Draft Introduction P-2 Utah Core Mathematics Standards

Step 11 Revision

Draft P-12 Utah Core Mathematics Standards
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Introduction

Utah's Core Mathematics Standards assist in opening doors of opportunity for all students. They set clear expectations and guide students through a focused and coherent progression of math concepts, considering age-level development and emphasizing proficiency of identified essential competencies. These standards establish a strong mathematical foundation in early grades that allows students to engage with complex mathematical concepts as they progress through secondary mathematics.

All students must have the opportunity to learn and meet high mathematics standards in order to understand and navigate the modern world. Engaging with mathematics helps students develop tools to analyze patterns, quantify relationships, and make informed decisions. Understanding mathematics provides students with skills that support success in college, career, and family life.

Mathematics plays a critical role in the development of cognitive abilities, significantly contributing to the architectural growth of a child's brain. Regarded as a unifying discipline, it assists students in a comprehensive understanding of the world around them. Additionally, it enhances logical reasoning, problem-solving abilities, and overall mental development.

The standards set grade-specific expectations but do not dictate curriculum or teaching methods, nor do they define the strategies necessary to meet diverse learners' needs (53E-4-202). Customized supports must be provided to ensure all learners have access to the grade-level content in *Utah's Core Mathematics Standards*.

Organization of the Standards

In Utah State Code 53E-4-202, the State Board is charged with establishing core standards for Utah Public Schools that identify the basic knowledge, skills, and competencies each student is expected to acquire or master as the student advances through the public education system. These basic knowledge, skills, and competencies increase in depth and complexity from year to year.

Strands

The *Utah Core Standards* are organized into *strands*, which represent significant areas of learning within content areas. In mathematics, the strands are organized by overarching themes but do not necessarily represent isolated topics. Mathematical concepts are connected across multiple strands and grade levels. The trajectory of the strands is designed to follow a logical learning progression.

Standards

Within each strand are *standards*. A standard articulates the knowledge and skills to be obtained by students. A standard represents the essential elements of the expected learning.

Utah Mathematical Practices

In each grade-level core, there is a collection of *Mathematical Practices* *that describe how students engage with, reason about, and apply mathematical content*. ~~Each skill is a fundamental mathematical practice that students build as they engage with mathematical content. The Practices are not written in hierarchical order, they are all important skills that students must engage in to build their mathematical understanding.~~ Each grade level identifies developmentally appropriate ways students engage with these practices as they learn grade level skills. To ensure students develop capacity with these skills, they have been embedded into the ~~every~~ standards across all strands and can be *identified by the use of italic text* and the parenthetical reference at the end of each standard.

Although specific ~~Mathematical P~~practices have been ~~intentionally identified and~~ connected to each standard, other practices can be integrated when they support the mathematics identified in that standard. ~~instruction and practice of other Mathematical Practices not referenced in an individual standard may be appropriate if other skills support student learning in mathematics learning experience.~~

Essential Competencies

Essential competencies have been identified at each grade level to represent foundational knowledge and skills upon which subsequent mathematics

depends.~~understandings that s~~Students need these competencies to succeed as they continue in future grade levels. The list of competencies is not exhaustive of every standard.~~;~~ ~~S~~students will engage with all grade-level standards, however, these competencies warrant sustained instructional attention. Educators should~~may~~ prioritize instructional time and, as needed, provide additional instruction or interventions based on the standards that support these competencies to ensure students are proficient.

Shifts in the Standards

Changes in the standards were made to improve their consistency, clarity, and progression through the grade levels. These changes include:

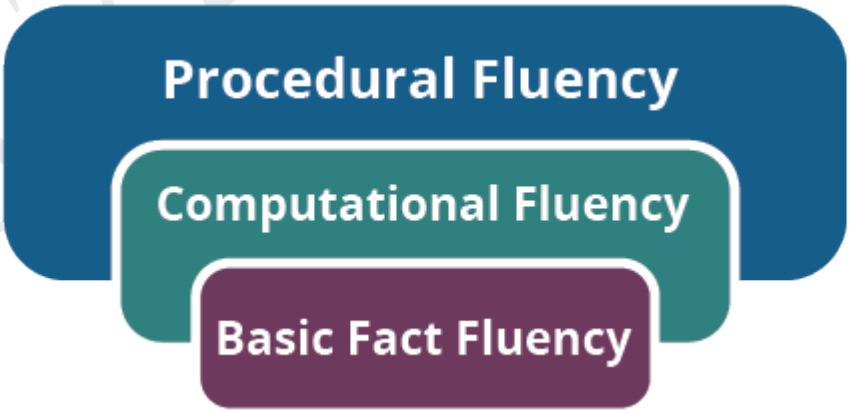
- Standards were clarified, and the overall number of standards was reduced.
- Mathematical Practices were identified and are highlighted throughout the standards P-12.
- Expectations were defined for the mathematical practices at each grade level.
- Essential Competencies were identified for each grade level specifying the success criteria associated with proficiently completing the major work of that grade level.
- Data Science standards were emphasized and incorporated into all grades.
    - The Data Science standards follow a cyclical structure where students iteratively model with mathematics by:
        - Asking statistical questions,
        - Collecting and exploring data,
        - Analyzing data,
        - And interpreting results
- In Secondary Math III, specific standards that are essential for all students were highlighted, and additional standards were developed to provide

students and their families agency in choosing which math course pathways will best support their post-high school goals.

Building Conceptual Understanding & Procedural Fluency

These standards define what students should understand and be able to do in their study of mathematics. Throughout the progression of the Utah mathematics core standards, special attention was paid to ensuring that students develop a strong foundation in conceptual understanding and procedural fluency. Procedural fluency is defined as the ability to apply procedures efficiently, flexibly, and accurately, transfer procedures to different problems and contexts, build or modify procedures from other procedures, and recognize when one strategy or procedure is more appropriate to apply than another. Student learning is supported when procedures and concepts are explicitly connected in ways that make sense to them. Conceptual foundations provide opportunities for students to develop reasoning strategies, which in turn deepens conceptual understanding and allows students to build procedural fluency.

Through the progression of the standards, students are provided opportunities to make sense of and build a conceptual understanding of the mathematical operations. This conceptual understanding supports children in becoming automatic in their retrieval of basic math facts. That basic fact fluency can then be applied as students develop computational and procedural fluency using a variety of numerical strategies and efficient algorithms.



Mathematical Tools and Technology

An excellent mathematics program integrates the use of mathematical tools and technology as resources to empower students to meet the learning intentions of the classroom. Software and online programs cannot replace authentic interactions between teachers and students, and the value of student-to-student discourse and collaboration. Technology and tools should be used in ways that promote mathematical reasoning and sense-making.

Utah Mathematical Practices

The mathematical practices included in *Utah's P-12 Core Mathematics Standards* describe how students engage with, reason about, and apply mathematical content ~~mathematical skills that Utah students develop throughout their educational experiences. Students become proficient in engaging with mathematical content and concepts as they learn, experience, and apply these skills.~~ Each grade level identifies's ~~standards have a description in their introductory material specifying the~~ developmentally appropriate ways students ~~will~~ engage with these practices as they learn grade level content~~math concepts~~. Although specific ~~Mathematical P~~practices have been ~~intentionally identified and~~ connected to each standard, other practices can be integrated when they support the mathematics identified in that standard. ~~instruction and practice of other Mathematical Practices not referenced in that standard are encouraged~~. Below, general descriptions are provided for each Mathematical Practice.

Descriptions of what the practices look like in each grade band are included in the grade level standards. More details about the practices and how they are integrated throughout the standards are included in each grade level's Utah Mathematics Core Guides.

(Utah Mathematics Core Guides will be updated after these standards are approved by the Utah State Board of Education)

Mathematical Practice 1: Ask and answer questions to build~~explore~~ mathematical knowledge~~concepts~~

Students formulate questions about ~~examine~~ mathematical concepts ~~and formulate questions~~. They build upon their background knowledge to help them clarify, connect, or extend mathematical ideas. During mathematical discourse, students ask ~~probing~~ questions to deepen their ~~better~~ understanding of mathematics. ~~concepts.~~

Asking questions cultivates students' curiosity about mathematical relationships and helps them refine their understanding. As students build their capacity to ask and answer mathematical~~probing~~ questions, they engage in more meaningful discourse about mathematics. When students ask and answer their own ~~explore rich~~ questions, they develop skills that help them persevere in mathematical problem solving. ~~it advances the mathematical understanding of all learners.~~

Mathematical Practice 2: Add or remove context to make sense of mathematics

Students add or remove context to help make sense of mathematical concepts. Students add context by connecting numbers and operations to images, stories, objects, and events. They remove context from a situation by representing the mathematics using numbers, symbols, and equations. This process involves two complementary mathematical skills: 1) decontextualizing—or abstracting a concrete situation by representing it symbolically and manipulating the symbols to arrive at a numerical or symbolic solution—and 2) recontextualizing, or pausing to probe the referents in the original problem during the manipulation and interpreting the numerical or symbolic answer in context.

When students contextualize and decontextualize mathematical concepts, they can make sense of underlying structures to help them solve problems. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects. Working in and out of context throughout a learning progression empowers students to make sense of mathematics and persevere as they examine abstract and real-world problems. This process allows students to take their knowledge of mathematics and meaningfully apply it to their lives.

Mathematical Practice 3: Construct, justify, and communicate clear and reasonable arguments

Students construct arguments explaining mathematical reasoning and assumptions by using known facts, definitions, and procedures to justify ~~using the mathematical reasoning that underlies~~ a strategy, solution, or conjecture. They justify their ~~conjectures and clearly communicate~~ reasoning using symbols, words, and concrete referents such as objects, drawings, diagrams, and actions. ~~They justify their arguments with peers through discourse, refining their thinking to create more robust and precise arguments.~~ Through discourse with peers, students examine arguments, identify errors or unsupported claims, and refine their reasoning. They listen to or read the arguments of others, decide whether they make sense, ask questions to clarify, improve, or build on their arguments.

Constructing, justifying, and communicating arguments fosters a deep understanding of mathematical concepts. By defending their conjectures, and critiquing the reasoning of their peers, students solidify their mathematical understanding and identify potential flaws in their reasoning. Clear communication enables students to articulate their thoughts effectively, enhancing their ability to explain their reasoning to others. Discourse with peers exposes students to diverse perspectives, promoting critical thinking and collaborative problem-solving.

Mathematical Practice 4: Model with Mathematics~~Build and use models~~

Mathematical models use structures to represent relationships. Students build and use verbal, contextual, visual, symbolic, and physical models to represent and make sense of the relationships between quantities in real-world situations and mathematical problems. Students use mathematical models to solve problems in everyday life, society, and the workplace; identifying important quantities; analyzing relationships; drawing conclusions; and revising the model if necessary. This process is distinctive for its cyclic nature, where, starting from a real-world situation, students or modelers formulate a mathematical representation, work through it, and then return to the context to assess the model's validity and applicability.

Using models enhances student learning by providing students with multiple ways to represent and understand mathematical concepts, connect mathematical concepts to real-world situations, and develop problem-solving skills. Students explore the idea that various models can showcase mathematical thinking in valuable ways. Using multiple models helps students notice the connections between mathematical structures and promotes the development of mathematical generalizations that can be leveraged as tools to make sense of and persevere in solving novel problems.

Mathematical Practice 5: Select and use tools appropriately and strategically

Students strategically select and use relevant and valuable tools for mathematical tasks with which they engage. Tools can be physical objects (e.g., compasses or manipulatives), technological tools (e.g. graphing calculators or virtual manipulatives) or mathematical constructs (e.g. diagrams, strategies, or algorithms).

Students consider the available mathematical problem-solving tools and choose the most relevant and useful ones. When students have the agency to select mathematical tools strategically, it empowers them to visualize, represent, and understand mathematical concepts effectively, fostering critical thinking, problem-solving flexibility, perseverance, and engagement.

Mathematical Practice 6: Attend to precision and reasonableness

Students exercise mathematical precision and reasonableness in their communication, calculations, and processes. They calculate flexibly, accurately, and efficiently, using clear and concise notation to record their work. They regularly evaluate whether actions, ideas, processes, and solutions make sense and are reasonable.

Precision in communication and calculation fosters a deeper understanding of mathematical concepts. Using precise language, students articulate their thoughts clearly, enhancing their ability to explain their reasoning to others and understand others' ideas. Accurate and efficient calculations and precise notation enable

students to solve problems effectively and minimize errors. The continuous evaluation of reasonableness ensures that students improve their ability to identify and learn from mathematical errors.

Mathematical Practice 7: Describe and represent structures, patterns, and relationships

Students describe and represent structures, patterns, and relationships to make sense of mathematics. While engaging in mathematical tasks, students ~~use their understanding to~~ make generalizations about the structure of numbers and become more flexible and efficient in applying mathematical concepts. They can see complicated things, such as the place value system and some algebraic expressions, as single objects or as being composed of several objects.

Students demonstrate these skills when they identify patterns and make connections across mathematical ideas. Students notice when calculations are repeated, look for general methods and shortcuts, and abstract patterns into algebraic rules. Analyzing these relationships allows students to bridge the gap between concrete observations and abstract reasoning.

Mathematical Practice 8: Make conjectures and evaluate the results

~~Students make sense of mathematics when they engage in mathematical investigations. They use their understanding of structures, patterns, and relationships to speculate about the nature of a relationship and then test their conjecture to determine how to proceed. As they test their mathematical hypotheses and evaluate the outcomes of their investigation, they build mathematical generalizations.~~

Students make mathematical generalizations by observing patterns, proposing conjectures, and testing their validity against known facts, definitions, and procedures. Making mathematical conjectures involves a rigorous metacognitive process. Students make sense of the mathematical situation, make a claim, monitor and evaluate progress, change course if necessary, persevere when stuck, and check answers using a different method.

Developing and assessing conjectures encourages active engagement and critical thinking. ~~Conjecturing acts as an entry point to exploration for all students. When making conjectures, students have opportunities to continually revise their thinking.~~ Students formulate conjectures, test them, and refine their understanding based on the outcomes. ~~Students view mistakes as assets that help them better refine their mathematical understanding.~~ This iterative process fosters a deep~~er~~ understanding of underlying mathematical principles. It promotes curiosity, students' ownership of their learning, and the development of positive mathematical identities.

Standards: Preschool Age 3

Introduction

In Preschool Age 3 (P3) and Preschool Age 4 (P4), the major work of both grades focuses on developing an understanding of the foundational concepts of counting and cardinality and developing the ability to describe and compare measurable attributes of objects and shapes.

In P3, instructional time should focus on three major works: (1) developing concepts of counting and cardinality; (2) beginning to recognize simple patterns; and (3) beginning to describe shapes and objects. Quality learning environments focus on hands-on experiences during play and interaction with others to incorporate well-designed mathematical experiences aligned to specific learning goals.

Mathematical Practices

Mathematical Practice 1: Ask and answer questions to build ~~explore~~ mathematical knowledge~~ideas~~

In grades P-2, students ask questions to help them develop understanding of numbers, place value, the properties of addition and subtraction, and the properties of shapes. Students begin to ask questions about data related to the classroom and their day-to-day lives.

Mathematical Practice 2: Add or remove context to make sense of mathematics

In grades P-2, students build an understanding of what the numbers, symbols, pictures, words, etc., in their work represent. Students develop flexibility in moving between concrete, pictorial, and abstract representations of mathematical ideas. They begin moving back and forth between a problem's context and its representation to use the form that best fits the situation.

Mathematical Practice 3: Construct, justify, and communicate clear and

reasonable arguments

In grades P3 and P4, students are learning to communicate their ideas and listen to the ideas of others. They develop strategies to agree and disagree respectfully. Students begin to explain their ideas about mathematics.

Mathematical Practice 4: Model with Mathematics~~Build and use models~~

In grades P-2, students use a variety of models to build their understanding of numbers with increasing complexity, leading to an understanding of the base ten place value system. They model the actions and comparisons represented by the operations of addition and subtraction. Consistent exposure to these models supports fluency and helps students connect concrete experiences to foundational mathematical ideas.

Mathematical Practice 5: Select and use tools appropriately and strategically

In grades P-2, students use tools when they help them make sense of mathematics. Tools can include, but are not limited to, physical tools, visual tools, strategies, and algorithms. Consistent, hands-on practice with tools builds confidence and prepares students for flexible application.

Mathematical Practice 6: Attend to precision and reasonableness

In grades P-K, students use informal language as they develop and learn accurate mathematical vocabulary. They begin to learn strategies for assessing their accuracy when counting, naming numbers, and describing shapes.

Mathematical Practice 7: Describe and represent structures, patterns, and relationships

In grades P-K, students explore patterns and structures in counting and with shapes. Students begin to develop understanding of the relationship between addition and subtraction using small numbers.

Mathematical Practice 8: Make conjectures and evaluate the results

In grades P-2, students make and test conjectures related to numbers, place value, the properties of addition and subtraction, and the attributes of shapes. During this process, students learn to evaluate the reasonableness of their solution path and adjust as needed. Providing students opportunities to revise their thinking helps students develop confidence in problem solving.

Standards: Preschool Age 3 (P3)

More details about the standards, including relevant vocabulary, representations that support student learning, pre-requisite skills, and how the skills are integrated, can be found in the Utah Mathematics Core Guides.

(Utah Mathematics Core Guides will be updated after these standards are approved by the Utah State Board of Education)

Counting and Cardinality (CC)

Identify numerals by name, count to 10, use one-to-one correspondence, describe quantities of objects counted, use ordinal language, and subitize.

P3.CC.1

Recite number names in sequence to 10~~, attending to *structure* and *precise language*~~. (MP 6~~, 7~~)

P3.CC.2

~~Begin to recognize~~ Match ~~that~~ written numerals~~numbers represent a~~to a given quantity 1-5. Use ~~a variety of~~ *tools* to *build and model* numbers. (MP 4, 5)

P3.CC.3

Demonstrate one-to-one correspondence by *accurately* counting and pointing/touching a line of 1-5 objects. (MP 6)

P3.CC.4

~~Begin to use *accurate* number names to identify the number of objects in a group of up to 5 objects, recognizing that the last number in a count represents the total number of objects. (MP 6)~~Count a group of up to 5 objects using *accurate number*

names, and identify that the last number named tells the total quantity counted (cardinality). (MP 6)

P3.CC.5

~~With support, i~~Identify whether the number of objects in one group is the same as those in another group for sets of up to 4 objects~~., using *precise mathematical language.* ~~(MP 6)

P3.CC.6

Identify whether an object is "first" or "second" in a sequence~~. by noticing ordinal structure~~. ~~Begin to recognize~~ Use ordinal terms (e.g. “first”, “second”)~~ordering words~~ in everyday *contexts*. (MP 2)

P3.CC.7

~~Subitize~~ Name the number without counting each object (subitize) for quantities up to 3~~ using *patterns and structures*~~. (MP 7)

Operations and Algebraic Thinking (OA)

Identify and explore simple patterns.

P3.OA.1

Describe ~~and *model* simple~~ repeating *patterns* in the environment. Duplicate~~and begin to duplicate~~ and extend those patterns. (MP ~~4,~~ 7)

Measurement and Geometry (MG)

Identify and describe measurable attributes of basic shapes.

P3.MG.1

~~With prompting and support, i~~Identify and *describe* measurable attributes (e.g., big, small, tall, short). (MP 7)

P3.MG.2

~~With prompting and support, i~~Identify, *describe*, and *represent* basic shapes and their attributes. (MP 7)

Data Science (D)

Begin asking questions that lead to collecting and analyzing data by sorting and counting objects.

P3.D.1

~~With prompting and support, a~~A*sk questions* about people or objects in the classroom and represent the data. (e.g. Build a class pictograph to answer the question "What is our favorite weather?") ~~that lead to data collection~~. (MP 1)

P3.D.2

~~With prompting and support, c~~Collect and sort data or objects by attribute (color, shape, size, etc)~~., and *build data models.*~~ (MP 4)

P3.D.3

~~With prompting and support, a~~A*ccurately* count the number of objects or data points in each category (no more than five objects per category). (MP 6)

Essential Competencies

Essential competencies have been identified at each grade level to represent foundational understandings that students need to succeed as they continue in future grade levels. This list is not exhaustive; students will engage with all grade-level standards. Educators may prioritize instructional time and, as needed, provide interventions based on the standards that support these competencies to ensure students are proficient. Through engagement with the knowledge and skills embedded within the standards, by the end of P3, children will be able to:

- Count up to 5 objects in a set; then tell how many objects are in the set without counting again. (CC)
- Count to 10 by ones and recognize that numbers have a known sequence (e.g., "1, 2, 3, 4, 5. What comes next?"). (CC)
- Quickly recognize small groups of up to 3 objects without counting. (CC)
- Identify and describe basic shapes and their measurable attributes. (MG)

- ~~Begin s~~Sort~~ing~~ and count~~ing~~ objects. (D)

Standards: Preschool Age 4

Introduction

In Preschool Age 3 (P3) and Preschool Age 4 (P4), the major work of both grades focuses on developing an understanding of foundational concepts of counting and cardinality and developing the ability to describe and compare measurable attributes of objects and shapes.

In P4, instructional time should focus on three major works: (1) reinforcing concepts of counting and cardinality; (2) exploring concepts of addition and subtraction; and (3) exploring and describing shapes, patterns, and measurable attributes of objects. Quality learning environments focus on hands-on experiences during play and interaction with others to incorporate well-designed mathematical experiences aligned to specific learning goals.

Mathematical Practices

Mathematical Practice 1: Ask and answer questions to build ~~explore~~ mathematical knowledge~~ideas~~

In grades P-2, students ask questions to help them develop understanding of numbers, place value, the properties of addition and subtraction, and the properties of shapes. Students begin to ask questions about data related to the classroom and their day-to-day lives.

Mathematical Practice 2: Add or remove context to make sense of mathematics

In grades P-2, students build an understanding of what the numbers, symbols, pictures, words, etc., in their work represent. Students develop flexibility in moving between concrete, pictorial, and abstract representations of mathematical ideas. They begin moving back and forth between a problem's context and its representation to use the form that best fits the situation.

Mathematical Practice 3: Construct, justify, and communicate clear and

reasonable arguments

In grades P3 and P4, students are learning to communicate their ideas and listen to the ideas of others. They develop strategies to agree and disagree respectfully. Students begin to explain their ideas about mathematics.

Mathematical Practice 4: Model with Mathematics~~Build and use models~~

In grades P-2, students use a variety of models to build their understanding of numbers with increasing complexity, leading to an understanding of the base ten place value system. They model the actions and comparisons represented by the operations of addition and subtraction. Consistent exposure to these models supports fluency and helps students connect concrete experiences to foundational mathematical ideas.

Mathematical Practice 5: Select and use tools appropriately and strategically

In grades P-2, students use tools when they help them make sense of mathematics. Tools can include, but are not limited to, physical tools, visual tools, strategies, and algorithms. Consistent, hands-on practice with tools builds confidence and prepares students for flexible application.

Mathematical Practice 6: Attend to precision and reasonableness

In grades P-K, students use informal language as they develop and learn accurate mathematical vocabulary. They begin to learn strategies for assessing their accuracy when counting, naming numbers, and describing shapes.

Mathematical Practice 7: Describe and represent structures, patterns, and relationships

In grades P-K, students explore patterns and structures in counting and with shapes. Students begin to develop understanding of the relationship between addition and subtraction using small numbers.

Mathematical Practice 8: Make conjectures and evaluate the results

In grades P-2, students make and test conjectures related to numbers, place value, the properties of addition and subtraction, and the attributes of shapes. During this process, students learn to evaluate the reasonableness of their solution path and adjust as needed. Providing students opportunities to revise their thinking helps students develop confidence in problem solving.

Standards: Preschool Age 4 (P4)

More details about the standards, including relevant vocabulary, representations that support student learning, pre-requisite skills, and how the skills are integrated, can be found in the Utah Mathematics Core Guides.

(Utah Mathematics Core Guides will be updated after these standards are approved by the Utah State Board of Education)

Counting and Cardinality (CC)

Count to 20, recognize numerals, demonstrate one-to-one correspondence, compare quantities, use ordinal language, and subitize.

P4.CC.1

~~With support, a~~*A*~~A~~*ccurately* recite number names and the counting sequence to 20. (MP 6)

P4.CC.2

Associate quantities with written numerals up to 10. ~~Begin to form~~ Practice forming numerals and use ~~a variety of~~ *tools* to represent quantities. (MP 5)

P4.CC.3

Demonstrate one-to-one correspondence by accurately counting and pointing to or touching one object per count for an arrangement of up to 10 objects. (MP 6)

P4.CC.4

Use *accurate* number names to identify the number of objects in a group of up to 10~~., recognizing~~ Explain that the last number in a count ~~is represents~~ the total number of objects. (MP 6)

P4.CC.5

Use mathematical language to *accurately* identify whether the number of objects in one group is more than, less than, or the same as the number of objects in another group for sets of up to 6 objects. (MP 6)

P4.CC.6

Identify and state whether an object is "first," "second," "third," or "last" in a sequence. ~~Begin to a~~Apply ordering words to everyday *contexts*. (MP 2)

P4.CC.7

~~Use *patterns* and *structures* to subitize~~ Name the number without counting each object (subitize) for quantities of up to five. (MP 7)

Operations and Algebraic Thinking (OA)

Identify and manipulate simple patterns and model addition and subtraction problems involving numbers up to and including 5.

P4.OA.1

~~*Build and u*~~*Use concrete and/or pictorial models* to represent real-world situations involving addition (adding to or putting together) and subtraction (taking from or taking apart) with numbers up to and including 5. (MP 4)

P4.OA.2

Decompose numbers less than or equal to five *using a variety of models* (e.g. objects, drawings, fingers) and demonstrate that a ~~explain why a~~ number or set of objects can be broken apart in multiple ways. (MP 4~~, 8~~)

P4.OA.3

Select and use tools to *model* sums of 5 using quantities from 0–5. (MP 4, 5)

P4.OA.4

Create, duplicate, and extend repeating ~~simple~~ *patterns*. (MP 7)

Measurement and Geometry (MG)

Identify, describe, build, and compare basic shapes. Describe their measurable attributes.

P4.MG.1

Describe measurable attributes of objects using *accurate* vocabulary (e.g., length [long/short], weight [heavy/light], size [big/small], and distance [near/far]). (MP 6)

P4.MG.2

~~Compare measurable attributes of objects by *making and testing conjectures*~~. ~~Directly c~~Compare two objects~~.,~~ ~~using~~ Use measurable attributes to *justify* the comparison. (e.g. My friend has more crackers than me because his pile is bigger.) (MP 3~~, 8~~)

P4.MG.3

Identify, *describe, and represent* two- and three-dimensional shapes. Describe attributes of two dimensional shapes including size, number of sides, and number of corners. (MP 7)

P4.MG.4

~~Use names of shapes to describe objects in the environment.~~ Identify the relative positions of ~~these~~ objects in the environment *accurately* using terms such as above, below, beside, in front of, behind, and next to. (MP 6)

P4.MG.5

Create basic shapes using a *variety of tools*. ~~With support, c~~Combine basic shapes to create new shapes. (MP 5)

P4.MG.6

Recognize patterns in activities that occur during different times of day including morning, afternoon, and night. (MP 7)

Data Science (D)

Ask questions that lead to collecting, analyzing, and interpreting data by sorting and counting objects.

P4.D.1

~~With prompting and support, a~~*Ask questions* about a given topic that can be answered by collecting ~~lead to collecting, analyzing, and interpreting~~ data as a class ~~gathered within the classroom~~. (MP 1)

P4.D.2

Collect and sort data or objects organized by attribute (color, shape, size, etc). ~~With prompting and support, *build data models.*~~ (MP 4)

P4.D.3

~~With prompting and support, a~~Analyze data by *accurately* counting the number of objects or data points in each category. (MP 6)

P4.D.4

~~With prompting and support, i~~Interpret data to identify and *explain* ~~*justify*~~ which groups contain more, less, or the same amount. (MP 3)

Essential Competencies

Essential competencies have been identified at each grade level to represent foundational understandings that students need to succeed as they continue in future grade levels. This list is not exhaustive; students will engage with all grade-level standards. Educators may prioritize instructional time and, as needed, provide interventions based on the standards that support these competencies to ensure students are proficient. Through engagement with the skills and knowledge embedded within the *Utah Core Mathematics Standards*, by the end of P4, children will be able to:

- Count up to 10 objects in a set, then tell how many objects are in the set without counting again. (CC)
- ~~Begin to c~~Connect number names and quantities with written numerals. (CC)
- Count to 20. (CC)
- Quickly recognize groups of up to 5 objects without counting. (CC)

- Model addition and subtraction with numbers up to and including 5 using concrete objects, fingers, movements, and simple drawings. (OA)
- Identify, describe, build, and compare basic shapes using their measurable attributes. (MG)
- ~~Begin interpreting data when s~~Sort~~ing~~ and count~~ing~~ objects. (D)

Standards: Kindergarten (K)

Introduction

In kindergarten through second grade, the major work of each grade focuses on developing an understanding of addition and subtraction and building an understanding of the base-ten place value number system. Students begin to develop an understanding of foundational concepts of linear measurement and explore the defining attributes of shapes.

In kindergarten, instructional time should focus on three major works: (1) mastering concepts of counting and cardinality; (2) representing, relating, and operating on whole numbers, initially with sets of objects; and (3) describing shapes and space. More learning time in kindergarten should be devoted to number sense than to other topics, as students build fluency through concrete experiences, visual models, and verbal expressions.

Mathematical Practices

Mathematical Practice 1: Ask and answer questions to build~~explore~~ mathematical knowledge~~ideas~~

In grades P-2, students ask questions to help them develop understanding of numbers, place value, the properties of addition and subtraction, and the properties of shapes. Students begin to ask questions about data related to the classroom and their day-to-day lives.

Mathematical Practice 2: Add or remove context to make sense of mathematics

In grades P-2, students build an understanding of what the numbers, symbols, pictures, words, etc., in their work represent. Students develop flexibility in moving between concrete, pictorial, and abstract representations of mathematical ideas. They begin moving back and forth between a problem's context and its representation to use the form that best fits the situation.

Mathematical Practice 3: Construct, justify, and communicate clear and

reasonable arguments

In grades K-2, students are learning to communicate their ideas and listen to the ideas of others. They develop strategies to agree and disagree respectfully. They begin to justify their arguments with evidence and draw connections between mathematical representations and procedures. Students also begin to compare and contrast their strategies and solutions.

Mathematical Practice 4: ~~Build and use models~~Model with Mathematics

In grades P-2, students use a variety of models to build their understanding of numbers with increasing complexity, leading to an understanding of the base ten place value system. They model the actions and comparisons represented by the operations of addition and subtraction. Consistent exposure to these models supports fluency and helps students connect concrete experiences to foundational mathematical ideas.

Mathematical Practice 5: Select and use tools appropriately and strategically

In grades P-2, students use tools when they help them make sense of mathematics. Tools can include, but are not limited to, physical tools, visual tools, strategies, and algorithms. Consistent, hands-on practice with tools builds confidence and prepares students for flexible application.

Mathematical Practice 6: Attend to precision and reasonableness

In grades P-K, students use informal language as they develop and learn accurate mathematical vocabulary. They begin to learn strategies for assessing their accuracy when counting, naming numbers, and describing shapes.

Mathematical Practice 7: Describe and represent structures, patterns, and relationships

In grades P-K, students explore patterns and structures in counting and with shapes. Students begin to develop understanding of the relationship between addition and subtraction using small numbers.

Mathematical Practice 8: Make conjectures and evaluate the results

In grades P-2, students make and test conjectures related to numbers, place value, the properties of addition and subtraction, and the attributes of shapes. During this process, students learn to evaluate the reasonableness of their solution path and adjust as needed. Providing students opportunities to revise their thinking helps students develop confidence in problem solving.

Standards: Kindergarten (K)

More details about the standards, including relevant vocabulary, representations that support student learning, pre-requisite skills, and how the skills are integrated, can be found in the Utah Mathematics Core Guides.

(Utah Mathematics Core Guides will be updated after these standards are approved by the Utah State Board of Education)

Counting and Cardinality (CC)

Know number names and the counting sequence. Count to tell the number of objects and represent a given quantity in a set. Identify and compare quantities of objects and numerals. Identify an object's ordinal position. Subitize quantities.

K.CC.1

~~*Accurately*~~ recite numbers in sequence from 1 to 100 by ones and tens. *Accurately* count backward from 10. ~~Attend to the counting *structure*.~~ (MP 6~~, 7~~)

K.CC.2

Accurately count forward from a given number between 1 and 100. Attend to *patterns* of tens and ones ~~the counting *structure*~~. (MP 6, 7)

K.CC.3

Use one-to-one correspondence to *accurately* identify the quantity of objects in a group of 0–20. ~~Understand~~ Explain that the last number stated ~~represents~~ is the number of objects counted. (MP 6)

K.CC.4

Given a number 1-20, count out that many objects. When counting objects, *build models* to show that each successive number refers to a quantity that is one greater than the previous number. (MP 4)

K.CC.5

Read and write numbers 0 to 20 using base-ten numerals *with precision*. Represent a quantity of 0 to 20 objects with written numerals. (MP 6)

K.CC.6

Identify and compare quantities of objects and numerals up to 10 using the words "greater than," "less than," and "equal to." Use matching or counting strategies and reasoning to *justify* comparisons. (MP 3)

K.CC.7

Identify and *justify* an object's ordinal position, *using precise mathematical language*. Order quantities or numerals using the ordinal words "first" through "tenth." (MP 3, 6)

K.CC.8

Use visual *patterns and structures* (e.g. five frames, ten frames, dice, fingers) to subitize (name the number without counting each object) quantities up to 10. (MP 7)

Operations and Algebraic Thinking (OA)

Understand addition as putting together and adding to, and subtraction as taking apart and taking from.

K.OA.1

Represent addition and subtraction within ~~sums and minuends up to and including~~ 10 *using a variety of tools and models*. *Attend to the precision and reasonableness* of results. (MP 4, 5, 6)

K.OA.2

Build and use models to solve addition and subtraction ~~story~~ word problems within ~~sums or minuends up to and including~~ 10. ~~*Add or remove story context to s*~~Solve problem type situations of adding to and taking from with result unknown, putting together with the total unknown, and putting together with both addends unknown. (MP 2, 4)

K.OA.3

Compose and decompose numbers less than or equal to 10 in multiple ways *using a variety of models*. Make sums to 10 using numbers 1-9. ~~*Make conjectures* about~~ *Explain* why a number or set of objects can be broken apart in multiple ways. (MP 4, 8)

K.OA.4

Use strategies to add and subtract *fluently*~~*flexibly, accurately, and efficiently* using numbers less than or equal to~~ within 5. (MP 6)

Number and Operations in Base Ten (NBT)

Build and use models to compose and decompose numbers from 11-19 into ten ones and some more ones to conceptually understand place value.

K.NBT.1

Build and use models to compose and decompose numbers from 11-19 into ten ones and some more ones. *Represent structure* from those models with math language and an equation (e.g., "Eighteen is the same as 10 and 8”; 18=10+8). *Describe the pattern* that teen numbers are always composed of ten ones and some more ones. (MP 4, 7)

Measurement and Geometry (MG)

Identify, describe, and compare measurable attributes of objects. Analyze, compare, create, and compose shapes.

K.MG.1

Describe several measurable attributes of a single object (e.g., length and weight)~~., *attending to precision and reasonableness.*~~ Compare two objects with a common

measurable attribute to see which object has "more of"/ "less of" the attribute, and *justify the results*. (MP 3~~, 6~~)

K.MG.2

Describe structures of two-dimensional and three-dimensional shapes, including names and attributes, regardless of size or orientation. *Describe* their relative positions in the environment. (MP 7)

K.MG.3

Analyze, compare, and sort two- and three-dimensional shapes and objects regardless of size or orientation. *Justify* the sort using informal language to describe similarities, differences, and other attributes (e.g., color, size, shape, number of sides). (MP 3)

K.MG.4

Build and use models to create two- and three-dimensional shapes and objects. Use simple shapes to form larger shapes. (MP 4)

K.MG.5

~~Recognize that clocks are tools used to measure and show time.~~ Connect the use of clocks to daily routines and events. *Name*~~*Recognize*~~ *structures* and features of clocks. (MP 7)

Data Science (D)

Ask questions that lead to collecting, analyzing, and interpreting data. Sort, count, and compare objects in a data set.

K.D.1

Ask questions ~~as a class~~ about a given topic that can be answered by ~~will lead to~~ collecting ~~, analyzing, and interpreting~~ data ~~gathered~~ within the classroom. (MP 1)

K.D.2

Collect and organize data. *Build data models* with up to three categories. (MP 4)

K.D.3

Analyze data by describing~~observing~~ *patterns and structures* in data models~~.~~ (e.g. compare categories, identify most/least). *Accurately* count the number of objects or data points in each category. (MP 6, 7)

K.D.4

Interpret data to identify *and explain~~justify~~* which groups contain more, less, or the same amount by comparing the number in each category. (MP 3)

Essential Competencies

Essential competencies have been identified at each grade level to represent foundational understandings that students need to succeed as they continue in future grade levels. This list is not exhaustive; students will engage with all grade-level standards. Educators may prioritize instructional time and, as needed, provide interventions based on the standards that support these competencies to ensure students are proficient. Through engagement with the skills and knowledge embedded within the *Utah Core Mathematics Standards*, by the end of kindergarten, children will be able to:

- Count up to 20 objects in a set to answer questions like "how many." (CC)
- Read and write numbers 0-20. (CC)
- Count to 100 by ones. (CC)
- Compare quantities of objects and numerals up to 10. (CC)
- Quickly recognize groups of up to 10 objects without counting. (CC)
- Fluently add and subtract when the largest number in the equation is no greater than 5. (Basic fact fluency) (OA)
- Draw pictures or use objects to solve addition and subtraction word problems where the largest number in the problem is no greater than 10. (OA)
- Break apart numbers less than or equal to 10 in multiple ways. (OA)

- Break apart numbers 11-19 into ten ones and some more ones. (NBT)

Standards: Grade 1

Introduction

In kindergarten through second grade, the major work of each grade focuses on developing an understanding of addition and subtraction and building an understanding of the base-ten place value number system. Students develop an understanding of foundational concepts of linear measurement and explore the defining attributes of shapes.

In Grade 1, instructional time should focus on four major works: (1) developing understanding of addition, subtraction, and strategies for addition and subtraction; (2) developing understanding of whole number relationships and place value, including grouping in tens and ones; (3) developing understanding of linear measurement and measuring lengths as iterating length units; and (4) reasoning about attributes of, and composing and decomposing geometric shapes.

Mathematical Practices

Mathematical Practice 1: Ask and answer questions to build ~~explore~~ mathematical knowledge~~ideas~~

In grades P-2, students ask questions to help them develop understanding of numbers, place value, the properties of addition and subtraction, and the properties of shapes. Students begin to ask questions about data related to the classroom and their day-to-day lives.

Mathematical Practice 2: Add or remove context to make sense of mathematics

In grades P-2, students build an understanding of what the numbers, symbols, pictures, words, etc., in their work represent. Students develop flexibility in moving between concrete, pictorial, and abstract representations of mathematical ideas. They begin moving back and forth between a problem's context and its representation to use the form that best fits the situation.

Mathematical Practice 3: Construct, justify, and communicate clear and

reasonable arguments

In grades K-2, students are learning to communicate their ideas and listen to the ideas of others. They develop strategies to agree and disagree respectfully. They begin to justify their arguments with evidence and draw connections between mathematical representations and procedures. Students also begin to compare and contrast their strategies and solutions.

Mathematical Practice 4: Model with Mathematics~~Build and use models~~

In grades P-2, students use a variety of models to build their understanding of numbers with increasing complexity, leading to an understanding of the base ten place value system. They model the actions and comparisons represented by the operations of addition and subtraction. Consistent exposure to these models supports fluency and helps students connect concrete experiences to foundational mathematical ideas.

Mathematical Practice 5: Select and use tools appropriately and strategically

In grades P-2, students use tools when they help them make sense of mathematics. Tools can include, but are not limited to, physical tools, visual tools, strategies, and algorithms. Consistent, hands-on practice with tools builds confidence and prepares students for flexible application.

Mathematical Practice 6: Attend to precision and reasonableness

In grades 1-2, students refine informal language as they develop and learn precise mathematical vocabulary. Students use structure to accurately record, label, and share their thinking. They explore when a precise answer is necessary and when making an estimate, which can help them determine if a solution makes sense. Students use estimation strategies based on place value structure and the properties of operations to assess reasonableness throughout the problem-solving process.

Mathematical Practice 7: Describe and represent structures, patterns, and relationships

In grades 1-2, students explore patterns and structures such as place value, properties of operations, and composition of shapes. They use structures and patterns to develop a deep understanding of addition and subtraction. Students use structures and patterns to see complicated things as single objects or as composed of several objects.

Mathematical Practice 8: Make conjectures and evaluate the results

In grades P-2, students make and test conjectures related to numbers, place value, the properties of addition and subtraction, and the attributes of shapes. During this process, students learn to evaluate the reasonableness of their solution path and adjust as needed. Providing students opportunities to revise their thinking helps students develop confidence in problem solving.

Standards: Grade 1

More details about the standards, including relevant vocabulary, representations that support student learning, pre-requisite skills, and how the skills are integrated, can be found in the Utah Mathematics Core Guides.

(Utah Mathematics Core Guides will be updated after these standards are approved by the Utah State Board of Education)

Operations and Algebraic Thinking (OA)

Represent and solve problems involving addition and subtraction with sums and minuends less than or equal to 20. Solve problem type situations with unknowns in all places. (Mastery of start-unknown problems is not expected until second grade.) Understand and apply properties of operations and the relationship between addition and subtraction. Understand the meaning of the equal sign.

1.OA.1

Build and use models to solve addition and subtraction wordsstory problems withinin sums and minuends less than or equal to 20. *Add or remove story context* to sSolve problem type situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions. (MP 2, 4)

1.OA.2

Build and use models to *solve* ~~*word*~~*story ~~*~~ problems* involving adding three whole numbers with*in* ~~ sums less than or equal to~~ 20.~~ *Add or remove context to make sense of problems and solutions.*~~ (MP 2, 4)

1.OA.3

~~*Make and test conjectures* about~~ Use the properties of addition to examine patterns in addition and subtraction. ~~*Add context* to~~ *Test examples and non-examples*~~make sense~~ of these properties *in equations and story contexts.* ~~as strategies to add and subtract.~~ (MP 2, 8)

1.OA.4

Describe and represent subtraction as an unknown-addend problem (e.g., thinking of subtraction as "what number plus ___ equals the total"). Determine the unknown whole number in an addition or subtraction equation relating three whole numbers, and *justify the results*. (MP 3, 7)

1.OA.5

Describe structures and relationships using number lines and counting sequences to connect counting to addition and subtraction. (MP 7)

1.OA.6

Add and subtract with*in* ~~sums and minuends less than or equal to~~ 20. ~~*Connect and justify*~~ *Apply* different strategies for addition and subtraction and *explain* the strategy using place value understanding, the relationship between addition and subtraction, and properties of addition. (MP 3)

1.OA.7

~~Use strategies to a~~A*dd* and subtract ~~*fluently flexibly, accurately, and efficiently*~~ with*in* ~~sums and minuends less than or equal to~~ 10. (MP 6)

1.OA.8

Build and use models ~~*(e.g. objects, drawing, equations)*~~ to understand ~~make sense of~~ the meaning of the equal sign. Demonstrate that both sides of an equation have

equal value. ~~*Make and test conjectures* regarding~~ *Use evidence to explain* whether addition and subtraction equations are true or false. (MP 4, 8)

Number and Operations in Base Ten (NBT)

Count and represent numbers up to and including 120. Build and use models to conceptually understand place value. Use place value understanding to add and subtract larger numbers.

1.NBT.1

Count to 120 *accurately,* starting at any number. Represent a number of objects up to and including 120 with a written numeral. (MP 6)

1.NBT.2

Build and use models to represent and identify the number of tens and ones in a two-digit number. Show place value understanding by bundling ten ones to make a "ten." (MP 4)

1.NBT.3

Compare two two-digit numbers using *models* and/or place value understanding. *Represent the relationship* between the two numbers using comparison symbols <, =, and >. (MP 4, 7)

1.NBT.4

~~*Build and u*~~*Use concrete and pictorial models* to find ~~determine the~~ sums involving~~of two~~ two-digit numbers, ~~a two-digit number and a~~ one-digit numbers, and ~~a two-digit number and a~~ multiples of ten up ~~(less than or equal~~ to 90~~)~~. ~~Use the models *to represent and describe the structure of*~~ *Explain how the model demonstrates combining tens with tens, ones with ones, and how it is sometimes necessary to group~~*ing* *ten ones to make a ten*. ~~*Ask questions to c*~~*Compare* concrete and pictorial models. (MP 4, 7~~, 8~~)

1.NBT.5

~~*Build and u*~~*Use concrete and pictorial models* based on place value, properties of operations, and/or the relationship between addition and subtraction to subtract a multiple of ten from a larger multiple of ten. ~~*Ask questions to c*~~*Compare* concrete

and pictorial models; *relate the model* to a numerical method and explain the reasoning used. (MP ~~4~~1, 7)

1.NBT.6

Mentally find ten more or ten less than a given two-digit number and *justify the result* using place value language. (MP 3)

1. NBT.7

Use place value understanding to count forward or backward by tens from any number, and *describe the pattern* in the ones place and tens place when counting by ten. (MP 7)

Measurement and Geometry (MG)

Measure lengths. Tell and write time. Identify the value of U.S. coins. Reason with shapes and their attributes.

1.MG.1

Select a tool to use as a non-standard length unit. Measure by repeating the non-standard length unit. Express the length of the object as a whole number. (MP 5)

1.MG.2

~~*Construct a reasonable argument* about the o~~Order ~~of~~ three objects ~~sorted~~ by length. Compare the lengths of two objects indirectly using a third object and *justify the results.* (MP 3)

1.MG.3

Tell and write time in hours and half-hours using analog and digital clocks~~, *attending to precision and reasonableness*~~. (MP 6~~3~~)

1.MG.4

Describe attributes of and identify common U.S. coins. ~~*Attend to precision* when representing~~ Represent their comparative values and *use appropriate notation* (5¢). (MP 6)

1.MG.5

Ask questions to distinguish between defining and non-defining attributes of shapes (e.g. number of sides vs. color). Given defining attribute(s), build and draw shapes that possess the defining attribute(s). (MP 1)

1.MG.6

~~*Use structures, patterns, and relationships* to create a composite shape formed by two- and three-dimensional shapes and compose new shapes from the composite shape. (MP 7)~~

Combine two-dimensional shapes (e.g. rectangles, squares, trapezoids, triangles, half circles, quarter circles) to create two-dimensional composite shapes; combine three-dimensional shapes (cubes, rectangular prisms, cones, and cylinders) to create three-dimensional composite shapes. Describe how the smaller shapes *form the structure* of the larger composite shape. (MP 7)

1.MG.7

Build and use models to partition circles and rectangles into two or four equal shares. *Justify, compare, and evaluate* how decomposing a shape into more equal shares creates smaller shares. (MP 3, 4)

Data Science (D)

Ask investigative questions that lead to collecting, analyzing, and interpreting data. Build models to organize data, and interpret data visualizations.

1.D.1

~~Determine a topic question and *ask investigative*~~ *Choose a topic and ask questions* that can be answered by ~~will lead to~~ collecting ~~, analyzing, and interpreting~~ data within the context of the classroom. (MP 1)

1.D.2

Collect and organize data. *Build data visualizations* including bar graphs and picture graphs. When given a data set, *build data models and visualizations*. (MP 4)

1.D.3

Analyze data sets and data visualizations with up to three categories. *Ask and answer questions* to make sense of the data representation (e.g. How many data points are there? How many in each category? How many more or less are in one category than another?). (MP 1)

1.D.4

Interpret data thatto answers investigative questions. *Explain* trends or patterns in ~~*Construct and justify arguments about*~~ the data. (MP 3)

Essential Competencies

Essential competencies have been identified at each grade level to represent foundational understandings that students need to succeed as they continue in future grade levels. This list is not exhaustive; students will engage with all grade-level standards. Educators may prioritize instructional time and, as needed, provide interventions based on the standards that support these competencies to ensure students are proficient. Through engagement with the skills and knowledge embedded within the *Utah Core Mathematics Standards*, by the end of first grade, children will be able to:

- Fluently add and subtract when the largest number in the equation is no greater than 10. (Basic fact fluency) (OA)
- Draw pictures, use objects or write equations to solve addition and subtraction word problems where the largest number in the problem is no greater than 20. (OA)
- Use a variety of strategies to add and subtract. (OA)
- Count, write, and recognize numbers to 120 (NBT)
- Make sense of place value and the meaning of tens and ones in two-digit numbers. (NBT)
- Add two-digit numbers using objects and pictures. (NBT)
- Measure length using non-standard measurement units. (MG)

Standards: Grade 2

Introduction

In kindergarten through second grade, the major work of each grade focuses on developing an understanding of addition and subtraction and building an understanding of the base-ten place value number system. Students develop an understanding of foundational concepts of linear measurement and explore the defining attributes of shapes.

In Grade 2, instructional time should focus on four major works: (1) extending understanding of place value, including grouping in hundreds, tens and ones; (2) building fluency with addition and subtraction; (3) using standard units of measure; and (4) describing and analyzing shapes.

Mathematical Practices

Mathematical Practice 1: Ask and answer questions to build ~~explore~~ mathematical knowledge ~~ideas~~

In grades P-2, students ask questions to help them develop understanding of numbers, place value, the properties of addition and subtraction, and the properties of shapes. Students begin to ask questions about data related to the classroom and their day-to-day lives.

Mathematical Practice 2: Add or remove context to make sense of mathematics

In grades P-2, students build an understanding of what the numbers, symbols, pictures, words, etc., in their work represent. Students develop flexibility in moving between concrete, pictorial, and abstract representations of mathematical ideas. They begin moving back and forth between a problem's context and its representation to use the form that best fits the situation.

Mathematical Practice 3: Construct, justify, and communicate clear and reasonable arguments

In grades K-2, students are learning to communicate their ideas and listen to the ideas of others. They develop strategies to agree and disagree respectfully. They begin to justify their arguments with evidence and draw connections between mathematical representations and procedures. Students also begin to compare and contrast their strategies and solutions.

Mathematical Practice 4: Model with Mathematics~~Build and use models~~

In grades P-2, students use a variety of models to build their understanding of numbers with increasing complexity, leading to an understanding of the base ten place value system. They model the actions and comparisons represented by the operations of addition and subtraction. Consistent exposure to these models supports fluency and helps students connect concrete experiences to foundational mathematical ideas.

Mathematical Practice 5: Select and use tools appropriately and strategically

In grades P-2, students use tools when they help them make sense of mathematics. Tools can include, but are not limited to, physical tools, visual tools, strategies, and algorithms. Consistent, hands-on practice with tools builds confidence and prepares students for flexible application.

Mathematical Practice 6: Attend to precision and reasonableness

In grades 1-2, students refine informal language as they develop and learn precise mathematical vocabulary. Students use structure to accurately record, label, and share their thinking. They explore when a precise answer is necessary and when making an estimate, which can help them determine if a solution makes sense. Students use estimation strategies based on place value structure and the properties of operations to assess reasonableness throughout the problem-solving process.

Mathematical Practice 7: Describe and represent structures, patterns, and relationships

In grades 1-2, students explore patterns and structures such as place value,

properties of operations, and composition of shapes. They use structures and patterns to develop a deep understanding of addition and subtraction. Students use structures and patterns to see complicated things as single objects or as composed of several objects.

Mathematical Practice 8: Make conjectures and evaluate the results

In grades P-2, students make and test conjectures related to numbers, place value, the properties of addition and subtraction, and the attributes of shapes. During this process, students learn to evaluate the reasonableness of their solution path and adjust as needed. Providing students opportunities to revise their thinking helps students develop confidence in problem solving.

Standards: Grade 2

More details about the standards, including relevant vocabulary, representations that support student learning, pre-requisite skills, and how the skills are integrated, can be found in the Utah Mathematics Core Guides.

(Utah Mathematics Core Guides will be updated after these standards are approved by the Utah State Board of Education)

Operations and Algebraic Thinking (OA)

Represent and solve problems involving addition and subtraction with unknowns in all locations. Add and subtract fluently with sums and minuends less than or equal to 20. Work with equal groups of objects to gain foundations for multiplication.

2.OA.1

Build and use models to solve one-step addition and subtraction *word ~~story~~ problems* within ~~sums and minuends less than or equal to~~ 100~~,~~ and two-step addition and subtraction word~~story~~ problems within ~~sums and minuends less than or equal to~~ 20. ~~*Add or remove story context* to s~~ Solve problem type situations with unknowns in all positions. ~~while attending to the meaning of the equal sign.~~ (MP 2, 4)

2.OA.2

~~Use strategies and properties to a~~Add and subtract *fluently ~~flexibly, accurately, and~~*

~~*efficiently* within sums and minuends less than or equal to~~ 20. Explain mental strategies for addition and subtraction within 20 based on place value understanding, the relationship between addition and subtraction, and properties of operations. ~~Know from memory all sums of two one-digit numbers.~~ (MP 6)

2.OA.3

Describe and represent structures and patterns to determine if a group of up to 20 objects has an odd or even number of items by pairing them or counting by twos. (MP 7)

2.OA.4

Build and use models of ~~involving~~ repeated addition to determine the total number of objects in rectangular arrays with up to 5 rows and up to 5 columns. *Describe and represent the structures and patterns* of the arrays. ~~. *Make and evaluate conjectures about* *Evaluate*~~ whether the sums are the same when adding by row or column. (MP 4, 7, 8)

Number and Operations in Base Ten (NBT)

Build and use models to conceptually understand place value. Use place value understanding to add and subtract.

2.NBT.1

Show place value understanding by bundling ten 10s to make a "hundred." Use a variety of *models to represent* the amount of hundreds, tens, and ones in a three-digit number. Identify the number of hundreds, tens, and ones in a three-digit number and describe the value of each digit. (MP 4)

2.NBT.2

Count within 1,000., ~~*making conjectures* about counting patterns;~~ Skip-count by twos, fives, tens, and hundreds. *Make conjectures and predictions* about counting patterns. (MP 8)

2.NBT.3

Read three-digit whole numbers and *represent the place value structure in* those

numbers using numerals, base 10 word form, and expanded form. (MP 7)

2.NBT.4

Compare two three-digit numbers *using models* and/or place value understanding. *Represent the relationship* between the two numbers using comparison symbols <, =, and >. (MP 4, 7)

2.NBT.5

Use numerical strategies to *fluently* add and subtract within 100.~~determine the sum of up to four two-digit numbers, and the difference of two two-digit numbers *fluently flexibly, accurately, and efficiently*~~. *Justify* ~~a~~ the ~~chosen~~ strategy using place value understanding, the relationship between addition and subtraction, and/or properties of addition~~, and/or place value language~~. (MP 3, 6)

2.NBT.6

Build and use concrete and pictorial models to determine the sums and differences of three-digit numbers within ~~sums and minuends up to and including~~ 1,000~~999~~. ~~Use the models to *represent and describe the structure of*~~ Explain how the model demonstrates combining hundreds with hundreds, tens with tens, ones with ones, and how it is sometimes necessary to compose~~e~~ing and decompose~~e~~ing tens and hundreds. *Ask questions to compare* concrete and pictorial models with efficient numerical strategies. (MP 1, 4, 7)

2.NBT.7

Mentally add and subtract multiples of 10 or 100 from a three-digit number and *justify the result* using place value language. (MP 3)

Measurement and Geometry (MG)

Measure and estimate lengths in standard units and relate addition and subtraction to length. Work with time and money. Analyze and partition shapes to build a foundation for multiplication, area, and fractions.

2.MG.1

Select and use appropriate tools such as rulers, yardsticks, meter sticks, and

measuring tapes to measure the length of objects to the nearest whole unit. (MP 5)

2.MG.2

Describe and represent the length of an object using two different units of measure. *Describe the relationship* of the two measurements and relate them to the units chosen. (MP 7)

2.MG.3

~~*Construct, justify, and communicate clear and reasonable arguments* when estimating~~ Estimate lengths using inches, feet, centimeters, and meters. *Justify* why the estimate is *reasonable* by comparing it to a known length, benchmark, or measurement tool. (MP 3, 6)

2.MG.4

Measure with *precision* to determine how much longer one object is than another. Express the difference in length using a standard unit. (MP 6)

2.MG.5

Build and use a number line diagram with equally spaced points labeling ~~corresponding to the numbers~~ 0, 1, 2,… as a *model* to represent whole numbers as lengths from zero. ~~*Strategically u*~~*Use an open number line as a tool* to model and solve whole-number addition and subtraction equations and word problems within 100. (MP 4, 5)

2.MG.6

Attend to precision when telling and writing time to the nearest five minutes. ~~*Add*~~ *Use context* to determine when it is *reasonable* to use a.m. or ~~and~~ p.m.~~*, attending to reasonableness.*~~ (MP 2, 6)

2.MG.7

~~*Add or remove context* when solving~~Solve *word problems* involving dollar bills, quarters, dimes, nickels, and pennies. (MP 2)

2.MG.8

Build, draw, and identify shapes that possess specified attributes. *Ask and answer questions* about attributes to identify and describe shapes ~~having specific attributes (e.g. How many angles does this shape have? How many faces?)~~. ~~Build and draw shapes that possess specified attributes.~~ (MP 1)

2.MG.9

Build and use models to partition a rectangle into rows and columns of same-size squares and count to find the total number of squares. (MP 4)

2.MG.10

~~*Describe and represent structures, patterns and relationships* when partitioning~~ Partition two-dimensional shapes into two, three, or four equal shares; describe the shares' *relationship* to the whole (e.g. two halves, one third, three fourths). ~~shape using the words halves, thirds, a fourth of, quarters, etc. (e.g.~~ ~~Recognize~~ Demonstrate that equal parts of identical wholes need not have the same shape. (MP 7)

Data Science (D)

Ask investigative questions that lead to collecting, analyzing, and interpreting data. Organize and build data visualizations using features such as titles, labels, and legends. Consider the impact missing data may have on a data set.

2.D.1

~~Determine a topic question and *ask investigative*~~ Choose a topic and *ask questions* that can be answered by~~will lead to~~ collecting ~~, analyzing, and interpreting~~ data within the context of the classroom or school ~~and grade~~. (MP 1)

2.D.2

Collect and organize data. *Build data visualizations* including bar graphs and pictographs with single-unit scales. ~~*Ask questions* to consider a given data set about a classroom or grade level context, and o~~Organize ~~that~~ data by~~using~~ different variables. (MP ~~1,~~ 4)

2.D.3

Analyze data sets and single-unit scale data visualizations using features such as titles, labels, and legends. *Ask* *and answer addition, subtraction, and/or comparison questions* to make sense of the data. (MP 1)

2.D.4

Interpret data thatto answers investigative questions. *Justify* conclusions using specific information from the data set or visualization. ~~*Construct and justify arguments* about the data~~. ~~*Make conjectures* about the impact missing data may have on interpretation of the data.~~ *Explain* how missing data could change the way the data is interpreted. (MP 3, 8)

Essential Competencies

Essential competencies have been identified at each grade level to represent foundational understandings that students need to succeed as they continue in future grade levels. This list is not exhaustive; students will engage with all grade-level standards. Educators may prioritize instructional time and, as needed, provide interventions based on the standards that support these competencies to ensure students are proficient. Through engagement with the skills and knowledge embedded within the *Utah Core Mathematics Standards*, by the end of second grade, children will be able to:

- Fluently add and subtract when the largest number in the equation is no greater than 20. (Basic fact fluency) (OA)
- Connect numerical strategies to concrete and pictorial models to solve one- and two-step addition and subtraction word problems. (OA)
- Fluently add and subtract when the largest number in the equation is no greater than 100. (Computational fluency) (NBT)
- Make sense of place value and the meaning of hundreds, tens, and ones in three-digit numbers using visual and numerical models. (NBT)
- Add and subtract three-digit numbers using objects, pictures, and numerical strategies. (NBT)
- Relate addition and subtraction to length. (MG)

- Analyze and partition shapes and begin using fractional language (e.g., halves, thirds and fourths). (MG)