shares and rectangles into rows and columns, laying the foundation for fractions and area.

Next year, students will explore:

- **Operations and Algebraic Thinking** Students build on their understanding of addition and subtraction to develop an understanding of the meanings of multiplication and division of whole numbers. By the end of 3rd grade, students should know from memory all products of single-digit numbers and the related division facts.
- **Numbers and Operations in Base Ten** Students begin to develop an understanding of rounding whole numbers to the nearest ten or hundred. Students fluently add and subtract within 1000 using strategies and algorithms. Students multiply one-digit whole numbers by multiples of 10.
- **Number and Operations in Fractions** This domain builds on the previous skill of partitioning shapes in geometry. This is the first time students are introduced to unit fractions. Students use fractions to represent numbers equal to, less than, and greater than 1 and are able to generate simple equivalent fractions by using drawings and/or reasoning about fractions.
- **Measurement and Data** In 2nd grade, students tell time in five minute increments, measure lengths, and create bar graphs, pictographs, and line plots with whole number units. In 3rd grade, students tell and write time to the nearest minute and solve contextual problems involving addition and subtraction.
- **Geometry** Students understand that shapes in given categories have shared attributes and they identify polygons. Students continue their understanding of shapes and fractions by partitioning shapes into parts with equal areas and identify the parts with unit fractions.

Suggestions to prepare for next year:

- Continue to work on fluency of addition and subtraction facts within 30.
- Practice telling time using an analog clock or watch, and practice writing time in quarter hours and to the nearest minute.
- Practice skip counting by 5s, 10s, and 100s within 1,000.

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Math – Rising 4th Grader

Overview of the mathematical concepts and skills that students explored throughout 3rd grade:

- **Operations and Algebraic Thinking** Students build on their understanding of addition and subtraction to develop an understanding of the meanings of multiplication and division of whole numbers. By the end of 3rd grade, students should know from memory all products of single-digit numbers and the related division facts.
- **Numbers and Operations in Base Ten** Students begin to develop an understanding of rounding whole numbers to the nearest ten or hundred. Students fluently add and subtract within 1000 using strategies and algorithms. Students multiply one-digit whole numbers by multiples of 10.
- **Number and Operations in Fractions** This domain builds on the previous skill of partitioning shapes in geometry. This is the first time students are introduced to unit fractions. Students use fractions to represent numbers equal to, less than, and greater than 1 and are able to generate simple equivalent fractions by using drawings and/or reasoning about fractions.
- **Measurement and Data** In 2nd grade, students tell time in five minute increments, measure lengths, and create bar graphs, pictographs, and line plots with whole number units.
- **Geometry** Students understand that shapes in given categories have shared attributes and they identify polygons. Students continue their understanding of shapes and fractions by partitioning shapes into parts with equal areas and identify the parts with unit fractions.

Next year, students will explore:

- **Operations and Algebraic Thinking** Students build on their knowledge of multiplication and begin to interpret and represent multiplication as a comparison. They multiply and divide to solve contextual problems.
- **Numbers and Operations in Base Ten** Students generalize place value understanding to read and write numbers to 1,000,000, using standard form, word form, and expanded form. They compare the relative size of the numbers and round numbers to the nearest hundred thousand, which builds on 3rd grade rounding concepts. By the end of 4th grade, students should fluently add and subtract multi-digit whole numbers to 1,000,000.
- **Number and Operations in Fractions** Students continue to develop an understanding of fraction equivalence by reasoning about the size of the fractions, using a benchmark fraction to compare the fractions, or finding a common denominator. Students learn decimal notation for the first time to represent fractions with denominators of 10 and 100. They express these fractions and their equivalents as decimals and are able to read, write, compare, and locate these decimals on a number line.
- **Measurement and Data** Students know the relative sizes of measurement units within one system of units. They use the four operations to solve contextual problems involving measurement. For the first time, students learn concepts of angle measurement.
- **Geometry** Students extend their previous understanding to analyze and classify shapes based on line and angle types. Students also use knowledge of line and angle types to identify right triangles. Students recognize and draw lines of symmetry for the first time.

Suggestions to prepare for next year:

- Continue to work on fluency of addition and subtraction facts within 1,000.
- Practice finding products of single-digit number and their related quotients.
- Recall basic multiplication (and division facts) through 12 x 12 by memory.

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Math – Rising 5th Grader

Overview of the mathematical concepts and skills that students explored throughout 4th grade:

- **Operations and Algebraic Thinking** Students build on their knowledge of multiplication and begin to interpret and represent multiplication as a comparison. They multiply and divide to solve contextual problems.
- **Numbers and Operations in Base Ten** Students generalize place value understanding to read and write numbers to 1,000,000, using standard form, word form, and expanded form. They compare the relative size of the numbers and round numbers to the nearest hundred thousand, which builds on 3rd grade rounding concepts. By the end of 4th grade, students should fluently add and subtract multi-digit whole numbers to 1,000,000.
- **Number and Operations in Fractions** Students continue to develop an understanding of fraction equivalence by reasoning about the size of the fractions, using a benchmark fraction to compare the fractions, or finding a common denominator. Students learn decimal notation for the first time to represent fractions with denominators of 10 and 100.
- **Measurement and Data** Students know the relative sizes of measurement units within one system of units. They use the four operations to solve contextual problems involving measurement. For the first time, students learn concepts of angle measurement.
- **Geometry** Students extend their previous understanding to analyze and classify shapes based on line and angle types. Students also use knowledge of line and angle types to identify right triangles. Students recognize and draw lines of symmetry for the first time.

Next year, students will explore:

- **Operations and Algebraic Thinking** Students build on their understanding of patterns to generate two numerical patterns using given rules and identify relationships between the patterns. For the first time, students form ordered pairs and graph them on a coordinate plane.
- **Numbers and Operations in Base Ten** Students generalize their understanding of place value to include decimals by reading, writing, comparing, and rounding numbers. By the end of 5th grade, students should fluently multiply multi-digit whole numbers (up to 4 digits by 3 digits).
- **Number and Operations in Fractions** Students apply their understanding of equivalent fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. For the first time, students develop an understanding of fractions as division problems.
- **Measurement and Data** Students build on their understanding of area and recognize volume as an attribute of three-dimensional space. Students build on their understanding of measurements to convert from larger units to smaller units within a single system of measurement and solve multistep problems involving these conversions. Students solve problems with data from line plots involving fractions using operations appropriate for the grade.
- **Geometry** Students plot points on the coordinate plane to solve real-world and mathematical problems. Students classify two-dimensional figures into categories based on their properties.

Suggestions to prepare for next year:

- Continue to work on fluency of addition and subtraction facts within 1,000,000.
- Practice finding products of single-digit number and their related quotients.