Core Content Connectors

2021

3rd Grade

Mathematics

Montana Office of Public Instruction

High Academic Standards For Students

The Core Content Connectors were developed by the National Center and State Collaborative (NCSC) Project under a federal grant.

3rd Grade Overview

Core Content Connectors (CCCs) are only used for students with the most significant cognitive disabilities. They identify the most salient grade-level, core academic content in ELA and Mathematics found in both the Montana Content Standards and the Learning Progression Frameworks (LPF). CCCs illustrate the necessary knowledge and skills in order to reach the learning targets within the LPF and the Montana Content Standards, focus on the core content, knowledge and skills needed at each grade to promote success at the next, and identify priorities in each content area to guide the instruction for students in this population and for the alternate assessment. These standards reflect the constitutional mandate that all educators must provide instruction including the distinct and unique heritage and contemporary contributions of American Indians in a culturally responsive manner (See IEFA; MCA 20-1-501 Article X; resources; and materials).

Operations and Algebraic Thinking (OA)

- Represent and solve problems involving whole number multiplication and division.
- Understand properties of multiplication and the relationship between multiplication and division.
- Multiply and divide within 100.
- Solve problems involving the four operations and identify and explain patterns in arithmetic.

Number and Operations in Base Ten (NBT)

- Use place value understanding and properties of operations to perform multi-digit arithmetic

Number and Operations - Fractions (NF)

- Understand fractions as numbers.

Measurement and Data (MD)

- Solve problems involving measurement.
- Represent and interpret data.
- Geometric measurement: Understand concepts of area and perimeter.

Geometry (G)

- Reason with shapes and their attributes.

Standards for Mathematical Practices (MP)

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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3rd Grade: Critical Areas

In Grade 3, instructional time should focus on four critical areas [Multiplication, division, and fractions are the most important developments]:

1. **Developing understanding of multiplication and division and strategies for multiplication and division within 100**
    - Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models; multiplication is finding an unknown product, and division is finding an unknown factor in these situations. For equal-sized group situations, division can require finding the unknown number of groups or the unknown group size. Students use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the relationship between multiplication and division.
2. **Developing understanding of fractions, especially unit fractions (fractions with numerator 1)**
    - Students develop an understanding of fractions, beginning with unit fractions. Students view fractions in general as being built out of unit fractions, and they use fractions along with visual fraction models to represent parts of a whole. Students understand that the size of a fractional part is relative to the size of the whole. For example, 1/2 of the paint in a small bucket could be less paint than 1/3 of the paint in a larger bucket; but 1/3 of a ribbon is longer than 1/5 of the same ribbon because when the ribbon is divided into three equal parts, the parts are longer than when the ribbon is divided into five equal parts. Students are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing fractions by using visual fraction models and strategies based on noticing equal numerators or denominators.
3. **Developing understanding of the structure of rectangular arrays and of area**
    - Students recognize area as an attribute of two-dimensional regions. They measure the area of a shape by finding the total number of same-size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication to determine the area of a rectangle.
4. **Describing and analyzing two-dimensional shapes**
    - Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify shapes by their sides and angles and connect these with definitions of shapes. Students also relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole.

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	Standards for Mathematical Practice: Grade 3 Explanations and Examples
Standards	**Explanations and Examples**
	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. Students are expected to:
3.MP.1	**Make sense of problems and persevere solving them** In third grade, students know 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. Third graders 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 listen to the strategies of others and will try different approaches. They often will use another method to check their answers.
3.MP.2	**Reason abstractly and quantitatively** Third graders should recognize that a number represents a specific quantity. They connect the quantity to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities.
3.MP.3	**Construct viable arguments and critique the reasoning of others** In third grade, students may construct arguments using concrete referents, such as objects, pictures, and drawings. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" They explain their thinking to others and respond to others' thinking.
3.MP.4	**Model with mathematics** Students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart, list, or graph, 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. Third graders should evaluate their results in the context of the situation and reflect on whether the results make sense.
3.MP.5	**Use appropriate tools strategically** Third graders consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use graph paper to find all the possible rectangles that have a given perimeter. They compile the possibilities into an organized list or a table and determine whether they have all the possible rectangles.
3.MP.6	**Attend to precision** As third graders develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, when figuring out the area of a rectangle they record their answers in square units.
3.MP.7	**Look for and make use of structure** In third grade, students look closely to discover a pattern or structure. For instance, students use properties of operations as strategies to multiply and divide (commutative and distributive properties).
3.MP.8	**Look for and express regularity in repeated reasoning** Students in third grade should notice repetitive actions in computation and look for more shortcut methods. For example, students may use the distributive property as a strategy for using products they know to solve products that they don't know.

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	For example, if students are asked to find the product of 7 x 8, they might decompose 7 into 5 and 2 and then multiply 5 x 8 and 2 x 8 to arrive at 40 + 16 or 56. In addition, third graders continually evaluate their work by asking themselves, “Does this make sense?”

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Grade 3 Overview					
Domains	**Operations and Algebraic Thinking**	**Number and Operations in Base Ten**	**Number & Operations - Fractions**	**Measurement and Data**	**Geometry**
Clusters	• Represent and solve problems involving multiplication and division • Understand properties of multiplication and division • Multiply and divide by 100 • Solve problems involving the four operations, and identify and explain patterns in arithmetic	• Use place value understanding and properties of operations to perform multi-digit arithmetic	• Develop understanding of fractions and numbers	• Solve problems involving measurement and estimation of intervals of time, liquid, volumes, and masses of objects • Represent and interpret data • Geometric measurement: understand concepts of area and relate area to multiplication and to addition • Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures	• 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 that 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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	Montana's Mathematics Standards – Grade 3
	Operations and Algebraic Thinking (OA)
	Represent and solve problems involving whole number multiplication and division
3.OA.1	Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7. **3.NO.2d1 Find the total number of objects when given the number of identical groups and the number of objects in each group neither number larger than five.** **3.NO.2d2 Find total number inside an array with neither number in the columns or rows larger than five.** **3. NO.2d3 Solve multiplication problems with neither number greater than five.** **3.PRF.1d1 Use objects to model multiplication and division situations involving up to five groups with up to five objects in each group and interpret the results.** **4.NO.2d6 Find total number inside an array with neither number in the columns or rows larger than 10.** **4.NO.2d8 Match an accurate addition and multiplication equation to a representation.** **4. PRF.1d2 Use objects to model multiplication and division situations involving up to 10 groups with up to five objects in each group and interpret the results.**
3.OA.2	Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8. **3.NO.2d4 Determine how many objects go into each group when given the total number of objects and the number of groups where the number in each group or number of groups is not greater than five.** **3.NO.2d5 Determine the number of groups given the number of total number of objects and the number of objects in each group where the number in each group and the number of groups is not greater than five.** **3.PRF.1d1 Use objects to model multiplication and division situations involving up to five groups with up to five objects in each group and interpret the results.**
3.OA.3	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. **No CCCs developed for this standard.**
3.OA.4	Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = ? ÷ 3, 6 × 6 = ?. **No CCCs developed for this standard.**
	Understand properties of multiplication and the relationship between multiplication and division
3.OA.5	Apply properties of operations as strategies to multiply and divide. Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.) [Students need not use formal terms for these properties.] **3.PRF.2d2 Apply properties of operations as strategies to multiply and divide.**

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3.OA.6	Understand division as an unknown factor problem. For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8. **No CCCs developed for this standard.**
	Multiply and divide within 100
3.OA.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. **No CCCs developed for this standard.**
	Solve problems involving the four operations, and identify and explain patterns in arithmetic
3.OA.8	Solve two-step word problems using the four operations within cultural contexts, including those of Montana American Indians. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. [This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order.] **3.NO.2e1 Solve or solve and check one or two step word problems requiring addition, subtraction or multiplication with answers up to 100**.
3.OA.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table) and explain them using properties of operations. For example, observe that four times a number is always even, and explain why four times a number can be decomposed into two equal addends **3.PRF.1e1 Describe the rule for a numerical pattern (e.g., increase by 2, 5, or 10).** **3.PRF.1e2 Select or name the three next terms in a numerical pattern where numbers increase by 2, 5 or 10.** **3. PRF.2d1 Identify multiplication patterns in a real word setting.**

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	Montana's Mathematics Standards – Grade 3
	Number and Operations in Base Ten (NBT)
	Use place value understanding and properties of operations to perform multi-digit arithmetic
3.NBT.1	Use place value understanding to round whole numbers to the nearest 10 or 100. **3.NO.1j3 Use place value to round to the nearest 10 or 100.** **3.NO.1j4 Use rounding to solve word problems.**
3.NBT.2	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. **3.NO.2c1 Solve multi-step addition and subtraction problems up to 100.** **3. NO.2b1 Use the relationships between addition and subtraction to solve problems.**
3.NBT.3	Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations. **No CCCs developed for this standard.**

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	Montana's Mathematics Standards – Grade 3
	Number and Operations - Fractions (NF)
	Use place value understanding and properties of operations to perform multi-digit arithmetic
3.NF.1	Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. **3. NO.1l1 Identify the number of highlighted parts (numerator) of a given representation (rectangles and circles).** **3. NO.1l2 Identify the total number of parts (denominator) of a given representation (rectangles and circles).** **3. NO.1l3 Identify the fraction that matches the representation (rectangles and circles; halves, fourths, and thirds, eighths).**
3.NF.2	Understand a fraction as a number on the number line and represent fractions on a number line diagram. • Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b, and that the endpoint of the part based at 0 locates the number 1/b on the number line. • Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. **3. NO.1l4 Identify that a part of a rectangle can be represented as a fraction that has a value between 0 and 1.** **3.NO.1l5 Locate given common unit fractions (i.e., ½, ¼, 1/8,) on a number line or ruler.** **4. NO.1l6 Locate fractions on a number line.** **3. NO.1l1 Identify the number of highlighted parts (numerator) of a given representation (rectangles and circles).** **3. NO.1l2 Identify the total number of parts (denominator) of a given representation (rectangles and circles).** **3. NO.1l3 Identify the fraction that matches the representation (rectangles and circles; halves, fourths, and thirds, eighths)** **4. NO.1l7 Order fractions on a number line.**
3.NF.3	Explain equivalence of fractions in special cases and compare fractions by reasoning about their size. • Understand two fractions as equivalent (equal) if they are the same size or the same point on a number line. • Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3. Explain why the fractions are equivalent, e.g., by using a visual fraction model. • Express whole numbers as fractions and recognize fractions that are equivalent to whole numbers. Examples: express 3 in the form 3 = 3/1; recognize that 6/1 = 6; and locate 4/4 and 1 at the same point of a number line diagram. • Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model. **3. SE.1g1 Use =, <, or > to compare two fractions with the same numerator or denominator.** **4.SE.1h1 Express whole numbers as fractions.** **4. NO.1m1, part c Determine equivalent fractions.**

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	4.NO.2h3 Solve word problems involving addition and subtraction of fractions with like denominators (2, 3, 4, or 8).
	Montana's Mathematics Standards – Grade 3
	Measurement and Data (MD)
	Solve problems involving measurement
3.MD.1	Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. **3.ME.1a2 Solve word problems involving the addition and subtraction of time intervals of whole hours or within an hour (whole hours: 5:00 to 8:00, within hours: 7:15 to 7:45).** **3.PRF.1f1 Determine the equivalence between number of minutes and the fraction of the hour (e.g., 30 minutes = hour).** **3.PRF.1f 2 Determine the equivalence between the number of minutes and the number of hours (e.g., 60 minutes hour).**
3.MD.2	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. [Excludes compound units such as cm3 and finding the geometric volume of a container. Excludes multiplicative comparison problems (problems involving notions of "times as much").] **3.ME.1f1 Select appropriate units for measurement (liquid volume, area, time, money).** **3.ME.1f2 Add to solve one step word problems.** **3.ME.2e1 Select appropriate tool for measurement: liquid volume, area, time, money.** **3.ME.2i1 Estimate liquid volume.**
	Represent and interpret data
3.MD.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories, within cultural contexts including those of Montana American Indians. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent five pets. **3.DPS.1g1 Collect data, organize into picture or bar graph.** **3.DPS.1i1 Select the appropriate statement that describes the data representations based on a given graph (picture, bar, line plots).**
3.MD.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot where the horizontal scale is marked off in appropriate units, i.e., whole numbers, halves, or quarters. **3.ME.2e2 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.** **3.ME.2e3 Measure to solve problems using number lines and ruler to 1 inch, ½ inch, or ¼ of an inch.** **3.DPS.1g2 Organize measurement data into a line plot.**

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	Geometric measurement: Understand concepts of area and perimeter
3.MD.5	Recognize area as an attribute of plane figures and understand concepts of area measurement. • A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area and can be used to measure area. • A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units. **No CCCs developed for this standard**.
3.MD.6	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). **3. ME.1d2 Measure area of rectangles by counting squares.**
3.MD.7	Relate area to the operations of multiplication and addition. • Find the area of a rectangle with whole-number side lengths by tiling it and show that the area is the same as would be found by multiplying the side lengths. • Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real-world and mathematical problems and represent whole-number products as rectangular areas in mathematical reasoning. • Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a× b and a × c. Use area models to represent the distributive property in mathematical reasoning. • Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real-world problems, including those of Montana American Indians **3.ME.1d1 Use tiling and addition to determine area.** **4.ME.1d3 Use tiling and multiplication to determine area.** **4.ME.2h1 Apply the formulas for area and perimeter to solve real world problems.** **4.PRF.1f3 Apply the distributive property to solve problems with models.**
	Geometric measurement: Recognize perimeter as an attribute of plane figures and distinguish between linear and area measures
3.MD.8	Solve real-world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. **3.ME.1g1 Identify a figure as getting larger or smaller when the dimensions of the figure changes.** **3.ME.2h1 Use addition to find the perimeter of a rectangle.** **4.ME.2h1 Apply the formulas for area and perimeter to solve real world problems.**

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	Montana's Mathematics Standards – Grade 3
	Geometry (G)
	Reason with shapes and their attributes
1.G.1	Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides) and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. **3.GM.1h1 Identify shared attributes of shapes.**
1.G.2	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. For example, partition a shape into four parts with equal area, and describe the area of each part as 1/4 of the area of the shape. **3.GM.1i1 Partition rectangles into equal parts with equal area**.

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