SECOND GRADE

Mathematics

CURRICULUM & STANDARDS

Montana Mathematics K-12 Content Standards and Practices

From the Montana Office of Public Instruction:

GRADE LEVEL STANDARDS & PRACTICES

CURRICULUM ORGANIZERS

From the Ravalli County Curriculum Consortium Committee:

After each grade level:

Year Long Plan Samples

Unit Organizer Samples

Lesson Plan Samples

Assessment Sample

Resources

Standards for Mathematical Practice: Grade 2 Explanations and Examples

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.
2.MP.1. Make sense of problems and persevere in solving them.	In second 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. They 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 make conjectures about the solution and plan out a problem-solving approach.
2.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. Second graders begin to know and use different properties of operations and relate addition and subtraction to length.
2.MP.3. Construct viable arguments and critique the reasoning of others.	Second graders may construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They 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 appropriate questions.
2.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.
2.MP.5. Use appropriate tools strategically.	In second grade, students consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be better suited. For instance, second graders may decide to solve a problem by drawing a picture rather than writing an equation.
2.MP.6. Attend to precision.	As 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.
2.MP.7. Look for and make use of structure.	Second graders look for patterns. For instance, they adopt mental math strategies based on patterns (making ten, fact families, doubles).
2.MP.8. Look for and express regularity in repeated reasoning.	Students notice repetitive actions in counting and computation, etc. When children have multiple opportunities to add and subtract, they look for shortcuts, such as rounding up and then adjusting the answer to compensate for the rounding. Students continually check their work by asking themselves, "Does this make sense?"

Explanations and Examples Grade 2
Arizona Department of Education: Standards and Assessment Division

Montana Mathematics Grade 2 Content Standards

In Grade 2, instructional time should focus on four critical areas: (1) extending understanding of base-ten notation; (2) building fluency with addition and subtraction; (3) using standard units of measure; and (4) describing and analyzing shapes.

1. Students extend their understanding of the base-ten system. This includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. Students 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).

2. Students use their understanding of addition to develop fluency with addition and subtraction within 100. They solve problems within 1000 by applying their understanding of models for addition and subtraction, and they develop, discuss, and use efficient, accurate, and generalizable 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 select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences for numbers with only tens or only hundreds.

3. Students recognize the need for standard units of measure (centimeter and inch) and they use rulers and other measurement tools with the understanding that linear measure involves an iteration of units. They recognize that the smaller the unit, the more iterations they need to cover a given length.

4. Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing, and analyzing two- and three-dimensional shapes, students develop a foundation for understanding area, volume, congruence, similarity, and symmetry in later grades.

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.

Grade 2 Overview

Operations and Algebraic Thinking
- Represent and solve problems involving addition and subtraction.
- Add and subtract within 20.
- Work with equal groups of objects to gain foundations for multiplication.

Number and Operations in Base Ten
- Understand place value.
- Use place value understanding and properties of operations to add and subtract.

Measurement and Data
- Measure and estimate lengths in standard units.
- Relate addition and subtraction to length.
- Work with time and money.
- Represent and interpret data.

Geometry
- Reason with shapes and their attributes.

Operations and Algebraic Thinking 2.OA

Represent and solve problems involving addition and subtraction.

1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations within a cultural context, including those of Montana American Indians, of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.[1]

Add and subtract within 20.

2. Fluently add and subtract within 20 using mental strategies.[2] By end of Grade 2, know from memory all sums of two one-digit numbers.

Work with equal groups of objects to gain foundations for multiplication.

3. 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.
4. 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.

Number and Operations in Base Ten 2.NBT

Understand place value.

1. 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 as special cases:
   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).
2. Count within 1000; skip-count by 5s, 10s, and 100s.
3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
4. Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

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

5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
6. Add up to four two-digit numbers using strategies based on place value and properties of operations.
7. Add and subtract within 1000, 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. 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.
8. Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
9. Explain why addition and subtraction strategies work, using place value and the properties of operations.[3]

Measurement and Data 2.MD

Measure and estimate lengths in standard units.

1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
2. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.
3. Estimate lengths using units of inches, feet, centimeters, and meters.
4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

Relate addition and subtraction to length.

5. Use addition and subtraction within 100 to solve word problems within a cultural context, including those of Montana American Indians, involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
6. Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.

Work with time and money.

7. Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.
8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*

Represent and interpret data.

9. Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.
10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set from a variety of cultural contexts, including those of Montana American Indians, with up to four categories. Solve simple put-together, take-apart, and compare problems[4] using information presented in a bar graph.

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Geometry 2.G

Reason with shapes and their attributes.

1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.[4] Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.
2. Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.
3. Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape. [5]

[1] See Glossary, Table 1.
[2] See standard 1.OA.6 for a list of mental strategies.
[3] Explanations may be supported by drawings or objects
[4] See Glossary, Table 1
[5] Sizes are compared directly or visually, not compared by measuring.

GRADE 2

Domain	Cluster	Code	Common Core State Standard
Operations and Algebraic Thinking	Represent and solve problems involving addition and subtraction.	2.OA.1	Use addition and subtraction within 100 to solve one- and two-step word problems involving situations within a cultural context, including those of Montana American Indians, of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
	Add and subtract within 20.	2.OA.2	Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers.
	Work with equal groups of objects to gain foundations for multiplication.	2.OA.3	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.
		2.OA.4	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.
Number and Operations in Base Ten	Understand place value.	2.NBT.1	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 as special cases: 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).
		2.NBT.2	Count within 1000; skip-count by 5s, 10s, and 100s.
		2.NBT.3	Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
		2.NBT.4	Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.
	Use place value understanding and properties of operations to add and subtract.	2.NBT.5	Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
		2.NBT.6	Add up to four two-digit numbers using strategies based on place value and properties of operations.
		2.NBT.7	Add and subtract within 1000, 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. 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
		2.NBT.8	Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900.
		2.NBT.9	Explain why addition and subtraction strategies work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.)

GRADE 2

Domain	Cluster	Code	Common Core State Standard
Measurement and Data	Measure and estimate lengths in standard units.	2.MD.1	Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
		2.MD.2	Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.
		2.MD.3	Estimate lengths using units of inches, feet, centimeters, and meters.
		2.MD.4	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.
	Relate addition and subtraction to length.	2.MD.5	Use addition and subtraction within 100 to solve word problems within a cultural context, including those of Montana American Indians, involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem
		2.MD.6	Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ... , and represent whole-number sums and differences within 100 on a number line diagram.
	Work with time and money.	2.MD.7	Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.
		2.MD.8	Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ (dollars) and ¢ (cents) symbols appropriately. Example: If you have 2 dimes and 3 pennies, how many cents do you have?
	Represent and interpret data.	2.MD.9	Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.
		2.MD.10	Draw a picture graph and a bar graph (with single-unit scale) to represent a data set from a variety of cultural contexts, including those of Montana American Indians, with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.
Geometry	Reason with shapes and their attributes.	2.G.1	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, and cubes. (Sizes are compared directly or visually, not compared by measuring.)
		2.G.2	Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.
		2.G.3	Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

Getting Every Montana Student College and Career Ready

Montana Common Core Standards and Assessments

Montana Curriculum Organizer

Grade 2

Mathematics

Montana
Office of Public Instruction
Denise Juneau, State Superintendent
opi.mt.gov

November 2012

Materials adapted from Arizona, Delaware and Ohio Departments of Education

Montana Curriculum Organizer: Grade 2 Mathematics

This document is a curriculum organizer adapted from other states to be used for planning scope and sequence, units, pacing and other materials that support a focused, coherent, and rigorous study of mathematics K-12.

TABLE OF CONTENTS

Montana Curriculum Organizer: Grade 2 Mathematics

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HOW TO USE THE MONTANA CURRICULUM ORGANIZER

The Montana Curriculum Organizer supports curriculum development and instructional planning. The Montana Guide to Curriculum Development, which outlines the curriculum development process, is another resource to assemble a complete curriculum including scope and sequence, units, pacing guides, outline for use of appropriate materials and resources and assessments.

Page 4 of this document is important for planning curriculum, instruction and assessment. It contains the Standards for Mathematical Practice grade-level explanations and examples that describe ways in which students ought to engage with the subject matter as they grow in mathematical maturity and expertise. The Critical Areas indicate two to four content areas of focus for instructional time. Focus, coherence and rigor are critical shifts that require considerable effort for implementation of the Montana Common Core Standards. Therefore, a copy of this page for easy access may help increase rigor by integrating the Mathematical Practices into all planning and instruction and help increase focus of instructional time on the big ideas for that grade level.

Pages 5 through 20 consist of tables organized into learning progressions that can function as units. The table for each learning progression unit includes: 1) domains, clusters and standards organized to describe what students will Know, Understand, and Do (KUD), 2) key terms or academic vocabulary, 3) instructional strategies and resources by cluster to address instruction for all students, 4) connections to provide coherence, and 5) the specific standards for mathematical practice as a reminder of the importance to include them in daily instruction.

Description of each table:

LEARNING PROGRESSION	STANDARDS IN LEARNING PROGRESSION
Name of this learning progression, often this correlates with a domain, however in some cases domains are split or combined.	Standards covered in this learning progression.
UNDERSTAND:	
What students need to understand by the end of this learning progression.	
KNOW:	**DO:**
What students need to know by the end of this learning progression.	What students need to be able to do by the end of this learning progression, organized by cluster and standard.
KEY TERMS FOR THIS PROGRESSION:	
Mathematically proficient students acquire precision in the use of mathematical language by engaging in discussion with others and by giving voice to their own reasoning. By the time they reach high school they have learned to examine claims, formulate definitions, and make explicit use of those definitions. The terms students should learn to use with increasing precision in this unit are listed here.	
INSTRUCTIONAL STRATEGIES AND RESOURCES:	
Cluster: Title Strategies for this cluster **Instructional Resources/Tools** Resources and tools for this cluster	
Cluster: Title Strategies for this cluster **Instructional Resources/Tools** Resources and tools for this cluster	
CONNECTIONS TO OTHER DOMAINS AND/OR CLUSTERS:	
Standards that connect to this learning progression are listed here, organized by cluster.	
STANDARDS FOR MATHEMATICAL PRACTICE:	
A quick reference guide to the eight standards for mathematical practice is listed here.	

Montana Curriculum Organizer: Grade 2 Mathematics

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Mathematics is a human endeavor with scientific, social, and cultural relevance. Relevant context creates an opportunity for student ownership of the study of mathematics. In Montana, the Constitution pursuant to Article X Sect 1(2) and statutes §20-1-501 and §20-9-309 2(c) MCA, calls for mathematics instruction that incorporates the distinct and unique cultural heritage of Montana American Indians. Cultural context and the Standards for Mathematical Practices together provide opportunities to engage students in culturally relevant learning of mathematics and create criteria to increase accuracy and authenticity of resources. Both mathematics and culture are found everywhere, therefore, the incorporation of contextually relevant mathematics allows for the application of mathematical skills and understandings that makes sense for all students.

Standards for Mathematical Practice: Grade 2 Explanations and Examples

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.
2.MP.1. Make sense of problems and persevere in solving them.	In second 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. They 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 make conjectures about the solution and plan out a problem-solving approach.
2.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. Second-graders begin to know and use different properties of operations and relate addition and subtraction to length.
2.MP.3. Construct viable arguments and critique the reasoning of others.	Second-graders may construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They 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 appropriate questions.
2.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.
2.MP.5. Use appropriate tools strategically.	In second grade, students consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be better suited. For instance, second-graders may decide to solve a problem by drawing a picture rather than writing an equation.
2.MP.6. Attend to precision.	As 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.
2.MP.7. Look for and make use of structure.	Second-graders look for patterns. For instance, they adopt mental math strategies based on patterns (making ten, fact families, doubles).
2.MP.8. Look for and express regularity in repeated reasoning.	Students notice repetitive actions in counting and computation, etc. When children have multiple opportunities to add and subtract, they look for shortcuts, such as rounding up and then adjusting the answer to compensate for the rounding. Students continually check their work by asking themselves, "Does this make sense?"

CRITICAL AREAS FOR GRADE 2 MATH

In Grade 2, instructional time should focus on four critical areas:

(1) extending understanding of base-ten notation;
(2) building fluency with addition and subtraction;
(3) using standard units of measure; and
(4) describing and analyzing shapes.

Montana Curriculum Organizer: Grade 2 Mathematics

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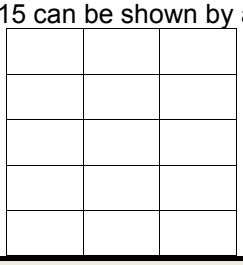
LEARNING PROGRESSION	STANDARDS IN LEARNING PROGRESSION
Operations & Algebraic Thinking – Add/Sub within 100 & Foundations for Multiplication	2.OA.1, 2.OA.2, 2.OA.3, 2.OA.4

UNDERSTAND:

There are multiple ways to represent and find sums/differences within 100 (e.g., story problems, pictures, equations, computational strategies, manipulatives, and arrays).

KNOW:	DO:
Addition and subtraction are related operations. Subtraction can be perceived as an unknown addend problem. Addition and subtraction problems can be posed with the missing part being in different positions. Word problems may require one or two computations to find a solution. Mental strategies for adding single-digit numbers to know combinations to 20 fluently (e.g., doubles + 1, Make a Ten, Ten plus …, 9 + …). The objects in an even number set can be paired or broken into two equal groups, and an odd number set of objects cannot. Methods for recording addition and subtraction strategies using number lines and equations. Symbols can represent an unknown quantity in an equation. Rectangular arrays can represent the relationship between repeated addition and the foundations of multiplication.	***Represent and solve problems involving addition and subtraction.*** **2.OA.1** Use addition and subtraction within 100 to solve one- and two-step word problems involving situations within a cultural context, including those of Montana American Indians, of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem).[1] ***Add and subtract within 20.*** **2.OA.2** Fluently add and subtract within 20 using mental strategies.[2] By end of Grade 2, know from memory all sums of two one-digit numbers. ***Work with equal groups of objects to gain foundations for multiplication.*** **2.OA.3** 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 2's); write an equation to express an even number as a sum of two equal addends. **2.OA.4** 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. For example, 5 + 5 + 5 = 15 can be shown by a 3 x 5 rectangle: 

KEY TERMS FOR THIS PROGRESSION:

Array, Difference, Equation, Even, Odd, Sum

INSTRUCTIONAL STRATEGIES AND RESOURCES:

Cluster: Represent and solve problems involving addition and subtraction.
Students now build on their work with one-step problems to solve two-step problems. Second-graders need to model and solve problems for all the situations shown in Table 1 on page 72 in the *Montana Common Core Standards for School Mathematics Grade-Band* and represent their solutions with equations. The problems should involve sums and differences less than or equal to 100 using the numbers 0 to 100. It is vital that students develop the habit of checking their answer to a problem to determine if it makes sense for the situation and the questions being asked.

Ask students to write word problems for their classmates to solve. Start by giving students the answer to a problem. Then tell students whether it is an addition or subtraction problem situation. Also let them know that the sums and differences can be less than or equal to 100 using the numbers 0 to 100. For example, ask students to write an addition word problem for their classmates to solve which requires adding four two-digit numbers with 100 as the answer. Students then share, discuss and compare their solution strategies after they solve the problems.

[1] See Glossary, Table 1 in the MCCS document.
[2] See standard 1.OA.6 for a list of mental strategies.

Instructional Resources/Tools
Montana Office of Public Instruction. 2011. *Montana Common Core Standards for School Mathematics Grade-Band*: Table 1 on page 72 illustrates 12 addition and subtraction problem situations.

National Council of Teachers of Mathematics. 2000-2012. *Mathematics and Football: Get the Picture — Get the Story.* In this lesson, students act as reporters at the Super Bowl. Students study four pictures of things that they would typically find at a football game then create problem situations that correspond to their interpretation of each of the pictures.

Cluster: Add and subtract within 20.
Provide many activities that will help students develop a strong understanding of number relationships, addition and subtraction so they can develop, share and use efficient strategies for mental computation. An efficient strategy is one that can be done mentally and quickly. Students gain computational fluency, using efficient and accurate methods for computing, as they come to understand the role and meaning of arithmetic operations in number systems. Efficient mental processes become automatic with use.

Provide activities in which students apply the commutative and associative properties to their mental strategies for sums less or equal to 20 using the numbers 0 to 20.

Have students study how numbers are related to 5 and 10 so they can apply these relationships to their strategies for knowing 5 + 4 or 8 + 3. Students might picture 5 + 4 on a ten-frame to mentally see 9 as the answer. For remembering 8 + 7, students might think: since 8 is 2 away from 10, take 2 away from 7 to make 10 + 5 = 15.

Provide simple word problems designed for students to invent and try a particular strategy as they solve it. Have students explain their strategies so that their classmates can understand it. Guide the discussion so that the focus is on the methods that are most useful. Encourage students to try the strategies that were shared so they can eventually adopt efficient strategies that work for them.

Make posters for student-developed mental strategies for addition and subtraction within 20. Use names for the strategies that make sense to the students and include examples of the strategies.

Present a particular strategy along with the specific addition and subtraction facts relevant to the strategy. Have students use objects and drawings to explore how these facts are alike.

Instructional Resources/Tools
National Council of Teachers of Mathematics. 2000-2012.

Comparing Connecting Cubes: Looking back and Moving Forward: In the game Race to Zero at the bottom of the page, students take turns rolling a number cube and subtracting the number they rolled each time from 20. The first person to reach 0 wins the round.

Do It with Dominoes: Finding Fact Families: In this lesson, the relationship of subtraction to addition is introduced with a book and with dominoes.

Pearson Education, Inc. 2012. *Five-frames and ten-frames*

Cluster: Work with equal groups of objects to gain foundations for multiplication.
Students need to understand that a collection of objects can be one thing (a group) and that a group contains a given number of objects. Investigate separating no more than 20 objects into two equal groups. Find the numbers (the total number of objects in collections up to 20 members) that will have some objects and no objects remaining after separating the collections into two equal groups. Odd numbers will have some objects remaining while even numbers will not. For an even number of objects in a collection, show the total as the sum of equal addends (repeated addition).

A rectangular array is an arrangement of objects in horizontal rows and vertical columns. Arrays can be made out of any number of objects that can be put into rows and columns. All rows contain the same number of items and all columns contain an equal number of items. Have students use objects to build all the arrays possible with no more than 25 objects. Their arrays should have up to five rows and up to five columns. Ask students to draw the arrays on grid paper and write

two different equations under the arrays: one showing the total as a sum by rows and the other showing the total as a sum by columns. Both equations will show the total as a sum of equal addends.

The equation by rows: 20 = 5 + 5 + 5 +5

The equation by columns: 20 = 4 + 4 + 4 + 4 + 4

Build on knowledge of composing and decomposing numbers to investigate arrays with up to five rows and up to five columns in different orientations. For example, form an array with 3 rows and 4 objects in each row. Represent the total number of objects with equations showing a sum of equal addends two different ways: by rows, 12 = 4 + 4 + 4; by columns, 12 = 3 + 3 + 3 + 3. Rotate the array 90° to form 4 rows with 3 objects in each row. Write two different equations to represent 12 as a sum of equal addends: by rows, 12 = 3 + 3 + 3 + 3; by columns, 12 = 4 + 4 + 4. Have students discuss this statement and explain their reasoning: The two arrays are different and yet the same.

Ask students to think of a full ten-frame showing 10 circles as an array. One view of the ten-frame is 5 rows with 2 circles in each row. Students count by rows to 10 and write the equation 10 = 2 + 2 + 2 + 2 + 2. Then students put two full ten-frame together end-to-end so they form 10 rows of 2 circles or 10 columns of 2 circles. They use this larger array to count by 2's up to 20 and write an equation that shows 20 equal to the sum of ten 2's.

Instructional Resources/Tools
Linking cubes
Tiles

Pearson Education, Inc. 2012.
Five-frames and ten-frames
Grid paper

CONNECTIONS TO OTHER DOMAINS AND/OR CLUSTERS:

Reason with shapes and their attributes. (2.G.2)
Use place-value understanding and properties of operations to add and subtract. (2.NBT.5, 2.NBT.6, 2.NBT.9)
Relate addition and subtraction to length. (2.MD.5)
Work with time and money. (2.MD.8)
Represent and interpret data. (2.MD.10)

STANDARDS FOR MATHEMATICAL PRACTICE:

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.

Montana Curriculum Organizer: Grade 2 Mathematics

This document is a curriculum organizer adapted from other states to be used for planning scope and sequence, units, pacing and other materials that support a focused, coherent, and rigorous study of mathematics K-12.

LEARNING PROGRESSION	STANDARDS IN LEARNING PROGRESSION
Understanding Place Value	2.NBT.1, 2.NBT.2, 2.NBT.3, 2.NBT.4

UNDERSTAND:

Three-digit numbers are composed of hundreds, tens, and ones.

KNOW:	DO:
2.NBT.1 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 as special cases: 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, or 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones). The repeating patterns of the counting sequence up to 1,000. The meaning of recording symbols >, =, <.	***Understand place value.*** **2.NBT.2** Count within 1,000; skip-count by 5's, 10's, and 100's. **2.NBT.3** Read and write numbers to 1,000 using base-ten numerals, number names, and expanded form. **2.NBT.4** Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.

KEY TERMS FOR THIS PROGRESSION:

Break apart, Digits, Hundreds, Ones, Place value, Put together, Tens

INSTRUCTIONAL STRATEGIES AND RESOURCES:

Cluster: Understand place value.

The understanding that 100 is 10 tens or 100 ones is critical to the understanding of place value. Using proportional models like base-ten blocks and bundles of tens along with numerals on place-value mats provides connections between physical and symbolic representations of a number. These models can be used to compare two numbers and identify the value of their digits.

Model three-digit numbers using base-ten blocks in multiple ways. For example, 236 can be 236 ones, or 23 tens and 6 ones, or 2 hundreds, 3 tens and 6 ones, or 20 tens and 36 ones. Use activities and games that have students match different representations of the same number.

Provide games and other situations that allow students to practice skip-counting. Students can use nickels, dimes and dollar bills to skip count by 5, 10 and 100. Pictures of the coins and bills can be attached to models familiar to students: a nickel on a five-frame with 5 dots or pennies and a dime on a ten-frame with 10 dots or pennies.

On a number line, have students use a clothespin or marker to identify the number that is ten more than a given number or five more than a given number.

Have students create and compare all the three-digit numbers that can be made using numbers from 0 to 9. For instance, using the numbers 1, 3, and 9, students will write the numbers 139, 193, 319, 391, 913 and 931. When students compare the numerals in the hundreds place, they should conclude that the two numbers with 9 hundreds would be greater than the numbers showing 1 hundred or 3 hundreds. When two numbers have the same digit in the hundreds place, students need to compare their digits in the tens place to determine which number is larger.

Instructional Resources/Tools

Base-ten blocks
Pictures of nickels and dimes

Pearson Education, Inc. 2012.

Base-ten grid paper
Five-frames and Ten-frames

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Utah State University. National Library of Virtual Manipulatives. 1999-2010.

Base-ten blocks
Hundreds chart (Use for counting by 5's and 10's.)
Place-value number line

CONNECTIONS TO OTHER DOMAINS AND/OR CLUSTERS:

Use place-value understanding and properties of operations to add and subtract. (2.NBT.7, 2.NBT.8, 2.NBT.9)
Work with time and money. (2.MD.8)

STANDARDS FOR MATHEMATICAL PRACTICE:

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.
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6. Attend to precision.
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LEARNING PROGRESSION	STANDARDS IN LEARNING PROGRESSION
Adding & Subtracting Within 1,000 including Place Value	2.NBT.5, 2.NBT.6, 2.NBT.7, 2.NBT.8, 2.NBT.9

UNDERSTAND:

Numbers can be composed and decomposed into place-value parts to add and subtract multi-digit numbers efficiently.

KNOW:	DO:
The strategy of mentally adding and subtracting 10 or a 100 to a given number. Addition and subtraction are related operations. Commutative and associative properties of operations can be used to solve problems. For example, students know that if 120 + 140 = 260, the 140 + 120 = 260 without actually naming the commutative property. Students know if 2 + 3 + 4 = 9, then they will know that 4 + 3 + 2 = 9 without actually naming the associative property. Place-value strategies for adding and subtracting (counting on, making 10's/100's, breaking apart and putting together, using known facts). Models for adding and subtracting (number line, base-ten materials). Methods for recording addition and subtraction strategies using number lines and equations. Symbols can represent an unknown quantity in an equation.	***Use place-value understanding and properties of operations to add and subtract.*** **2.NBT.5** Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction. **2.NBT.6** Add up to four two-digit numbers using strategies based on place value and properties of operations. **2.NBT.7** Add and subtract within 1,000, 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. 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. **2.NBT.8** Mentally add 10 or 100 to a given number 100-900, and mentally subtract 10 or 100 from a given number 100-900. **2.NBT.9** Explain why addition and subtraction strategies work, using place value and the properties of operations.

KEY TERMS FOR THIS PROGRESSION:

Difference, Digit, Mental math, Model, Strategy, Sum
Place-value words: **Ones, Tens, Hundreds, Thousands**

INSTRUCTIONAL STRATEGIES AND RESOURCES:

Cluster: Use place-value understanding and properties of operations to add and subtract.
Provide many activities that will help students develop a strong understanding of number relationships, addition and subtraction so they can develop, share and use efficient strategies for mental computation. An efficient strategy is one that can be done mentally and quickly. Students gain computational fluency, using efficient and accurate methods for computing, as they come to understand the role and meaning of arithmetic operations in number systems. Efficient mental processes become automatic with use.

Students need to build on their flexible strategies for adding within 100 in Grade 1 to fluently add and subtract within 100, add up to four two-digit numbers, and find sums and differences less than or equal to 1,000 using numbers 0 to 1,000.

Initially, students apply base-ten concepts and use direct modeling with physical objects or drawings to find different ways to solve problems. They move to inventing strategies that do not involve physical materials or counting by ones to solve problems. Student-invented strategies likely will be based on place-value concepts, the commutative and associative properties, and the relationship between addition and subtraction. These strategies should be done mentally or with a written record for support.

It is vital that student-invented strategies be shared, explored, recorded and tried by others. Recording the expressions and equations in the strategies horizontally encourages students to think about the numbers and the quantities they represent instead of the digits. Not every student will invent strategies, but all students can and will try strategies they have seen that make sense to them. Different students will prefer different strategies.

Students will decompose and compose tens and hundreds when they develop their own strategies for solving problems where regrouping is necessary. They might use the make-ten strategy (37 + 8 = 40 + 5 = 45, add 3 to 37 then 5) or (62 - 9 = 60 – 7 = 53, take off 2 to get 60, then 7 more) because no ones are exchanged for a ten or a ten for ones.

Have students analyze problems before they solve them. Present a variety of subtraction problems within 1,000. Ask students to identify the problems requiring them to decompose the tens or hundreds to find a solution and explain their reasoning.

Instructional Resources/Tools

Groupable materials

- Dried beans and small cups for groups of 10 beans
- Linking cubes
- Plastic chain links

Pre-grouped materials

- Base-ten blocks
- Dried beans and beans sticks (10 dried beans glued on a craft stick – 10 sticks can be bundled for 100)

Pearson Education, Inc. 2012:

- *Strips (ten connected squares) and squares (singles)*
- *Ten-frame*
- *Place-value mat with ten-frames*
- *Hundreds chart (numbers 1-100) and blank hundreds chart (Add numbers 101-120 and attach to hundreds chart.)*

CONNECTIONS TO OTHER DOMAINS AND/OR CLUSTERS:

Relate addition and subtraction to length. (2.MD.5, 2.MD.6)
Work with time and money. (2.MD.8)

STANDARDS FOR MATHEMATICAL PRACTICE:

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.

Montana Curriculum Organizer: Grade 2 Mathematics

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LEARNING PROGRESSION	STANDARDS IN LEARNING PROGRESSION
Measurement (Length, Time, Money)	2.MD.1, 2.MD.2, 2.MD.3, 2.MD.4, 2.MD.5, 2.MD.6, 2.MD.7, 2.MD.8

UNDERSTAND:

Tools that measure length, time, and money must have equal intervals between units (e.g.; clocks, number lines, coins).

KNOW:

The appropriate tool and unit of measure should be selected based on the context of the situation.

Estimating strategies can be applied to measuring lengths to the closest standard unit of measure.

Lengths of an object can be compared by using various units of measure.

The value of the measurement of an object will be different depending on the size of the units used to measure it.

When you compare two lengths, you are finding the difference.

Strategies used for solving and representing addition/subtraction problems can be utilized to solve and represent measurement word problems involving length, money, and time.

Methods for recording addition and subtraction strategies using number lines and equations.

Symbols can represent an unknown quantity in an equation.

Consecutive whole numbers are equidistant on a number line (e.g.; 0-10, 10-20, 20-30, etc.).

The number line can be utilized as a model for adding and subtracting within 100.

Time intervals on analog clock skip-count by 5 minutes.

The time before 12 noon is a.m., and the time 12 noon and after is p.m.

DO:

Measure and estimate lengths in standard units.

2.MD.1 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

2.MD.2 Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.

2.MD.3 Estimate lengths using units of inches, feet, centimeters, and meters.

2.MD.4 Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

Relate addition and subtraction to length.

2.MD.5 Use addition and subtraction within 100 to solve word problems within a cultural context, including those of Montana American Indians, involving lengths that are given in the same units (e.g., by using drawings of rulers) and equations with a symbol for the unknown number to represent the problem.

2.MD.6 Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ... and represent whole-number sums and differences within 100 on a number line diagram.

Work with time and money.

2.MD.7 Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

2.MD.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *For example, "If you have 2 dimes and 3 pennies, how many cents do you have?"*

KEY TERMS FOR THIS PROGRESSION:

Analog clock, Estimate, Length, Measure, Standards, Units

INSTRUCTIONAL STRATEGIES AND RESOURCES:

Cluster: Measure and estimate lengths in standard units.

Second-graders are transitioning from measuring lengths with informal or nonstandard units to measuring with these standard units: inches, feet, centimeters, and meters. The measure of length is a count of how many units are needed to match the length of the object or distance being measured. Students have to understand what a length unit is and how it is used to find a measurement. They need many experiences measuring lengths with appropriate tools so they can become very familiar with the standard units and estimate lengths. Use language that reflects the approximate nature of measurement, such as the length of the room is about 26 feet.

Have students measure the same length with different-sized units then discuss what they noticed. Ask questions to guide the discussion so students will see the relationship between the size of the units and measurement (i.e., the measurement made with the smaller unit is more than the measurement made with the larger unit and vice versa).

Insist that students always estimate lengths before they measure. Estimation helps them focus on the attribute to be measured, the length units, and the process. After they find measurements, have students discuss the estimates, their procedures for finding the measurements and the differences between their estimates and the measurements.

Instructional Resources/Tools
Centimeter rulers and tapes
Inch rulers and tapes
Meter sticks
Yardsticks

Cluster: Relate addition and subtraction to length.
Connect the whole-number units on rulers, yardsticks, meter sticks and measuring tapes to number lines showing whole-number units starting at 0. Use these measuring tools to model different representations for whole-number sums and differences less than or equal to 100 using the numbers 0 to 100.

Use the meter stick to view units of ten (10 cm) and hundred (100 cm), and to skip count by 5's and 10's.

Provide one- and two-step word problems that include different lengths measurement made with the same unit (inches, feet, centimeters, and meters). Students add and subtract within 100 to solve problems for these situations: adding to, taking from, putting together, taking apart, and comparing, and with unknowns in all positions. Students use drawings and write equations with a symbol for the unknown to solve the problems.

Have students represent their addition and subtraction within 100 on a number line. They can use notebook or grid paper to make their own number lines. First, they mark and label a line on paper with whole-number units that are equally spaced and relevant to the addition or subtraction problem. Then they show the addition or subtraction using curved lines segments above the number line and between the numbers marked on the number line. For 49 + 5, they start at 49 on the line and draw a curve to 50, then continue drawing curves to 54. Drawing the curves or making the hops between the numbers will help students focus on a space as the length of a unit and the sum or difference as a length.

Instructional Resources/Tools
Cash register tapes or paper strips
Measuring tapes
Meter sticks
Rulers
Yardsticks

National Council of Teachers of Mathematics. 2000-2012.
How Many More Fish? Hopping Backward to Solve Problems: In this lesson, students determine differences using the number line to compare lengths.
Macaroni Math: Where Will I Land? In this lesson, the students find differences using the number line, a continuous model for subtraction.

Cluster: Work with time and money.
Second-graders expand their work with telling time from analog and digital clocks to the nearest hour or half-hour in Grade 1 to telling time to the nearest five minutes using a.m. and p.m.

The topic of money begins at Grade 2 and builds on the work in other clusters in this and previous grades. Help students learn money concepts and solidify their understanding of other topics by providing activities where students make connections between them. For instance, link the value of a dollar bill as 100 cents to the concept of 100 and counting

within 1,000. Use play money (i.e., nickels, dimes, and dollar bills) to skip count by 5's, 10's, and 100's. Reinforce place value concepts with the values of dollar bills, dimes, and pennies.

Students use the context of money to find sums and differences less than or equal to 100 using the numbers 0 to 100. They add and subtract to solve one- and two-step word problems involving money situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions. Students use drawings and equations with a symbol for the unknown number to represent the problem. The dollar sign ($) is used for labeling whole-dollar amounts without decimals, such as $29.

Students need to learn the relationships between the values of a penny, nickel, dime, quarter and dollar bill.

Instructional Resources/Tools
Play money

National Council of Teachers of Mathematics. 2000-2012.

Coin Box: This game will help students learn how to count, collect, exchange and make change for coins.
Number Cents: In this unit, students explore the relationship between pennies, nickels, dimes, and quarters. They count sets of mixed coins, write story problems that involve money, and use coins to make patterns.

Utah State University. National Library of Virtual Manipulatives. 1999-2010. *Time – Match Clocks:* Students manipulate a digital clock to show the time given on an analog clock. They can also manipulate the hands on a face clock to show the time given on a digital clock. Times are given to the nearest five minutes.

CONNECTIONS TO OTHER DOMAINS AND/OR CLUSTERS:

Represent and interpret data. (2.MD.9)

STANDARDS FOR MATHEMATICAL PRACTICE:

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.

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LEARNING PROGRESSION:	STANDARDS IN LEARNING PROGRESSION:
Data – Represent & Interpret	2.MD.9, 2.MD.10

UNDERSTAND:

Data can be organized, represented, and interpreted in multiple ways for a variety of purposes.

KNOW:	DO:
Data can be organized and represented in multiple ways. Data presented in graphs can be interpreted and manipulated to solve problems.	***Represent and interpret data*.** **2.MD.9** Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units. **2.MD.10** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set from a variety of cultural contexts, including those of Montana American Indians, with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.

KEY TERMS FOR THIS PROGRESSION:

Bar graph, Line, Plot, Measure, Picture graph, Scale

INSTRUCTIONAL STRATEGIES AND RESOURCES

Cluster: Represent and interpret data.

Line plots are useful tools for collecting data because they show the number of things along a numeric scale. They are made by simply drawing a number line then placing an "X" above the corresponding value on the line that represents each piece of data. Line plots are essentially bar graphs with a potential bar for each value on the number line.

Pose a question related to the lengths of several objects. Measure the objects to the nearest whole inch, foot, centimeter or meter. Create a line plot with whole-number units (0, 1, 2, ...) on the number line to represent the measurements.

At first students should create real-object and picture graphs so each row or bar consists of countable parts. These graphs show items in a category and do not have a numerical scale. For example, a real-object graph could show the students' shoes (one shoe per student) lined end to end in horizontal or vertical rows by their color. Students would simply count to find how many shoes are in each row or bar. The graphs should be limited to two to four rows or bars.

Students would then move to making horizontal or vertical bar graphs with two to four categories and a single-unit scale. Use the information in the graphs to pose and solve simple put-together, take-apart, and compare problems illustrated in Table 1 on page 72 in the *Montana Common Core Standards for School Mathematics Grade-Band*.

Instructional Resources/Tools

Montana Office of Public Instruction. 2011. *Montana Common Core Standards for School Mathematics Grade-Band*: Table 1 on page 72.

Utah State University. National Library of Virtual Manipulatives. 1999-2010. *Bar Chart:* This manipulative can be used to make a bar chart with 1 to 20 for the vertical axis and 1 to 12 bars on the horizontal axis. The colors for the bars are predetermined however, users can type in their own title for the graph and labels for the bars.

CONNECTIONS TO OTHER DOMAINS AND/OR CLUSTERS:

None

STANDARDS FOR MATHEMATICAL PRACTICE:

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LEARNING PROGRESSION:	STANDARDS IN LEARNING PROGRESSION:
Geometry – Reason with Shapes & Their Attributes	2.G.1, 2.G.2, 2.G.3

UNDERSTAND:

Shapes have defining attributes that can be utilized for comparing and composing/constructing.
Rectangular arrays promote the connection between geometry and the foundations multiplication.
Decomposing shapes into equal-size pieces promotes the connection between geometry and fractional concepts.

KNOW:	DO:
Angles and sides are important specified attributes of 2D shapes. Faces, edges, and vertices are important specified attributes of 3D shapes. Distinguishing features of 2D and 3D shapes. Equal shares of identical wholes do not need to have the same shape. For example, ¼ of a square can look different for different equal squares. Rectangular arrays can represent the relationship between repeated addition and the foundations of multiplication.	**Reason with shapes and their attributes.** **2.G.1** Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.[3] Identify triangles, quadrilaterals, pentagons, hexagons, and cubes. **2.G.2** Partition a rectangle into rows and columns of same-size squares and count to find the total number of them. **2.G.3** Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words *halves*, *thirds*, *half of*, *a third of*, etc., and describe the whole as *two halves, three thirds, four fourths*. Recognize that equal shares of identical wholes need not have the same shape.

KEY TERMS FOR THIS PROGRESSION:

Angles, Array, Columns, Cubes, Edges, Faces, Fourths, Halves, Hexagons, Pentagons, Polygons, Quadrilaterals, Regular, Rows, Sides, Thirds, Triangles

INSTRUCTIONAL STRATEGIES AND RESOURCES

Cluster: Reason with shapes and their attributes.

Modeling multiplication with partitioned rectangles promotes students' understanding of multiplication. Tell students that they will be drawing a square on grid paper. The length of each side is equal to 2 units. Ask them to guess how many 1 unit by 1 unit squares will be inside this 2 unit by 2 unit square. Students now draw this square and count the 1 by 1 unit squares inside it. They compare this number to their guess. Next, students draw a 2 unit by 3 unit rectangle and count how many 1 unit by 1 unit squares are inside. Now they choose the two dimensions for a rectangle, predict the number of 1 unit by 1 unit squares inside, draw the rectangle, count the number of 1 unit by 1 unit squares inside and compare this number to their guess. Students repeat this process for different-size rectangles. Finally, ask them to what they observed as they worked on the task.

It is vital that students understand different representations of fair shares. Provide a collection of different-size circles and rectangles cut from paper. Ask students to fold some shapes into halves, some into thirds, and some into fourths. They compare the locations of the folds in their shapes as a class and discuss the different representations for the fractional parts. To fold rectangles into thirds, ask students if they have ever seen how letters are folded to be placed in envelopes. Have them fold the paper very carefully to make sure the three parts are the same size. Ask them to discuss why the same process does not work to fold a circle into thirds.

Instructional Resources/Tools

Pearson Education, Inc. 2012. *Grid paper.*

Drexel University. The Math Forum. 1994-2012.

Equal Parts: Students learn to divide a circle into pieces of equal size.
Divide and Shade: Students shade equal parts to indicate fraction of the circle.
Extension Ideas: Introduction to fractions for primary students. This four-lesson unit introduces young children to fractions. Students learn to recognize equal parts of a whole as halves, thirds and fourths.

[3] Sizes are compared directly or visually, not compared by measuring.

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CONNECTIONS TO OTHER DOMAINS AND/OR CLUSTERS:
Work with equal groups of objects to gain foundations for multiplication. (2.OA.4)

STANDARDS FOR MATHEMATICAL PRACTICE:	
1. Make sense of problems and persevere in solving them.	4. Model with mathematics.
2. Reason abstractly and quantitatively.	5. Use appropriate tools strategically.
3. Construct viable arguments and critique the reasoning of others.	6. Attend to precision.
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This Curriculum Organizer was created using the following materials:
ARIZONA - STANDARDS FOR MATHEMATICAL PRACTICE EXPLANATIONS AND EXAMPLES
http://www.azed.gov/standards-practices/mathematics-standards/
DELAWARE – LEARNING PROGRESSIONS
http://www.doe.k12.de.us/infosuites/staff/ci/content_areas/math.shtml
OHIO – INSTRUCTIONAL STRATEGIES AND RESOURCES (FROM MODEL CURRICULUM)
http://education.ohio.gov/GD/Templates/Pages/ODE/ODEDetail.aspx?Page=3&TopicRelationID=1704&Content=134773

SAMPLE YEAR LONG PLAN

COURSE: 2nd GRADE MATH

Unit	Add/ Subt within 100	Understanding Place Value within 100	Data- Represent & Interpret	Add/ Subt within 1000 including Place Value	Geometry Reason with shapes and their attributes
(Time)	30 days	30 days	10 days	30 days	15 days
STANDARDS	2 OA 2	2 NBT 1	2 MD 9	2 NBT 2	2 G 1
	2 OA 3	2 NBT 4	2 MD 10	2 NBT 3	2 G 2
	2 NBT 8	2 NBT 5		2 NBT 6	2 G 3
	2 NBT 9	2 OA 1		2 NBT 7	

SECOND GRADE MATH p. 2

Measurement Length	Measurement Time	Measurement Money	Foundations for Multiplication
15 days	10 days	10 days	10 days
2 MD 1	2 MD 7	2 MD 8	2 OA 4
2 MD 2			
2 MD 3			
2 MD 4			
2 MD 5			
2 MD 6			

TEACHER: _____ SCHOOL DISTRICT/BUILDING: _____

COURSE: MATH GRADE LEVEL(S): 2nd Grade

LAST UNIT	**CURRENT UNIT** **Add/Subtract within 100**	NEXT UNIT

UNIT SCHEDULE	
	Writing Addition Sentences
	Writing Subtraction Sentences
	Addition Word Problems
	Subtraction Word Problems
	Relating Addition & Subtraction
	Adding 0, 1, 2,
	Adding Doubles
	Adding in any Order
	Adding Three Numbers
	Thinking Addition to Subtract
	Models for Tens
	Models for Tens and Ones
	Reading and Writing Whole Numbers
	Using Models to Compare Numbers
	Using Symbols to Compare Numbers
	Ordering Numbers
	Number Patterns
	Even and Odd Numbers

UNIT MAP

is about…

Represent and find sums/differences within 100

Fluently add/subtract within 20 and sums from memory of two one-digit numbers.

Explain why addition and subtraction strategies work using properties of operations and place value.

Mentally add and subtract 10 or 100 to/from a given number (100-900)

Determine odd/even numbers up to 20

UNIT SELF TEST QUESTIONS

1. What strategy did you use to find the sum? And why does it work?
2. What strategy did you use to find the difference? And why does it work?
3. How do you determine if a number is odd or even?
4. How can you model numbers in several ways?

MATH STANDARDS	
2 NBT 8	2 OA 2
2 NBT 9	2 OA 3

Second Grade Sample Lesson Plan
Odds and Evens

Common Core Standard:
Work with equal groups of objects to gain foundations for multiplication.
2.OA.3 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.

Standards for Mathematical Practice:
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..
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning

Student Outcomes:
 I can write an equation to show that a number that is doubled has an even sum.
 I can explain why two even numbers have an even sum and why two odd numbers have an even sum and why an odd and even have an odd sum.

Materials:
 Odds and Evens gameboard (one for partners)
 Paperclip and pencil to use as spinner or a clear spinner to use on top of the gameboard
 Pencil to record on gameboard
 Color tiles or grid paper for students needing additional instruction
 Two of Everything by Lily Toy Hong
 Chart paper or a way to display the chart, marker
 Index cards with 1+1=, 2+2=, 3+3=, etc. to 10+10, one card for each set of partners
 Color tiles or grid paper to model

Engage
Give partners an index card with 1+1= or 2+2= or 3+3=, etc. Ask partners to find something or think of something in the real world that represents their equation. For example, 1+1= a pair of shoes, 4+4= the legs on an octopus (4 on each side), 5+5= the number of cents in a dime (nickel plus nickel)

Explore and Elaborate
Bring the cards back to the group and share the “doubles” found. Ask students about the sums. Do you notice what happens when you add two equal addends? Why do you think this happens? Brainstorm with the class and model with color tiles by creating rectangles to “prove” this concept.

Explain
Read Two of Everything to the class. Chart what happens when something is put in the pot. For example, if 3 of something goes in the pot, then how many come out? 3+3=6. Continue this with at least five examples.

Evaluate

Before:
What do you know about “doubles” facts?
How do we know if a number is odd or even?

During:
What have you noticed about the sums you are getting while playing the game?
What happens when you add two equal addends? Why do you think this happens?
Are you starting to notice what is happening when an even and an even are added together, odd and odd, even and odd?
If you played again would you like to be Even Steven or Odd Rod? Why?

After:
As a whole group discuss the questions listed above and focus on what student learned about odd and even addends.

Possible Misconceptions Suggestions

IF Students may think an odd and an odd will equal an odd.
THEN Show students a rectangle made with color tiles of an odd number and make another rectangle of an odd number then match the two odd tiles together so that it becomes even.

IFStudents may think an even and odd will equal an even.
THEN Repeat the task above using an odd and even number so students can see that you still have an odd tile left over.

EXTEND

Introduce the game Odds and Evens to the class by the teacher playing the game against the class. One player is Even Steven and one player is Odd Rod, each player spins one spinner and the two addends are added together. If the sum is even Steven records it by writing the equation on a blank sheet of paper or in their math journal, and then writing the sum in the box under Even Steven. If the sum is odd Rod records it by writing the equation on a blank sheet of paper or in their math journal, and then writing the sum in the box under Odd Rod and the number goes to Rod. The first player to fill all the blanks is the winner.
While the students are playing, the teacher should rotate around the room and see if students are starting to notice what is happening when an even and an even are added together, odd and odd, even and odd?
Ask students if they played again if they would like to be Even Steven or Odd Rod and why.
After playing discuss the game and the generalizations students were able to construct about even and odd numbers and what happens when you have two equal addends. As students share what they learned, the teacher could chart their ideas such as “odd + odd = even, odd + even=odd, even + even = even. “

Odd Todd and Even Steven game:
http://maccss.ncdpi.wikispaces.net/file/view/CCSSMathTasks-Grade2.pdf/376944368/CCSSMathTasks-Grade2.pdf

Unit 1 Assessment

1. Pick a number less than ten. What numbers are 2 more, 1 more, and o more than your number?

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2. How are 2 less than 5 and 5 – 2 related?

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3. What are two different ways you could add 3 + 4 + 7? Explain.

_____
_____
_____

4. Sam scored 12 points in all. Write a number sentence for Sam's points.

_____ + _____ + _____ =

43 34 **61** **58**

1. Write two numbers from above in the boxes below. Choose an odd number for A. Choose an even number for B. Draw cubes to show the numbers.

Number A: _____	Number B: _____

2. Write the number of tens and ones for each of your numbers.

   Number A has _____ tens and _____ ones.

   Number B has _____ tens and _____ ones.

3. Use > or < to complete a sentence about your numbers.

   _____ ◯ _____

   Number A Number B

4. Use your two numbers. Write two even numbers that come between your numbers.

   _____ _____ _____ _____

   Number A Number B

Scoring Rubric Performance Task One Unit One-Second Grade

Standard to be achieved for performance of specified level

4-Point Answer The child correctly writes, and draws pictures for two selected numbers and identifies them as Numbers A and B; uses the inequality sign correctly to compare Numbers A and B; and writes two numbers that are between Numbers A and B.

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3 –Point Answer The child correctly writes, draws pictures, and states the numbers of tens and ones for two numbers, but numbers are not listed. The child uses the correct inequality sign to compare numbers. For Exercise 4, the child correctly writes two additional numbers that are between lesser and greater numbers written.

2-Point Answer The child correctly draws pictures for two numbers that are not listed at the top of the page, does not correctly state the numbers of tens and ones in the two numbers, and does not correctly compare the numbers. For exercise 4, the child writes Numbers A and B on the first two blanks and then incorrectly writes two additional numbers that are greater than or less than Numbers A and B.

1-Point Answer The child draws pictures for Numbers A and B that do not correspond to tens and ones in each number. The child incorrectly uses the inequality sign and is unable to write numbers that are between Numbers A and B.

- DOK Level 4: Remove given numbers and instruct students to choose their own numbers between 50 and 100.