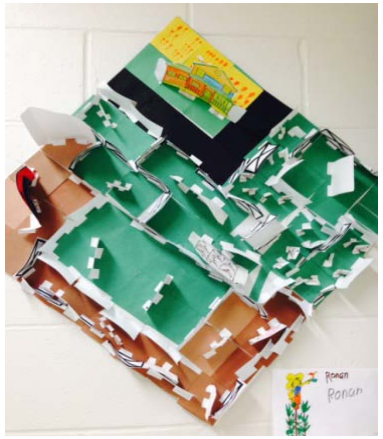
Bedford Public Schools

Grade 1 – Math

The First Grade curriculum builds on and extends the concepts begun in Kindergarten with increasing attention to mental and symbolic arithmetic, measurement and geometry. The content of the First Grade program includes numeration and counting, addition and subtraction, exploration of geometry, measurement, money, and time. Students continue to develop understanding and strategies for adding and subtracting within 20. They solve and create addition and subtraction number stories with numbers within 20. They are expected to master addition and subtraction facts to 10. Students continue to develop an understanding of whole number relationships and place value, including grouping in ones and tens. In measurement, students develop an understanding of linear measurement, and measure lengths as repeating length units. In geometry, students build on what they learned in kindergarten and reason about attributes of geometric shapes by looking at a number of sides. They also compose and decompose "flat" (2-D) and "solid" (3-D) shapes. Students learn the names and values of coins, and learn to tell time to the half hour.

Throughout all grades, there is an emphasis on the skills of mathematical practice that prepare children to be mathematically proficient students. These skills include making sense of problems and persevering in solving them, assessing how reasonable their answers are, explaining in words (both orally and in writing) their understanding and reasoning, attending to precision in both calculations and in math language, using appropriate math tools, and looking for and extending patterns.

Assessments happen in multiple ways routinely throughout the school year to measure student progress. Assessments consist of informal as well as formal teacher observations, small group interviews, individual interviews and checkpoints, and written tests. Student progress is monitored carefully to ensure proficiency in both the mathematical content and the practice standards that are expected at each grade level.



Learning Expectations

Operations and Algebraic Thinking

Enduring Understandings In order to meet the standards, the students will need to understand that . . .	Essential Questions In order to understand, students will need to consider questions such as . . .	Knowledge and Skills Learning this material will require students to . . .
Represent and Solve Problems Involving Addition and Subtraction • Adding to and putting together are two situations that involve addition. • Taking from, taking apart and comparing are three situations that involve subtraction. • Unknowns can be used in all positions when solving problems (i.e. the start, the addend or change, or the sum or difference might be unknown). • Sums and differences can be found using models (i.e. tens frames, base ten blocks). • Three numbers can be added in any order and the sum will be the same. • Situations in word problems can be represented in equations that include an equal sign and a symbol for an unknown.	• What are some ways to think about representing addition and subtraction problems? • What are ways to distinguish between addition and subtraction problems? • What strategies can be used to solve addition and subtraction problems?	• Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. • Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20.
Understand and Apply Properties of Operations and the Relationship Between Addition and Subtraction • For a given set of numbers, there are relationships that are always true called properties. Properties are the rules that govern arithmetic. (i.e. Numbers can be added in any order, numbers must be subtracted in a specified order.)	• What are the rules that govern addition and subtraction? • What are models that can effectively demonstrate addition or subtraction? • How can the relationship between addition and subtraction help solve problems and check answers?	• Apply properties of operations as strategies to add and subtract. • Understand subtraction as an unknown-addend problem (i.e. subtract 10 – 8 by finding the number that makes 10 when added to 8).

Enduring Understandings In order to meet the standards, the students will need to understand that . . .	Essential Questions In order to understand, students will need to consider questions such as . . .	Knowledge and Skills Learning this material will require students to . . .
Operations and Relationships (cont.) • Addition and subtraction have an inverse relationship and can be used to solve problems and check answers. • The inverse relationship between addition and subtraction means that every subtraction fact has a related addition fact.	• What are strategies for adding and subtracting?	
Add and Subtract Within 20 • There are strategies for learning addition and subtraction facts within 20 that will help fluency to 10. • The number 10 can be represented on a ten-frame using 5 and 10 as benchmark numbers. • The number 10 can be broken down into parts of the whole in different ways. • Number relationships of 0-more or less than, 1-more or less than, and 2-more or less than are the basis for addition and subtraction facts with 0, 1 and 2. • Doubles can be associated with real life situations (i.e. pairs of eyes, legs, hands). • Basic addition facts that are near doubles can be found using related doubles facts (i.e. doubles plus one, doubles minus one).	• How can counting strategies help with addition and subtraction? • What are the strategies for mastering addition and subtraction facts to 10? • How can mental strategies help when adding and subtracting within 20? • How can the benchmark numbers 5 and 10 help to learn basic facts?	• Relate counting to addition and subtraction (i.e., by counting on 2 to add 2). • Add and subtract within 20, demonstrating *fluency for addition and subtraction within 10. Use mental strategies, such as counting on, making ten, decomposing a number leading to ten, knowing the relationship between addition and subtraction, and creating equivalent but easier or known sums. **Fluency is used in the standards as meaning "fast and accurate". Fluency is a mixture of knowing some answers, knowing some answers from patterns, and knowing some answers from the use of strategies.*

Numbers and Operations in Base Ten

Enduring Understandings In order to meet the standards, the students will need to understand that . . .	Essential Questions In order to understand, students will need to consider questions such as . . .	Knowledge and Skills Learning this material will require students to . . .
Extend the Counting Sequence • The counting sequence in our number system extends beyond 100. • There is a unique symbol that goes with each number. • There is a specific order to the set of whole numbers. • The decade numbers are built on groups of tens. The oral names are similar, but not exactly the same, as the number of tens counted.	• How can numbers up to 120 be counted, read and written? • What number patterns are there when counting to 120?	• Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.
Understand Place Value • Our number system (the Base Ten numeration system) uses the symbols 0-9 and place value to build all our numbers. • Sets of ten can be perceived as single entities. In a standard numeral, tens are written to the left of ones. • The decade numbers to 100 are built on groups of 10s. • When objects are grouped in sets of 10s and leftovers (ones) counting the groups of ten and adding in the ones tells how many there are in all. • Numbers greater than 10 can be represented as groups of tens and ones. • Place value can be used to compare and order numbers. • For some relationships, mathematical symbols (i.e. > "more than", < "less than" , and = "equal") can be used to describe how one set of numbers is related to another set.	• How can numbers greater than 10 be shown, counted, read and written? • What are two-digit numbers? • How can numbers to 100 be compared and ordered?	• Understand that the two digit numbers in a two-digit number represent the amount of tens and ones. • 10 can be thought of as a bundle of ten ones, which is called a "ten". • The numbers from 11 to 19 are composed of a ten and one, two,…or nine ones. • The numbers 10, 20,…90 refer to one, two or nine tens (and 0 ones). • Compare two two-digit numbers based on meanings of the tens and ones digit, recording the results of comparisons with the symbols >, < and =.

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Use place Value Understanding and Properties of Operations to Add and Subtract • Understanding place value can be useful in solving multi-digit addition and subtraction problems. • Understanding the properties of addition and subtraction can be useful in solving multi-digit addition and subtraction problems. • Understanding the inverse relationship between addition and subtraction can be useful in solving multi-digit addition and subtraction problems. • When adding or subtracting 10 to a two-digit number, only the digit in the tens place changes. • Adding or subtracting groups of tens is similar to adding and subtracting less than ten. • Concrete models, such as base ten blocks, and drawings can be useful in solving multi-digit addition and subtraction problems.	• What are strategies to add and subtract with tens and ones? • What is a mental strategy to add or subtract 10 from a given two-digit number without having to count? • What are strategies to add and subtract multiples of 10 with two-digit numbers? • What does a good written explanation look like?	• Add within 100, including a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of addition and subtraction, and/or the relationship between addition and subtraction. • Given a two-digit number, mentally find 10 more or 10 less than the number without having to count; explain the reasoning used. • Subtract multiples of 10 in the range 10-99 from multiples of 10 in the range of 10-99 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Measurement and Data

Enduring Understandings In order to meet the standards, the students will need to understand that . . .	Essential Questions In order to understand, students will need to consider questions such as . . .	Knowledge and Skills Learning this material will require students to . . .
Measure Lengths Indirectly and By Iterating Length Units • Some attributes of objects are measurable and can be quantified using unit amounts. • The length of an object is measurable. • Objects can be compared and ordered by length. • The length of any object can be used as a measurement unit for length (ie. paperclip), but a standardized unit such as an inch or centimeter is always the same length. • Measurement is the process of comparing a unit to the object being measured.	• How can objects be measured, compared and ordered by length? • What is the process for comparing and ordering three objects by length? • What units of measure can be used for measuring length?	• Order three objects by length; compare the lengths of two objects indirectly by using a third object. • Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. (Limit to whole number of length units.)
Tell and Write Time • Time can be recorded on analog and digital clocks. • On an analog clock, the hour hand tells the hour, and the minute hand tells the number of minutes after the hour. • Time to the hour can be shown on an analog clock or a digital clock and can read as "_o'clock" and be written in two ways: _o'clock or _:00. • Time can be given to the half hour (30 minutes after the hour) and can be read in two ways: "_thirty" or "half past _" and can be written _:30.	• How can time be recorded? • What are analog and digital clocks? • How can time to the hour be read and written? • How can time to the half hour be read and written?	• Tell and write time in hours and half hours using analog and digital clocks.

Enduring Understandings In order to meet the standards, the students will need to understand that . . .	**Essential Questions** In order to understand, students will need to consider questions such as . . .	**Knowledge and Skills** Learning this material will require students to . . .
Represent and Interpret Data • Some questions can be answered by collecting and analyzing data. • Data can be represented visually using graphs. • Real graphs, picture graphs and bar graphs make it easy to compare data. • Tally charts are useful in recording and organizing some kinds of data. • In a real graph, objects are arranged in a particular way to make comparisons. • The key for a pictograph determines the number of pictures needed to represent each number in a set of data. • The type of data determines the best type of visual representation.	• How can picture graphs and bar graphs be used to represent data sets? • How can bar graphs be used in solving simple addition and subtraction problems?	• Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
Work With Money • Specific coins have a unique value. The size of a coin does not indicate its value. • One penny is worth one cent. One nickel is equal to 5 pennies. One dime is equal to 10 pennies. One quarter is equal to 25 pennies. • Money amounts can usually be counted in different ways. • The ¢ symbol is used to designate coin values. • Money amounts can be used in solutions to problems.	• What are the coins and their values that are used in our money system? • What are coin equivalencies? • What is the appropriate notation to indicate money?	• Identify the value of all U.S. coins and know their comparative values (i.e. a dime is of greater value than a nickel). Find equivalent values (i.e. a nickel is the equivalent of 5 pennies). Use appropriate notation (i.e. 69¢). Use the values of coins in the solutions of problems.

Geometry

Enduring Understandings In order to meet the standards, the students will need to understand that . . .	**Essential Questions** In order to understand, students will need to consider questions such as . . .	**Knowledge and Skills** Learning this material will require students to . . .
Reason With Shapes and Their Attributes • Shapes can be defined by various attributes. • "Defining" attributes can include the concepts of open or closed, and number of sides and corners. "Non-defining" attributes can include such attributes as color, orientation and size. • Shapes can be combined to make new shapes. • Two-dimensional shapes are "flat" while three-dimensional shapes are "solid". • A region can be divided into equal-sized parts in different ways. These equal-sized parts have specific names depending on how many parts they were divided into.	• What are "defining" and "non-defining" attributes when describing shapes? • How can two and three-dimensional shapes be described, built, and drawn? • How can two and three-dimensional shapes be combined to make other shapes? • How can circles and rectangles be partitioned into equal shares and what names can be given to these equal shares?	• Distinguish between defining attributes (i.e. triangles are closed and three-sided) versus non-defining attributes (i.e, color, orientation, overall size); build and draw shapes that possess defining attributes. • Compose "flat" (two-dimensional) shapes such as rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles or "solids" (three-dimensional) shapes such as cubes, right rectangular prisms, right circular cones, and right circular cylinders* to create a composite shape, and compose new shapes from the composite shape. * *Students to not need to learn the formal names of 3-D shapes.* • Partition circles and rectangles into two and four equal shares, describe the shares using the words halves, fourth, and quarters, and use the phrases half of, fourth of, and quarter of. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.