GRADE 1 MATHEMATICS

Overview:

Domains	Operations and Algebraic Thinking	Number & Operations in Base Ten	Measurement and Data	Geometry
Clusters	• Represent and solve problems involving addition and subtraction • Understand and apply properties of operations and the relationship between addition and subtraction • Add and subtract within 20 • Work with addition and subtraction equations	• Extend the counting sequence • Understand place value • Use place value understanding and properties of operations to add and subtract	• Measure lengths indirectly and by iterating length units • Tell and write time • Represent and interpret data	• Reason with shapes and their attributes
Mathematical Practices	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.
Major Interdisciplinary Grade 1 Units	**English Language Arts: across the content areas** • Reading • Writing • Speaking & Listening • Language	**Indian Education for All Titles** • *Two Pairs of Shoes* by Esther Sanderson • *Where did you get your Moccasins?* By Bernelda Wheeler • *White Bead Ceremony* by Sherrin Watkins	**Science** • Space: Investigating Sunlight and Moonlight • How Animals and Plants Interact in Their Environment • Nutrition/Food Pyramid	**Social Studies** **A Child's Place in Time and Space:** • Developing Social Skills and Responsibilities • Expanding Children's Geographic and Economic Worlds • Developing Awareness of Cultural Diversity, Now and Long Ago

In Grade 1, instructional time should focus on four critical areas:

1. Developing understanding of addition, subtraction, and strategies for addition and subtraction within 20

Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model add-to, take-from, put-together, take-apart, and compare situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations. Students understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). They use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems within 20. By comparing a variety of solution strategies, children build their understanding of the relationship between addition and subtraction.

2. Developing understanding of whole number relationship and place value, including grouping in tens and ones

Students develop, discuss, and use efficient, accurate, and generalizable methods to add within 100 and subtract multiples of 10. They compare whole numbers (at least to 100) to develop understanding of and solve problems involving their relative sizes. They 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 understand the order of the counting numbers and their relative magnitudes.

3. Developing understanding of linear measurement and measuring lengths as iterating length units

Students develop an understanding of the meaning and processes of measurement, including underlying concepts such as iterating (the mental activity of building up the length of an object with equal-sized units) and the transitivity principle for indirect measurement. (Note: students should apply the principle of transitivity of measurement to make direct comparisons, but they need not use this technical term.)

4. Reasoning about attributes of, and composing and decomposing geometric shapes

Students 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 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.

Domain: Operations and Algebraic Thinking

1.OA

Cluster: Represent and solve problems involving addition and subtraction.

1. Use addition and subtraction within 20 to solve word problems within a cultural context, including those of Montana American Indians, involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
    - I can use addition and subtraction within 20 to solve word problems using objects, drawings, and equations.
    - I can solve word problems using unknowns in all positions. (8 + 2 = _, 8 + _ = 10, 10 - 8 = _, 10 - _ = 2)

2. Solve word problems within a cultural context, including those of Montana American Indians, that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
    - I can solve word problems that call for addition of three whole numbers whose sum is within 20 by using objects, drawings, and equations.
    - I can use a symbol for the unknown number.

Cluster: Understand and apply properties of operations and the relationship between addition and subtraction.

3. Apply properties of operations as strategies to add and subtract. *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)* (Note: Students need not use the formal terms for these properties.)

- I can apply strategies to add and subtract. (Examples: Commutative and Associative properties of addition, switch partners, make a ten)

4. Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.*
   - I can show the relationship between addition and subtraction. (note: subtraction is the inverse of *addition)*

Cluster: Add and subtract within 20.

5. Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).
   - I can use counting to add and subtract.

6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).
   - I can fluently add and subtract within 10.
   - I can add and subtract within 20 using a variety of strategies. (Examples: make a ten, decompose numbers, doubles or other "friendly" numbers)

Cluster: Work with addition and subtraction equations.

7. Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.
   - I can interpret the meaning of the equal sign.
   - I can determine if equations are true or false.

8. Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + _ = 11, 5 = _ – 3, 6 + 6 = _.*
   - I can solve addition and subtraction equations to determine the unknown whole number.

Domain: Number and Operations in Base Ten

1.NBT

Cluster: Extend the counting sequence.

1. 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.
   - I can count to 120, starting from any number.
   - I can read, write, and represent numerals to 120.

Cluster: Understand place value.

2. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:
   a. 10 can be thought of as a bundle of ten ones — called a "ten."

b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
c. 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).

- I can identify how many ones are in a ten.
- I can represent two-digit numbers as tens and ones.
- I can represent numbers 11 to 19, as tens and ones.
- I can refer to multiples of ten (10, 20, 30,...) as groups of ten and 0 ones.

3. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.
   - I can use the symbols >, <, and = to compare two two-digit numbers.

Cluster: Use place value understanding and properties of operations to add and subtract.

4. Add within 100, including adding 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 operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.
   - I can add a two-digit number and a one-digit number within 100.
   - I can add a two-digit number and multiples of ten within 100.
   - I can use a variety of strategies to show the relationship between addition and subtraction and explain my reasoning (models, drawings, place-value strategies, properties of addition and subtraction).

5. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.
   - I can mentally find 10 more or 10 less of a two-digit number.

6. Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (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.
   - I can subtract multiples of ten from other multiples of ten within 100 using a variety of strategies to support my reasoning.

Domain: Measurement and Data

1.MD

Cluster: Measure lengths indirectly and by iterating length units.

1. Order three objects from a variety of cultural contexts, including those of Montana American Indians, by length; compare the lengths of two objects indirectly by using a third object.
   - I can order three objects by length.
   - I can compare the lengths of two objects by using the third object.

2. 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 contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*
    - I can measure an object using multiple shorter, same-size length units.
    - I can measure an object to the nearest whole number.

Cluster: Tell and write time.

3. Tell and write time in hours and half-hours using analog and digital clocks.
    - I can tell time in hours and half-hours using analog and digital clocks.
    - I can write time in hours and half-hours using analog and digital clocks.

Cluster: Represent and interpret data.

4. 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.
    - I can organize, represent, and interpret data with up to three categories.
    - I can ask and answer questions about data using the words total, more than, and less than.

Domain: Geometry

1.G

Cluster: Reason with shapes and their attributes.

1. Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
    - I can identify, define, draw, and create geometric shapes (square, circle, triangle, rectangle, hexagon, trapezoid, parallelogram, cube, cone, cylinder, sphere, rectangular prism).

2. Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape. (Note: Students do not need to learn to formal names such as "right rectangular prism.")
    - I can compose two- and three-dimensional shapes to create new shapes.

3. Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves*, *fourths*, 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.
    - I can divide circles and rectangles into two or four equal shares.
    - I can use words like half, halves, fourths, quarters, and equal shares.

Standards	Explanations and Examples
Students are expected to:	**The Standards for Mathematical Practice describe ways in which students ought to engage with the subject matter as they grow in mathematical maturity and expertise.**
1.MP.1. Make sense of problems and persevere in solving them.	In first grade, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They are willing to try other approaches.
1.MP.2. Reason abstractly and quantitatively.	Younger students recognize that a number represents a specific quantity. They connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.
1.MP.3. Construct viable arguments and critique the reasoning of others.	First graders construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also practice their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" "Explain your thinking," and "Why is that true?" They not only explain their own thinking, but listen to others' explanations. They decide if the explanations make sense and ask questions.
1.MP.4. Model with mathematics.	In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.
1.MP.5. Use appropriate tools strategically.	In first grade, students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, first graders decide it might be best to use colored chips to model an addition problem.
1.MP.6. Attend to precision.	As young children begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and when they explain their own reasoning.
1.MP.7. Look for and make use of structure.	First graders begin to discern a pattern or structure. For instance, if students recognize $12 + 3 = 15$, *then they also know* $3 + 12 = 15$. *(Commutative property of addition.) To add* $4 + 6 + 4$, *the first two numbers can be added to make a ten, so* $4 + 6 + 4 = 10 + 4 = 14$.
1.MP.8. Look for and express regularity in repeated reasoning.	In the early grades, students notice repetitive actions in counting and computation, etc. When children have multiple opportunities to add and subtract "ten" and multiples of "ten" they notice the pattern and gain a better understanding of place value. Students continually check their work by asking themselves, "Does this make sense?"

Standard	Grade 1 Montana Common Core Standards Vocabulary	Math Expressions Vocabulary
1.OA.1	addition, add, subtraction, subtract, equation, adding to, taking from, putting together, taking apart, compose, decompose	break apart
1.OA.2	addition, add, sum, equation, unknown number, symbol, solve, word problem	total, unknown partner, unknown total, story problem
1.OA.3	addition, add, subtraction, subtract, commutative property, associative property	switch partners, unknown partner, math mountain
1.OA.4	addition, subtraction, addend	partner
1.OA.5	addition, subtraction, count on, count back	count on
1.OA.6	addition, add, subtraction, subtract, count on, make a 10, fluency, decompose,	break apart, friendly numbers
1.OA.7	equal sign, equation, true, false, addition, subtraction	not equal
1.OA.8	addition, subtraction, whole number	total, unknown partner, unknown total
1.NBT.1	count, numeral	digit
1.NBT.2	two-digit number, tens, ones, bundle	teen number, decade number, ten stick, quick ten
1.NBT.3	> greater than, < less than, = equal	
1.NBT.4	add, multiple of 10, compose, place value	decade number, tens and ones, tens sticks, one circles
1.NBT.5	add, subtract, mental math,	
1.NBT.6	add, subtract, 10 more, 10 less, multiples of 10	
1.MD.1	measure, measurement, length, order, compare	standard unit of length, non-standard unit of length, estimate
1.MD.2	length, units of length, longer, shorter,	ruler, centimeters, inch
1.MD.3	time, hour, half-hour, analog clock, digital clock	half past
1.MD.4	data, organize, interpret, more, less, total	fewer, least, most, graph, table
1.G1.	square, triangle, circle, rectangle, trapezoid, hexagon, parallelogram, cube, cone, cylinder, rectangular prism, sphere, defining attributes, non-defining attributes, sides, angles, faces, sides, angles, shape	flat shapes, solid shapes
1.G.2	two-dimensional shape, three-dimensional half-circle, quarter-circle, compose, decompose, composite	combine, congruent, symmetry, symmetrical, line of symmetry
1.G.3	half, haves, half of, quarters, fourth of, quarter of, whole	