



Standards: Grade 3

Introduction

In third through fifth grade, the major work of each grade focuses on representing and understanding multiplication and division and developing an understanding of fractions. Students generalize and expand their place value understanding. Measurement concepts are expanded to include two- and three-dimensional measurements.

In Grade 3, instructional time should focus on four major works: (1) developing understanding of multiplication and division and strategies for multiplication and division within 100; (2) developing understanding of fractions, especially unit fractions (fractions with numerator 1); (3) developing understanding of the structure of rectangular arrays and of area; and (4) describing and analyzing two-dimensional shapes.

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 third grade, children will be able to:

- Use pictures, objects, and equations to solve multiplication and division word problems ~~within when the largest number in the problem is no greater than~~ 100. (OA)

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This draft is for consideration during the October 8, 2026 Standards & Assessment Committee Meeting

- ~~Fluently multiply two one-digit numbers. (Basic fact fluency) (OA)~~
- Fluently multiply and divide within 100. ~~numbers within when the dividend is no greater than 100 and the quotient is no greater than 10.~~ (Basic fact fluency) (OA)
- Fluently add and subtract within 1000. ~~when the largest number in the equation is no greater than 999.~~ (Computational fluency) (NBT)
- Describe and represent a fraction as a numerator and denominator, a fraction as a part of a whole, and as a location on a number line. (NF)
- Build models and use reasoning strategies to compare fractions. (NF)
- Build models to generate equivalent fractions. (NF)
- Use models to determine the area of rectangles. (MG)

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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 multiplication and division with whole number products and quotients. Demonstrate understanding of the properties of multiplication and the relationship between multiplication and division. Utilize the associative, commutative, distributive, identity, and zero properties. Use the four operations to solve multistep problems and to explain patterns in arithmetic.

3.OA.1

Build and use models to find and interpret the products of whole numbers. (MP 4)

3.OA.2

Build and use models to find and interpret whole-number quotients. (MP 4)

3.OA.3

Solve multiplication and division wordstory problems with products or dividends less than or equal to 100 and whole number quotients. *Use models using a variety of models. Add or remove context* to solve situations involving equal groups, arrays, and measurement quantities. (MP ~~2~~, 4)

3.OA.4

~~Determine~~*Evaluate* the unknown whole number in a multiplication or division equation. Represent a division equation as a multiplication equation with an unknown factor ~~problem~~ and *describe the relationship* between multiplication and division. (MP 7)

3.OA.5

Use properties of multiplication to solve multiplication problems within 100. Use stories, drawings, or equations to illustrate the property. Make and assess conjectures about the properties of multiplication. Add context to make sense of these properties as strategies to multiply and divide with products and dividends less than or equal to 100. Write or describe a story, drawing or equation that illustrates the property/ies. (MP ~~2~~, 8)

3.OA.6

Multiply and divide *fluently within flexibly, accurately, and efficiently, with products, dividends, and divisors up to and including 100* ~~using strategies~~ *Using strategies such as the relationship between multiplication and division or properties of operations and quotients up to and including 10. Show automaticity when calculating. Know from memory* all products of two one-digit numbers. (MP 6)

3.OA.7

Build and use models to solve two-step wordstory problems involving whole numbers and having whole-number answers using the four operations, and determine ~~attend to~~ *the reasonableness* of answers. *Remove context* to represent situations as equations with a variable standing in for the unknown quantity. (MP 2,

4, 6)

Number and Operations in Base Ten (NBT)

Use efficient numerical strategies (founded in place value thinking and properties of operations) to perform multi-digit addition, subtraction, and multiplication.

3.NBT.1

Describe and represent place value structure by bundling ten 100s to make a thousand. *Represent* the amount of thousands, hundreds, tens, and ones in a 4-digit number, and *describe* the value of each. (MP 7)

3.NBT.2

Use models to round 2- or 3-digit whole numbers to the nearest 10 or 100 *in and out of context*. Determine if rounding is appropriate for a given situation and *justify* the reasoning. (MP 2, 3, 4)

3.NBT.3

Determine sums and differences of three-digit whole numbers using numerical strategies *fluently, flexibly, accurately, and efficiently*. *Justify* a chosen strategy with place value language. (MP 3, 6)

3.NBT.4

Find the product of a one-digit whole number and a multiple of 10 (10-90). *Use mathematical regularity to make and test conjectures about to generalize* patterns that occur when multiplying by a multiple of ten. (MP 8)

Number and Operations – Fractions (NF)

Develop an understanding of fractions including whole numbers. Represent fractions, find equivalent fractions, and make sense of fractions in context. Denominators are limited to 2, 3, 4, 6, and 8 in third grade.

3.NF.1

Describe and represent a fraction, a/b , *where a is the numerator and b is a non-zero denominator*, including unit fractions and fractions

equal to whole numbers. Compose and decompose a fraction using unit fractions. Identify the meaning of the whole for a given context. (MP 7)

3.NF.2

Build and use number line models ~~with~~to represent fractions, using unit fractions as intervals. ~~Represent and locate fractions on a Connect number line, models with area models by explaining how both models show the same fractional parts of a whole to make sense of fractions.~~ (MP 4)

3.NF.3

Use number line models and area models to generate equivalent fractions, including fractions equivalent to whole numbers. Use the models to justify equivalency by showing that the fractions name the same amount of the same whole or same location on a number line. Build and use models to make sense of and generate equivalent fractions including whole numbers. Justify why equivalent fractions must reference the same whole to be equivalent. (MP 3, 4)

3.NF.4

Compare fractions with like numerators or like denominators, and *justify* the comparisons *using models* and/or by reasoning about their size. (MP 3, 4)

Measurement and Geometry (MG)

Solve problems involving estimated and precise measurements. Develop an understanding of area and perimeter. Relate area to multiplication and division. Reason with shapes and their attributes.

3.MG.1

*~~Estimate~~Make reasonable estimates about length, weight, and liquid volume of objects by comparing them to familiar benchmarks. Select and use *measurement tools appropriately and strategically* to find precise measurements.* (MP 5, 6)

3.MG.2

Tell and write ~~Attend to precision when telling and writing~~ time to the nearest minute. (MP 6)

3.MG.3

Solve one-step word problems involving masses of objects or volumes of liquids that are given in the same units. (MP 2)

~~Add or remove context to solve one-step word story problems that are given in the same units involving length, liquid volume, and mass, and time. (MP 26)~~

3.MG.4

Build and use tiling models composed of unit squares to demonstrate area as a measurable attribute of a plane figure. Show that the tiled area of a rectangle is the same as would be found by multiplying side lengths. Use linear measurement tools to find the perimeter of a plane figure. Explain that perimeter measures the distance around a plane figure, while area measures the number of square units that cover a figure. Recognize area and perimeter as attributes of plane figures. Build and use models to understand the concept of unit squares and area. Select and use tools strategically and appropriately to distinguish between linear (perimeter) and area measures. Use tiling to show that the area of a rectangle is the same as would be found by multiplying side lengths. (MP 4, 5)

3.MG.5

Build and use area models to represent the distributive property and relate the representations to the operations of addition and multiplication. (MP 4)

3.MG.6

~~Add and remove context to solve real-world and mathematical problems involving perimeters of simple polygons and rectangular areas. Use mathematical regularity to Make and evaluate conjectures about rectangles with the same perimeter and different areas or with the same area and different perimeters. Describe how area and perimeter are related. (MP 4, 8)~~

3.MG.7

~~Describe and represent shared attributes of shapes in a category, and recognize that the shared attributes define the larger category. Build models of quadrilaterals that do not belong to a given subcategory. (MP 4, 7)~~

Describe shared attributes of squares, rectangles, rhombuses, parallelograms, and/or trapezoids, and explain that the shared attribute of 4 sides defines a larger category called quadrilaterals. Draw examples of quadrilaterals that do not belong to any of these subcategories. (MP 7)

3.MG.8

Partition~~Attend to precision when partitioning~~ shapes into parts with equal areas, and expressing the area of each part as a unit fraction of the whole. (MP ~~4~~6)

Data Science (D)

Identify whether investigative questions will result in quantitative or categorical data collection. Represent data sets with three or more categories using visualizations with scales of 2, 5, and 10. Determine the benefits and drawbacks of different data visualizations and scales. Identify patterns, trends, and outliers in a data set.

3.D.1

Choose a topic and ask~~Determine a topic question and ask investigative questions that can be answered by~~will lead to collecting, analyzing, and interpreting data. Identify whether the question asked will result in quantitative or categorical data. (MP 1)

3.D.2

Select and use tools~~strategically~~ to collect and to organize collected or given data sets. Build data visualizations including bar graphs and pictographs withusing scales of 2s, 5s, and 10s for data sets with three or more categories. Represent a data set with three or more categories. Ask questions to consider a given data set. Identify data as quantitative or categorical. (MP ~~1~~, 5)

3.D.3

Analyze data sets and scaled data visualizations~~bar graphs and pictographs with scales of 2s, 5s, and 10s. Make and evaluate conjectures about~~ Evaluate the benefits and drawbacks of different visualizations and scales used when analyzing to analyze a set of data. (MP 6, 8)

3.D.4

Interpret data, including scaled visualizations, to answer the initial investigative questions. Justify/Construct and justify conclusions using specific information from the data set or visualization arguments about the data. Identify patterns, trends, and outliers in the data. Identify ways to refine investigative questions, data collection, visualization, or analysis. (MP 3)

Mathematical Practices

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

In grades 3-5, students ask questions to help them understand multi digit numbers, fractions, decimals, the properties of all four operations, and the classification of shapes. Students ask questions to help them make sense of data and different data representations.

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

In grades 3-5, students understand what the numbers, symbols, pictures, words, etc. in their work represent when using the four operations. Students flexibly move between concrete, pictorial, and abstract representations of mathematical ideas. They move 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 3-5, students use mathematical vocabulary to communicate their ideas and listen to others' ideas. They utilize strategies to agree and disagree respectfully. They back their argument up with evidence and draw connections between mathematical representations, comparing and contrasting their strategy and solution to others.

Mathematical Practice 4: Model with Mathematics

In grades 3-5, students use a variety of models to extend their understanding of the base ten place value system, including decimals. They use models to build their understanding of fractions. They model the actions and comparisons represented by all four operations. In the upper grades, students focus on models that represent multiplication and division, including area models, number lines, and other multiplicative comparisons.

Mathematical Practice 5: Select and use tools appropriately and strategically

In grades 3-5, students use tools when they help them understand mathematics. Tools can include, but are not limited to, physical tools, visual tools, strategies, and algorithms.

Mathematical Practice 6: Attend to precision and reasonableness

In grades 3-5, students refine informal language as they develop and learn precise mathematical vocabulary. Students use structure to accurately record, label, and share their thinking. They determine when a precise answer is necessary and when making an estimate can help them determine if a solution makes sense. Students use estimation strategies such as rounding, utilizing benchmark fractions, and properties of operations to assess reasonableness through the problem solving process.

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

In grades 3-5, students use structures and patterns to develop a deep understanding of the operations of multiplication and division. They extend their understanding of patterns, structures, and relationships through work with fractions, decimals, and larger whole numbers. Students use structures and patterns to see complicated things as single objects or composed of several objects.

Mathematical Practice 8: Use mathematical regularity to make conjectures and evaluate the results

In grades 3-5, students make and test conjectures related to multi digit numbers,

fractions, decimals, the properties of all four operations, and the properties of shapes. As students test their conjectures, they evaluate the reasonableness of their solution path and adjust as needed.

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Standards: Grade 4

Introduction

In third through fifth grade, the major work of each grade focuses on representing and understanding multiplication and division and developing an understanding of fractions. Students generalize and expand their place value understanding. Measurement concepts are expanded to include two- and three-dimensional measurements.

In Grade 4, instructional time should focus on four major works: (1) generalizing understanding of place value to 1,000,000, understanding the multiplicative relationship between the value of each place; (2) developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends; (3) developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers; and (4) understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

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 fourth grade, children will be able to:

- Understand multiplication as a comparison. (OA)
- Solve whole number, multi-step word problems involving addition, subtraction, multiplication, and division. (OA)

- Generalize place value understanding for multi-digit whole numbers (less than 1,000,000) by analyzing patterns, representing whole numbers in a variety of ways, and making multiplicative comparisons. (NBT)
- Use efficient algorithms to fluently add and subtract. (Computational and procedural fluency) (NBT)
- Use models to represent and make sense of two-digit by two-digit multiplication and division with one-digit divisors (ex, $125 \div 5 = 25$ where 5 is the divisor). (NBT)
- Make connections between numerical representations and visual models to compare, order, and determine if fractions have equal values. (NF)
- Build and use models to add and subtract fractions with like denominators and to multiply fractions by a whole number. (NF)
- Build and use models to connect decimal values to fractions with denominators of tenths and hundredths. (NF)
- Apply knowledge of area to solve real-world and mathematical problems. (MG)

Standards: Grade 4

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)

Operation and Algebraic Thinking (OA)

Understand multiplication as a comparison. Use the four operations to solve multistep problems in which remainders must be interpreted. Demonstrate understanding of the properties of operations. Explore the relationship between factors and multiples. Generate and interpret multiplicative patterns.

4.OA.1

Build and use models to represent multiplicative comparisons. ~~visualize a multiplication equation as a comparison.~~ Represent verbal statements of multiplicative comparisons as multiplication equations (for example, “35 is 5 times as many as 7” can be represented as $35 = 5 \times 7$). (MP 4, 7)

4.OA.2

Solve wordstory problems involving multiplicative comparison by *building and using models*, including drawings and equations with a symbol for the unknown number. ~~Identify~~*Make and evaluate conjectures about* the difference between multiplicative and additive comparison. (MP 4, 8)

4.OA.3

Use and name properties of operations to *justify* strategies used to solve problems involving the four operations. (MP 3)

4.OA.4

Build and use models to solve multi-step wordstory problems involving whole numbers using the four operations, including problems in which remainders must be interpreted. ~~Attend to the reasonableness of answers.~~ *Remove context to represent situations as equations with a variable standing in for the unknown quantity.* (MP 2, 4, 6)

4.OA.5

Find factors and multiples of whole numbers. *Use mathematical regularity to describe* ~~Make and test conjectures about~~ the relationship between any whole number and its factors. (MP 8)

4.OA.6

Generate a number or shape pattern based on a given rule. ~~Identify~~ *Describe and represent* the *features of the pattern* that are not explicitly stated in the rule itself. *Make and test conjectures* about how the pattern will continue. (MP 7, 8)

Number and Operations in Base Ten (NBT)

Use place value understanding to make multiplicative comparisons. Write, compare, and round whole numbers less than or equal to 1,000,000. Use efficient algorithms for multi-digit addition and subtraction. Use efficient numerical strategies, place value understanding, and properties of operations to perform multi-digit multiplication and division.

4.NBT.1

Describe the structure of place value by explaining how the value of one place represents ten times more than the place to its right. Represent those patterns with a statement of multiplicative comparison. (MP 7)

4.NBT.2

Read multi-digit whole numbers up to and including 1,000,000. *Represent* multi-digit whole numbers using numerals and expanded form. (MP 7)

4.NBT.3

Compare two whole numbers with up to 6 digits and *represent the relationship* between two numbers using comparison symbols $<$, $=$, and $>$. (MP 7)

4.NBT.4

Apply knowledge of place value structure to round whole numbers up to and including six digits *in and out of context*. *Justify* whether rounding is appropriate in a given situation. (MP 2, 3)

4.NBT.5

Use efficient algorithms to determine sums and differences of multi-digit whole numbers *in real-world contexts and equations flexibly, accurately, and efficiently*. ~~Determine if sums and differences are reasonable.~~ (MP 2, 6)

4.NBT.6

Develop visual and numerical models based on place value and/or the properties of multiplication to multiply a whole number of up to four digits by a one-digit whole number, and to multiply two two-digit numbers. (MP 4)

4.NBT.7

Develop visual and numerical models based on place value and/or the relationship between multiplication and division to divide up to a three-digit number by a one-digit number. (MP 4)

Number and Operations–Fractions (NF)

Extend understanding of equivalence and ordering fractions. Build on previous understanding of fractions to begin operating with fractions and explore the relationship between fractions and decimals. Understand decimal notation to the hundredths. Denominators are limited to 2, 3, 4, 5, 6, 8, 10, 12, and 100 in fourth grade.

4.NF.1

Compose and decompose fractions, mixed numbers and fractions greater than one *by building and using models. Write equations to represent fractions as the sum of fractions with the same denominator in more than one way. Justify the equivalence with equations.* Recognize that a value can be expressed as a fraction greater than one and an equivalent mixed number. (MP 3, 4)

4.NF.2

Recognize and generate equivalent fractions, connecting numerical strategies to visual fraction models. Make and test conjectures about what happens to a fraction when the numerator and the denominator are multiplied by the same number. (MP 8)

4.NF.3

Compare and order fractions with different numerators and denominators. *Construct and communicate arguments that justify the order of the fractions. (MP 3)*

4.NF.4

Build and use models to add and subtract fractions with like denominators, including mixed numbers. Add or remove context to solve equations and real-world problems involving addition and subtraction of fractions in real-world contexts and equations. (MP 2, 4)

4.NF.5

Build and use models, repeated addition, and numerical strategies to multiply a fraction by a whole number. extend understanding of multiplication to fractions. Connect repeated addition to multiplication when multiplying a fraction by a whole number. Multiply a fraction by a whole number using numerical strategies. *Add or remove context to* solve equations and real-world problems involving multiplying a fraction by a whole number in real-world contexts. (MP 2, 4)

4.NF.6

Build and use models to express a fraction with denominator of 10 as an equivalent fraction with denominator of 100, and use *the model* this technique to add two fractions with respective denominators of 10 and 100. (MP 4)

4.NF.7

Connect decimal notation to fractions with denominators of 10 or 100. *Construct clear and reasonable arguments to justify* how the decimal notation and fraction are equivalent. (MP 3)

4.NF.8

Compare two decimal numbers to the hundredths place by reasoning about their size. *Justify* the comparison. *Represent the relationship* between two numbers using comparison symbols $<$, $=$, and $>$. (MP 3, 7)

Measurement and Geometry (MG)

Solve problems involving measurement and conversion of measurements. Solve real-world area and perimeter problems. Understand concepts of angles and angle measurement. Draw and identify lines and angles, and classify shapes by the properties of their lines and angles.

4.MG.1

Add and remove context to solve real-world and mathematical problems involving the area and perimeter of rectangles and rectilinear shapes. *Build and use models* to make sense of the area and perimeter formulas for rectangles. (MP 2, 4)

4.MG.2

Draw points, lines, line segments, rays, angles (right, acute, and obtuse), and perpendicular and parallel lines. ~~Identify these geometric elements in~~*Describe these structures and their relationships within* two-dimensional figures. (MP ~~6~~7)

4.MG.3

Describe angles as geometric figures formed by two rays with a common endpoint. ~~Understand that an angle is measured with reference to a circle.~~ *Describe the relationship* between an angle's measure and the fraction of the circular arc that it represents. (MP 7)

4.MG.4

~~Measure~~*Attend to precision and reasonableness when measuring or sketching* angles in whole-number degrees using a protractor. *Sketch angles of specified measure.* (MP 6)

4.MG.5

~~Understand and~~ demonstrate the additive nature of angle measures. Find and *justify* unknown angles on a diagram using addition and subtraction. (MP 3)

4.MG.6

Compare and classify two-dimensional figures including quadrilaterals and triangles based on the presence or absence of parallel lines, perpendicular lines, and angles of specified sizes. *Justify and evaluate* the classification. (MP 3)

Data Science (D)

Investigate and analyze situations with up to two variables. Identify the impact of the sampling process and sample size on the collection, visualization, and interpretation of data.

4.D.1

~~Choose a topic and ask~~ *Determine a topic question and ask investigative questions* that ~~can be answered by~~ *will lead to* collecting, analyzing, and interpreting data with

up to two variables. *Make conjectures* about the impact of the sampling process and sample size on results. (MP 1, 8)

4.D.2

Select and use tools *strategically* to collect data and to organize collected or given data sets with up to two variables. Build data visualizations. ~~Ask questions to consider a given data set with up to two variables.~~ (MP ~~1~~, 5)

4.D.3

Analyze data sets and data visualizations, including bar graphs, pictographs, and tables. Evaluate ~~conjectures about~~ how different sampling processes or data visualizations might influence interpretation of data. (MP 3-6, 8)

4.D.4

Interpret data and data visualizations to answer the initial investigative question and justify conclusions with evidence from the data.s. ~~Evaluate how~~ Construct and justify arguments about the data. ~~Discuss ways that~~ the sampling process and sample size may affect the how people draw conclusions people draw from data. Identify ways to refine the investigative questions, data collection, visualization, or analysis. (MP 3)

Mathematical Practices

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

In grades 3-5, students ask questions to help them understand multi digit numbers, fractions, decimals, the properties of all four operations, and the classification of shapes. Students ask questions to help them make sense of data and different data representations.

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

In grades 3-5, students understand what the numbers, symbols, pictures, words,

etc. in their work represent when using the four operations. Students flexibly move between concrete, pictorial, and abstract representations of mathematical ideas. They move 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 3-5, students use mathematical vocabulary to communicate their ideas and listen to others' ideas. They utilize strategies to agree and disagree respectfully. They back their argument up with evidence and draw connections between mathematical representations, comparing and contrasting their strategy and solution to others.

Mathematical Practice 4: Model with Mathematics

In grades 3-5, students use a variety of models to extend their understanding of the base ten place value system, including decimals. They use models to build their understanding of fractions. They model the actions and comparisons represented by all four operations. In the upper grades, students focus on models that represent multiplication and division, including area models, number lines, and other multiplicative comparisons.

Mathematical Practice 5: Select and use tools appropriately and strategically

In grades 3-5, students use tools when they help them understand mathematics. Tools can include, but are not limited to, physical tools, visual tools, strategies, and algorithms.

Mathematical Practice 6: Attend to precision and reasonableness

In grades 3-5, students refine informal language as they develop and learn precise mathematical vocabulary. Students use structure to accurately record, label, and share their thinking. They determine when a precise answer is necessary and when making an estimate can help them determine if a solution makes sense. Students use estimation strategies such as rounding, utilizing benchmark fractions, and

properties of operations to assess reasonableness through the problem solving process.

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

In grades 3-5, students use structures and patterns to develop a deep understanding of the operations of multiplication and division. They extend their understanding of patterns, structures, and relationships through work with fractions, decimals, and larger whole numbers. Students use structures and patterns to see complicated things as single objects or composed of several objects.

Mathematical Practice 8: Use mathematical regularity to make conjectures and evaluate the results

In grades 3-5, students make and test conjectures related to multi digit numbers, fractions, decimals, the properties of all four operations, and the properties of shapes. As students test their conjectures, they evaluate the reasonableness of their solution path and adjust as needed.

Standards: Grade 5

Introduction

In third through fifth grade, the major work of each grade focuses on representing and understanding multiplication and division and developing an understanding of fractions. Students generalize and expand their place value understanding. Measurement concepts are expanded to include two- and three-dimensional measurements.

In Grade 5, instructional time should focus on three major works: (1) extending understanding of addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions); (2) master place value understanding to develop understanding of operations with decimals to hundredths and with whole number and decimal operations; and (3) developing an understanding of volume.

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 fifth grade, children will be able to:

- Generalize place value understanding for decimals to the thousandths place by analyzing patterns, representing numbers in a variety of ways, and making multiplicative comparisons. (NBT)
- Fluently multiply multi-digit whole numbers by a one-digit whole number and two two-digit whole numbers. (Computational and procedural fluency) (NBT)
- Use efficient numerical strategies to solve division problems. (NBT)

- Build and use models to solve addition, subtraction, multiplication and division problems involving decimals. (NBT)
- Add and subtract fractions with unlike denominators. (NF)
- Build and use models to multiply fractions, whole numbers, and mixed numbers. (NF)
- Recognize volume as an attribute of a solid shape and explain how multiplication and addition relate to volume. (MG)

Standards: Grade 5

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)

Explore prime and composite numbers. Write and interpret numerical expressions. Justify and generalize understanding of properties of operations. Analyze patterns and relationships.

5.OA.1

Use structures, patterns, and relationships to determine whether a given whole number between 1 and 100 is prime or composite. (MP 7)

5.OA.2

Add context to make sense of numerical expressions involving multiple operations with parentheses, brackets, or braces. Write and/or evaluate numerical expressions. (SMP 2)

5.OA.3

Generate two numerical patterns using two given rules. *Describe and represent*

relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns and graph the ordered pairs on a coordinate plane. (MP 7)

Number and Operations in Base Ten (NBT)

Understand structures and patterns in the place value system including decimals to thousandths and powers of ten. Perform operations with multi-digit whole numbers and with decimals to hundredths.

5.NBT.1

Describe the structure of place value by explaining that the value of one place represents ten times as much as the place to its right and $\frac{1}{10}$ of the place to its left. *Represent those patterns* with a statement of multiplicative comparison. (MP 7)

5.NBT.2

Represent powers of 10 with whole-number exponents. *Make and test conjectures about* a decimal's placement when multiplying by powers of 10. (MP 7, 8)

5.NBT.3

Describe and represent decimals to the thousandths place using models, base-ten numerals, number names, and expanded forms. (MP 7)

5.NBT.4

Compare two decimal numbers and *represent the relationship* between the two numbers using comparison symbols $<$, $=$, and $>$. (MP 7)

5.NBT.5

Apply knowledge of place value structure to round decimal numbers to the nearest whole, tenth, or hundredth *in and out of context*. Determine and *justify* situations where rounding is appropriate. (MP 2, 3)

5.NBT.6

Use efficient numerical strategies based on properties of multiplication and/or place value to multiply a whole number of up to four digits by a one digit whole number and to multiply two two-digit numbers *flexibly, accurately, and efficiently in real-world contexts and equations. Determine if products are reasonable.* (MP 2, 6)

5.NBT.7

Use efficient numerical strategies based on properties of multiplication and/or place value to divide up to a four digit number by a one digit number.
Explain/Communicate the meaning of the remainder *in real world contexts.* (MP 2, 3)

5.NBT.8

Build and use models to find sums and differences of decimals to hundredths *in real-world contexts and equations.* Use the models to *represent and describe the structure* of adding tenths with tenths and hundredths with hundredths. (MP 2, 4, 7)

5.NBT.9

Build and use models to find products of decimals to hundredths *in real-world contexts and equations.* (MP 2, 4)

5.NBT.10

Build and use models to find quotients of decimals limited to a whole number dividend with a decimal divisor of tenths between 0 and 1, or a decimal dividend with a single-digit whole number divisor *in real-world contexts and equations.* (MP 2, 4)

Number and Operations–Fractions (NF)

Use equivalent fractions as a strategy to add and subtract fractions. Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

5.NF.1

Add and subtract fractions with unlike denominators *with precision*. ~~Add or remove context to s~~Solve equations and real-world problems involving addition and subtraction with unlike denominators ~~in real world contexts and equations~~. Determine if the solution is *reasonable*. (MP 2, 6)

5.NF.2

Interpret a fraction as division (a/b is the same as $a \div b$). ~~Add or remove context to s~~Solve equations and real-world problems involving division ~~in real world contexts~~ using *visual models and/or equations*. (MP 2, 4)

5.NF.3

Build and use models, including area models, to multiply fractions. ~~Explain how; whole numbers, and mixed numbers. Connect~~ the properties of multiplication ~~can be used~~ to multiplying fractions. ~~Add or remove context to s~~Solve equations and real-world problems involving multiplication of fractions ~~and mixed numbers using real world contexts and equations~~ (fraction by a fraction, fraction by a mixed number, mixed number by mixed number). (MP 2, 4)

5.NF.4

Use multiplication to ~~make and test conjectures~~Interpret multiplication as scaling. Construct, justify, and communicate clear and reasonable arguments about the size of ~~at the resulting~~ product when multiplying a given number by a fraction greater than one, a fraction less than one, ~~or a~~ fraction equal to one (*known as scaling*). ~~Without computing, explain the relationship between the Make and test conjectures about the~~ size of the product based on the size of the factors ~~without computing~~. (MP 3, 8)

5.NF.5

Build and use models ~~that extend understanding of division~~ to divide unit fractions by whole numbers and whole numbers by unit fractions ~~when solving equations and real-world problems~~. ~~Explain~~Solve problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions ~~using real world contexts and equations. Make conjectures about~~ the relationship between multiplication and division when ~~dividing operating~~ with fractions ~~and evaluate the~~

~~results.~~ (MP ~~2~~, 4, ~~8~~)

Measurement and Geometry (MG)

Convert like measurement units. Develop an understanding of volume. Understand and use quadrant one in the coordinate plane. Classify two-dimensional figures based on their attributes.

5.MG.1

~~Build and use models composed of unit cubes to demonstrate volume as a measurable attribute of right rectangular prisms. Recognize volume as an attribute of solid figures. Build and use models to understand the concept of volume.~~

Demonstrate that unit cubes can be packed into rectangular prisms. Determine volume by counting unit cubes and expressing the volume in cubic units. (MP 4)

5.MG.2

Build and use models to make sense of and apply the formulas for finding the volume of right rectangular prisms. ~~Show that the number of cubes packed within the rectangular prism is the same as would be found by multiplying the length, width, and height.~~ Add or remove context to solve *real-world* problems involving the volume of a right rectangular prisms with whole-number side lengths. (MP 2, 4)

5.MG.3

Build and use a model of the coordinate plane to represent real-world problems. ~~Explain that~~Understand the numbers in ~~a~~the coordinate pair indicate distance from the origin in the direction of the horizontal and vertical axes. ~~Locate and g~~Graph points in the first quadrant of the coordinate plane ~~when given an ordered pair or real-world situation.~~ Interpret coordinate values based on a given context. (MP 2, 4)

5.MG.4

Describe and represent structure, patterns, and relationships when classifying quadrilaterals in a hierarchy based on attributes. (MP 7)

Data Science (D)

Investigate and analyze situations with up to four variables. Interpret data to answer investigative questions. Consider the impact of data visualizations, bias, and sampling approaches. Explore features of visible distribution.

5.D.1

~~Choose a topic and ask~~*Determine a topic question and ask investigative questions* that ~~can be answered by will lead to~~ collecting, ~~analyzing, and interpreting~~ data with up to four variables. *Ask questions* to identify potential sources of bias in data collection, representation, and interpretation. (MP 1)

5.D.2

Select and use tools strategically, to collect data and to organize collected or given data sets with two or more variables. Build data visualizations. ~~Ask questions to consider a given data set with up to four variables.~~ *Make conjectures about* potential sampling approaches and how those approaches impact results. (MP 1, 5, 8)

5.D.3

Analyze data sets with two or more up to four variables and multiple data visualizations. *Evaluate* sampling approaches and data visualizations to identify potential data bias. (MP 6, 8)

5.D.4

Interpret data and data visualizations to answer the initial investigative questions while considering the impact of data bias, choice of data visualizations, and sample size. ~~Use~~*Construct and justify arguments about the data based on* visible features of distribution such as center and range *to construct and justify arguments about the data.* Identify ways to refine investigative questions, data collection, visualization, or analysis. (MP 3)

Mathematical Practices

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

In grades 3-5, students ask questions to help them understand multi digit numbers,

fractions, decimals, the properties of all four operations, and the classification of shapes. Students ask questions to help them make sense of data and different data representations.

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

In grades 3-5, students understand what the numbers, symbols, pictures, words, etc. in their work represent when using the four operations. Students flexibly move between concrete, pictorial, and abstract representations of mathematical ideas. They move 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 3-5, students use mathematical vocabulary to communicate their ideas and listen to others' ideas. They utilize strategies to agree and disagree respectfully. They back their argument up with evidence and draw connections between mathematical representations, comparing and contrasting their strategy and solution to others.

Mathematical Practice 4: Model with Mathematics

In grades 3-5, students use a variety of models to extend their understanding of the base ten place value system, including decimals. They use models to build their understanding of fractions. They model the actions and comparisons represented by all four operations. In the upper grades, students focus on models that represent multiplication and division, including area models, number lines, and other multiplicative comparisons.

Mathematical Practice 5: Select and use tools appropriately and strategically

In grades 3-5, students use tools when they help them understand mathematics. Tools can include, but are not limited to, physical tools, visual tools, strategies, and algorithms.

Mathematical Practice 6: Attend to precision and reasonableness

In grades 3-5, students refine informal language as they develop and learn precise mathematical vocabulary. Students use structure to accurately record, label, and share their thinking. They determine when a precise answer is necessary and when making an estimate can help them determine if a solution makes sense. Students use estimation strategies such as rounding, utilizing benchmark fractions, and properties of operations to assess reasonableness through the problem solving process.

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

In grades 3-5, students use structures and patterns to develop a deep understanding of the operations of multiplication and division. They extend their understanding of patterns, structures, and relationships through work with fractions, decimals, and larger whole numbers. Students use structures and patterns to see complicated things as single objects or composed of several objects.

Mathematical Practice 8: Use mathematical regularity to make conjectures and evaluate the results

In grades 3-5, students make and test conjectures related to multi digit numbers, fractions, decimals, the properties of all four operations, and the properties of shapes. As students test their conjectures, they evaluate the reasonableness of their solution path and adjust as needed.