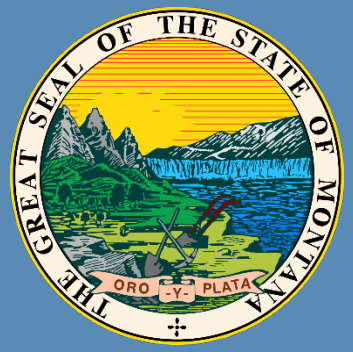
MONTANA PK-12 MATHEMATICS CONTENT STANDARDS



Adopted 2025. Implemented 2026.

MONTANA OFFICE OF PUBLIC INSTRUCTION (OPI)

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INTRODUCTION TO THE K-12 MONTANA MATHEMATICAL PRACTICE AND CONTENT STANDARDS

This document outlines the Montana Standards for Mathematical Practices and Mathematics Content. Adopted in 2025 and implemented in 2026, the standards are designed to expose students to mathematics content that will ensure their readiness for college, career, and community engagement. The Standards for Mathematics Content do not dictate curriculum or pedagogy, but rather, drive curriculum creation. The K-12 content standards describe what students shall know, understand, and be able to do upon completion of a course of study. These K-12 standards define end-of-year expectations and a cumulative progression designed to enable students to meet college and career readiness expectations no later than the end of high school. (Administrative Rule 10.53.101)

The Montana Mathematics Standards also reflect the constitutional mandate to provide instruction that includes the distinct and unique heritage and contemporary contributions of American Indians in a culturally responsive manner (Montana Constitution Article X Section 1(2) and statutes §20-1-501 and §20-9-309 2(c), MCA). This allows students to recognize and respect the historical and contemporary manifestations of mathematical knowledge across the unique cultures of Montana's 12 federally recognized tribes, ensuring that the teaching of mathematics in Montana integrates cultural understanding, respect, and relevance for all Montana students.

Purpose of this Document

This document serves as a comprehensive resource to support a K-12 perspective on mathematics education in Montana. While it does not provide in-depth, grade-specific guidance, those resources are available separately. Instead, this document is designed to assist educators, schools, and districts in understanding and implementing the Montana Standards for K-12 Mathematics. Specifically, it aims to:

- Clarify the purpose and goals of the Montana Standards for K-12 Mathematics.
- Provide an overview of the standards for educators, families, students, and others invested in K-12 mathematics education.
- Offer guidance on mathematics instruction from a K-12 perspective, while directing users to grade-specific guidance documents for more detailed recommendations.
- Support schools and districts in implementing mathematics practice and content standards effectively across all grade levels.

*For grade-level support, please refer to the **expanded grade-level specific guidance documents**, which outline special considerations, examples, and elaborations by grade.*

Frequently Asked Questions - Navigating the K-12 Standards

What are the standards?

Content standards define the knowledge or skills that every student should know and be able to do at the conclusion of a particular grade level (REL Southeast, 2020). Montana's mathematics content standards begin with kindergarten and continue through twelfth grade, providing a clear progression of learning that builds a strong foundation in mathematical concepts and procedures.

In addition, Montana includes K–12 mathematical **practice standards**, which guide the development of critical thinking, reasoning, and problem-solving abilities in age-appropriate ways throughout students' educational journeys. Combined, the content and practice standards are designed to equip students with the mathematical skills necessary for success in adulthood, career pathways, and post-secondary education, developing universal abilities that extend far beyond the classroom.

Students grow into informed thinkers who can analyze complex problems, make data-driven decisions, and contribute meaningfully to society through mastering both the knowledge from content standards and the habits of mind fostered by mathematical practices. These skills prepare students to navigate challenges in their personal lives, pursue diverse opportunities, and participate as active, thoughtful citizens in a rapidly evolving world.

How should the coding scheme be read and understood?

The Montana mathematics content standards use a structured coding system to help educators, schools, and invested parties efficiently locate individual standards within the general framework. While the coding structure is consistent across K-12, there are slight variations between the K-8 and high school (9-12) standards to reflect the additional organization components relevant to the organization of the high school standards.

Elements across the K-12 Standards

All K-12 standards follow a coding scheme that includes the following elements:

1. **State indicator: MT**
   Every Montana mathematics content standard begins with the MT designation, signifying that the standard is unique to the state of Montana and reflects the standards Montana has codified within its Administrative Rules.

2. **Grade Level: Letter or Number**
   This element identifies the grade level of the standard:
   - Kindergarten is indicated by **"K"**
   - Grades 1-8 are represented by their respective numbers (e.g., **"1"** for Grade 1)
   - High School (9-12) standards are designated by **"HS."**

3. **Domain: Abbreviated Representation**
   Each standard is categorized within a domain, represented by a short abbreviation. A **domain** within a set of K-12 content standards for mathematics is a **broad organizational category** that groups related to standards around a key mathematical concept or set of concepts (REL Southeast, 2020). Domains support the organizational structure and also help illustrate the progression of mathematical ideas across grade levels. Examples of domains across the K-12 standards include but are not limited to, Geometry, Counting and Cardinality, and Numbers and Operations in Base Ten.

4. **Standard Item: Number**
   This element specified the standard's sequence within a particular domain. If a standard includes sub-items, a letter may follow this number to indicate any subdivisions within the standard.

Additional Elements in High School (9-12) Mathematics Standards

In addition to the standard coding elements used across K–12, Montana's high school (9–12) mathematics content standards include the following additional components, which do not appear in the K–8 standards:

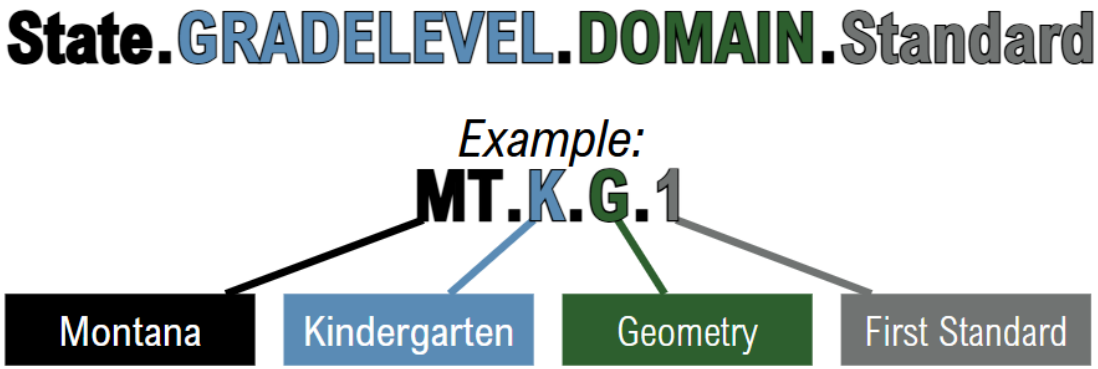
1. **Designation as Core or Core Plus: "CORE" or "PLUS"**
   High school standards are categorized as either **Core** or **Core Plus** to distinguish between essential content and additional concepts that prepare students for post-secondary education and career pathways. The definitions and applications of these designations are provided within the high school standards section of this document, with further guidance available in the **expanded high school guidance documents**.

2. **Conceptual Category: Abbreviated Representation**
   High school standards are grouped into **conceptual categories** (e.g., Probability), which represent broad areas of mathematics. These categories structure content in a way that allows flexibility in course design at the local level. For instance, while some schools may teach all concepts within a single dedicated course (e.g., Algebra 1 or Geometry), others may integrate them across multiple courses (e.g., Integrated I, Integrated II).

These additional elements clarify the structure of the high school standards and instruction while permitting flexibility for schools and districts to design courses that best meet the needs of their students and communities.

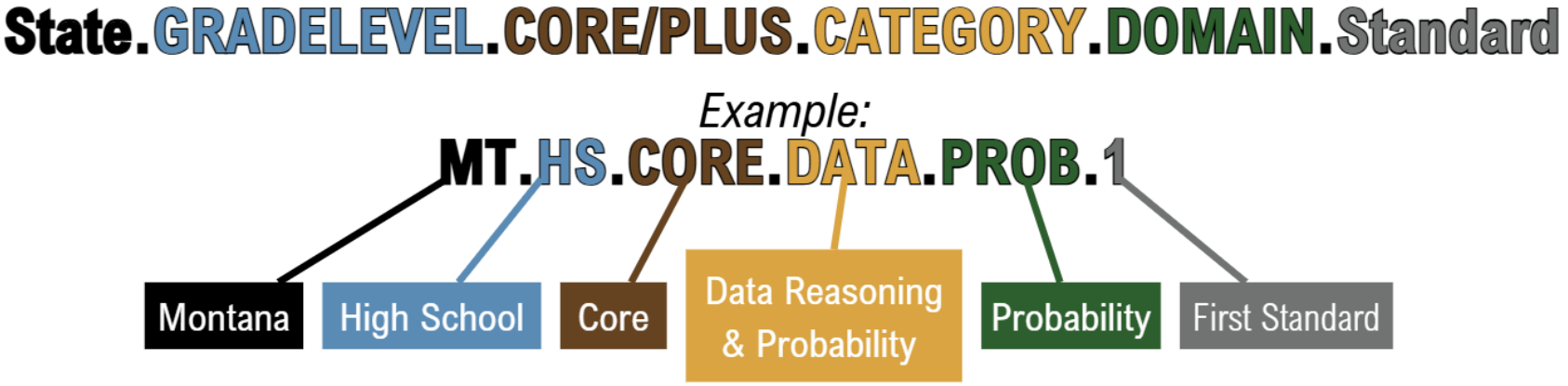
K-8 Coding Scheme Exemplar

For K-8 Standards, the structure follows the sequence **MT [Grade Level] [Domain] [Standard Number]**, illustrated in the figure provided:



High School (9-12) Coding Scheme Exemplar

The high school (9-12) mathematics content standards include additional components for identifying standards within the framework. The structure follows the sequence **MT [Grade Level] [Core/Plus] [Conceptual Category] [Domain] [Standard Number],** illustrated in the figure provided:



MONTANA K-12 MATHEMATICAL PRACTICE STANDARDS

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in all students. These practices are rooted in fundamental **processes and proficiencies** that have long been central to effective mathematics instruction.

As part of the revision process for Montana's mathematics standards and practices, the revision task force reviewed research compiled by the Regional Education Laboratory (REL) Northwest (see Appendix X: References). Their analysis found that the eight mathematical practices adopted by Montana in 2011 – originating from the 2006 NAEP Mathematics framework developed by the National Assessment Governing Board (NAGB) and were later incorporated into the Common Core State Standards – no longer fully reflected current research and instructional standards.

The 2026 NAEP Mathematics framework integrates recent research on cognitive development, instructional practices, and evolving mathematical needs in a rapid data and mathematics-reliant society, offering a clearer vision of the skills students need to understand and apply mathematics in relevant contexts (NAGB, 2021). The task force examined this framework while recognizing the need for a more modern and comprehensive framework that reflects the unique needs of Montana learners.

While the five mathematical practices outlined in the NAEP framework provided valuable skills for Montana students, the task force determined that a full adoption would not fully address the diverse needs of Montana's learners. Instead, they recommended revising Montana's mathematical practices to reflect both national research-based best practices and state-specific educational priorities. The revision aimed to preserve alignment with the language and intent of the NAEP practices while ensuring that Montana's students develop mathematical habits that are relevant to their unique cultural, educational, and career trajectories.

Therefore, Mathematical Practices numbered 2 through 6 have been adapted from the NAEP Framework. These practices emphasize a deep understanding of mathematical thinking reflecting decades of efforts to define higher-order reasoning, problem-solving, and mathematical communication (NAGB, 2022). Additionally, Mathematical Practices 1 and 7 were developed to reflect specific priorities identified by Montana educators, ensuring that the state's mathematical practices are both research-informed and responsive to the needs of Montana's students and communities.

What is a Mathematical Practice Standard?

A **mathematical practice standard** is a specific statement that defines the **how** of student engagement in mathematical reasoning, problem-solving, communication, and collaboration (Harbin Miles & Williams, 2016). These standards describe expertise that mathematics educators at all levels should seek to develop in their students to support proficiency in mathematical thinking. Mathematical practice standards focus on the **processes and practices** students use to apply their mathematical knowledge flexibly, accurately, and efficiently across a variety of applications and scenarios (Harbin Miles & Williams, 2016). Designers of curricula, assessments, and professional development should connect the mathematical practices to mathematics content.

In addition to stating each of Montana's Practice Standards, the following section provides example proficiency scales, identifies embedded skills, provides a skills timeline, describes elements of rich mathematical practice learning tasks, and offers suggestions for how adults might support students in acquiring these skills.

Proficiency in Mathematical Practice Standards

Embedding mathematical practices within instructional activities can enhance and enrich mathematical learning. These skills support mathematical learning and, as a result, it can be challenging to assess students' proficiency in isolation. Educators should take special care when assessing students on these standards. Assessment can occur in a variety of contexts, including student observations during class activities, student self-assessments, projects or performance tasks, and student portfolios. Clear rubrics and proficiency scales can help educators accurately determine students' proficiency in the Mathematical Practice Standards.

Notes on Proficiency:

- Proficiency is defined by clearly articulated learning objectives or standards. It is the ability to consistently demonstrate a sufficient level of knowledge, skill, or understanding to meet all specific standards or expectations.

- These targets are often broken into measurable criteria that describe what mastery looks like for a particular skill or concept.

- Proficiency is demonstrated through evidence of learning, such as assessments, projects, or performances that align directly with the standard.

- There are differing views on the quality versus quantity of evidence for mastery; some resources argue that a single demonstration of mastery suffices, while others argue that mastery should be established through multiple assessments. Districts are encouraged to explore and adopt a consistent methodology across classrooms that aligns with their pedagogical philosophy and instructional practice. Engaging in discussions at

the local level about district and educator preferences greatly benefits students, educators, and families. The example proficiency scales below assume that multiple demonstrations of mastery are utilized.

Example Proficiency Rubric:

When determining students' proficiency in a mathematical practice, it may be useful to utilize a rubric, such as the one provided below:

Beginning	Developing	Proficient	Mastery
The student shows minimal understanding or requires significant support.	The student demonstrates partial understanding but has not yet mastered each skill. The student may be able to independently engage in some skills, but may require support in others. It may also be the case that the student requires minimal support across multiple skills.	The student is able to engage in each of the skills identified in the mathematical practice with independence and accuracy in developmentally appropriate ways.	The student is able to engage in the skills identified in the mathematical practice in or beyond developmentally appropriate ways. They are able to engage in this mathematical practice in connection with other mathematical practices or content standards. The student exceeds the standard, showing deeper understanding or application.

Achieving proficiency indicates that a student is ready to move on to the next level of learning. It is important to note that, as the practice standards span the K-12 experience, the next level of learning may include applying the mathematical practice to new content standards, or in new developmentally appropriate ways such as utilizing age-appropriate methodologies for proving in upper grade levels. Although proficiency is the target goal, all students should be provided with opportunities to demonstrate and develop mastery through mathematically rigorous tasks.

Mathematical Practice Standard 1 – Problem Solve and Persevere:

Mathematically proficient students:

- ***Make conjectures, plan, and follow solution strategies***
- ***Evaluate their progress and accuracy***
- ***Engage in sense-making and self-monitoring and***
- ***Persevere in seeking solutions, and value alternative approaches***

Embedded Skills:

To be considered proficient in this mathematical practice standard, students should be able to demonstrate each of the following skills in developmentally appropriate ways:

- ✓ Make conjectures
- ✓ Make a plan
- ✓ Follow solution strategies
- ✓ Evaluate their progress and accuracy
- ✓ Engage in sense-making
- ✓ Engage in self-monitoring
- ✓ Persevere in seeking solutions
- ✓ Value alternative approaches

Skills Timeline:

Students may engage in these skills at the following intervals of the solving process:

Before solving, students will be able to:	During solving, students will be able to:	After solving, students will be able to:
✓ Make conjectures	✓ Follow solution strategies	✓ Evaluate their progress and accuracy
✓ Make a plan	✓ Evaluate their progress and accuracy	✓ Engage in self-monitoring

✓ Engage in sense-making	✓ Engage in sense-making	✓ Value alternative approaches
	✓ Engage in self-monitoring	
	✓ Persevere in seeking solutions	

Elements of a Rich Task:

Learning tasks that engage students in problem-solving and persevering may have some or all the following characteristics:

- **Open-Ended:** Tasks encourage students to engage in deep thinking, reasoning, and discussion rather than applying a single procedure to reach a predefined answer. Teachers might provide activities like solving puzzles, patterns, number or data talks, or building structures that allow students to explore using different strategies.

- **Conjecture:** Tasks require students to form conjectures about mathematical observations and ideas. Teachers might prompt students to predict outcomes before starting, such as asking, "What do you think will happen if we do this?" or “What do you observe might be happening?”

- **Plan-Making:** Learning activities require students to consider how they will approach a problem without providing explicit direction. Teachers may ask questions such as, “How can we begin?”, “What strategies do you think will work?”, or “Can we use strategies from similar problems we have completed before?”

- **Critical Reflection:** Tasks facilitate students’ careful thinking about whether the information they have, their chosen approach, the steps they take, or their final answer are logical. Students are encouraged to keep reflecting during the problem-solving process, which supports understanding and self-checking.

- **Perseverance Through Challenges:** Learning activities include obstacles or setbacks, encouraging students to try different methods. Teachers may support this by asking questions such as "When you’re ready to try again, what might you do differently?"

- **Multiple Solution Paths:** Learning activities have more than one correct approach, enabling students to find different starting points. This encourages creativity and exploration, while also showing that math is a process that can develop over time, and there are often many correct ways to approach a problem. Teachers might encourage this by challenging students to think about alternative approaches or asking students to share diverse ways of solving aloud.

- **Opportunities for Reflection:** Tasks include moments for students to assess their progress. Educators may ask questions such as, "How did you solve this?", "What could you try next?", or “does your answer make sense?” and offer opportunities for students to consider their progress and whether their solutions made sense and were appropriate for the circumstances.

Ways Adults Can Support Learning:

Some ways adults can support students in developing their problem-solving and persevering skills include:

- **Model Problem-Solving and Perseverance Behaviors:** Demonstrate how to think aloud while solving a problem, such as saying, "I’m not sure this will work, so I’ll try another way." Demonstrate perseverance by speaking about things that are challenging for you, for instance, “I’m not quite sure how to do this yet, and I am getting frustrated. I’ll take a break and try again when I am ready.”

- **Encourage Perseverance:** At this stage, it is important for the adult to support and encourage the student, congratulating them on their hard work, persistence, and creativity in problem solving, rather than reserving praise for when the student discovers the correct answer.

- **Ask Open-Ended Questions:** Use prompts like "What do you think will happen if you try this?" or "Can you show me another way to solve the problem?" in a variety of contexts, including mathematical ones.

- **Provide Tools and Resources:** Offer manipulatives (e.g., number counters, blocks, ten frames, grid paper, etc.), drawings, or other concrete materials to help students explore solutions.

- **Create a Safe Environment:** Foster an atmosphere where mistakes are seen as opportunities to learn, reassuring students that it’s okay to try again.

Mathematical Practice Standard 2 – Abstract and Generalize:

Mathematically proficient students are able to decontextualize and symbolically represent both mathematical and non-mathematical situations to search for and analyze regularities, patterns, and structures.

Embedded Skills:

To be considered proficient in this mathematical practice standard, students should be able to demonstrate each of the following skills in developmentally appropriate ways:

- ✓ Decontextualize mathematical and non-mathematical situations
- ✓ Symbolically represent mathematical and non-mathematical situations
- ✓ Search for regularities, patterns, and structures
- ✓ Analyze regularities, patterns, and structures

Skills Timeline:

Students may engage in these skills at the following intervals of the solving process:

Before solving, students will be able to:	During solving, students will be able to:	After solving, students will be able to:
✓ Decontextualize mathematical and non-mathematical situations.	✓ Symbolically represent mathematical and non-mathematical situations.	✓ Symbolically represent mathematical and non-mathematical situations.
✓ Search for regularities, patterns, and structures.	✓ Search for regularities, patterns, and structures.	✓ Analyze regularities, patterns, and structures.
	✓ Analyze regularities, patterns, and structures.	

Elements of a Rich Task:

Learning tasks that engage students in abstracting and generalizing may have some or all the following characteristics:

- **Decontextualization:** In mathematics, tasks that involve decontextualization require separating a concrete problem from its application context to represent it abstractly (common examples of this can be found in word or story problems). Students should be required to represent contextual information in mathematical ways. Teachers may support this by providing materials, representations, or strategies that help students translate the information they are presented with.

- **Symbolic Representation:** Learning activities involve symbols, numerals, and visual representations of mathematical concepts to support forming connections between abstract and concrete thinking.

- **Pattern Recognition and Exploration:** Tasks provide opportunities for students to notice, create, or extend patterns using tools, strategies, or representations to help students identify regularities.

- **Structural Analysis:** Activities ask students to recognize, understand, and utilize patterns, relationships, or properties within mathematical concepts to generalize and apply mathematical ideas.

- **Generalization:** Tasks require the identification of patterns, prediction of outcomes, or application of mathematical principles to broad contexts and applied situations. Students will need to abstract key ideas and extend them to new situations, both real and theoretical.

- **Relevant Contexts:** Learning activities involve examples relevant to students' lived experiences, local communities, or Indigenous Peoples of Montana where students must consider how mathematical theories apply to situational contexts.

Ways Adults Can Support Learning:

Some ways adults can support students in developing their abstracting and generalizing skills include:

- **Model Observing Patterns and Relationships:** Verbally describe patterns or groupings as they arise, such as saying, "I see a red-blue-red-blue pattern here. What do you think comes next?" or "I notice that when we multiply the function by a constant, the graph changes, can you describe what is happening?"

- **Ask Guiding Questions:** Use prompts like, "What do you notice about the values in this table?" or "How does multiplying the input value by a constant affect the output?"

- **Provide Tools and Examples:** Offer manipulatives such as counters, algebra tiles, technology, or pictures to help students experiment with representing quantities or structures.

- **Encourage Explanation:** Prompt students to explain their reasoning, such as asking, "Why did you group these objects?" or "How can we represent what we notice, symbolically?"

- **Reinforce Vocabulary:** Use content area vocabulary terms frequently to help students articulate their observations and ideas. ***Refrain from making up terms for formal mathematical vocabulary terms in an effort to simplify the language*** – this creates challenges for students in the future (e.g. using "plus-ing" instead of "addition") and creates confusion for students in later grades, requiring students to relearn vocabulary in tandem with more challenging mathematical concepts.

Mathematical Practice Standard 3 – Justify and Prove:

Mathematically proficient students create, evaluate, justify, and refute mathematical claims in developmentally and mathematically appropriate ways.

Embedded Skills:

To be considered proficient in this mathematical practice standard, students should be able to demonstrate each of the following skills in developmentally appropriate ways:

- ✓ Create mathematical claims in developmentally and mathematically appropriate ways
- ✓ Evaluate mathematical claims in developmentally and mathematically appropriate ways
- ✓ Justify mathematical claims in developmentally and mathematically appropriate ways
- ✓ Refute mathematical claims in developmentally and mathematically appropriate ways

Skills Timeline:

Students may engage in these skills at the following intervals of the solving process:

Before solving, students will be able to:	During solving, students will be able to:	After solving, students will be able to:
✓ Create mathematical claims in developmentally and mathematically appropriate ways	✓ Create mathematical claims in developmentally and mathematically appropriate ways	✓ Create mathematical claims in developmentally and mathematically appropriate ways
✓ Evaluate mathematical claims in developmentally and mathematically appropriate ways	✓ Evaluate mathematical claims in developmentally and mathematically appropriate ways	✓ Evaluate mathematical claims in developmentally and mathematically appropriate ways

✓ Justify mathematical claims in developmentally and mathematically appropriate ways	✓ Justify mathematical claims in developmentally and mathematically appropriate ways	✓ Justify mathematical claims in developmentally and mathematically appropriate ways
✓ Refute mathematical claims in developmentally and mathematically appropriate ways	✓ Refute mathematical claims in developmentally and mathematically appropriate ways	✓ Refute mathematical claims in developmentally and mathematically appropriate ways

**** Special Note:** Students may engage in each of the four skills embedded within this standard at any stage of the solving continuum – depending on the task – but the purpose and depth evolve as students progress through the process.

Elements of a Rich Task:

Learning tasks that engage students in justifying and proving may have some or all the following characteristics:

- **Make and Test Claims:** Tasks prompt students to form statements they believe might be true based on their observations and then test these claims using mathematical methods.

- **Evaluation of Claims:** Learning activities encourage students to determine whether a claim is accurate by comparing or testing it in mathematically appropriate ways.

- **Evidence-Based Reasoning to Justify:** A learning task might require students to explain and provide evidence of their thinking using developmentally appropriate tools (e.g., technology, manipulatives, etc.), vocabulary, and methods (e.g., verbal statements, drawings, etc.).

- **Opportunities for Refutation:** Tasks provide flawed examples or incorrect claims for students to analyze, correct, and justify with evidence, fostering critical thinking. Tasks may also encourage students to identify and revise their own misconceptions.

Ways Adults Can Support Students in Learning to Justify and Prove:

Some ways adults can support students in developing their justifying and proving skills include:

- **Model Clear Explanations:** Demonstrate how to explain reasoning, such as saying, "I know these groups are equal because I counted five in both."
- **Ask Probing Questions:** Use prompts like, "How do you know that's true?" or "Can you show me why this works?"
- **Provide Opportunities for Practice:** Require students to explain their reasoning frequently, both individually and in groups.
- **Encourage Reflection:** After students provide explanations, ask follow-up questions like, "What made you think that?" or "Does this always work?"
- **Help Students Learn to Disagree Respectfully:** Consider introducing common misconceptions and guide students in refuting them while modeling appropriate communication.
- **Praise the Process:** Creating, evaluating, justifying, and refuting mathematical claims are fundamental to mathematics at all levels. Praising students for this process—even when they're wrong—builds confidence. Remind them that mathematicians spend years solving just one problem!
- **Foster a Safe Environment:** Ensure students feel comfortable sharing their reasoning, even if it's incorrect, by reinforcing that mistakes are valuable learning opportunities.

Mathematical Practice Standard 4 – Model with Mathematics:

Mathematically proficient students:

- ***Make sense of a scenario***
- ***Identify a problem to be solved, and mathematize it, and***
- ***Apply a mathematical model to reach a solution and verify its viability.***

Embedded Skills:

To be considered proficient in this mathematical practice standard, students should be able to demonstrate each of the following skills in developmentally appropriate ways:

- ✓ Make sense of a scenario
- ✓ Identify a problem to be solved
- ✓ Mathematize problems
- ✓ Apply mathematical models to reach a solution
- ✓ Verify the validity of a chosen mathematical model

Skills Timeline:

Students may engage in these skills at the following intervals of the solving process:

Before solving, students will be able to:	During solving, students will be able to:	After solving, students will be able to:
✓ Make sense of a scenario	✓ Mathematize problems	✓ Verify the validity of a chosen mathematical model
✓ Identify a problem to be solved	✓ Apply mathematical models to reach a solution	

Elements of a Rich Task:

Learning tasks that engage students in modeling may have some or all the following characteristics:

- **Mathematize:** Tasks require students to translate contextual information into mathematical problems.
- **Real-World Scenarios:** Learning activities present situations and contexts familiar to students, such as socializing with friends or solving community problems, to help them create and test mathematical models.
- **Sense-Making:** Tasks require students to make sense of realistic scenarios or situations using mathematics. Often, activities are accompanied by tools or resources, such as manipulatives, drawings, explanations, or other resources to help students make sense of scenarios visually, physically, verbally, symbolically, and contextually.

- **Student Agency:** Activities create opportunities for students to be empowered in the problem-solving process such as considering a scenario, defining a problem presented in the scenario, and selecting the approach to mathematize and to solve.

- **Problem-Solving and Verification:** Tasks include aspects that ask students to create a model, test it, and check if their model and solution accurately reflect the problem.

- **Multiple Entry Points or Multiple Problems to be Solved:** Activities contain multiple mathematical problems students can choose to identify or multiple entry points for solution-making in a single problem.

- **Productive Struggle:** Tasks provide scaffolded challenges, resources, and encouragement to support students in modeling situations mathematically. Students should be challenged in ways that feel uncomfortable but not impossible and able to persevere without feeling overwhelmed.

- **Engagement, Curiosity, and Creativity:** Learning activities contain accessible opportunities for students of varying abilities and proficiency to engage in the task with natural curiosity and promote the utilization of creative thinking, mathematical representation, and problem-solving.

Ways Adults Can Support Learning:

Some ways adults can support students in developing their modeling skills include:

- **Promote Mathematical Inquiry:** Ask questions such as “What mathematical questions do we have about this situation?”, “What are you curious to know more about?”, or “How can math help us in this scenario?”

- **Pose Open-Ended Questions:** Use prompts like, “What would help us model this situation?” or “What would help us better understand the problem?”

- **Model the Use of Tools and Resources:** Demonstrate how to use a variety of tools and resources to represent and solve problems. For example, in the classroom, if you are graphing a line, explain why a straight edge is useful. In the context of the home, caregivers might articulate to children how a tape measure and level might help hang a picture on a wall and support calculating the placement of the frame.

- **Encourage Verification:** Ask students, “Does your model match the problem?” or “Can you check to see if your answer makes sense?”

- **Provide Realistic Contexts:** Design tasks that reflect students' daily experiences to enhance relevance and engagement. Where appropriate, integrate community-based or culturally significant scenarios, including those of the Indigenous Peoples of Montana, to help students recognize math as a powerful tool for problem-solving in realistic situations. This approach can empower students to see math as a tool for overcoming obstacles in their daily lives and create a sense of pride, ownership, and accomplishment in learning.

- **Celebrate Creativity:** Praise students for unique or innovative ways of modeling problems, reinforcing that there are many ways to make sense of a scenario.

- **Offer Tools and Resources Before Hints or Solutions:** Before providing students with a pathway to the answer, try offering a tool, such as “Can using our blocks help us?” You can stick around and offer encouragement and support as a fellow problem solver instead of a solution bringer. This fosters perseverance and confidence in students.

Mathematical Practice Standard 5 – Represent:

Mathematically proficient students:

- ***Recognize, use, create, interpret, and translate representations using appropriate methods and tools and***
- ***Understand multiple ways of representing mathematical ideas and how they are related.***

Embedded Skills:

To be considered proficient in this mathematical practice standard, students should be able to demonstrate each of the following skills in developmentally appropriate ways:

- ✓ Recognize representations using appropriate methods and tools
- ✓ Use representations using appropriate methods and tools
- ✓ Create representations using appropriate methods and tools
- ✓ Interpret representations using appropriate methods and tools
- ✓ Translate representations using appropriate methods and tools
- ✓ Understand multiple ways of representing mathematical ideas
- ✓ Understand how multiple ways of representing mathematical ideas are related

Skills Timeline:

Students may engage in these skills at the following intervals of the solving process:

Before solving, students will be able to:	During solving, students will be able to:	After solving, students will be able to:
✓ Recognize representations using appropriate methods and tools	✓ Use representations using appropriate methods and tools	✓ Interpret representations using appropriate methods and tools
✓ Understand multiple ways of representing mathematical ideas	✓ Create representations using appropriate methods and tools	✓ Understand multiple ways of representing mathematical ideas
	✓ Interpret representations using appropriate methods and tools	✓ Understand how multiple ways of representing mathematical ideas are related
	✓ Translate representations using appropriate methods and tools	
	✓ Understand how multiple ways of representing mathematical ideas are related	

Elements of a Rich Task:

Learning tasks that engage students in representing may have some or all the following characteristics:

- **Recognition of Representations:** Tasks present mathematical concepts in multiple forms (e.g., visually, symbolically, verbally, contextually, or physically) and prompt students to recognize them as representations of the same mathematical idea.

- **Multiple Representations:** Tasks incorporate recognizing or using visual, symbolic, verbal, contextual, or physical representations to deepen their understanding.

- **Creation of Representations:** Learning activities provide opportunities for students to develop their own representations to make sense of mathematical ideas. In this case, students may not be given a directive of which representation to use, offering the agency to select their own. These self-generated representations strengthen students' mathematical reasoning and problem-solving skills.

- **Interpretation of Representations:** Tasks are designed in ways that require students to describe and comprehend the mathematical concepts shown in a representation.

- **Translation Between Representations:** Tasks prompt students to connect and translate between different forms of representation.
- **Exploring Multiple Representations:** Learning activities provide opportunities to connect different forms of representation, reinforcing that mathematical ideas can be expressed in many ways.
- **Open-Ended Choices:** Tasks allow students to choose their preferred representation method, promoting creativity and exploration.

Ways Adults Can Support Learning:

Some ways adults can support students in developing their representing skills include:

- **Model Different Representations:** Demonstrate using manipulatives, drawings, and symbols to represent the same quantity or problem.
- **Ask Guiding Questions:** Use prompts like, “How can you show this visually?” or “What is an alternate way to represent this?”
- **Provide Opportunities for Translation:** Encourage students to connect representations by asking, “Can you draw a picture for what your blocks show?” or “What does this table tell us about this graph?”
- **Celebrate Diverse Approaches:** Praise students for using different methods to represent a problem, reinforcing that all valid representations help us understand math better.
- **Introduce Real-World Contexts:** Engage students with tasks that involve representing mathematical scenarios from their daily lives to make representations concrete and relevant. For instance, students may be encouraged to find representations of geometric symmetry in their lives, such as through the artistic patterns on Lakota Star Quilts, Mexican Talavera Tiles, structures in their communities, the wings of the Mourning Cloak Butterfly, Wild Rag Scarves, and beyond.

Mathematical Practice Standard 6 – Collaborate Mathematically:

Mathematically proficient students engage in mathematics as a social enterprise through discussion and collaborative inquiry where ideas are offered, debated, connected, and built upon toward solutions, shared understanding, and appreciation of other perspectives.

Embedded Skills:

To be considered proficient in this mathematical practice standard, students should be able to demonstrate each of the following skills in developmentally appropriate ways:

- ✓ Engage in mathematics as a social enterprise
- ✓ Engage in mathematical discussions
- ✓ Engage in collaborative mathematical inquiry
- ✓ Offer mathematical ideas
- ✓ Debate mathematical ideas
- ✓ Connect mathematical ideas
- ✓ Build upon mathematical ideas toward solutions
- ✓ Work toward a shared understanding of mathematical ideas
- ✓ Appreciate other mathematical perspectives

Skills Timeline:

Students may engage in these skills at the following intervals of the solving process:

Before solving, students will be able to:	During solving, students will be able to:	After solving, students will be able to:
✓ Engage in mathematics as a social enterprise	✓ Engage in collaborative mathematical inquiry	✓ Work toward a shared understanding of mathematical ideas
✓ Engage in mathematical discussions	✓ Offer mathematical ideas	✓ Appreciate other mathematical perspectives

✓ Engage in collaborative mathematical inquiry	✓ Debate mathematical ideas	✓ Connect mathematical ideas
✓ Offer mathematical ideas	✓ Connect mathematical ideas	
✓ Debate mathematical ideas	✓ Build upon mathematical ideas toward solutions	
✓ Appreciate other mathematical perspectives	✓ Work toward a shared understanding of mathematical ideas	
	✓ Appreciate other mathematical perspectives	

Elements of a Rich Task:

Learning tasks that engage students in mathematical collaborations may have some or all the following characteristics:

- **Group Problem Solving:** Learning tasks require students to work together to solve a shared problem. This could include all students contributing to a single solution or each student solving a piece of a larger problem, requiring connectivity and collaboration to complete the overall task.

- **Idea Generation and Sharing:** Activities create opportunities for students to generate, express, and investigate their own mathematical ideas in a group setting. Teachers should encourage students to share freely with the knowledge that their contributions are valued.

- **Respectful Discussion and Debate:** Tasks invite students to listen to and respond to their peers' ideas, including offering counterarguments, asking clarifying questions, and making connections between different approaches. Teachers should encourage students to respectfully agree, disagree, and communicate effectively.

- **Building on Others' Ideas:** Tasks support students in co-constructing solutions, encouraging them to build upon their peers' reasoning, rather than working in isolation.

- **Appreciation of Other Perspectives:** Activities require students to listen actively and consider their classmates' mathematical ideas, even if they do not fully understand them yet. Learning also fosters curiosity, a willingness to ask questions and explore different ways of thinking.

- **Shared Materials & Resources:** Learning activities involve a finite set of tools or materials, requiring students to negotiate, plan, and collaborate to use them effectively.

- **Reciprocal Responsibility & Participation:** Tasks provide opportunities for each student to play a meaningful role in the group's process and include measures that hold students accountable to their group. Each child should be contributing and engaged in the collective mathematical learning experience.

- **Relational Learning & Community Building:** Learning activities help students see math as a social activity that strengthens relationships among learners and peers through shared problem-solving experiences.

Ways Adults Can Support Learning:

Some ways adults can support students in developing their mathematical collaboration skills include:

- **Normalize Mistakes:** Frame mistakes as a valuable part of learning, demonstrating that "not knowing is not failure; it is the first step to understanding" (Finkle, 2016). Encourage students to test ideas, refine strategies, and learn from their attempts. Emphasize that mistakes spark discussion and discovery, fostering a safe and collaborative learning environment.

- **Model Respectful Communication:** Demonstrate how to listen attentively and respond thoughtfully to others' ideas, such as saying, "I like how you thought of that! What if we also tried this?" or "I do not understand what you're saying yet, can you tell me more?"

- **Facilitate Group Discussions:** Use prompts like "What do you think of [person's] idea?" or "Can you add to what your friend said?"

- **Encourage Turn-Taking:** Help students navigate conversations and shared materials by reinforcing patience and respect. If students interrupt or struggle to take turns, model mediation by saying, "[Person] wasn't finished speaking yet. To fully understand their idea, let's let them finish. If you have thoughts or questions, jot them down, and you'll have a turn next."

- **Guide Reflection on Group Work:** Ask students to reflect on their collaboration with questions like, "How did working together help us solve this problem?" or "What did you learn from your friends today?"

- **Celebrate Group Success:** Reinforce the value of teamwork by praising the group's collective effort, such as saying, "You all worked so well together to figure that out!" or "I know it was challenging at times to work together, but you kept going and completed the task—great job!"

Mathematical Practice Standard 7 – Culturally Connect:

Mathematically proficient students:

- ***Recognize cultural connections and contributions to mathematics and***
- ***Appreciate the role of mathematics in various cultural contexts, including those of tribally specific Montana Indigenous Peoples.***

Embedded Skills:

To be considered proficient in this mathematical practice standard, students should be able to demonstrate each of the following skills in developmentally appropriate ways:

- ✓ Recognize cultural connections to mathematics
- ✓ Recognize cultural contributions to mathematics
- ✓ Appreciate the role of mathematics in various cultural contexts, including those of tribally specific Montana Indigenous Peoples

Skills Timeline:

Students may engage in these skills at the following intervals of the solving process:

Before solving, students will be able to:	During solving, students will be able to:	After solving, students will be able to:
✓ Recognize cultural connections to mathematics	✓ Recognize cultural connections to mathematics	✓ Recognize cultural connections to mathematics
✓ Recognize cultural contributions to mathematics	✓ Recognize cultural contributions to mathematics	✓ Recognize cultural contributions to mathematics
✓ Appreciate the role of mathematics in various cultural contexts, including those of tribally specific Montana Indigenous Peoples	✓ Appreciate the role of mathematics in various cultural contexts, including those of tribally specific Montana Indigenous Peoples	✓ Appreciate the role of mathematics in various cultural contexts, including those of tribally specific Montana Indigenous Peoples

**** Special Note:** Students may engage in each of the three skills embedded within this standard at any stage of the solving continuum – depending on the task – but the purpose and depth evolve as students progress through the process.

Elements of a Rich Task:

Learning tasks that engage students in culturally connecting may have some or all the following characteristics:

- **Contextual & Cultural Connection:** Tasks provide connection between mathematical concepts and cultural practices. These cultural practices can present in a variety of forms, such as Montana Indigenous Peoples, global cultures, local communities, or students' lived experiences. Teachers may provide examples of cultural contexts or ask students to share math-related traditions or activities such as cooking measurements or traditional games.

- **Engages the Essential Understandings:** Learning activities with connection to Indigenous practices, peoples, and experiences engage the Essential Understandings and Multi-Cultural Approaches to best align with the principles of Indian Education for All.

- **Diverse Perspectives:** Activities may showcase and compare how various cultures approach similar mathematical ideas and cultural concepts. Examples might include number representations, using tools for measuring, or using geometric patterns in artistic expression.

- **Math as a Universal Tool:** Tasks promote mathematics as a universal tool that has meaning and application across cultures and communities, challenging students to connect mathematical concepts to contextual applications.

- **Hands-On and Inquiry-Based**: Tasks provide opportunities for students to actively engage in mathematical reasoning through culturally relevant activities, such as mapping land features with Indigenous methods, solving local community-based problems, or investigating the mathematics of historical architecture.

- **Storytelling and Oral Traditions:** Learning may incorporate narratives, legends, or oral histories that include mathematical thinking, such as counting in traditional games, measuring for seasonal changes, or problem-solving in folktales.

- **Connection to Everyday Life**: Activities contextualize math in ways that reflect students' own lives and communities, such as using family recipes to explore ratios or examining how local businesses price and trade goods.

- **Use of Language and Symbols from Different Cultures**: Tasks may include Indigenous languages, historical number systems, or culturally significant symbols, to expand students' understanding of mathematical representation.

- **Reflection and Discussion**: Learning tasks prompt students to think critically about their personal cultural experiences with math and consider how different communities and nations approach mathematics.

Ways Adults Can Support Learning:

Some ways adults can support students in developing their cultural connection skills include:

- **Review the Essential Understandings Regarding Montana Indians:** This document can support adults in understanding the seven guiding principles behind Indian Education for All. These principles provide a foundation for incorporating Indigenous perspectives into mathematical learning.

- **Integrate Authentic Examples:** Incorporate cultural contexts such as geometric designs in Montana Indigenous art, local events, or astronomy in planting cycles to illustrate how math is embedded in local and cultural traditions. Use realistic historical or modern examples related to global, local, or Indigenous contexts and issues to make math relevant and meaningful to students' lived experiences and communities.

- **Highlight Everyday Math in Practices**: Talk about ways math appears in daily life through traditions like quilting, weaving, cooking measurements, agriculture, or budgeting within different cultural and community contexts.

- **Ask Open-Ended, Reflective Questions**: Encourage thoughtful exploration by prompting students to analyze and connect mathematics to lived or cultural experiences. Questions such as *"What patterns do you see in this design?"* or *"How does your family use numbers at home?"* invite students to share personal experiences and recognize math in everyday contexts.

- **Provide Culturally Relevant, Reliable Resources:** Introduce tools, artifacts, context, or resources with modern and historical significance to different cultures, like Indigenous counting systems or items used in traditional games. Be sure that resources are relevant and come from reliable sources. **Use caution when engaging technological tools, such as Artificial Intelligence (AI)** as a resource for cultural information – this information must be properly vetted. While large language model AI tools are continually evolving, it is important to recognize that, as of the writing of this document, they have been known to misrepresent or misattribute cultural practices and citations.

- **Invite Community and Cultural Experts**: Partner with Tribal Elders, community members, families, or professionals from diverse backgrounds to share firsthand knowledge of how math is used in their traditions and professions.

- **Recognize and Honor Mathematical Contributions from Many Cultures**: Share stories of the mathematical discoveries of Montana's Indigenous Peoples, American, and global cultures. Ensure that students understand that mathematical knowledge has been independently

developed in many places throughout history.

- **Encourage Collaboration Across Cultural and Linguistic Backgrounds**: Support students in working with diverse peers, emphasizing that language and cultural differences are assets to mathematical learning.

- **Encourage Multilingual Math Discussions**: Support students in using their home languages when discussing math, reinforcing that mathematical reasoning is universal and not limited to one language.

- **Model Curiosity and Respect:** Demonstrate a genuine interest in diverse mathematical practices by sharing your learning process and engaging students in discussions about their cultural or experiential observations. Adults do not need to be experts in every culture or the history of mathematics. Modeling respectful inquiry and a willingness to learn fosters a reciprocal learning experience that benefits both students and adults.

- **Encourage Student-Led Cultural Math Connections** – Give students opportunities to research and present how math appears in their own culture or heritage, fostering pride and deeper connections.

MONTANA PK-12 MATHEMATICAL CONTENT STANDARDS – Overview

This section presents the complete set of Montana's PK–12 mathematical content standards, outlining what all students are expected to know and be able to do by the conclusion of their PK–12 educational journey as outlined in the Administrative Rules of Montana 10.53.5 Mathematics Content Standards and 10.63.110 Early Learning Developmental Domains and Content Standards.

While this section provides an overview of the standards, expanded guidance—including detailed notes, instructional examples, sample proficiency scales, and grade-specific considerations—can be found in the corresponding grade-level guidance documents. **Please refer to the grade level of interest for more in-depth support tailored to specific instructional needs.**

What is a Mathematical Content Standard?

A **content standard** in mathematics is a specific statement that defines the knowledge, skills, and understandings that students are expected to achieve at a particular grade level or within a course of study (REL Southeast, 2020). Content standards articulate the **what** of student learning, providing clear expectations for the mathematical concepts and procedures that should be taught and mastered.

Proficiency in the Mathematical Content Standards

The Administrative Rules of Montana (item 10.55.603) states "Local school districts shall develop and implement a proficiency-based learning model that includes curriculum aligned to all content standards and appropriate learning progressions." As a supportive resource, this section provides sample proficiency scales that illustrate how the mathematics content standards can be assessed. These examples are **not mandatory** and are intended solely to guide districts in designing their own proficiency-based systems.

When assessing students on content standards, educators should consider multiple forms of evidence, including classroom observations, student self-assessments, projects or performance tasks, formative and summative assessments, and student portfolios. Using clear rubrics and proficiency scales can help educators consistently and accurately measure students' progress and proficiency in mathematics.

Notes on Proficiency:

- Proficiency is defined by clearly articulated learning objectives or standards. It is the ability to consistently demonstrate a sufficient level of knowledge, skill, or understanding to meet all specific standards or expectations.
- These targets are often broken into measurable criteria that describe what mastery looks like for a particular skill or concept.
- Proficiency is demonstrated through evidence of learning, such as assessments, projects, or performances that align directly with the standard.
- There are differing views on the quality versus quantity of evidence for mastery; some resources argue that a single demonstration of mastery suffices, while others argue that mastery should be established through multiple assessments. Districts are encouraged to explore and adopt a consistent methodology across classrooms that aligns with their pedagogical philosophy and instructional practice. Engaging in discussions at the local level about district and educator preferences greatly benefits students, educators, and families.

Example Proficiency Rubric:

When determining students' proficiency in a math content standard, it may be useful to utilize a rubric, such as the one provided below:

Beginning	Developing	Proficient	Mastery
The student shows minimal understanding or requires significant support.	The student demonstrates partial understanding but has not yet mastered each skill within the standard. The student may be able to independently engage in some skills, but may require support in others. It may also be the case that	The student is able to engage in each of the skills identified in the content standard with independence and accuracy.	The student may be able to engage in the skills identified in the content standard beyond grade level expectations. They may be able to engage in these skills in connection with other

	the student requires minimal support across multiple skills.		mathematical practice or content standards. The student exceeds the standard, showing deeper understanding or application.
Example: Kindergarten Content Standard MT.K.CC.1 - Flexibly count to 100 by ones and by tens.			
The student is **not yet able to** flexibly count to 100 by ones **or** by tens without significant support.	The student **can** flexibly count to 100 by ones **and** by tens **with some support.** *or,* The student can flexibly count by ones **or** by tens with independence.	The student **can** flexibly count to 100 by ones **and** by tens **with independence and accuracy.**	The student **can** flexibly count to 100 by ones **and** by tens **with independence and accuracy.** They demonstrate an **<u>advanced</u>** understanding by being able to employ this skill efficiently, in connection with other standards, **or** by working beyond 100.

Achieving proficiency indicates that a student is ready to move on to the next level of learning. Although proficiency is the target goal, all students should be provided with opportunities to demonstrate and develop mastery through mathematically rigorous tasks.

EARLY LEARNING MATHEMATICS AND NUMERACY STANDARDS:

Counting and Cardinality (CC)

- Number sense and operations, wherein students develop the ability to think and work with numbers, to understand their uses, and describe their relationships through structured and everyday experiences (MT.PK.CC.1)

Operations and Algebraic Thinking (OA)

- Initial algebraic thinking and operations, wherein students identify, describe, produce, and create patterns using mathematical language and materials. (MT.PK.OA.1)

Measurement and Data (MD)

- Measurement concepts, wherein students use measurement instruments to explore and discover measurement relationships and characteristics, such as length, quantity, volume, distance, weight, area, and time. (MT.PK.MD.1)
- Mathematical skills in data analysis, wherein students count, sort, and compare objects. (MT.PK.MD.2)

Geometry (G)

- Geometric and spatial reasoning, wherein students build the foundation for recognizing, creating, and manipulating shapes, and learning spatial reasoning and directional words as they become aware of their bodies and personal space in their physical environment. (MT.PK.G.1)

END OF PRE-KINDERGARTEN MATH CONTENT STANDARDS

KINDERGARTEN MATHEMATICS CONTENT STANDARDS

Counting and Cardinality (CC)

- Flexibly count to 100 by ones and by tens. (MT.K.CC.1)
- Count beginning from a given number within the known sequence. (MT.K.CC.2)
- Write numbers from 0-20 and represent a number of objects with a written numeral 0-20. (MT.K.CC.3)
- Understand the relationship between numbers and quantities and connect counting to cardinality by recognizing that each successive number name refers to a quantity that is one larger within a normal counting sequence. (MT.K.CC.4)
- Count to answer "how many?" in a variety of arrangements and, given a number, produce a set within 20. (MT.K.CC.5)
- Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group. (MT.K.CC.6)
- Compare two numbers between 1 and 10 presented as written numerals. (MT.K.CC.7)

Operations and Algebraic Thinking (OA)

- Represent addition and subtraction in multiple ways. (MT.K.OA.1)
- Solve addition and subtraction problems in context within 10. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.K.OA.2)
- Decompose numbers less than or equal to 10 into pairs in multiple ways. (MT.K.OA.3)
- For any number from 1 to 9, find the number that makes 10 when added to the given number. (MT.K.OA.4)
- Flexibly and accurately add and subtract within 5. (MT.K.OA.5)
- Recognize the characteristics of the commutative property in addition. (MT.K.OA.6)

Number and Operations in Base Ten (NBT)

- Compose and decompose numbers from 11-19 into ten ones and further ones in multiple ways and record each composition or decomposition by a drawing or an equation. (MT.K.NBT.1)

Measurement and Data (MD)

- Describe several attributes of a single object. (MT.K.MD.1)
- Directly compare two objects with a measurable attribute in common using comparative language. (MT.K.MD.2)
- Classify, count, and sort objects into categories. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.K.MD.3)
- Describe attributes and identify the names of coins. (MT.K.MD.4)
- Explain time in days, months, years, and seasons. (MT.K.MD.5)

Geometry (G)

- Describe the relative positions of objects in their environment. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.K.G.1)
- Correctly name shapes regardless of their orientations or overall size. (MT.K.G.2)
- Identify shapes as two-dimensional or three-dimensional. (MT.K.G.3)
- Analyze and compare two- and three-dimensional shapes using informal language and other attributes. (MT.K.G.4)
- Model shapes in the environment. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.K.G.5)
- Compose simple shapes to form larger shapes. (MT.K.G.6)

END OF KINDERGARTEN MATH CONTENT STANDARDS

GRADE 1 MATHEMATICS CONTENT STANDARDS

Operations and Algebraic Thinking (OA)

- Use addition and subtraction within 20 to solve of all types. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.1.OA.1)
- Solve problems in context that call for addition of three whole numbers with a sum less than or equal to 20 in context of all types. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.1.OA.2)
- Flexibly compose and decompose numbers to add and subtract. (MT.1.OA.3)
- Understand subtraction as an unknown-addend problem. (MT.1.OA.4)
- Relate counting to addition and subtraction. (MT.1.OA.5)
- Flexibly, accurately, and efficiently add and subtract within 10. (MT.1.OA.6)
- Use multiple strategies to add and subtract within 20. (MT.1.OA.7)
- Understand the meaning of the equal sign and determine if equations are true or false. (MT.1.OA.8)
- Determine the unknown number in an addition or subtraction equation relating to three numbers. (MT.1.OA.9)

Number and Operations in Base Ten (NBT)

- Flexibly count, read, write, and represent numbers to 120. (MT.1.NBT.1)
- Understand that ten is a unit composed of ten ones and that a two-digit number represents tens and ones. (MT.1.NBT.2)
- Compare two two-digit numbers using comparison symbols $>, =, and\ <$. (MT.1.NBT.3)
- Build a foundation for addition within 100 by:
    - Adding two-digit to one-digit numbers, and
    - Adding multiples of 10 to two-digit numbers. (MT.1.NBT.4)
- Using place value, given a two-digit number, find 10 more or 10 less than the number. (MT.1.NBT.5)
- Subtract multiples of 10 from a two-digit number. (MT.1.NBT.6)

Measurement and Data (MD)

- Order three objects by length and compare the lengths of two objects indirectly by using a third object. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.1.MD.1)
- Express the length of an object as a whole number of length units. Understand that the measurement of an object is the number of same-size length units that span it with no gaps or overlaps. (MT.1.MD.2)
- Tell and write time in hours and half-hours using analog and digital clocks. (MT.1.MD.3)
- Identify the value of coins. (MT.1.MD.4)
- Organize, represent, and interpret data with up to three categories by:
    - Asking and answering questions about the total number of data points,
    - Identifying how many are in each category, and
    - Analyzing differences between categories. (MT.1.MD.5)

Geometry (G)

- Distinguish between defining attributes versus nondefining attributes. (MT.1. G.1)
- Build and draw shapes to possess defining attributes. (MT.1.G.2)
- Compose new shapes using two- and three-dimensional shapes. (MT.1.G.3)
- Partition circles and rectangles into two and four equal shares. Describe the shares using the words: halves, fourths, and quarters. (MT.1.G.4)

END OF GRADE 1 MATH CONTENT STANDARDS

GRADE 2 MATHEMATICS CONTENT STANDARDS

Operations and Algebraic Thinking (OA)

- Use addition and subtraction within 100 to solve one- and two-step problems in context involving all problem types. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.2.OA.1)
- Flexibly, accurately, and efficiently add and subtract within 20 using mental strategies. (MT.2.OA.2)
- Determine whether a group of objects, up to 20, has an odd or even number of members. (MT.2.OA.3)
- Use addition to find the total number of objects arranged in rectangular arrays. (MT.2.OA.4)

Number and Operations in Base Ten (NBT)

- Understand one hundred is a unit composed of ten tens and that three-digit numbers represent amounts of hundreds, tens, and ones. (MT.2.NBT.1)
- Skip-count by 5s, 10s, and 100s. (MT.2.NBT.2)
- Flexibly count, read, write, and represent numbers to 1000. (MT.2.NBT.3)
- Compare two three-digit numbers using $>, =, and\ <$ symbols. (MT.2.NBT.4)
- Flexibly, accurately, and efficiently add and subtract within 100 using multiple strategies. (MT.2.NBT.5)
- Add up to four two-digit numbers using multiple strategies. (MT.2.NBT.6)
- Add and subtract within 1000 using multiple strategies. (MT.2.NBT.7)
- Using place value, add or subtract 10 or 100 from a given number. (MT.2.NBT.8)
- Understand and make connections between different strategies for addition and subtraction. (MT.2.NBT.9)

Measurement and Data (MD)

- Measure the length of an object by selecting and using appropriate tools. (MT.2.MD.1)
- Understand the relationship between unit sizes and number of units by measuring a single object using two different units of common measurement. (MT.2.MD.2)
- Estimate lengths using units of common measurement. (MT.2.MD.3)

- Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard-length unit. (MT.2.MD.4)
- Use addition and subtraction within 100 to solve problems in context involving lengths that are given in the same units. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.2.MD.5)
- Represent whole numbers as lengths from 0 and represent sums and differences within 100 on a number line. (MT.2.MD.6)
- Tell and write time from analog and digital clocks to the nearest five minutes using a.m. and p.m. (MT.2.MD.7)
- Solve problems in context involving dollar bills, quarters, dimes, nickels, and pennies using $ and ¢ symbols appropriately. (MT.2.MD.8)
- Generate measurement data and present the data in multiple ways. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.2.MD.9)
- Organize, represent, and interpret data with up to four categories. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.2.MD.10)
- Solve addition and subtraction problems of all types using data presented. (MT.2.MD.11)

Geometry (G)

- Recognize and draw shapes having specified attributes. (MT.2.G.1)
- Partition a rectangle into rows and columns of same-size squares and find the total number. (MT.2.G.2)
- Partition circles and rectangles into equal shares, recognize that equal shares need not have the same shape, and express the shares in two-halves, three-thirds, and four-fourths. (MT.2.G.3)

END OF GRADE 2 MATH CONTENT STANDARDS

GRADE 3 MATHEMATICS CONTENT STANDARDS

Operations and Algebraic Thinking (OA)

- Understand products of whole numbers as the total number found by multiplying a number of groups by the number of objects per group. (MT.3.OA.1)
- Understand whole-number quotients of whole numbers:
    - As the number of objects in each group with the total quantity divided equally into a number of shares, and
    - As the number of shares when a total number of objects is partitioned into equal-sized groups. (MT.3.OA.2)
- Use multiplication and division within 100 to solve problems in context in situations involving equal groups, arrays, and measurement quantities. (MT.3.OA.3)
- Determine the unknown whole number in a multiplication or division equation relating three whole numbers. (MT.3.OA.4)
- Apply the commutative property of multiplication, associative property of multiplication, and distributive property of multiplication over addition on whole numbers as strategies to multiply. (MT.3.OA.5)
- Use division as an unknown factor problem. (MT.3.OA.6)
- Flexibly, accurately, and efficiently multiply and divide within 100, using strategies such as the relationship between multiplication and division. (MT.3.OA.7)
- Solve two-step problems in context using the four operations, represent these problems using equations with a letter standing for the unknown quantity and assess the reasonableness of answers using mental computation and estimation strategies. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.3.OA.8)
- Identify arithmetic patterns and explain them using properties of operations. (MT.3.OA.9)

Number and Operations in Base Ten (NBT)

- Use place value understanding to round whole numbers to the nearest 10 or 100. (MT.3.NBT.1)
- Flexibly, accurately, and efficiently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. (MT.3.NBT.2)
- Multiply one-digit whole numbers by multiples of 10 in the range 10-90 using strategies based on place value and properties of operations. (MT.3.NBT.3)

Number and Operations – Fractions (NF)

- Understand a fraction $\frac{1}{b}$ as the quantity formed by 1 part when a whole is partitioned into b equal parts and understand a fraction $\frac{a}{b}$ as the quantity formed by a parts of size $\frac{1}{b}$. (MT.3.NF.1)
- Understand a fraction as a number on the number line by:
    - Representing a unit fraction on a number line,
    - Representing a fraction as multiple copies of a unit fraction on a number line, and
    - Representing fractions on a number line. (MT.3.NF.2)
- Understand the equivalence of fractions in special cases and compare fractions by reasoning about their size by:
    - Understanding two fractions as equivalent if they are the same size or the same point on a number line,
    - Recognizing and generating simple equivalent fractions and by demonstrating or justifying why the fractions are equivalent,
    - Writing whole numbers as fractions, recognizing fractions that are equivalent to whole numbers, and locating them on a number line,
    - Comparing two fractions with the same numerator or the same denominator by reasoning about their size and recognizing that comparisons are valid only when the two fractions refer to the same whole, and
    - Recording the results of fraction comparisons with the symbols $>, =, or\ <$ and justifying the conclusions. (MT.3.NF.3)

Measurement and Data (MD)

- Tell and write time on an analog and digital clock to the nearest minute and measure time intervals in minutes and solve word problems in context involving addition and subtraction of time intervals in minutes. (MT.3.MD.1)
- Measure and estimate liquid volumes and masses of objects using customary and metric units by adding, subtracting, multiplying, and dividing to solve one-step problems in context that involve masses or volumes that are given in the same units. (MT.3.MD.2)
- Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.3.MD.3)
- Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch and show the data by making a line plot where the horizontal scale is marked off in appropriate units. (MT.3.MD.4)
- Recognize area as an attribute of plane figures and understand concepts of area measurement by:
    - Understanding that 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, and
    - Understanding that 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. (MT.3.MD.5)

- Measure areas by counting unit squares. (MT.3.MD.6)
- Relate area to the operations of multiplication and addition by:
    - Finding the area of a rectangle with whole-number side lengths by tiling it, and showing that the area is the same as would be found by multiplying the side lengths,
    - Multiplying side lengths to find areas of rectangles with whole-number side lengths while solving problems in context and representing whole-number products as rectangular areas,
    - Using tiling and area models to represent the distributive property in finding area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$, and
    - Recognizing area as additive, finding areas of straight-line figures by decomposing them into nonoverlapping rectangles and adding the areas of the nonoverlapping parts. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.3.MD.7)
- Solve problems in context 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. (MT.3.MD.8)

Geometry (G)

- Understand that shapes in different categories may share attributes and that the shared attributes can define a larger category. Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. (MT.3.G.1)
- Partition shapes into parts with equal areas; express the area of each part as a unit fraction of the whole. (MT.3.G.2)

END OF GRADE 3 MATH CONTENT STANDARDS

GRADE 4 MATHEMATICS CONTENT STANDARDS

Operations and Algebraic Thinking (OA)

- Interpret a multiplication equation as a multiplicative comparison and represent verbal statements of multiplicative comparisons as multiplication equations. (MT.4.OA.1)
- Multiply or divide to solve problems in context that involve multiplicative comparison and distinguish multiplicative comparison from additive comparison. (MT.4.OA.2)
- Solve multistep problems in context with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted, represent these problems using equations with a letter standing for the unknown quantity, and assess the reasonableness of answers using mental computation and estimation strategies. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.4.OA.3)
- Find all factor pairs for a whole number in the range 1-100, recognize that a whole number is a multiple of each of its factors, determine whether a given whole number in the range 1-1000 is a multiple of a given one-digit number, and determine whether a given whole number in the range 1-100 is prime or composite. (MT.4.OA.4)
- Analyze a number or shape pattern that follows a given rule, identify and explain informally features of the pattern that were not explicit in the rule itself, generate terms in the resulting sequence, and observe the pattern. (MT.4.OA.5)

Number and Operations in Base Ten (NBT)

- Recognize that in a multi-digit whole number, each place represents ten times the place to its right. (MT.4.NBT.1)
- Read and write multi-digit whole numbers using standard form, word form, and expanded form and compare two multi-digit numbers based on the value of the digits in each place using $>, =, and\ <$ symbols. (MT.4.NBT.2)
- Use place value understanding to round multi-digit whole numbers to any place. (MT.4.NBT.3)
- Accurately and efficiently add and subtract multi-digit whole numbers using the standard algorithm. (MT.4.NBT.4)
- Multiply a whole number of up to four digits by a one-digit whole number, multiply two two-digit numbers, flexibly using strategies based on place value and the properties of operations, and illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. (MT.4.NBT.5)

- Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, flexibly using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division, and illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. (MT.4.NBT.6)

Number and Operations – Fractions (NF)

- Explain why a fraction $\frac{a}{b}$ is equivalent to a fraction $\frac{(n \times a)}{(n \times b)}$ by using visual fraction models and use this principle to recognize and generate equivalent fractions. (MT.4.NF.1)
- Compare two fractions with different numerators and different denominators by creating common denominators or numerators, or by comparing to a benchmark fraction, recognize that comparisons are valid only when the two fractions refer to the same whole, record the results of comparisons with symbols $>, =, or\ <$, and justify the conclusions. (MT.4.NF.2)
- Understand a fraction $\frac{a}{b}$ with $a > 1$ as a sum of fractions $\frac{1}{b}$ by:
    - Understanding addition and subtraction of fractions as joining and separating parts referring to the same whole,
    - Decomposing a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation,
    - Adding and Subtracting mixed numbers with like denominators by replacing each mixed number with an equivalent improper fraction or other efficient strategies, and
    - Solving problems in context that involve addition and subtraction of fractions referring to the same whole or having like denominators. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.4.NF.3)
- Apply and extend previous understandings of multiplication to multiply a fraction by a whole number by:
    - Understanding a fraction $\frac{a}{b}$ as a multiple of $\frac{1}{b}$ and recording the conclusion by the equation $\frac{a}{b} = a \times \frac{1}{b}$,
    - Understanding a multiple of $\frac{a}{b}$ as a multiple of $\frac{1}{b}$, using this to multiply a fraction by a whole number and recognizing $n \times \frac{a}{b} = \frac{(n \times a)}{b}$, and
    - Solving problems in context involving multiplication of a fraction by a whole number. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.4.NF.4)
- Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. (MT.4.NF.5)
- Use decimal notation for fractions with denominators 10 or 100. (MT.4.NF.6)
- Compare two decimals to hundredths by reasoning about their size, recognize that comparisons are valid only when the two decimals refer to the same whole, record the results of comparisons with the symbols $>, =, or\ <$, and justify the conclusions. (MT.4.NF.7)

Measurement and Data (MD)

- Know relative sizes of units within one system of measurement and within the system, express measurements of a larger unit in terms of a smaller unit. (MT.4.MD.1)
- Use the four operations to solve problems in context using distances, intervals of time, liquid volumes, masses of objects, and money, including problems with simple fractions or decimals and problems that require expressing measurements given in a larger unit in terms of a smaller unit, and represent measurement quantities using diagrams that feature a measurement scale. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.4.MD.2)
- Apply the area and perimeter formulas for rectangles including problems in context. (MT.4.MD.3)
- Make a line plot to display a data set of measurements in fractions of a unit and solve problems involving addition and subtraction of fractions by using information presented in line plots. (MT.4.MD.4)
- Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint and understand concepts of angle measurement by:
    - Understanding that an angle is formed by two rays with a common endpoint at the center of a circle that measures a total of 360 degrees, and a single-degree unit measure is equal to 1/360th of the circle, and
    - Understanding that an angle that turns through n one-degree angles is said to have an angle measure of n degrees. (MT.4.MD.5)
- Measure angles in whole-number degrees using a protractor and sketch angles of specified measure. (MT.4.MD.6)
- Recognize angle measure as additive. When an angle is decomposed into nonoverlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram including problems in context. (MT.4.MD.7)

Geometry (G)

- Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines and identify these in two-dimensional figures. (MT.4.G.1)
- Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines or the presence or absence of angles of a specified size, recognize right triangles as a category, and identify right triangles. (MT.4.G.2)
- Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts, identify line-symmetric figures, and draw lines of symmetry. This standard should incorporate designs and cultural context relating to Montana Indigenous Peoples and local communities. (MT.4.G.3)

END OF GRADE 4 MATH CONTENT STANDARDS

GRADE 5 MATHEMATICS CONTENT STANDARDS

Operations and Algebraic Thinking (OA)

- Use parentheses, brackets, or braces in numerical expressions and evaluate expressions with these symbols using the order of operations. (MT.5.OA.1)
- Write simple expressions that record calculations with numbers and interpret numerical expressions without evaluating them. (MT.5.OA.2)
- Generate two numerical patterns using given rules and complete an input-output table for the data, identify apparent relationships between corresponding terms, form ordered pairs from the values in the input-output table, and graph them on a coordinate plane. (MT.5.OA.3)

Number and Operations in Base Ten (NBT)

- Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left. (MT.5.NBT.1)
- Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10, and use whole-number exponents to denote powers of 10. (MT.5.NBT.2)
- Read, write, and compare decimals to thousandths by:
    - Reading and writing decimals to thousandths using standard form, word form, and expanded form, and
    - Comparing two decimals to thousandths based on the meanings of the digits in each place using $>, =, and\ <$ symbols. (MT.5.NBT.3)
- Use place value understandings to round decimals to any place. (MT.5.NBT.4)
- Accurately and efficiently multiply multi-digit whole numbers using the standard algorithm. (MT.5.NBT.5)
- Flexibly, accurately, and efficiently find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division and illustrate and explain the calculation by using equations, rectangular arrays, and/or area models. (MT.5.NBT.6)
- Add, subtract, multiply, and divide decimals to hundredths using concrete models or drawings. This standard should incorporate designs and cultural context relating to Montana Indigenous Peoples and local communities. (MT.5.NBT.7)

Number and Operations – Fractions (NF)

- Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions. (MT.5.NF.1)
- Solve problems in context that involve addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, and use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. (MT.5.NF.2)
- Interpret a fraction as division of the numerator by the denominator ($\frac{a}{b} = a \div b$) and solve problems in context that involve division of whole numbers leading to answers in the form of fractions or mixed numbers. (MT.5.NF.3)
- Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction by:
    - Expressing the product $\frac{a}{b} \times q$ as "a" parts of a partition of q into b equal parts, equivalently, as the result of a sequence of operations $a \times q \div b$, and
    - Finding the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, showing that the area is the same as would be found by multiplying the side lengths, multiplying fractional side lengths to find areas of rectangles, and represent representing fraction products as rectangular areas. (MT.5.NF.4)
- Interpret multiplication as scaling (resizing), by:
    - Comparing the size of a product to the size of one factor on the basis of the size of the other factor without performing the indicated multiplication, and
    - Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number, and relating the principle of fraction equivalence $\frac{q}{b} = \frac{n \times a}{n \times b}$ to the effect of multiplying $\frac{a}{b}$ by 1. (MT.5.NF.5)
- Solve problems in context that involve multiplication of fractions and mixed numbers. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.5.NF.6)
- Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions by:
    - Expressing division of a unit fraction by a nonzero whole number and computing such quotients,
    - Expressing division of a whole number by a unit fraction and computing such quotients, and
    - Solving problems in context involving division of unit fractions by nonzero whole numbers and division of whole numbers by unit fractions. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.5.NF.7)

Measurement and Data (MD)

- Convert among different-sized standard measurement units within a given measurement system and use these conversions in solving multi-step problems in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.5.MD.1)
- Make a line plot to display a data set of measurements in fractions of a unit and use operations on fractions to solve problems involving information presented in line plots. (MT.5.MD.2)
- Recognize volume as an attribute of solid figures and understand concepts of volume measurement by:
    - Understanding that a cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume and can be used to measure volume, and
    - Understanding that a solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units. (MT.5.MD.3)
- Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and non-standard units. (MT.5.MD.4)
- Relate volume to the operations of multiplication and addition and volume problems including problems in context by:
    - Finding the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes and showing that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base and representing the product of three whole numbers using the associative property of multiplication.
    - Applying the formulas $V = l \times w \times h$ and $V = B \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths including problems in context, and
    - Recognizing volume as additive and finding volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the nonoverlapping parts, applying this technique to solve problems in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.5.MD.5)

Geometry (G)

- Use a pair of perpendicular number lines, called axes, to define a coordinate system with the intersection of the lines at the origin arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the x-coordinate, the first number, indicates how far to travel from the origin in the direction of the x-axis and the y-coordinate, the second number, indicates how far to travel in the direction of the y-axis. (MT.5.G.1)
- Represent problems including problems in context by graphing points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation. This standard should incorporate designs and cultural context relating to Montana Indigenous Peoples and local communities. (MT.5.G.2)

- Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. (MT.5.G.3)
- Classify two-dimensional figures in a hierarchy based on properties. (MT.5.G.4)

END OF GRADE 5 MATH CONTENT STANDARDS

GRADE 6 MATHEMATICS CONTENT STANDARDS

Ratios and Proportional Relationships (RP)

- Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MT.6.RP.1)
- Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship. (MT.6.RP.2)
- Use ratio and rate reasoning to solve proportional problems in context about unit rates, percentages (as a rate per 100), and/or measurement units using tables or equations. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.6.RP.3)

The Number System (NS)

- Represent, interpret, and compute quotients of fractions and solve problems in context involving division of fractions by fractions. (MT.6.NS.1)
- Accurately and efficiently divide multi-digit numbers using the standard algorithm. (MT.6.NS.2)
- Accurately and efficiently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. (MT.6.NS.3)
- Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factor. (MT.6.NS.4)
- Understand that positive and negative numbers are used together to describe quantities having opposite directions or values and use positive and negative numbers to represent quantities in problems in contexts, explaining the meaning of 0 in each situation. (MT.6.NS.5)
- Understand a rational number as a point on the number line and extend number line diagrams and coordinate axes by:
    - Recognizing opposite signs of numbers as indicating locations on opposite sides of 0 on the number line, recognizing that the opposite of the opposite of a number is the number itself, and that 0 is its own opposite.
    - Understanding signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane and recognizing that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes, and
    - Finding and positioning integers and other rational numbers on a horizontal or vertical number line diagram and finding and positioning pairs of integers and other rational numbers on a coordinate plane. (MT.6.NS.6)
- Understand ordering and absolute value of rational numbers by:
    - Interpreting statements of inequality as statements about the relative position of two numbers on a number line diagram,
    - Writing, interpreting, and explaining statements of order for rational numbers in problems in context,

  - Understanding the absolute value of a rational number as its distance from 0 on the number line and interpreting absolute value as magnitude for a positive or negative quantity in problems in context, and
  - Distinguishing comparisons of absolute value from statements about order. (MT.6.NS.7)
- Graph points in all four quadrants of the coordinate plane and include the use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.6.NS.8)

Expressions and Equations (EE)

- Write and evaluate numerical expressions involving whole-number bases and exponents. (MT.6.EE.1)
- Write, read, and evaluate expressions with variables by:
  - Writing expressions that record operations with numbers and with variables,
  - Identifying parts of an expression using mathematical terms (sum, product, difference, quotient, term, factor, coefficient, variable) and writing expressions that represent verbal descriptions of problems in context, and
  - Evaluating expressions at specific values of their variables including expressions that arise from formulas performing arithmetic operations, including those involving whole-number exponents and using the order of operations. (MT.6.EE.2)
- Apply the properties of operations including the distributive property, to generate equivalent expressions and determine when two expressions are equivalent. (MT.6.EE.3)
- Understand how to solve an equation or inequality as a process by using substitution to determine whether a given number in a specified set makes an equation or inequality true. (MT.6.EE.4)
- Write expressions when solving problems in context and understand that a variable can represent an unknown number, or any number in a specified set. (MT.6.EE.5)
- Solve problems including problems in context by writing and solving equations of the form $x + p = q$ and $p \cdot x = q$ for cases in which $p, q,$ and x are all nonnegative rational numbers. (MT.6.EE.6)
- Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in problems including problems in context; graph and describe solutions of such inequalities on number line diagrams. (MT.6.EE.7)
- Use variables to represent two quantities that change in relationship to one another, analyze the relationship between the dependent and independent variables using graphs and tables, and write an equation to express one quantity in terms of the other. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.6.EE.8)

Geometry (G)

- Find the area of triangles, quadrilaterals, and other polygons by composing them into rectangles or decomposing them into triangles and other shapes. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.6.G.1)
- Find the volume of a right rectangular prism with fractional edge lengths by filling it with unit cubes of the appropriate unit fraction edge lengths and connect and apply the formulas $V = l \cdot w \cdot h$ and $V = B \cdot h$ to find volumes of right rectangular prisms with fractional edge lengths to solve problems in context. (MT.6.G.2)
- Draw polygons in the coordinate plane given coordinates for the vertices, find the length of a horizontal or vertical side, and apply these techniques to problems in context. (MT.6.G.3)
- Represent three-dimensional figures using nets made up of rectangles and triangles and use the nets to find the surface area of these figures in problems including problems in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.6.G.4)

Statistics and Probability (SP)

- Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. (MT.6.SP.1)
- Understand that a set of data collected to answer a statistical question has a distribution that can be described by its center, spread, and overall shape. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.6.SP.2)
- Recognize that measures of central tendency for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number. (MT.6.SP.3)
- Display numerical data in plots on a number line, including dot plots, histograms, and box plots, and describe any overall pattern and any striking deviations from the overall pattern with reference to the context from which the data were gathered. (MT.6.SP.4)
- Characterize numerical data sets from a sample in relation to their context, such as by:
    - Reporting the number of observations,
    - Describing the nature of the attribute under investigation, including how it was measured and its units of measurement, and
    - Finding quantitative measures of central tendency (mode, median, and/or mean) and variability (interquartile range and/or mean absolute deviation), for numerical data sets and relating the choice of measures of central tendency and variability to the shape of the data distribution and the context in which the data were gathered. (MT.6.SP.5)

END OF GRADE 6 MATH CONTENT STANDARDS

GRADE 7 MATHEMATICS CONTENT STANDARDS

Ratios and Proportional Relationships (RP)

- Compute unit rates associated with ratios of fractions, measured in like or different units. (MT.7.RP.1)
- Recognize and represent proportional relationships between quantities, using tables, graphs, and equations by:
    - Deciding whether a table represents quantities in a proportional relationship, by testing for equivalent ratios and deciding whether a graph represents quantities in a proportional relationship if the graph is a straight line through the origin, and
    - Identifying the constant of proportionality (unit rate) in tables, graphs, and equations, of proportional relationships. (MT.7.RP.2)
- Use proportional relationships to solve multi-step ratio and percent problems, including problems in context that involve simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, and percent error. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.7.RP.3)

The Number System (NS)

- Add and subtract rational numbers, represent addition and subtraction on a horizontal or vertical number line diagram, and understand subtraction as adding the additive inverse $p - q = p + (-q)$. (MT.7.NS.1)
- Multiply and divide rational numbers and use operations of rational numbers to solve problems in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.7.NS.2)
- Write any rational number as a fraction, decimal, and percent using long division, and know that the decimal form of a rational number terminates or repeats. (MT.7.NS.3)

Expressions and Equations (EE)

- Use properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients and generate equivalent expressions. (MT.7.EE.1)
- Understand that rewriting an expression in different forms in a problem in context can show how the quantities in it are related. (MT.7.EE.2)
- Write and solve one- and two-step equations including problems in context with rational numbers, convert between forms as appropriate, and assess the reasonableness of answers. (MT.7.EE.3)

- Use variables to represent quantities and construct simple equations and inequalities to solve problems in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by:
    - Solving, accurately and efficiently, problems in context leading to equations of the form $p \cdot x + q = r$ and $p(x + q) = r$, where $p, q,$ and r are specific rational numbers, comparing an algebraic solution to an arithmetic solution, and identifying the sequence of the operations used in each approach, and
    - Solving problems in context leading to inequalities of the form $p \cdot x + q > r$ or $p \cdot x + q < r$, where $p, q,$ and r are specific rational numbers graphing the solution set of the inequality, and interpreting the solution in context. (MT.7.EE.4)

Geometry (G)

- Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. (MT.7.G.1)
- Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions, focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle. (MT.7.G.2)
- Know and use the formulas for the area and circumference of a circle and give an informal derivation of the relationship between the circumference and area of a circle. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.7.G.3)
- Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. (MT.7.G.4)
- Solve geometrical problems including problems in context that involve area, volume, and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.7.G.5)

Statistics and Probability (SP)

- Understand statistics can be used to gain information about a population by examining a representative sample of the population. (MT.7.SP.1)
- Use data from a random sample to draw inferences about a population with an unknown characteristic of interest and generate or simulate multiple samples of the same size to gauge the variation in estimates or predictions. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.7.SP.2)
- Visually analyze two data distributions to compare measures of central tendency and variability. (MT.7.SP.3)

- Use measures of central tendency and measures of variability for numerical data from random samples to draw comparative inferences about two populations. (MT.7.SP.4)
- Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. (MT.7.SP.5)
- Find the experimental probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.7.SP.6)
- Develop a theoretical probability model and use it to find probabilities of events, compare theoretical and experimental probabilities, and explain possible sources of discrepancy, if any exist. (MT.7.SP.7)
- Represent sample spaces for compound events, identify the desired outcomes in the sample spaces, and find probabilities of events using organized lists, tables, tree diagrams, and simulations. (MT.7.SP.8)

END OF GRADE 7 MATH CONTENT STANDARDS

GRADE 8 MATHEMATICS CONTENT STANDARDS

The Number System (NS)

- Know real numbers are made up of rational and irrational numbers, understand informally that every number has a decimal expansion, and convert a decimal expansion which repeats eventually into a rational number. (MT.8.NS.1)
- Use rational approximations of irrational numbers to compare the value of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions. (MT.8.NS.2)

Expressions and Equations (EE)

- Know and apply the properties of integer exponents to generate equivalent numerical expressions. (MT.8.EE.1)
- Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number and evaluate square roots of small perfect squares and cube roots of small perfect cubes. (MT.8.EE.2)
- Represent very large or very small quantities using scientific notation, limited to a single digit times an integer power of ten. (MT.8.EE.3)
- Perform operations with numbers expressed in scientific notation. (MT.8.EE.4)
- Graph proportional relationships, interpret the unit rate as the slope of the graph, and compare two different proportional relationships as tables, graphs, and equations. (MT.8.EE.5)
- Use similar triangles to explain why the slope m is the same between any two distinct points on a nonvertical line in the coordinate plane and derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b. (MT.8.EE.6)
- Solve linear equations in one variable by:
    - Giving examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions and showing which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a, a = a, or\ a = b$ results (where a and b are different numbers), and
    - Solving linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. (MT.8.EE.7)
- Analyze and solve pairs of simultaneous linear equations by:
    - Understanding that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously,
    - Solving systems of two linear equations in two variables algebraically, estimating solutions by graphing the equations, and solving simple cases by inspection, and

- Solving problems in context that lead to two linear equations in two variables. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.8.EE.8)

Functions (F)

- Understand that a function is a rule that assigns to each input exactly one output and the graph of a function is the set of ordered pairs (x, y) each consisting of an input, x, and the corresponding output, y. (MT.8.F.1)
- Compare properties of two functions using tables, graphs, and equations. (MT.8.F.2)
- Interpret the equation $y = mx + b$ as defining a linear function whose graph is a straight line with slope m passing through the point $(0, b)$. (MT.8.F.3)
- Given linear data relating two quantities, construct a linear function that models the data and interpret the rate of change and initial value of a linear function in terms of the situation it models. (MT.8.F.4)
- Given the graph of a function, describe qualitatively the functional relationship between quantities, and given a verbal description of a functional relationship, sketch a graph that exhibits the qualitative features of a function. (MT.8.F.5)

Geometry (G)

- Verify experimentally the properties of rotations, reflections, and translations and understand that these are rigid transformations, lines are taken to lines, line segments to line segments of the same length, angles are taken to angles of the same measure, and parallel lines are taken to parallel lines. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.8.G.1)
- Understand that a two-dimensional figure is congruent to another if the second can be obtained by a sequence of rigid transformations, and, given two congruent figures, describe a sequence that exhibits the congruence between them. (MT.8.G.2)
- Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.8.G.3)
- Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations, and, given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. (MT.8.G.4)
- Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. (MT.8.G.5)
- Explain a proof of the Pythagorean Theorem and its converse. (MT.8.G.6)

- Apply the Pythagorean Theorem to determine unknown side lengths in right triangle problems, including problems in context in two and three dimensions. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.8.G.7)
- Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. (MT.8.G.8)
- Know, use, and apply the formulas for the volumes of cones, cylinders, and spheres to solve problems, including problems in context. (MT.8.G.9)

Statistics and Probability (SP)

- Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities and describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. (MT.8.SP.1)
- Know that straight lines are widely used to model relationships between two quantitative variables and for scatter plots that suggest a linear association, informally fit a straight line and informally assess the model fit by judging the closeness of the data points to the line. (MT.8.SP.2)
- Use the equation of a linear model to solve problems in the context of bivariate measurement data, and interpret the slope and intercept. (MT.8.SP.3)
- Construct and interpret frequencies and relative frequencies for bivariate categorical data in a two-way table to investigate patterns of association. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.8.SP.4)

END OF GRADE 8 MATH CONTENT STANDARDS

HIGH SCHOOL MATHEMATICS CONTENT STANDARDS

The Montana High School Mathematics Content Standards are organized into two categories: **Core** and **Core Plus**. Together, these standards encompass the essential mathematical concepts and skills students encounter throughout high school.

- **Core Standards** are foundational standards that all Montana students should know, understand, and be able to do upon graduation of high school.
- **Core Plus Standards** are additional standards that all Montana students can pursue to prepare for post-secondary education and careers.

This structure provides opportunities for all students to receive a strong mathematical foundation while providing opportunities to extend their learning based on individual interests, goals, and post-secondary plans. The standards are designed to support flexible course pathways that meet the diverse needs of Montana learners.

To support implementation and decision-making, **Appendix G** provides guidance on where each standard typically appears within 9–12 mathematics coursework, and **Appendix H** outlines possible course pathways that align with students' postsecondary and career goals.

Further guidance, specific to each of the high school standards, can be found in the expanded high school guidance document.

Core Numeric Reasoning Standards (NUM)

The Real Number System (REAL)

- Use reasoning to establish properties of integer exponents, including scientific notation. (MT.CORE.NUM.REAL.1)
- Represent and perform operations within very large and very small numbers using scientific notation. (MT.CORE.NUM.REAL.2)
- Define, manipulate, interpret, and compare real numbers presented through different representations, including both rational and irrational numbers, and apply comparisons in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.CORE.NUM.REAL.3)

Core Algebraic and Functional Reasoning Standards (ALG)

Understand Functions and Expressions (FUN)

- Interpret parts of an expression, such as terms, factors, and coefficients. (MT.CORE.ALG.FUN.1)
- Understand the definition of a function and distinguish between functions and relations. (MT.CORE.ALG.FUN.2)
- Represent functions using tables, graphs with appropriate scales and labels, equations, and verbal situations, while using technology strategically by:
    - Understanding that different representations highlight different aspects of functions, choosing the representation that is appropriate for the context, and
    - Comparing properties of two functions, including when each is represented in a different way. (MT.CORE.ALG.FUN.3)
- Use function notation, evaluate functions, and interpret statements that use function notation in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.CORE.ALG.FUN.4)
- Identify the domain and range of a function, including considering the constraints imposed by context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.CORE.ALG.FUN.5)
- Understand that a graph of an equation in two variables is the set of all of its solutions plotted in a coordinate plane. (MT.CORE.ALG.FUN.6)
- Understand that expressions can be rewritten in equivalent forms to make different characteristics or features visible. (MT.CORE.ALG.FUN.7)
- Rearrange literal equations to highlight quantities of interest. (MT.CORE.ALG.FUN.8)

Linear Functions and Expressions (LIN)

- Understand that linear functions have a constant rate of change. (MT.CORE.ALG.LIN.1)
- Understand slope as a rate of change and y-intercept as the initial value. (MT.CORE.ALG.LIN.2)
- Represent linear functions using tables, graphs, equations, and verbal situations, while using technology strategically. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by:
    - Identifying the rate of change and initial value in each representation.
    - Converting between representations, and
    - Writing equations for a line perpendicular or parallel to a given line that passes through a given point. (MT.CORE.ALG.LIN.3)
- Understand that linear equations can be represented in multiple forms and the specific features of each form by:
    - Choosing the form strategically when writing an equation based on given information and intended use,
    - Converting between slope-intercept, point-slope, and standard form symbolically,

    - Understanding the relationship between slope-intercept form, the rate of change, and the initial value,
    - Understanding the relationship between point-slope form, the rate of change, and a given point, and
    - Understanding the relationship between standard form and the x- and y-intercepts. (MT.CORE.ALG.LIN.4)
- Understand that a solution to a system of equations is a coordinate pair that makes both equations true. (MT.CORE.ALG.LIN.5)
- Solve systems of linear equations by graphing, substitution, and elimination, including systems with zero, one, or infinite solutions, while using technology and representations strategically. (MT.CORE.ALG.LIN.6)

Quadratic Functions and Expressions (QUAD)

- Understand that quadratic functions do not have a constant rate of change but have a constant second difference over equal intervals and identify the constant second difference in tables. (MT.CORE.ALG.QUAD.1)
- Represent quadratic functions using tables, graphs, equations, and verbal situations, while using technology strategically. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.CORE.ALG.QUAD.2)
- Understand that quadratic expressions can be represented in multiple forms and the specific features of each form by:
    - Choosing the form strategically when writing an expression based on given information and intended use,
    - Converting between factored, standard, and vertex forms symbolically and using representations,
    - Understanding the relationship between factored form and the zeros of the function, and
    - Understanding the relationship between vertex form and the vertex of the function. (MT.CORE.ALG.QUAD.3)
- Solve quadratic equations by factoring, graphing, completing the square, using inverse operations, and the quadratic formula. Use technology and representations strategically. (MT.CORE.ALG.QUAD.4)

Exponential Functions and Expressions (EXP)

- Understand that exponential functions have a constant common ratio over equal intervals, and identify the common ratio in tables and equations. (MT.CORE.ALG.EXP.1)
- Understand a as the initial value and b as the growth/decay factor for an exponential function written in standard form, $y = a \cdot b^x$. (MT.CORE.ALG.EXP.2)
- Understand the relationship between growth/decay factor and growth/decay rate. (MT.CORE.ALG.EXP.3)
- Represent exponential functions using tables, graphs, equations, and verbal situations; using technology strategically. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.CORE.ALG.EXP.4)
- Solve exponential equations graphically, while using technology strategically. (MT.CORE.ALG.EXP.5)

Modeling with Functions (MOD)

- Model situations in context, with linear, quadratic, and exponential functions. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by:
    - Determining if a set of data is best modeled by a linear function, quadratic function, exponential function, or none, and explaining why, and
    - Understanding that there are contexts where solutions may not lie on the curve. (MT.CORE.ALG.MOD.1)
- Interpret the coefficients in a linear, quadratic, and exponential model in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.CORE.ALG.MOD.2)
- Choose and interpret measurement units in formulas, graphs, and data displays to understand problems and to guide problem-solving in modeling situations. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.CORE.ALG.MOD.3)
- Choose a level of accuracy appropriate to limitations on measurement when reporting quantities in modeling situations. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.CORE.ALG.MOD.4)

Core Data Reasoning and Probability Standards (DATA)

Quantitative Literacy (LIT)

- Distinguish between quantitative and categorical data and use representations and analysis techniques that are appropriate for each type. (MT.CORE.DATA.LIT.1)
- Ask a statistical question to determine whether there appears to be an association between two variables, design and carry out an investigation, and write a persuasive argument based on the results of the investigation. (MT.CORE.DATA.LIT.2)
- Distinguish between association and causation. (MT.CORE.DATA.LIT.3)

Visualizing, Summarizing, and Interpreting Data (INT)

- Use technology to organize data, including very large data sets, into a useful and manageable structure. (MT.CORE.DATA.INT.1)
- Represent the distribution of univariate quantitative data with plots on the real number line, choosing a format most appropriate to the data set, and representing the distribution of bivariate quantitative data with a scatter plot. (MT.CORE.DATA.INT.2)
- Understand that standard deviation measures the variability of a data distribution, and calculate standard deviation using technology. (MT.CORE.DATA.INT.3)
- Interpret differences in the shape, center, and spread of quantitative data distributions, in context, accounting for possible effects of outliers on measures of central tendency and variability. (MT.CORE.DATA.INT.4)
- Compare and contrast two or more quantitative data distributions, using shape, center, and spread in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.CORE.DATA.INT.5)
- Analyze the relationship between two quantitative data distributions in context that have a linear association. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by:
    - Using technology strategically, represent two quantitative data distributions on scatter plots,
    - Describing verbally how the variables are related,
    - Using technology to find the least-squares regression line (line of best) fit for two quantitative variables,
    - Understanding that the line of best fit minimizes the square of the residuals, and
    - Understanding correlation as a measure of linear association and using technology, compute the correlation coefficient of a linear relationship. (MT.CORE.DATA.INT.6)
- Analyze the relationship between two categorical variables in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by:

- Summarizing categorical data for two categories in two-way frequency tables and visual representations,
- Interpreting relative frequencies for categorical data in context, and
- Identifying possible associations and trends in categorical data. (MT.CORE.DATA.INT.7)

Probability (PROB)

- Understand the concept of a sample space and describe events as subsets of a sample space. (MT.CORE.DATA.PROB.1)
- Understand the concepts of conditional probability and independence in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by:
  - Determining whether two events, A and B, are independent by using two-way tables, tree diagrams, and/or Venn diagrams, and interpreting the answer in context, and
  - Computing the conditional probability of event A given event B by using two-way tables, tree diagrams, and/or Venn diagrams, and interpreting the answer in context. (MT.CORE.DATA.PROB.2)

Core Geometric Reasoning Standards (GEOM)

Transformations (TRANS)

- Represent transformations in the plane using a variety of methods. (MT.CORE.GEOM.TRANS.1)
- Define the congruence of two and show that two figures are congruent by finding a sequence of rigid motions that maps one figure to the other by:
    - Using the definition of congruence in terms of rigid motions to show that two triangles are congruent if, and only if, corresponding pairs of sides and corresponding pairs of angles are congruent, and
    - Verifying that two triangles are congruent if, but not only if, the following groups of corresponding parts are congruent: angle-side-angle (ASA), side-angle-side (SAS), and side-side-side (SSS). (MT.CORE.GEOM.TRANS.2)
- Define the similarity of two figures in terms of similarity transformations by:
    - Verifying that two triangles are similar if, and only if, corresponding pairs of sides are proportional and corresponding pairs of angles are congruent, and
    - Using the properties of similarity transformations to establish the angle-angle (AA) criterion for two triangles to be similar. (MT.CORE.GEOM.TRANS.3)

Geometric Arguments, Reasoning, and Proof (ARG)

- Investigate, conjecture, prove theorems, and communicate the proofs in a variety of ways by:
    - Proving theorems about lines and angles. Theorems include: vertical angles are congruent, when a transversal crosses parallel lines alternate interior angles are congruent and corresponding angles are congruent, and the points on the perpendicular bisector of a line segment are those equidistant from the segment's endpoints,
    - Proving theorems about triangles. Theorems include: the sum of the measures of the interior angles of a triangle is 180˚, the Pythagorean Theorem, the base angles of isosceles triangles are congruent, and a line parallel to one side of a triangle divides the other two sides proportionally,
    - Proving theorems about parallelograms and other quadrilaterals. Theorems include: necessary and sufficient conditions for rectangles, parallelograms, rhombi, and kites, and
    - Proving theorems about circles. Theorems include: the relationship between central, inscribed, and circumscribed angles, inscribed angles on a diameter are right angles, and the radius of a circle is perpendicular to the tangent where the radius intersects the circle. (CORE.GEOM.ARG.1)

Measurement, Problem-Solving, and Geometric Modeling (MEAS)

- Use the Pythagorean Theorem to calculate distance in the coordinate plane. (CORE.GEOM.MEAS.1)
- Derive the equation of a circle of a given center and radius using the Pythagorean Theorem. (CORE.GEOM.MEAS.2)
- Use similarity to explore and define the sine ratio, cosine ratio, and tangent ratio in terms of right triangles by:
    - Deriving and applying the trigonometric ratios in special right triangles, and
    - Using trigonometric ratios and the Pythagorean Theorem to solve right triangles. (CORE.GEOM.MEAS.3)
- Use geometric shapes, their measures, and their properties to model objects and use those models to solve problems in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by:
    - Modeling and solving problems with 2D shapes by using the perimeter and area of polygons, circles, and composite shapes with portions removed,
    - Modeling and solving problems with 3D solids by using surface area and volume of solids, including composite solids and solids with portions removed, and
    - Deriving and applying the relationships between the lengths, perimeters, areas, and volumes of similar figures in relation to their scale factor. (CORE.GEOM.MEAS.4)

Core Plus Number and Quantity Standards (NUM)

Numeric Reasoning (REAS)

- Extend the properties of exponents to rational exponents, including converting between exponential and radical forms. (MT.PLUS.NUM.REAS.1)
- Understand there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b as real numbers by:
    - Adding, subtracting, multiplying, and dividing complex numbers, and
    - Finding the conjugate of a complex number. (MT.PLUS.NUM.REAS.2)

Core Plus Algebraic and Functional Reasoning Standards (ALG)

Functions, Expressions, and Inequalities (FUN)

- Identify the effect on the graph of replacing $f(x)f(x)$ by $f(x)+k, k\cdot f(x),\ f(k\cdot x), and\ f(x+k)$ for specific values of k (both positive and negative). (MT.PLUS.ALG.FUN.1)
- Understand the relationship between a function and its inverse. (MT.PLUS.ALG.FUN.2)

Polynomial Functions (POLY)

- Understand polynomials are created by multiplying linear factors. (MT.PLUS.ALG.POLY.1)
- Understand that polynomial expressions can be represented in both factored and standard form, and the specific features of each form by:
  - Choosing the form strategically based on given information and intended use when writing an expression,
  - Converting between factored and standard form symbolically and using representations (e.g., area model), and
  - Interpreting the relationship between the factored form of the expression and the zeros of the function. (MT.PLUS.ALG.POLY.2)
- Graph polynomial functions with and without the use of technology, by identifying zeros, relative maxima and minima, and end behavior. (MT.PLUS.ALG.POLY.3)
- Solve quadratic equations that have complex solutions and understand why the solutions form a conjugate pair. (MT.PLUS.ALG.POLY.4)

Exponential and Logarithmic Functions (EXP)

- Understand logarithmic functions as the inverse of exponential functions. (MT.PLUS.ALG.EXP.1)
- Understand why e is defined as the natural base. (MT.PLUS.ALG.EXP.2)
- Understand that exponential and logarithmic functions can be represented using multiple forms by:
  - Expressing exponential functions in the form$f(x)=a\cdot b^x$ and $f(x)=Pe^{r\cdot t}$, and
  - Expressing logarithmic functions in base 10 and base e. (MT.PLUS.ALG.EXP.3)
- Graph logarithmic and exponential functions with and without the use of technology by identifying intercepts, asymptotes, and end behavior. (MT.PLUS.ALG.EXP.4)
- Solve exponential and logarithmic equations using inverse operations with and without the use of technology. (MT.PLUS.ALG.EXP.5)

Trigonometric Functions (TRIG)

- Understand how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers by:
    - Defining the sine and cosine functions in terms of the unit circle, and
    - Defining the tangent, cotangent, secant, and cosecant functions in terms of sine and cosine. (MT.PLUS.ALG.TRIG.1)
- Understand and use the radian measure of an angle and convert between degree and radian measures. (MT.PLUS.ALG.TRIG.2)
- Graph trigonometric functions with and without the use of technology by:
    - Graphing sine and cosine functions, identifying period, midline, and amplitude, and
    - Graphing tangent functions, identifying period and asymptotes. (MT.PLUS.ALG.TRIG.3)
- Solve trigonometric equations with and without the use of technology. (MT.PLUS.ALG.TRIG.4)
- Apply the Law of Sines and the Law of Cosines to find unknown measurements in non-right triangles. (MT.PLUS.ALG.TRIG.5)

Modeling (MOD)

- Model situations in context with polynomial, exponential, logarithmic, and trigonometric functions. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities by:
    - Determining if a set of data is best modeled by a polynomial, exponential, logarithmic, or trigonometric function or none, and explaining why, and
    - Understanding that there are contexts where solutions may not lie on the curve. (MT.PLUS.ALG.MOD.1)
- Interpret the coefficients in a polynomial, exponential, logarithmic, and trigonometric model in context. This standard should incorporate cultural context relating to Montana Indigenous Peoples and local communities. (MT.PLUS.ALG.MOD.2)
- Use and interpret units correctly in modeling situations. (MT.PLUS.ALG.MOD.3)
- Choose a level of accuracy appropriate to limitations on measurement when reporting quantities in modeling situations. (MT.PLUS.ALG.MOD.4)

Core Plus Data Reasoning Standards (DATA)

Normal Distribution (NORM)

- Determine if a data set is normally distributed. (MT.PLUS.DATA.NORM.1)
- Use technology to find the mean and standard deviation of a normally distributed data set and apply the empirical rule to estimate population percentages. (MT.PLUS.DATA.NORM.2)
- Estimate areas under a normal curve to solve problems in context, using calculators, spreadsheets, and tables as appropriate. (MT.PLUS.DATA.NORM.3)

Experimental Design (DES)

- Describe the purposes of and differences among sample surveys, experiments, and observational studies and explain how randomization relates to each. (MT.PLUS.DATA.DES.1)
- Describe differences between randomly selecting samples and randomly assigning subjects to experimental treatment groups in terms of inferences drawn regarding a population versus regarding cause and effect by:
    - Explaining the consequences, due to uncontrolled variables, of non-randomized assignment of subjects to groups in experiments, and
    - Evaluating where bias, including sampling, response, or nonresponse bias, may occur in surveys, and whether results are representative of the population of interest. (MT.PLUS.DATA.DES.2)
- Evaluate the effect of sample size on the expected variability in the sampling distribution of a sample statistic by:
    - Simulating a sampling distribution of sample means from a population with a known distribution, observing the effect of the sample size on the variability, and
    - Demonstrating that the standard deviation of each simulated sampling distribution is the known standard deviation of the population divided by the square root of the sample size. (MT.PLUS.DATA.DES.3)

Statistical Inference Using Simulation (INF)

- Distinguish between a statistic and a parameter and use statistical processes to make inferences about population parameters based on statistics from random samples from that population. (MT.PLUS.DATA.INF.1)
- Estimate a population parameter from a representative sample by:

    - Understanding why the sample statistic is the best estimate for the associated population parameter,
    - Understanding that sampling variability introduces uncertainty in the estimate, and account for the uncertainty with a confidence interval by:
        - Using resampling with replacement from an observed sample to produce a sampling distribution,
        - Verifying that a sampling distribution is centered at the population mean and approximately normal if the sample size is large enough,
        - Verifying that 95% of sample means are within two standard deviations of the sampling distribution from the population mean, and
        - Creating and interpreting a 95% confidence interval based on an observed mean from a sampling distribution. (MT.PLUS.DATA.INF.2)
- Use data from a randomized experiment to test the hypothesis that two groups are equal by:
    - Interpreting the difference or ratio between the group means as the observed effect between the groups, and
    - Understanding that an observed effect may be due to randomization and using a randomization test (repeatedly reshuffling the observed data into new groups) to determine the probability that an observed effect is due to randomization alone. (MT.PLUS.DATA.INF.3)

END OF THE HIGH SCHOOL MATHEMATICS CONTENT STANDARDS

Appendix A: K-12 Correspondence with Common Core State Standards

An Important Note:

The Montana State Standards are distinct from the Common Core State Standards (CCSS). While some Montana standards remain similar to their CCSS counterparts, many have been significantly revised or newly developed. This correspondence information is provided as a reference tool to help educators understand where conceptual connections may exist between the two sets of standards.

It is important to note that **this correspondence does not imply equivalence**. Educators should not assume that a CCSS-aligned resource automatically addresses the expectations and requirements of the Montana State Mathematics Standards. Rather, this tool is intended to support the process of evaluating existing materials, identifying areas of overlap or deviation, and making informed decisions about curriculum and instruction alignment.

Because many available curriculum resources are built around CCSS, the following charts may serve as a starting point for alignment work in districts and classrooms. However, each **Montana Math Standard must be reviewed individually** to promote accurate delivery during instruction. This is especially true for standards that reference Montana's Indigenous Peoples and local communities, which are unique to our state.

This appendix is designed to support educators in navigating these distinctions and ensuring that their curriculum and instruction meet the expectations of the Montana State Standards.

K-12 Mathematical Practice Standards

Montana Standard Code	Corresponding Common Core Standard(s)
MT.MP.1	CCSS.MP.1
MT.MP.2	CCSS.MP.2, CCSS.MP.7, CCSS.MP.8
MT.MP.3	CCSS.MP.3, CCSS.MP.6
MT.MP.4	CCSS.MP.4
MT.MP.5	CCSS.MP.5
MT.MP.6	**No corresponding standard**
MT.MP.7	**No corresponding standard**

Kindergarten Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)
MT.K.CC.1	CCSS.K.CC.A.1
MT.K.CC.2	CCSS.K.CC.A.2
MT.K.CC.3	CCSS.K.CC.A.3
MT.K.CC.4	CCSS.K.CC.B.1 and CCSS.K.CC.B.1.c
MT.K.CC.5	CCSS.K.CC.B.5
MT.K.CC.6	CCSS.K.CC.C.6
MT.K.CC.7	CCSS.K.CC.C.7
MT.K.OA.1	CCSS.K.OA.A.1
MT.K.OA.2	CCSS.K.OA.A.2
MT.K.OA.3	CCSS.K.OA.A.3
MT.K.OA.4	CCSS.K.OA.A.4
MT.K.OA.5	CCSS.K.OA.A.5
MT.K.OA.6	**No corresponding standard**
MT.K.NBT.1	CCSS.K.NBT.A.1
MT.K.MD.1	CCSS.K.MD.A.1
MT.K.MD.2	CCSS.K.MD.A.2
MT.K.MD.3	CCSS.K.MD.B.3
MT.K.MD.4	**No corresponding standard**
MT.K.MD.5	**No corresponding standard**
MT.K.G.1	CCSS.K.G.A.1
MT.K.G.2	CCSS.K.G.A.2
MT.K.G.3	CCSS.K.G.A.3
MT.K.G.4	CCSS.K.G.B.4
MT.K.G.5	CCSS.K.G.B.5
MT.K.G.6	CCSS.K.G.B.6

Grade 1 Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)
MT.1.OA.1	CCSS.1.OA.A.1
MT.1.OA.2	CCSS.1.OA.A.2
MT.1.OA.3	CCSS.1.OA.B.3
MT.1.OA.4	CCSS.1.OA.B.4
MT.1.OA.5	CCSS.1.OA.C.5
MT.1.OA.6	CCSS.1.OA.C.6
MT.1.OA.7	CCSS.1.OA.C.6
MT.1.OA.8	CCSS.1.OA.D.7
MT.1.OA.9	CCSS.1.OA.D.8
MT.1.NBT.1	CCSS.1.NBT.A.1
MT.1.NBT.2	CCSS.1.NBT.B.2
MT.1.NBT.3	CCSS.1.NBT.B.3
MT.1.NBT.4	CCSS.1.NBT.C.4
MT.1.NBT.5	CCSS.1.NBT.C.5
MT.1.NBT.6	CCSS.1.NBT.C.6
MT.1.MD.1	CCSS.1.MD.A.1
MT.1.MD.2	CCSS.1.MD.A.2
MT.1.MD.3	CCSS.1.MD.B.3
MT.1.MD.4	**No corresponding standard**
MT.1.MD.5	CCSS.1.MD.C.4
MT.1.G.1	CCSS.1.G.A.1
MT.1.G.2	**No corresponding standard**
MT.1.G.3	CCSS.1.G.A.2
MT.1.G.4	CCSS.1.G.A.3

Grade 2 Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)
MT.2.OA.1	CCSS.2.OA.A.1
MT.2.OA.2	CCSS.2.OA.B.2
MT.2.OA.3	CCSS.2.OA.C.3
MT.2.OA.4	CCSS.2.OA.C.4
MT.2.NBT.1	CCSS.2.NBT.A.1
MT.2.NBT.2	CCSS.2.NBT.A.2
MT.2.NBT.3	CCSS.2.NBT.A.3
MT.2.NBT.4	CCSS.2.NBT.A.4
MT.2.NBT.5	CCSS.2.NBT.B.5
MT.2.NBT.6	CCSS.2.NBT.B.6
MT.2.NBT.7	CCSS.2.NBT.B.7
MT.2.NBT.8	CCSS.2.NBT.B.8
MT.2.NBT.9	CCSS.2.NBT.B.9
MT.2.MD.1	CCSS.2.MD.A.1
MT.2.MD.2	CCSS.2.MD.A.2
MT.2.MD.3	CCSS.2.MD.A.3
MT.2.MD.4	CCSS.2.MD.A.4
MT.2.MD.5	CCSS.2.MD.B.5
MT.2.MD.6	CCSS.2.MD.B.6
MT.2.MD.7	CCSS.2.MD.C.7
MT.2.MD.8	CCSS.2.MD.C.8
MT.2.MD.9	CCSS.2.MD.C.9
MT.2.MD.10	CCSS.2.MD.C.10
MT.2.MD.11	**No corresponding standard**
MT.2.G.1	CCSS.2.G.A.1
MT.2.G.2	CCSS.2.G.A.2
MT.2.G.3	CCSS.2.G.A.3

Grade 3 Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)
MT.3.OA.1	CCSS.3.OA.A.1
MT.3.OA.2	CCSS.3.OA.A.2
MT.3.OA.3	CCSS.3.OA.A.3
MT.3.OA.4	CCSS.3.OA.A.4
MT.3.OA.5	CCSS.3.OA.B.5
MT.3.OA.6	CCSS.3.OA.B.6
MT.3.OA.7	CCSS.3.OA.C.7
MT.3.OA.8	CCSS.3.OA.D.8
MT.3.OA.9	CCSS.3.OA.D.9
MT.3.NBT.1	CCSS.3.NBT.A.1
MT.3.NBT.2	CCSS.3.NBT.A.2
MT.3.NBT.3	CCSS.3.NBT.A.3
MT.3.NF.1	CCSS.3.NF.A.1
MT.3.NF.2	CCSS.3.NF.A.2
MT.3.NF.3	CCSS.3.NF.A.3
MT.3.MD.1	CCSS.3.MD.A.1
MT.3.MD.2	CCSS.3.MD.A.2
MT.3.MD.3	CCSS.3.MD.B.3
MT.3.MD.4	CCSS.3.MD.B.4
MT.3.MD.5	CCSS.3.MD.C.5
MT.3.MD.6	CCSS.3.MD.C.6
MT.3.MD.7	CCSS.3.MD.C.7
MT.3.MD.8	CCSS.3.MD.C.8
MT.3.G.1	CCSS.3.G.A.1
MT.3.G.2	CCSS.3.G.A.2

Grade 4 Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)
MT.4.OA.1	CCSS.4.OA.A.1
MT.4.OA.2	CCSS.4.OA.A.2
MT.4.OA.3	CCSS.4.OA.A.3
MT.4.OA.4	CCSS.4.OA.B.4
MT.4.OA.5	CCSS.4.OA.C.5
MT.4.NBT.1	CCSS.4.NBT.A.1
MT.4.NBT.2	CCSS.4.NBT.A.2
MT.4.NBT.3	CCSS.4.NBT.A.3
MT.4.NBT.4	CCSS.4.NBT.B.4
MT.4.NBT.5	CCSS.4.NBT.B.5
MT.4.NBT.6	CCSS.4.NBT.B.6
MT.4.NF.1	CCSS.4.NF.A.1
MT.4.NF.2	CCSS.4.NF.A.2
MT.4.NF.3	CCSS.4.NF.B.3
MT.4.NF.4	CCSS.4.NF.B.4
MT.4.NF.5	CCSS.4.NF.C.5
MT.4.NF.6	CCSS.4.NF.C.6
MT.4.NF.7	CCSS.4.NF.C.7
MT.4.MD.1	CCSS.4.MD.1
MT.4.MD.2	CCSS.4.MD.2
MT.4.MD.3	CCSS.4.MD.3
MT.4.MD.4	CCSS.4.MD.4
MT.4.MD.5	CCSS.4.MD.5
MT.4.MD.6	CCSS.4.MD.6
MT.4.MD.7	CCSS.4.MD.7
MT.4.G.1	CCSS.4.G.1
MT.4.G.2	CCSS.4.G.2
MT.4.G.3	CCSS.4.G.3

Grade 5 Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)
MT.5.OA.1	CCSS.5.OA.A.1
MT.5.OA.2	CCSS.5.OA.A.2
MT.5.OA.3	CCSS.5.OA.B.3
MT.5.NBT.1	CCSS.5.NBT.A.1
MT.5.NBT.2	CCSS.5.NBT.A.2
MT.5.NBT.3	CCSS.5.NBT.A.3
MT.5.NBT.4	CCSS.5.NBT.A.4
MT.5.NBT.5	CCSS.5.NBT.B.5
MT.5.NBT.6	CCSS.5.NBT.B.6
MT.5.NBT.7	CCSS.5.NBT.B.7
MT.5.NF.1	CCSS.NF.A.1
MT.5.NF.2	CCSS.NF.A.2
MT.5.NF.3	CCSS.NF.B.3
MT.5.NF.4	CCSS.NF.B.4
MT.5.NF.5	CCSS.NF.B.5
MT.5.NF.6	CCSS.NF.B.6
MT.5.NF.7	CCSS.NF.B.7
MT.5.MD.1	CCSS.MD.A.1
MT.5.MD.2	CCSS.MD.B.2
MT.5.MD.3	CCSS.MD.C.3
MT.5.MD.4	CCSS.MD.C.4
MT.5.MD.5	CCSS.MD.C.5
MT.5.G.1	CCSS.G.A.1
MT.5.G.2	CCSS.G.B.2
MT.5.G.3	CCSS.G.B.3
MT.5.G.4	CCSS.G.B.4

Grade 6 Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)
MT.6.RP.1	CCSS.6.NS.A.1
MT.6.RP.2	CCSS.6.NS.B.2
MT.6.RP.3	CCSS.6.NS.B.3
MT.6.NS.1	CCSS.6.NS.B.4
MT.6.NS.2	CCSS.6.NS.C.5
MT.6.NS.3	CCSS.6.NS.C.6
MT.6.NS.4	CCSS.6.NS.A.1
MT.6.NS.5	CCSS.6.NS.B.2
MT.6.NS.6	CCSS.6.NS.B.3
MT.6.NS.7	CCSS.6.NS.C.7
MT.6.NS.8	CCSS.6.NS.C.8
MT.6.EE.1	CCSS.6.EE.A.1
MT.6.EE.2	CCSS.6.EE.A.2
MT.6.EE.3	CCSS.6.EE.A.3
MT.6.EE.4	CCSS.6.EE.B.5
MT.6.EE.5	CCSS.6.EE.B.6
MT.6.EE.6	CCSS.6.EE.B.7
MT.6.EE.7	CCSS.6.EE.B.8
MT.6.EE.8	CCSS.6.EE.C.9
MT.6.G.1	CCSS.6.G.A.1
MT.6.G.2	CCSS.6.G.A.2
MT.6.G.3	CCSS.6.G.A.3
MT.6.G.4	CCSS.6.G.A.4
MT.6.SP.1	CCSS.6.SP.A.1
MT.6.SP.2	CCSS.6.SP.A.2
MT.6.SP.3	CCSS.6.SP.A.3
MT.6.SP.4	CCSS.6.SP.B.4
MT.6.SP.5	CCSS.6.SP.B.5

Grade 7 Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)
MT.7.RP.1	CCSS.7.RP.A.1
MT.7.RP.2	CCSS.7.RP.A.2
MT.7.RP.3	CCSS.7.RP.A.3
MT.7.NS.1	CCSS.7.NS.A.1
MT.7.NS.2	CCSS.7.NS.A.2, CCSS.7.NS.A.3
MT.7.NS.3	CCSS.7.NS.A.2.d
MT.7.EE.1	CCSS.7.EE.A.1
MT.7.EE.2	CCSS.7.EE.A.2
MT.7.EE.3	CCSS.7.EE.B.3
MT.7.EE.4	CCSS.7.EE.B.4
MT.7.G.1	CCSS.7.G.A.1
MT.7.G.2	CCSS.7.G.A.2
MT.7.G.3	CCSS.7.G.B.4
MT.7.G.4	CCSS.7.G.B.5
MT.7.G.5	CCSS.7.G.B.6
MT.7.SP.1	CCSS.7.SP.A.1
MT.7.SP.2	CCSS.7.SP.A.2
MT.7.SP.3	CCSS.7.SP.B.3
MT.7.SP.4	CCSS.7.SP.B.4
MT.7.SP.5	CCSS.7.SP.C.5
MT.7.SP.6	CCSS.7.SP.C.6
MT.7.SP.7	CCSS.7.SP.C.7
MT.7.SP.8	CCSS.7.SP.C.8

Grade 8 Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)

MT.8.NS.1	CCSS.NS.A.1
MT.8.NS.2	CCSS.NS.A.2
MT.8.EE.1	CCSS.8.EE.A.1
MT.8.EE.2	CCSS.8.EE.A.2
MT.8.EE.3	CCSS.8.EE.A.3
MT.8.EE.4	CCSS.8.EE.A.4
MT.8.EE.5	CCSS.8.EE.B.5
MT.8.EE.6	CCSS.8.EE.B.6
MT.8.EE.7	CCSS.8.EE.C.7
MT.8.EE.8	CCSS.8.EE.C.8
MT.8.F.1	CCSS.8.F.A.1
MT.8.F.2	CCSS.8.F.A.2
MT.8.F.3	CCSS.8.F.A.3
MT.8.F.4	CCSS.8.F.B.4
MT.8.F.5	CCSS.8.F.B.5
MT.8.G.1	CCSS.8.G.A.1
MT.8.G.2	CCSS.8.G.A.2
MT.8.G.3	CCSS.8.G.A.3
MT.8.G.4	CCSS.8.G.A.4
MT.8.G.5	CCSS.8.G.A.5
MT.8.G.6	CCSS.8.G.B.6
MT.8.G.7	CCSS.8.G.B.7
MT.8.G.8	CCSS.8.G.B.8
MT.8.G.9	CCSS.8.G.C.9
MT.8.SP.1	CCSS.8.SP.A.1
MT.8.SP.2	CCSS.8.SP.A.2
MT.8.SP.3	CCSS.8.SP.A.3
MT.8.SP.4	CCSS.8.SP.A.4

High School Core Numeric Reasoning Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)

MT.CORE.NUM.REAL.1	**No corresponding standard**
MT.CORE.NUM.REAL.2	**No corresponding standard**
MT.CORE.NUM.REAL.3	N-RN.A.B, N-RN.B.3

High School Core Algebraic and Functional Reasoning Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)	Montana Standard Code	Corresponding Common Core Standard(s)
MT.CORE.ALG.FUN.1	A-SSE.A, A-SSE.A.1,	MT.CORE.ALG.LIN.5	A-REI.D.12, A-REI.D.11
MT.CORE.ALG.FUN.2	F-IF.B.4, F-IF.A.1	MT.CORE.ALG.LIN.6	A-REI.D.11, A-REI.C.6, A.REI.C.5
MT.CORE.ALG.FUN.3	A-CED.A.2	MT.CORE.ALG.QUAD.1	F-LE.A.3, F-LE.A.1
MT.CORE.ALG.FUN.3.a	**No corresponding standard**	MT.CORE.ALG.QUAD.2	F-IF.C.7, F-IF.C.8, A-SSE.B.3
MT.CORE.ALG.FUN.3.b	F-IF.C.9	MT.CORE.ALG.QUAD.3	F-IF.C.8, A-SSE.B.3
MT.CORE.ALG.FUN.4	F-IF.A.2, F-IF.B.5, F-IF.A.1	MT.CORE.ALG.QUAD.3.a	A-SSE.B.3
MT.CORE.ALG.FUN.5	F-IF.B.5, A-CED.A.3	MT.CORE.ALG.QUAD.3.b	A-SSE.B.3, A-SSE.A.2
MT.CORE.ALG.FUN.6	A-REI.D.10	MT.CORE.ALG.QUAD.3.c	A-SSE.B.3
MT.CORE.ALG.FUN.7	A-SSE.A.1, A-SSE.A.2, A-SSE.B	MT.CORE.ALG.QUAD.3.d	A-SSE.B.3
MT.CORE.ALG.FUN.8	A-CED.A.4	MT.CORE.ALG.QUAD.4	A-REI.B.4
MT.CORE.ALG.LIN.1	F-IF.B.6, F-LE.A.1	MT.CORE.ALG.EXP.1	F-LE.A.2, F-LE.A.1
MT.CORE.ALG.LIN.2	F-IF.B.6, S-ID.C.7	MT.CORE.ALG.EXP.2	F-IF.C.8
MT.CORE.ALG.LIN.3	F-IF.C.7, F-IF.B.4, F-LE.A.2	MT.CORE.ALG.EXP.3	F-IF.C.8, A-SSE.B.3
MT.CORE.ALG.LIN.3.a	S-ID.C.7	MT.CORE.ALG.EXP.4	F-IF.C.7, F-IF.C.8, F-LE.A.2
MT.CORE.ALG.LIN.3.b	F-IF.C.9	MT.CORE.ALG.EXP.5	A-CED.A.1
MT.CORE.ALG.LIN.3.c	G-GPE.B.5	MT.CORE.ALG.MOD.1	F-LE-B, F-LE.B.5, F-BF.A.1
MT.CORE.ALG.LIN.4	F-IF.C.8	MT.CORE.ALG.MOD.1.a	F-LE.A.1
MT.CORE.ALG.LIN.4.a	**No corresponding standard**	MT.CORE.ALG.MOD.1.b	A-REI.D.12
MT.CORE.ALG.LIN.4.b	A-SSE.A.2	MT.CORE.ALG.MOD.2	A-SSE.A.1, F-IF.B.4
MT.CORE.ALG.LIN.4.c	**No corresponding standard**	MT.CORE.ALG.MOD.3	N-Q.A., N-Q.A.1
MT.CORE.ALG.LIN.4.d	**No corresponding standard**	MT.CORE.ALG.MOD.4	N-Q.A.3
MT.CORE.ALG.LIN.4.e	**No corresponding standard**		

High School Core Data Reasoning and Probability Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)
MT.CORE.DATA.LIT.1	S-ID.B.6
MT.CORE.DATA.LIT.2	S-ID.B
MT.CORE.DATA.LIT.3	S-ID.C9
MT.CORE.DATA.INT.1	**No corresponding standard**
MT.CORE.DATA.INT.2	S-ID.A.1
MT.CORE.DATA.INT.3	S-ID.A.2
MT.CORE.DATA.INT.4	S-ID.A, S-ID.A.3
MT.CORE.DATA.INT.5	S-ID.A.2
MT.CORE.DATA.INT.6	S-ID.C, S-ID.C.7, S-ID.B.6
MT.CORE.DATA.INT.6.a	S-ID.B6
MT.CORE.DATA.INT.6.b	S-ID.B6
MT.CORE.DATA.INT.6.c	S-ID.C8
MT.CORE.DATA.INT.6.d	S-ID.C.8
MT.CORE.DATA.INT.6.e	S-ID.C.8
MT.CORE.DATA.INT.7	S-ID.B5
MT.CORE.DATA.INT.7.a	S-ID.B5, S-CP.A.4
MT.CORE.DATA.INT.7.b	S-ID.B5
MT.CORE.DATA.INT.7.c	S-ID.B5
MT.CORE.DATA.PROB.1	S-CP.A.1
MT.CORE.DATA.PROB.2	S-CP.A, S-CP.A.2, S-CP.A.3, S-CP.A.5
MT.CORE.DATA.PROB.2.a	S-CP.A3 S-CP.B.6, S-CP.A.3, S-CP.A.4
MT.CORE.DATA.PROB.2.b	S-CP.A, S-CP.B, S-CP.A.2, S-CP.A.4

High School Core Geometric Reasoning Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)
MT.CORE.GEOM.TRANS.1	C-CO.A, G-CO.A.2, G-CO.A.5, G-SRT.B.5
MT.CORE.GEOM.TRANS.2	G-CO.B.6, G-CO.A.3
MT.CORE.GEOM.TRANS.2.a	G-CO.B.7, G-CO.B.6
MT.CORE.GEOM.TRANS.2.b	G-CO.B.8
MT.CORE.GEOM.TRANS.3	G-CO.A.2, G-CO.A.5, G-SRT.A.2
MT.CORE.GEOM.TRANS.3.a	G-SRT.A, G-SRT.A.2, G-SRT.B.5
MT.CORE.GEOM.TRANS.3.b	G-SRT.A, G-SRT.A.3
CORE.GEOM.ARG.1	G-CO.C, G-CO.D.12, G-CO.C.11, G-CO.C.9
CORE.GEOM.ARG.1.a	G-CO.C.9
CORE.GEOM.ARG.1.b	G-CO.C.10, G-SRT.B.4
CORE.GEOM.ARG.1.c	G-CO.C.11
CORE.GEOM.ARG.1.d	G-C.A, G-C.A.2
CORE.GEOM.MEAS.1	G-GPE.B.7
CORE.GEOM.MEAS.2	G.GPE.A.1
CORE.GEOM.MEAS.3	G-SRT.C.6
CORE.GEOM.MEAS.3.a	F-TF.A
CORE.GEOM.MEAS.3.b	G-SRT.C, G-SRT.C.8
CORE.GEOM.MEAS.4	G-MG.A, G-MG.A.1, G-MG.A.3
CORE.GEOM.MEAS.4.a	G-C.B, G-MG.A, G-MG.A.3
CORE.GEOM.MEAS.4.b	G-MG.A.1, G-GMD.A.3, G-MG.A
CORE.GEOM.MEAS.4.c	**No corresponding standard**

High School Core Plus Number and Quantity Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)

MT.PLUS.NUM.REAS.1	N-RN.A,N-RN.A.1, N-RN.A.2, N-CN.A.2
MT.PLUS.NUM.REAS.2	N-CN.A.1
MT.PLUS.NUM.REAS.2.a	N-CN.A
MT.PLUS.NUM.REAS.2.b	N-CN.A.3

High School Core Plus Algebraic and Functional Reasoning Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)	Montana Standard Code	Corresponding Common Core Standard(s)
MT.PLUS.ALG.FUN.1	F-BF.B.3	MT.PLUS.ALG.TRIG.3.b	F-TF.B, F-IF.B.4
MT.PLUS.ALG.FUN.2	F-BF.B.4	MT.PLUS.ALG.TRIG.4	**No corresponding standard**
MT.PLUS.ALG.POLY.1	A-APR.B, A-SSE.A.1	MT.PLUS.ALG.TRIG.5	G-SRT.D.10, G-SRT.D.11
MT.PLUS.ALG.POLY.2	**No corresponding standard**	MT.PLUS.ALG.MOD.1	F.LE.A, F-BF.A.1, F-TF.B.5
MT.PLUS.ALG.POLY.2.a	F-IF.C.8	MT.PLUS.ALG.MOD.1.a	F.LE.A, F.LE.B, F-LE.B.5 F-LE.A.1, F-TF.B.5
MT.PLUS.ALG.POLY.2.b	F-IF.C.8, A-SSE.A.2	MT.PLUS.ALG.MOD.1.b	A-CED.A.3, A-REI.D.12
MT.PLUS.ALG.POLY.2.c	F-IF.C.8	MT.PLUS.ALG.MOD.2	F-IF.B, F-IF.B.4, F-TF.B.5
MT.PLUS.ALG.POLY.3	F-IF.C.7, F-IF.B.4	MT.PLUS.ALG.MOD.3	N-Q.A, N-Q.A.1
MT.PLUS.ALG.POLY.4	N-CN.C, N-CN.C.7,	MT.PLUS.ALG.MOD.4	N-Q.A.2, N-Q.A.3
MT.PLUS.ALG.EXP.1	F-BF.B.5		
MT.PLUS.ALG.EXP.2	F-LE.A.4		
MT.PLUS.ALG.EXP.3	F-LE.A.4		
MT.PLUS.ALG.EXP.3.a	F-LE.A.4		
MT.PLUS.ALG.EXP.3.b	F-LE.A.4		
MT.PLUS.ALG.EXP.4	F-IF.C.7, F-IF.B.4		
MT.PLUS.ALG.EXP.5	F-BF.B.5		
MT.PLUS.ALG.TRIG.1	F-TF.A, F-TF.A.2		
MT.PLUS.ALG.TRIG.1.a	F-TF.A.2		
MT.PLUS.ALG.TRIG.1.b	F-TF.C		
MT.PLUS.ALG.TRIG.2	F-TF.A.1, G-C.B.5		
MT.PLUS.ALG.TRIG.3	F-TF.B,		
MT.PLUS.ALG.TRIG.3.a	F-TF.B, F-IF.B.4		

High School Core Plus Data and Reasoning Mathematics Content Standards

Montana Standard Code	Corresponding Common Core Standard(s)
MT.PLUS.DATA.NORM.1	S-ID.A.4
MT.PLUS.DATA.NORM.2	S-ID.A.4
MT.PLUS.DATA.NORM.3	S-ID.A.4
MT.PLUS.DATA.DES.1	S-IC.B.3
MT.PLUS.DATA.DES.2	**No corresponding standard**
MT.PLUS.DATA.DES.2.a	S-IC.B.6
MT.PLUS.DATA.DES.2.b	S-IC.B.6
MT.PLUS.DATA.DES.3	**No corresponding standard**
MT.PLUS.DATA.DES.3.a	**No corresponding standard**
MT.PLUS.DATA.DES.3.b	**No corresponding standard**
MT.PLUS.DATA.INF.1	S-IC.A.1
MT.PLUS.DATA.INF.2	S-IC.A.1, S-IC.B.4
MT.PLUS.DATA.INF.2.a	S-IC.B.4
MT.PLUS.DATA.INF.2.b	S-IC.B.4
MT.PLUS.DATA.INF.2.b.i	S-IC.B.4
MT.PLUS.DATA.INF.2.b.ii	S-IC.B.4
MT.PLUS.DATA.INF.2.b.iii	S-IC.B.4
MT.PLUS.DATA.INF.2.b.iv	S-IC.B.4
MT.PLUS.DATA.INF.3	S-IC.B.5
MT.PLUS.DATA.INF.3.a	**No corresponding standard**
MT.PLUS.DATA.INF.3.b	S-IC.B.3

Appendix B: PK-5 Vertical Alignment by Domain - Coming Soon!

This appendix provides examples of the progression of standards across grade levels PK-5. It is intended to support educators in understanding the trajectory of a student's development within a concept in mathematics across grade levels, aiding in identifying prerequisite, corequisite, and post-requisite knowledge. This can aid in conversations regarding the identification of power standards, cross-grade level alignment, instructional differentiation, and scope and sequencing within schools and districts.

Note: A final draft of this appendix will be added once the expanded guidance for K-5 is completed. Thank you for your patience.

Appendix C: Financial Literacy Across the K-12 Mathematics Standards

This section highlights the K–12 mathematics standards that directly support the financial literacy requirements established by **Montana HB535 (2023)** and Administrative Rule **10.55.905**. Under this statute, all Montana high school graduates must complete **0.5 credits in economics or personal finance**, which may be offered through select courses in **social studies, mathematics, or career and technical education (CTE)** (OPI, 2024).

Montana has adopted six general themes of economic and financial literacy instruction. These themes, based upon the National Standards for Personal Finance Education (Jump$tart, 2021), establish essential understandings for Montana high school graduates. These themes are summarized below.

Summary of Themes of Economic and Financial Literacy Instruction

Theme:	Summary:
I. Earning Income	Most people earn wage and salary income in return for working, and they can also earn income from interest, dividends, rents, entrepreneurship, business profits, or increases in the value of investments. Employee compensation may also include access to employee benefits such as retirement plans and health insurance. Employers generally pay higher wages and salaries to more educated, skilled, and productive workers. The decision to invest in additional education or training can be made by weighing the benefit of increased income-earning and career potential against the opportunity costs in the form of time, effort, and money. Spendable income is lower than gross income due to taxes assessed on income by federal, state, and local governments.
II. Spending	A budget is a plan for allocating a person's spendable income to necessary and desired goods and services. When there is sufficient money in their budget, people may decide to give money to others, save, or invest to achieve future goals. People can often improve their financial well-being by making well-informed spending decisions, which include critical evaluation of price, quality, product information, and method of payment. Individual spending decisions may be influenced by financial constraints, personal preferences, unique needs, peers, and advertising.
III. Saving	People who have sufficient income can choose to save some of it for future uses such as emergencies or later purchases. Savings decisions depend on individual preferences and circumstances. Funds needed for transactions, bill-paying, or purchases, are commonly held in federally insured checking or savings accounts at financial institutions because these accounts offer easy access to their money and low risk. Interest rates, fees, and other account features vary by type of account and among financial institutions, with higher rates resulting in greater compound interest earned by savers.

Theme:	Summary:
IV. Investing	People can choose to invest some of their money in financial assets to achieve long-term financial goals, such as buying a house, funding future education, or securing retirement income. Investors receive a return on their investment in the form of income and/or growth in value of their investment over time. People can more easily achieve their financial goals by investing steadily over many years, reinvesting dividends, and capital gains to compound their returns. Investors have many choices of investments that differ in expected rates of return and risk. Riskier investments tend to earn higher long-run rates of return than lower-risk investments. Investors select investments that are consistent with their risk tolerance, and they diversify across a number of different investment choices to reduce investment risk.
V. Managing Credit	Credit allows people to purchase and enjoy goods and services today, while agreeing to pay for them in the future, usually with interest. There are many choices for borrowing money, and lenders charge higher interest and fees for riskier loans or riskier borrowers. Lenders evaluate creditworthiness of a borrower based on the type of credit, past credit history, and expected ability to repay the loan in the future. Credit reports compile information on a person's credit history, and lenders use credit scores to assess a potential borrower's creditworthiness. A low credit score can result in a lender denying credit to someone they perceive as having a low level of creditworthiness. Common types of credit include credit cards, auto loans, home mortgage loans, and student loans. The cost of post-secondary education can be financed through a combination of grants, scholarships, work-study, savings, and federal or private student loans.
VI. Managing Risk	People are exposed to personal risks that can result in lost income, assets, health, life, or identity. They can choose to manage those risks by accepting, reducing, or transferring them to others. When people transfer risk by buying insurance, they pay money now in return for the insurer covering some or all financial losses that may occur in the future. Common types of insurance include health insurance, life insurance, and homeowner's or renter's insurance. The cost of insurance is related to the size of the potential loss, the likelihood that the loss event will happen, and the risk characteristics of the asset or person being insured. Identity theft is a growing concern for consumers and businesses. Stolen personal information can result in financial losses and fraudulent credit charges. The risk of identity theft can be minimized by carefully guarding personal financial information.

Financial Literacy in the K-8 Standards

Financial literacy is a critical **life skill**, and its development should begin well before high school. While Montana statute 10.55.905 establishes a graduation requirement for a half-credit in personal finance or economics, students benefit most when they have opportunities to build financial understanding **early and often**. This section highlights K–8 mathematics standards that connect to financial literacy concepts, helping educators and families recognize where foundational skills can be introduced and reinforced. Integrating financial literacy in the earlier grades supports long-term

understanding while helping students see the relevance of mathematics in their daily lives. Early and intentional exposure promotes access to financial skills and better prepares students for the expectations they encounter in high school and beyond.

In this section, two categories of standards are identified:

- **Standards explicitly addressing financial literacy**: These standards have a direct and clear connection to financial literacy concepts. Teaching these standards in alignment with financial literacy themes will support students' preparation for high school expectations. Because application varies, specific financial literacy themes are not predefined.
- **Standards that may support financial literacy in context:** These standards have the **potential** to incorporate financial literacy concepts depending on the instructional approach. Because application varies, specific financial literacy themes are not predefined. Adding financial literacy context to a standard that does not require it can elevate the task to a "mastery" level, offering students an opportunity to demonstrate deeper understanding. While integrating financial literacy contexts can enrich instruction, educators should exercise care during assessment to ensure they are accurately measuring student proficiency with the content standards. This consideration applies generally to all assessments, regardless of the context used.

For additional resources and guidance on financial literacy instruction, please refer to the **OPI Career and Technical Education website**.

Kindergarten

*Kindergarten standards that address financial literacy **explicitly**:*

MT.K.MD.4

*Kindergarten standards that **could** address financial literacy **through problems in context**:*

MT.K.CC.1	MT.K.CC.6	MT.K.MD.3
MT.K.CC.3	MT.K.NBT.1	
MT.K.CC.5	MT.K.MD.2	

Grade 1

*Grade 1 standards that address financial literacy **explicitly**:*

MT.1.MD.4

*Grade 1 standards that **could** address financial literacy **through problems in context**:*

MT.1.OA.1	MT.1.OA.4	MT.1.OA.7	MT.1.NBT.1	MT.1.NBT.4	MT.1.MD.5
MT.1.OA.2	MT.1.OA.5	MT.1.OA.8	MT.1.NBT.2	MT.1.NBT.5	
MT.1.OA.3	MT.1.OA.6	MT.1.OA.9	MT.1.NBT.3	MT.1.NBT.6	

Grade 2

*Grade 2 standards that address financial literacy **explicitly**:*

MT.2.MD.8

*Grade 2 standards that **could** address financial literacy **through problems in context**:*

MT.2.OA.1	MT.2.OA.4	MT.2.NBT.3	MT.2.NBT.6	MT.2.MD.10
MT.2.OA.2	MT.2.NBT.1	MT.2.NBT.4	MT.2.NBT.7	MT.2.MD.11
MT.2.OA.3	MT.2.NBT.2	MT.2.NBT.5	MT.2.NBT.8	

Grade 3

*There are **no** Grade 3 standards that address financial literacy **explicitly.***

*Grade 3 standards that **could** address financial literacy **through problems in context**:*

MT.3.OA.1	MT.3.OA.5	MT.3.OA.9	MT.3.NBT.3
MT.3.OA.2	MT.3.OA.7	MT.3.NBT.1	MT.3.NF.1
MT.3.OA.4	MT.3.OA.8	MT.3.NBT.2	MT.3.MD.3

Grade 4

*Grade 4 standards that address financial literacy **explicitly**:*

MT.4.MD.2

*Grade 4 standards that **could** address financial literacy **through problems in context**:*

MT.4.OA.1	MT.4.OA.5	MT.4.NBT.3	MT.4.NF.6
MT.4.OA.2	MT.4.NBT.1	MT.4.NBT.4	MT.4.NF.7
MT.4.OA.3	MT.4.NBT.2	MT.4.NBT.5	

Grade 5

*There are **no** Grade 5 standards that address financial literacy **explicitly.***

*Grade 5 standards that **could** address financial literacy **through problems in context**:*

MT.5.OA.2	MT.5.NBT.2
MT.5.OA.3	MT.5.NBT.4
MT.5.NBT.1	MT.5.NBT.5

Grade 6

*There are **no** Grade 6 standards that address financial literacy **explicitly.***

*Grade 6 standards that **could** address financial literacy **through problems in context**:*

MT.6.NS.2	MT.6.NS.6	MT.6.EE.5	MT.6.SP.2	MT.6.SP.4
MT.6.NS.3	MT.6.EE.2	MT.6.EE.7	MT.6.SP.3	MT.6.SP.5
MT.6.NS.5	MT.6.EE.4	MT.6.EE.8		

Grade 7

*Grade 7 standards that address financial literacy **explicitly**:*

MT.7.RP.3

*Grade 7 standards that **could** address financial literacy **through problems in context**:*

MT.7.RP.2	MT.7.EE.3	MT.7.SP.2
MT.7.NS.2	MT.7.EE.4	MT.7.SP.3
MT.7.EE.2	MT.7.SP.1	MT.7.SP.4

Grade 8

*There are **no** Grade 8 standards that address financial literacy **explicitly**.*

MT.7.RP.3

*Grade 8 standards that **could** address financial literacy **through problems in context**:*

MT.8.EE.3	MT.8.EE.7	MT.8.F.3	MT.8.SP.1	MT.8.SP.4
MT.8.EE.4	MT.8.EE.8	MT.8.F.4	MT.8.SP.2	
MT.8.EE.5	MT.8.F.1	MT.8.F.5	MT.8.SP.3	

Financial Literacy in the 9-12 Standards:

In support of Montana's financial literacy graduation requirement, the task force reviewed the high school mathematics standards to identify where connections to financial literacy may exist. Recognizing the need for clarity, the task force has outlined the **domains** within the new high school mathematics standards that have the **potential** to support financial literacy instruction, depending on how the content is taught. To assist educators, the task force has also provided examples of **possible applications** within each domain. These examples are labeled *"possible applications include, but are not limited to"* to acknowledge that they are illustrative—not exhaustive—and that flexibility in instructional design is essential.

It is important to note that not all mathematics curricula will naturally incorporate financial literacy within these domains. **Financial literacy instruction within the 9-12 mathematics classroom will only occur when educators intentionally integrate these themes into their teaching and curricula.** Thoughtful planning is necessary to ensure that mathematical content is delivered in ways that also build the financial understanding students need for real-world decision making and long-term success.

Core Numeric Reasoning Standards

Domain:	Themes addressed:	Possible applications include, but are not limited to:
The Real Number System (REAL)	**II. Spending** **IV. Managing Credit**	This domain can assist with the development of skills related to large numbers and scientific notation within the context of national debt, national student loan balances, etc.

Core Algebraic and Functional Reasoning Standards

Domain:	Themes addressed:	Possible applications include, but are not limited to:
Understand Functions and Expressions (FUN)	**I. Earning Income**	Multiple representations of functions and discussions of domain and range could involve examples such as wages earned vs. hours worked for hourly employees and total compensation vs. sales for commission workers; students can examine the practical restrictions on the domains.
Linear Functions and Expressions (LIN)	**I. Earning Income**	Situations involving wages earned vs. hours worked or wages earned vs. base pay plus percentage commission can be used to illustrate the constant rate of change, initial value, and multiple representations of linear situations; and simple cost vs. revenue graphs can be expressed as systems of linear equations providing for multiple methods of solution and determination of "break-even" points.
Quadratic Functions and Expressions (QUAD)	**I. Earning Income**	The maximum value for a quadratic function could be used to find the optimal number of units to produce or sell in a small business situation.
Exponential Functions and Expressions (EXP)	**III. Saving** **IV. Investing** **V. Managing Credit**	Various applications can be found in this domain, including working with exponential growth in savings; compounding simple interest in banking; compounding simple interest in credit card debt; investing for retirement; and compound simple interest.

Core Data Reasoning and Probability Standards

Domain:	Themes addressed:	Possible applications include, but are not limited to:
Quantitative Literacy (LIT)	**I. Earning Income** **II. Spending** **III. Saving** **IV. Investing** **V. Managing Credit** **VI. Managing Risk**	There are extensive application opportunities within this domain to the field of financial literacy. Specific examples could include analyzing income and degree type data for associations and using measures of spread and variability; determining and analyzing risk factors for insurability; representing budget spending using appropriate diagrams and representations; comparing retirement savings based on age; and making comparisons of earnings based on types of investments.
Probability (PROB)	**I. Earning Income** **II. Spending** **III. Saving** **IV. Investing** **V. Managing Credit** **VI. Managing Risk**	Numerous applications involving a two-way table exist in this domain. For example, students may compare savings rates for different age groups to determine if the two variables are independent.

Core Plus Algebraic and Functional Reasoning Standards

Domain:	Themes addressed:	Possible applications include, but are not limited to:
Exponential and Logarithmic Functions (EXP)	**III. Savings** **IV. Investing** **V. Managing Credit**	Various applications exist such as exponential growth in savings, compounding interest in both savings, investment, and debt-related scenarios, and investing for retirement.

Core Plus Data Reasoning Standards

Domain:	Themes addressed:	Possible applications include, but are not limited to:
Experimental Design (DES)	**I. Earning Income** **II. Spending** **III. Saving** **IV. Investing** **V. Managing Credit** **VI. Managing Risk**	Applications may include assessing the reliability of sample and population data based upon the design of the study including assessing experimental design for hidden bias and flaws in design.
Statistical Inference Using Simulation (INF)	**I. Earning Income** **II. Spending** **III. Saving** **IV. Investing** **V. Managing Credit** **VI. Managing Risk**	Each of the examples in the Core Data Reasoning section above can be expanded upon to determine if there is a statistically significant difference between the two sets of data.

Appendix D: Indian Education for All (IEFA) Integration Guidelines

The Montana Mathematics Standards also reflect the constitutional mandate to provide instruction that includes the distinct and unique heritage and contemporary contributions of American Indians in a culturally responsive manner (Montana Constitution Article X Section 1(2) and statutes §20-1-501 and §20-9-309 2(c), MCA). This allows students to recognize and respect the historical and contemporary manifestations of mathematical knowledge across the unique cultures of Montana's 12 federally recognized tribes, ensuring that the teaching of mathematics in Montana integrates cultural understanding, respect, and relevance for all Montana students.

This section includes general guidelines for integrating Indian Education for All across the PK-12 continuum and identifies high-quality resources for educators.

Requirements

Several of Montana's mathematics content standards incorporate required contextual connections to Montana's Indigenous peoples. This requirement reflects the state's commitment to Indian Education for All (IEFA) and is an essential component of student proficiency for those standards. Educators are expected to align instruction and assessment for these standards with content that reflects the cultures, histories, and contributions of Montana's 12 federally recognized tribes.

Instructional materials and classroom activities should be consistent with the **Indian Education for All Framework**, which provides detailed guidance for integrating the **Essential Understandings Regarding Montana Indians** and recommended multicultural education approaches. This alignment supports the intent of the standards and Montana's constitutional commitment to preserving and honoring the cultural integrity of its Indigenous communities.

Resources

There are many resources available to support educators in integrating IEFA into mathematics. Some examples include:

- The OPI Indian Education For All webpage provides classroom resources, videos, and lesson plans.
- National Indian Education Association Digital Resources provides professional learning, digital lessons and tasks, projects, and parent resources.
- Confederated Salish Kootenai Tribes (CSKT) educational resources: Although not mathematics-specific, this resource includes lessons and activities that integrate many content areas, such as science, history, land management, and climate, through the perspective of the CSKT.

- Little Shell Tribe Our Culture shares many traditional teachings, cultural stories, and lessons. Although not mathematics-specific, this resource provides an opportunity for educators to better understand the cultural practices and stories of the Little Shell People.
- PBS Learning Media – Montana PBS provides multiple videos, documents, lessons, and images relating to American Indians all over the US, including many of the 12 tribes of Montana.
- Directory of Indian Education Programs in Montana: This directory includes contact information for all Tribal governments, universities and colleges, Tribal education specialists, etc.

Professional Learning

Though there are frequent and varied IEFA and Math integrated professional learning sessions available at districts and conferences around the state, the OPI offers some recurring opportunities, specifically:

- Courses on the Teacher Learning Hub
    - Indian Ed & Math Seamless Integration (2 PDUs)
    - An Introduction to Indian Education for All in Montana (2 PDUs)
    - Bison Restoration and Tribal Sovereignty in Montana (3 PDUs)
    - The Framework: A Practical Guide to Implementing IEFA (4 PDUs)
    - Building Your IEFA Mindset: Unpacking the Essential Understandings (15 PDUs)
    - Building Your IEFA Mindset: Culturally Responsive and Informed Teaching for All (15 PDUs)
- The OPI IEFA Best Practices Conference (Every Spring)
- Recurring professional learning events and webinars
- National Indian Education Association Professional Development Events

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Appendix E: A Note on Assessment

This section aims to provide general guidance on Statewide assessments. This can aid in understanding educator, school, and district responsibilities related to assessing the Montana mathematics practice and content standards.

State Assessment:

State testing measures student proficiency and progress on state content standards over time. The participation requirement to administer statewide assessments is required under federal and state law including:

- **ESSA Section 1111(b)(2) Academic Assessments**
  - (A) IN GENERAL.—Each State plan shall demonstrate that the State educational agency, in consultation with local educational agencies, has implemented a set of high-quality student academic assessments in mathematics, reading or language arts, and science. The State retains the right to implement such assessments in any other subject chosen by the State.
  - (B) REQUIREMENTS.—The assessments under subparagraph (A) shall— (i) except as provided in subparagraph (D), be— (I) the same academic assessments used to measure the achievement of all public elementary school and secondary school students in the State; and (II) administered to all public elementary school and secondary school students in the State; (ii) be aligned with the challenging State academic standards, and provide coherent and timely information about student attainment of such standards and whether the student is performing at the student's grade level;
- **ARM 10.56.101 Statewide Assessment**
  - (1) The Board of Public Education adopts rules for statewide assessments in the public schools and those private schools seeking accreditation.
  - (2) The Board of Public Education recognizes that the primary purpose of assessment is to serve learning. An assessment system that includes multiple measures and is aligned to state content and program delivery standards will provide an integrated approach to inform student learning, progression, growth, and proficiency. An assessment system is structured to continuously improve teaching and learning and to inform education policy.
  - (3) The obligation for funding statewide assessments is the responsibility of the state. This chapter may not be construed to require a school district to provide these assessments if the state does not have a current contract with test vendors for provision of these assessments to Montana school districts.
  - (4) The Superintendent of Public Instruction shall recommend in writing to the Board of Public Education any modifications to the single system of statewide assessments as set forth in (2). The Board of Public Education may consider recommended modifications as an information item on an agenda at a Board of Public Education meeting. At that meeting, the Board of Public Education may vote to list the recommendations as an action item on the agenda of a subsequent Board of Public Education meeting. Unless approved by

the Board of Public Education, no recommended modifications are effective and no accredited schools may implement the recommended modifications.

- (5) When developing a recommendation to the Board of Public Education for adopting statewide assessments the Superintendent of Public Instruction will include implications including alignment to content standards.
- (6) The Superintendent of Public Instruction shall: (a) ensure Montana educators participate in the process; (b) ensure that all statewide test items are field tested before being used to determine proficiency; and (c) request approval from the Board of Public Education to allow for census field testing before determining proficiencies.

- **ARM 10.56.102 Participation**
  - (1) By the authority of 20-2-121(11), MCA, and ARM 10.55.603, the Board of Public of Education (board) adopts rules for statewide assessment in all public and accredited nonpublic schools.
  - (2) Statewide assessments approved by the Board shall be administered in all public and accredited nonpublic schools.
  - (3) School districts shall annually administer statewide assessments to all students in accordance with state and federal laws and regulations that meet or exceed the following specifications:
    - (a) English language arts and mathematics assessments shall be aligned to Montana content standards in English language arts and mathematics and administered in grades 3-8 and at least once in grades 9-12;
    - (b) Science assessments shall be aligned to Montana content standards for science and administered not less than one time during grades 3-5, 6-9, and 10-12; and
    - (c) Statewide assessments shall be administered in all public and accredited nonpublic schools within the statewide assessment windows established by the Superintendent of Public Instruction. Assessments shall be administered in the spring of each year.
  - (4) Statewide assessments aligned to Montana-English language proficiency standards shall be administered to all students identified as English Learners (EL) in grades K-12 within the statewide assessment windows established by the Superintendent of Public Instruction.
  - (5) The Board of Public Education may approve alternative grade levels and timelines for the administration of statewide assessments due to the availability of assessments and other academic factors.
  - (6) School districts shall use guidance provided by the Office of Public Instruction to inform parents/guardians about statewide assessments, pursuant to ARM 10.55.601 and 10.55.722, including: (a) the purpose; (b) the source of the requirement; (c) when the information about student performance is provided to relevant educators and specialists and parents/guardians; (d) how relevant educators and specialists, principals, and district officials use the information about student performance; and (e) how parents/guardians can use that information to help their child.

Information on current statewide assessments can be found on the OPI Statewide Assessment Webpage.

Appendix F: Program and Curriculum Standards

This appendix outlines the program requirements for mathematics instruction in Montana, as defined by the **Administrative Rules of Montana (ARM)**. It includes a table summarizing relevant ARM items, along with brief overviews of their content. This appendix also offers resources to help districts select and develop mathematics curricula that meet state requirements and support local educational priorities.

10.55.602	DEFINITIONS (32) "Program area standards" means the subject matter Montana school districts are required to offer and the strategies and proven practices used to instruct. The program area standards include: English language arts, arts, health enhancement, mathematics, science, social studies, career and technical education, technology, workplace competencies, library media, world languages, and school counseling. (33) "Program delivery standards" means the conditions and practices school districts are required to provide ensuring that every student is afforded educational opportunities to learn, develop, and demonstrate achievement in content standards and content-specific grade-level learning progressions.
10.55.603	CURRICULUM AND ASSESSMENT Outlines requirements of districts to implement a proficiency-based learning model; review, update, and align learning programs following standards revisions; assess student progression, growth, and proficiency; review curricula and assessment processes; and more. Districts should review this information to ensure curricular and assessment practices are aligned with Administrative Rule.
10.55.701	BOARD OF TRUSTEES Outlines requirements on local boards of trustees to comply with local, state, and federal regulations; details what must be made available to the public; defines conditions that must be established to create a positive school climate; establishes the board's role in establishing an ISAP; outlines how the board might establish and implement additional policies by engaging stakeholders; and more. Districts should review this information to confirm that the local board of trustees' activities are aligned with the Administrative Rule.

10.55.803	LEARNER ACCESS Outlines equal opportunities for all students, which must be assured by the local board of trustees. Districts should review this item to ensure that all students have equal opportunities to learn in all program areas, across all levels.
10.55.901	BASIC EDUCATION PROGRAM: ELEMENTARY Outlines basic program requirements for elementary programs aligned to content standards and grade band learning progressions; recognizes the distinct and unique cultural heritages of American Indians; and includes instruction in reading and writing literacy. Districts should review this item to assess elementary program coherence.
10.55.902	BASIC EDUCATION PROGRAM: MIDDLE GRADES Outlines basic program requirements for Middle school, 7th/8th grade, or junior high school programs including: adherence to program, content, and grade-band progressions standards that recognize the unique and distinct cultural heritages of American Indians; specific areas the program must address; minimum course requirements; instructional time; and more. Districts should review this item to assess middle-grade program coherence.
10.55.904	BASIC EDUCATION PROGRAM OFFERINGS: HIGH SCHOOL Outlines the requirements for a basic high school education program including alignment to content standards, learning progressions, and inclusion of unique cultural heritages of American Indians and minimum course offerings. Districts should review this item to assess high school program coherence.
10.55.905	GRADUATION REQUIREMENTS Outlines the minimum graduation requirements for high school students.
10.55.1001	PROGRAM STANDARDS (1) It is the local board of trustees' responsibility to ensure the district's curricula align with the state content standards and content-specific grade-level learning progressions.
10.55.1003	PROGRAM FOUNDATION STANDARDS

	Outlines the common conditions and practices that must be evident in all school systems within Montana. Districts should review this item to assess program coherence across the PK-12 continuum.
10.55.1401	MATHEMATICS PROGRAM DELIVERY STANDARDS Outlines the general requirements for mathematics programs. Districts should review this item to assess mathematics program coherence across the PK-12 Continuum.

Curriculum Development and Selection Resources:

The Montana Office of Public Instruction empowers districts to select and review their own curriculum and high-quality instructional materials aligned with the Administrative Rules of Montana. The following resources support districts in this work:

- Guide for Selecting Materials Aligned to Montana's Content Standards (Word version)
- Criteria for Selecting Materials (Word version)

Appendix G: Course Recommendations

This appendix provides the recommended course codes and pathways for students' progression through the 9-12 experience. These recommendations were developed by the Math Standards Revision Task Force, informed by research conducted by the **Regional Education Laboratory (REL)** and other leading mathematics education organizations. The research highlights longstanding challenges with the traditional **Algebra I–Geometry–Algebra II** sequence, in particular, its limited flexibility and tendency to restrict access to rigorous mathematical learning for many students.

One of the key concerns addressed in REL Handout C (2022) is the use of tracking practices, which often result in classrooms where students receive varying levels of rigor based on perceived ability. In many cases, students on lower tracks are exposed to less challenging, more procedural instruction, which can hinder engagement, limit future opportunities, and expand disparities in learning outcomes. The research emphasizes the importance of creating course pathways that provide all students with four years of rich, relevant mathematics instruction, regardless of their intended postsecondary plans.

To support the application of this research, the task force has identified multiple course progression options, including both **traditional and integrated pathways**, to help schools structure 9-12 mathematics experiences. The appendix also includes recommendations for **upper-division mathematics courses**—those that extend beyond the minimum high school mathematics standards for graduation—to support students preparing for informed citizenship, advanced careers, college-level mathematics, or military pathways. These recommendations are intended to promote access to rigorous coursework, encourage flexible planning, and ensure that all students have opportunities to engage with mathematics in ways that align with their goals and aspirations and prepare them to be informed, productive citizens.

Traditional Pathway

Students following the traditional pathway typically complete the sequence of **Algebra I with Probability**, **Geometry with Data Analysis**, and **Algebra II with Statistics**. This pathway reflects the conventional structure used in many high schools and is aligned to the Montana Mathematics Content Standards. While students may choose to pursue additional elective mathematics courses beyond this sequence, engaging in these three core courses is the most direct way to ensure exposure to the full scope of the high school content standards.

Algebra I with Probability (SCED Course Code: 02-052)

Total Number of Standards: 33

- **Category:** Core Numeric Reasoning Standards (NUM) – ***All standards in the following domain (3 standards)***
  - **Domain:** The Real Number System (REAL)
- **Category:** Core Algebraic and Functional Reasoning Standards (ALG) – ***All standards in the following domains (27 standards)***
  - **Domain:** Understand Functions and Expressions (FUN)
  - **Domain:** Linear Functions and Expressions (LIN)
  - **Domain:** Quadratic Functions and Expressions (QUAD)
  - **Domain:** Exponential Functions and Expressions (EXP)
  - **Domain**: Modeling with Functions (MOD)

- **Category:** Core Data Reasoning and Probability Standards (DATA) – ***Some standards in the following domains as indicated (3 standards)***
  - **Domain:** Visualizing, Summarizing, & Interpreting Data (INT) – Only CORE.DATA.INT.6 (1 standard)
  - **Domain:** Probability (PROB) – All standards within the domain (2 standards)

Geometry with Data Analysis (SCED Course Code 0-072)

Total Number of Standards: 17

- **Category:** Core Data Reasoning and Probability Standards (DATA)– ***Some standards in the following domains as indicated (9 standards)***
  - **Domain:** Quantitative Literacy (LIT) – All standards within this domain (3 standards)
  - **Domain:** Visualizing, Summarizing, & Interpreting Data (INT) – All standards within this domain except CORE.DATA.INT.6 (6 standards)

- **Category:** Core Geometric Reasoning Standards (GEOM) – ***All standards in the following domains (8 standards)***
  - **Domain:** Transformations (TRANS)
  - **Domain:** Geometric Arguments, Reasoning, and Proof (ARG)
  - **Domain:** Measurement, Problem-Solving, and Geometric Modeling (MEAS)

Algebra II with Statistics (SCED Course Code: 02-056)

Total Number of Standards: 31

- **Category:** Core Plus Number and Quantity Standards (NUM) – ***All standards in the following domain (2 standards)***
  - **Domain:** Numeric Reasoning (REAS)

- **Category:** Core Plus Algebraic and Functional Reasoning Standards (ALG) – ***All standards in the following domains (20 standards)***
  - **Domain:** Functions, Expressions, and Inequalities (FUN)
  - **Domain:** Polynomial Functions (POLY)
  - **Domain:** Exponential and Logarithmic Functions (EXP)
  - **Domain:** Trigonometric Functions (TRIG)
  - **Domain:** Modeling (MOD)

- **Category:** Core Plus Data Reasoning Standards (DATA) – ***All standards in the following domains (9 standards)***
  - **Domain:** Normal Distribution (NORM)
  - **Domain:** Experimental Design (DES)
  - **Domain:** Statistical Inference Using Simulation (INF)

Integrated Pathway

The Integrated Pathway weaves together content from algebra, geometry, probability, and statistics across a series of three courses—**Integrated Mathematics I**, **Integrated Mathematics II**, and **Integrated Mathematics III**. Rather than teaching mathematical domains in isolation, this pathway blends concepts throughout each year to highlight connections between topics and to reflect how mathematics is applied in real-world contexts. This structure is also fully aligned with the Montana Mathematics Content Standards. Students on this pathway build a comprehensive understanding of high school mathematics over time and may also choose to extend their learning through advanced or specialized elective courses following Integrated III.

Integrated Math I (SCED Course Code: 02-062)

Total Number of Standards: 29

- **Category:** Core Numeric Reasoning Standards (NUM) – ***Some standards in the following domain as indicated (1 standard)***
  - **Domain:** The Real Number System (REAL) – Only CORE.NUM.REAL.3 (1 standard)

- **Category:** Core Algebraic and Functional Reasoning Standards (ALG) – ***All standards in the following domains (18 standards)***
  - **Domain:** Understand Functions and Expressions (FUN)
  - **Domain:** Linear Functions and Expressions (LIN)
  - **Domain:** Modeling with Functions (MOD) – All standards within this domain, as applied to linear functions

- **Category:** Core Data Reasoning and Probability Standards (DATA) – ***Some standards in the following domains as indicated (3 standards)***

- **Domain:** Visualizing, Summarizing, & Interpreting Data (INT) – Only CORE.DATA.INT.6 (1 standard)
- **Domain:** Probability (PROB) – All standards within the domain (2 standards)

- **Category:** Core Geometric Reasoning Standards (GEOM) – **All standards in the following domains (7 standards)**
  - **Domain:** Transformations (TRANS)
  - **Domain:** Measurement, Problem-Solving, and Geometric Modeling (MEAS)

Integrated Math II (SCED Course Code: 02-063)

Total Number of Standards: 25

- **Category:** Core Numeric Reasoning Standards (NUM) – ***Some standards in the following domain as indicated (2 standards)***
  - **Domain:** The Real Number System (REAL) – Only CORE.NUM.REAL.1 and CORE.NUM.REAL.2 (2 total)

- **Category:** Core Algebraic and Functional Reasoning Standards (ALG) – ***All standards in the following domains (13 standards)***
  - **Domain:** Quadratic Functions and Expressions (QUAD)
  - **Domain:** Exponential Functions and Expressions (EXP)
  - **Domain:** Modeling with Functions (MOD) – All standards within this domain, as applied to quadratic and exponential functions

- **Category:** Core Data Reasoning and Probability Standards (DATA) – ***Some standards in the following domains as indicated (9 standards)***
  - **Domain:** Quantitative Literacy (LIT) – All standards within this domain (3 standards)
  - **Domain:** Visualizing, Summarizing, & Interpreting Data (INT) - All standards within this domain except CORE.DATA.INT.6 (6 total)

- **Category:** Core Geometric Reasoning Standards (GEOM) – **All standards in the following domains (1 standard)**
  - **Domain:** Geometric Arguments, Reasoning, and Proof (ARG)

Integrated Math III (SCED Course Code: 02-064)

Total Number of Standards: 31

- **Category:** Core Plus Number and Quantity Standards (NUM) – ***All standards in the following domain (2 standards)***
  - **Domain:** Numeric Reasoning (REAS)

- **Category:** Core Plus Algebraic and Functional Reasoning Standards (ALG) – ***All standards in the following domains (20 standards)***
  - **Domain:** Functions, Expressions, and Inequalities (FUN)
  - **Domain:** Polynomial Functions (POLY)
  - **Domain:** Exponential and Logarithmic Functions (EXP)
  - **Domain:** Trigonometric Functions (TRIG)
  - **Domain:** Modeling (MOD)

- **Category:** Core Plus Data Reasoning Standards (DATA) – ***All standards in the following domains (9 standards)***
  - **Domain:** Normal Distribution (NORM)
  - **Domain:** Experimental Design (DES)
  - **Domain:** Statistical Inference Using Simulation (INF)

Recommendations for Learning Outcomes Beyond the Core Plus Standards

This section provides guidance for elective mathematics courses that extend beyond the Core and Core Plus standards outlined in Montana's graduation requirements. Though these courses are **not required for graduation in most districts**, many schools **encourage a fourth year of mathematics** because it supports students' preparation for postsecondary experiences and **expands opportunities** for future academic, career, or military pathways.

Where possible, the recommended learning outcomes have been aligned with **dual credit, Montana University System (MUS), and Advanced Placement (AP) offerings** to **encourage opportunities for students to earn college or trade school credit** while still in high school. These upper-division courses are designed to align with diverse student goals—including higher education, workforce entry, military service, or active civic engagement—by providing mathematically rigorous and relevant mathematical experiences that reflect the range of possibilities available to Montana graduates.

To support implementation, the task force has included instructional resources where appropriate. Each course recommendation also includes the SCED (School Courses for the Exchange of Data) course code, developed by the Institute of Education Sciences (IES), to assist districts in identifying courses for credit delivery and enrollment reporting.

Data Science (SCED Course Code: 30-7001)

Preamble (CIP, 2020): Data Science is an interdisciplinary course that prepares students to analyze and interpret large-scale data in real-world contexts. Drawing from statistics, computer science, and mathematics, students explore topics such as data collection, visualization, modeling, and analysis. This course emphasizes trend identification, algorithmic thinking, and ethical data use to inform decision-making and problem-solving.

Sample Learning Outcomes (IDS, 2022):

Students will:

- Learn fundamental notions of data analysis—such as distribution and multivariate associations.
- Create and interpret visualizations of real-world data.
- Use numerical summaries to describe distributions.
- Learn about the various ways of collecting data and the effect that data collection has on conclusions and interpretations.
- Use computer simulations for informal inference.
- Make and use mathematical and statistical models to predict future observations and learn how data scientists measure the success of these predictions.
- Communicate methods and results to various audiences

Instructional Resources:
Sample Courses:

- Explorations in Data Science (YouCubed)
- Introduction to Data Science (UCLA)
- Additional Options for Sample Courses and Instructional Resources (Data Science 4 Everyone)

Quantitative Reasoning (SCED Course Code: 02-158)

Preamble: Quantitative Reasoning prepares students for informed citizenship and decision-making in daily life. The course emphasizes the application of mathematics to real-world problems across disciplines. Students develop skills in logical reasoning, data interpretation, proportional reasoning, and basic statistical analysis, equipping them to critically evaluate information and communicate their conclusions effectively.

Sample Learning Outcomes (Darnell, 2022 and Luebeck, 2024):

Students will:

- Develop skills to think and reason mathematically in order to function more effectively in the modern world.
- Read mathematical material and write using mathematical notation correctly.
- Examine ways in which mathematics is used to solve applied quantitative problems. This includes learning to formulate a problem precisely, interpret solutions, and make critical judgments in the face of competing formulations and solutions.
- Follow and understand logical arguments.
- Apply elementary probability theory to construct models of random phenomena, including the use of simulations.
- Use elementary statistical tools such as measures of center and spread, graphical representations of data, and statistical estimation of population proportions.

Instructional Resources:
Teachers have broad latitude to choose focal topics, including, but not limited to: financial literacy (e.g., saving, investing, credit, managing risks and rewards), social choice and decision-making (e.g. elections, voting, fair division, Congress apportionment), geometry (e.g. symmetry, tiling), mathematical games, or management science (e.g. graph models for network problems).

Sample Courses:

- M105 Syllabus at University of Montana
- M105 Syllabus at Montana State University
- M105 Syllabus at Montana Digital Academy

Statistics (SCED Course Codes: 02-201, 02-203, or 02-205)

Preamble: Statistics is essential for careers in science, social science, health, and business. It involves the collection, organization, analysis, and interpretation of data. Students learn to draw meaningful conclusions from quantitative and categorical data through modeling, inference, and communication of findings.

Sample Learning Outcomes (Montana State University, 2025):

Students will:

- Describe and explore sets of data both numerically and graphically.
- Use the normal model for the distribution of a single variable and the linear regression model for the relationship between two variables.
- Know the basic principles of good experimental design and good sampling design.
- Know the fundamental ideas of statistical inference for means and proportions including both hypothesis testing and confidence intervals.
- Interpret confidence intervals and P-values in the context of real problems.
- Be a critical consumer of statistical studies reported in the media.

Instructional Resources:

Sample course:

- Advanced Placement Statistics Course Description
- STAT 216 Introduction to Statistics Montana State University
- Montana Digital Academy Statistics Introduction
- Montana Digital Academy AP Statistics

Other Resources:

- Common Online Data Analysis Platform (CODAP)
- Gap Minder
- Khan Academy
- American Statistical Association
- PBS High School Stats and Probability

Technical Math (SCED Course Code: 02-153)

Preamble: Technical Mathematics is recommended for students pursuing careers in industrial, technical, or applied fields. This course extends students' mathematical understanding by applying concepts to real-world technical and industrial contexts. Students develop skills in problem-solving, measurement, and modeling as they explore how mathematics supports processes and systems in the trades and technical industries.

Sample Learning Outcomes (Arends, 2018):

Students will:

- Utilize and apply mathematical operations, measurement (English and Metric Systems), introductory geometric principles, and applied algebra. to technical applications in academic and workplace situations.
- Read, interpret, and produce solutions to applications at the introductory technical mathematics level.
- Apply ratio and proportion concepts to introductory technical mathematical situations.
- Apply percent concepts to real-world applications.
- Apply appropriate technology in a mathematical situation.
- Convert the expression of a linear relationship between equation and graphical forms.
- Apply measurement concepts to real-world applications.
- Apply geometric formulas and concepts to solving technical applications.
- Analyze statistical data and determine the validity of results.
- Apply right triangle (trigonometric) relationships to problem-solving of technical applications.
- Apply formula manipulation and evaluation for problem-solving for unknown values.

Instructional Resources:

Sample courses:
The University of Montana M111
*Important comment about dual credit course offering: M111 **does not** count toward an Associate of Arts or Baccalaureate degree.*

Pre-Calculus (SCED Course Codes: 02-110, or 02-114)

Preamble: Pre-calculus is highly recommended for students aspiring to STEM careers requiring calculus. Pre-calculus completes the formal study of functions begun in the Core and Core Plus standards. Students focus on modeling, problem-solving, data analysis, translating mathematical information between representations, communicating with precise language, and providing rationales for conclusions.

Sample Learning Outcomes (Montana Digital Academy, 2025):

Students will:

- Describe the concept of a function and explain its various properties.
- Define a function by ordered pairs, by a graph, and algebraically.
- Use transformations, symmetry, function operations, and inverses.
- Translate between verbal, numerical, graphical, and algebraic representations of functions.
- Apply a variety of techniques to find solutions to equations and inequalities.
- Simplify algebraic and transcendental expressions.
- Graph polynomial and rational functions, find the zeros of functions, and reconstruct a polynomial from its given zeros.
- Graph and analyze graphs of exponential and logarithmic functions, solve exponential and logarithmic equations.
- Find equations of populations that obey the law of exponential growth and decay.
- Analyze conic sections and solve problems with real-world applications.
- Perform matrix operations and find inverse matrices.
- Understand notation and applications of Sequences and Series.
- Correctly write and explain mathematics quantitatively and conceptually.

Instructional Resources:

Sample Courses:
AP Precalculus
Montana Digital Academy Precalculus (Dual Credit M151)
University of Montana - M151

Calculus I (SCED Course Codes: 02-121 or 02-124)

Preamble: Calculus is required for most STEM careers. Calculus is the study of how things change. It provides a framework for modeling systems in which there is change and a way to deduce the predictions of such models.

Sample Learning Outcomes (Montana State University, 2025**)**

Students will:

- Explain the definition of limit, how to compute it in elementary cases, and how to determine the limits of transcendental, rational, and piecewise-defined functions.
- Define infinite limits, limits at infinity, asymptotes, indeterminate forms, and how to use L'Hôpital's Rule.
- Explain the limit definition of continuity.
- Explain the limit definition of the derivative of a function, how it relates to the function itself, and how to use it to compute derivatives.

- Use derivatives to find tangent lines to curves and velocity for particle motion.
- Apply the power, sum, product, quotient, and chain rules of differentiation.
- Use the derivatives of exponential, logarithmic, trigonometric, and hyperbolic functions.
- Explain implicit and logarithmic differentiation.
- Apply the Intermediate and Mean Value Theorems.
- Graphically analyze functions including using continuity and differentiation to determine local and global extrema, concavity, and inflection points.
- Use the derivative to solve challenging related rate and optimization word problems.
- Explain the Riemann integral, areas under graphs, antiderivatives the Fundamental Theorem of Calculus.
- Apply integration using the method of substitution.

Instructional Resources:

Sample Courses:
AP Calculus AB
Montana Digital Academy AP Calculus
171 - University of Montana
M171 - Montana State University

Appendix H: Recommended Pathways for High School Students

The high school task force has developed a dynamic **Recommended Pathways for High School Math** document to support educators, counselors, families, and students in making informed decisions about mathematics course selection based on a student's career goals. These pathways outline four years of math course opportunities, including required courses and recommendations tailored to students pursuing college or university, trade school, the military, apprenticeships, or on-the-job training.

Each pathway includes example careers to help students understand how their professional interests may align with one of the following areas: **Industry and Trades, Community Services, Humanities, Data-Driven Professions,** and **STEM-Focused Careers.**

For a comprehensive overview of the task force's recommendations, individuals should refer to the full **Recommended Pathways for High School Math** document. An abbreviated summary of this information is provided in this appendix.

Course Requirements Based on Career Training Source

4-Year College or University

Students planning to pursue a career that requires a four-year college or university degree must complete mathematics courses aligned to both the Core and Core Plus standards. The Montana University System—and many institutions outside of Montana—require Algebra II or an equivalent course for admission. In Montana, these requirements are typically met through either of the following course progressions:

Traditional Pathway: Algebra I with Probability → Geometry with Data Analysis → Algebra II with Statistics → Courses aligned with career interests

Integrated Pathway: Integrated Math I → Integrated Math II → Integrated Math III → Courses aligned with career interests

2-Year College, Trade School, Military, Apprenticeship, or On-The-Job Training

Students pursuing careers that require training through a two-year college, trade school, military service, apprenticeship, or on-the-job training may not need to take mathematics courses beyond the Core standards. However, students should always check the specific requirements of their intended program. Most programs in these pathways typically require the following:

Traditional Pathway: Algebra I with Probability → Geometry with Data Analysis → Courses aligned with career interests

Integrated Pathway: Integrated Math I → Integrated Math II → Courses aligned with career interests

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Recommended Pathways by Career Type:

Industry and Trades

It is recommended that students verify with their school counselor and chosen program to confirm graduation requirements before enrolling in any courses beyond the core. Note that this pathway meets Montana High School Graduation requirements, but **does not meet the requirements for admission to 4- year universities.**

Students who would benefit from this pathway might choose careers such as, but not limited to, the following:

Aviation Maintenance Boiler Repair Electrician HVAC Technician Construction	Automotive or Diesel Mechanic Plumber Ranch Management Welder Landscaper

RECOMMENDED COURSE PROGRESSION:

REQUIRED **Core Courses –** Algebra I with Probability & Geometry with Data Analysis or Integrated Math I and Integrated Math II	**RECOMMENDED** **Technical Math –** District Course Offering or Dual Credit M111	**OPTIONAL** **Quantitative Reasoning –** District Course Offering or Dual Credit M105	**RECOMMENDED** **Post HS Graduation –** 2-year community college, military, trade school, apprenticeship, or on-the-job training

Community Services:

It is recommended that students verify with their school counselor and chosen program to confirm graduation requirements before enrolling in any courses beyond the core. Note that this pathway meets Montana High School Graduation requirements, but **does not meet the requirements for admission to 4- year universities.**

Students who would benefit from this pathway might choose careers such as, but not limited to, the following:

Cosmetologist Licensed Practical Nurse Dental Hygienist Radiology Technician Firefighter Chef	Certified Nursing Assistant Emergency Medical Technician Veterinary Technician Doula Law Enforcement Officer Child Care Worker

RECOMMENDED COURSE PROGRESSION:

REQUIRED **Core Courses –** Algebra I with Probability & Geometry with Data Analysis or Integrated Math I and Integrated Math II	**OPTIONAL** **Quantitative Reasoning –** District Course Offering or Dual Credit M105	**OPTIONAL** **Intro to Data Science or Core Plus Course –** District Course Offering	**RECOMMENDED** **Post HS Graduation –** 2-year community college, military, trade school, apprenticeship, or on-the-job training

Humanities:

It is recommended that students verify with their school counselor and chosen program to confirm graduation requirements before enrolling in any courses beyond the Core. Note that **careers within this pathway often require a 2 or 4-year degree.**

Students who would benefit from this pathway might choose careers such as, but not limited to, the following:

Teacher Graphic Designer Artist Art Historian Speech Pathologist	Social Worker Historian Writer Human Rights Advocate Sign Language Interpreter

RECOMMENDED COURSE PROGRESSION:

REQUIRED **Core Courses –** Algebra I with Probability & Geometry with Data Analysis or Integrated Math I and Integrated Math II	**REQUIRED** **Core Plus Course –** Algebra II with Statistics or Integrated Math III	**OPTIONAL** **Quantitative Reasoning –** District Course Offering or Dual Credit M105	**RECOMMENDED** **Post HS Graduation –** 2-year community college or 4-year university

Data-Driven Professionals:

It is recommended that students verify with their school counselor and chosen program to confirm graduation requirements before enrolling in any courses beyond the core. Students on this pathway **will need to earn a 4-year degree and additional math courses may be required.**

Students who would benefit from this pathway might choose careers such as, but not limited to, the following:

Psychologist Registered Nurse Physician Assistant Political Scientist Human Resource Manager Criminologist	Journalist Marketing Executive Entrepreneur Business Owner Accountant Lawyer

RECOMMENDED COURSE PROGRESSION:

REQUIRED **Core Courses –** Algebra I with Probability & Geometry with Data Analysis or Integrated Math I and Integrated Math II	**REQUIRED** **Core Plus Course –** Algebra II with Statistics or Integrated Math III	**RECOMMENDED** **Statistics –** Credit-bearing courses such as AP Statistics or Dual Credit STAT216	**RECOMMENDED** **Post HS Graduation –** 4-year university

STEM-Focused Careers:

It is recommended that students verify with their school counselor and chosen program to confirm graduation requirements before enrolling in any courses beyond the core. Students on this pathway **will need to earn a 4-year degree and additional math courses may be required.**

Students who would benefit from this pathway might choose careers such as, but not limited to, the following:

Doctor Veterinarian Engineer Scientist Software Developer Statistician	Math Teacher Forrester Psychiatrist Wildlife Biologist Agricultural Market Analyst Environmental Technician

RECOMMENDED COURSE PROGRESSION:

REQUIRED **Core Courses –** Algebra I with Probability & Geometry with Data Analysis or Integrated Math I and Integrated Math II	**REQUIRED** **Core Plus Course –** Algebra II with Statistics or Integrated Math III	**RECOMMENDED** **Pre-Calculus –** District offering, AP Calculus, or Dual Credit M151	**OPTIONAL** **Calculus –** District offering, AP Calculus, or Dual Credit M171	**RECOMMENDED** **Post HS Graduation –** 4-year university

Appendix I: Statement of Gratitude

This work would not have been possible without the time, energy, and unwavering dedication of the many individuals who contributed to its development. We are deeply grateful to those who volunteered their time in service of mathematics education—your expertise, insight, and commitment to improving teaching and learning have shaped this work in meaningful and lasting ways. Thank you for your contributions to a project that will support educators and students across Montana. *The following individuals generously shared their time and expertise:*

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