AzMERIT | Arizona's Statewide Achievement Assessment for English Language Arts and Mathematics

Math Item Specifications

GRADE 4

Arizona Department of Education with American Institutes for Research - 2016

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Introduction

The Arizona Statewide Achievement Assessment for English Language Arts and Mathematics (AzMERIT) is Arizona's statewide achievement test. AzMERIT assesses the Arizona College and Career Ready Standards (AzCCRS) adopted by the Arizona State Board of Education in 2010. AzMERIT will inform students, teachers, and parents about preparedness for college and careers upon graduating from high school. AzMERIT tests are computer-based, meaning that they can better assess students' critical thinking skills and provide them with opportunities to demonstrate a deeper understanding of the materials. Computer-based testing also allows for the use of a variety of innovative items types.

During the item-development process, all AzMERIT items are written in accordance with the Item Specifications and are reviewed and approved by a committee of Arizona educators to confirm alignment and appropriateness for inclusion in the test. AzMERIT items are generally representative of Arizona's geographic regions and culturally diverse population. Items are reviewed for the following kinds of bias: gender, racial, ethnic, linguistic, religious, geographic, and socioeconomic. Item reviews also include consideration of issues related to individuals with disabilities. Arizona community members also have an opportunity to review items for issues of potential concern to members of the community at large. Reviewers are asked to consider the variety of cultural, regional, philosophical, political, and religious backgrounds throughout Arizona, and then to determine whether the subject matter will be acceptable to Arizona students, families, and other members of Arizona communities.

This *AzMERIT Item Specifications* is a resource document that defines the content and format of the test and test items for item writers and reviewers. Each *Item Specifications* document indicates the alignment of items with the AzCCRS. It also serves to provide all stakeholders with information about the scope and function of assessment items. This document can also serve to assist educators to understand how assessment items are developed in alignment with the standards for English language arts and math. These item specifications for AzMERIT are intended to provide information regarding standards, item formats and response types. The descriptions of math practices, blueprints, and depth of knowledge in this document are meant to provide an overview of the test. Item specifications are meant for the purposes of assessment, not instruction. They are not intended to be tools for instruction or the basis for curricula. AzMERIT has a test blueprint that was developed by Arizona and is different from any other state or consortium test blueprint.

For the math portion of AzMERIT, all of the test questions are aligned to the mathematic content standards for these subject areas. Similarly, each item assesses a single domain and aligns to one or more of the eight Math Practices. Any item specifications that are absent for standards listed in this document may be under development. This document does not endorse the exclusion of the instruction of any grade-level content standards. The test will ask questions that check a student's conceptual understanding of math as well as their procedural skills. These items have been written to be free from bias and sensitivity, and widely vary in their degree of difficulty.

Item Development Process

AzMERIT items go through a rigorous review before they are operational. When an item is "operational" it means it is used to determine a student's score on the assessment. This is a description of the process every item must go through before it is operational on AzMERIT.

Sample tests are available online for the math portion of AzMERIT. For more information view the Guide to the Sample Tests at http://azmeritportal.org/.

Test Construction Guidelines

The construction of the AzMERIT assessment is guided by the depth and rigor of the Arizona College and Career Ready Standards. Items are created to address key components of the standards and assess a range of important skills. The AzMERIT Blueprint provides an overview of the distribution of items on the AzMERIT according to the standards. The standards for Math Practices are embedded within all AzMERIT items. Further, the AzMERIT blueprint outlines the Depth of Knowledge distribution of items.

Math Practices

The standards for Mathematical Practice highlight the knowledge, skills and abilities that should be developed in students at all grades. The Mathematical Practices are a part of each course description for Grades 3 through 8, Algebra I, Geometry, and Algebra 2. These practices are a vital part of the curriculum. These skills are often difficult to measure, and as a result, every item created for AzMERIT aligns to one or more of the following eight Mathematical Practices.

Math Practice (MP)	Description
Math Practice 1	**Make sense of problems and persevere in solving them.** Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

Math Practice (MP)	Description
Math Practice 2	**Reason abstractly and quantitatively**. Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. 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.
Math Practice 3	**Construct viable arguments and critique the reasoning of others.** Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

Math Practice (MP)	Description
Math Practice 4	**Model with mathematics.** Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
Math Practice 5	**Use appropriate tools strategically.** Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

Math Practice (MP)	Description
Math Practice 6	**Attend to precision.** Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
Math Practice 7	**Look for and make use of structure.** Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7×8 equals the well-remembered $7 \times 5 + 7 \times 3$, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2×7 and the 9 as $2 + 7$. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 – 3(x – y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
Math Practice 8	**Look for and express regularity in repeated reasoning.** Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y – 2)/(x – 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x^2 + x + 1)$, and $(x – 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Blueprint

The AzMERIT blueprints detail specific information in regard to the domains tested at each grade level. The blueprint outlines the percentage of points aligned to each domain.

Grade 4		
Domain	**Minimum**	**Maximum**
Measurement and Data & Geometry	15%	19%
Number and Operations - Fractions	29%	33%
Numbers and Operations in Base Ten	24%	28%
Operations and Algebraic Thinking	22%	26%

Approximately 70% of the assessment for Grade 4 will be on major content.

Depth of Knowledge (DOK)

DOK refers to the level of rigor or sophistication of the task in a given item, designed to reflect the complexity of the AzCCRS. Items at DOK level 1 focus on the recall of information, such as definitions, terms, and simple procedures. Items at DOK 2 require students to make decisions, solve problems, or recognize patterns; in general, they require a greater degree of engagement and cognitive processing than items at DOK 1. Items at DOK 3 feature higher-order cognitive tasks that assess students' capacities to approach abstract or complex problems.

Percentage of Points by Depth of Knowledge (DOK) Level			
Grade 4	DOK Level 1	DOK Level 2	DOK Level 3
	10% - 20%	60% - 70%	12% - 30%

For more information on DOK go to www.azed.gov/AzMERIT.

Calculators

No calculators are permitted for either the paper-based or computer-based assessment for Math Grade 4.

Item Formats

The AzMERIT Assessments are composed of item formats that include traditional multiple-choice response items and technology-enhanced response items (TEI). TEIs are computer-delivered response items that require students to interact with test content to select, construct, and/or support their responses. TEIs are better able to assess a deeper level of understanding.

Currently, there are nine types of TEIs that may appear on the Math Grade 4 computer based assessment for AzMERIT:

- Editing Tasks (ET)
- Editing Task Choice (ETC)
- Equation Editor (EQ)
- Graphic Response Item Display (GRID)
- Hot Text (HT)
    - Selectable Hot Text
    - Drag-and-Drop Hot Text
- Matching Item (MI)
- Multi-Select (MS)
- Open Response
- Table Item (TI)

For paper based assessments (including those for students with an IEP or 504 plan that specifies a paper based accommodation), TEIs will be modified so that they can be scanned and scored electronically or hand-scored.

See the table below for a description of each TEI. In addition, for examples of each response item format described, see the AzMERIT Training Tests at http://azmeritportal.org/.

Item Format	Description
Editing Task (ET)	The student clicks on a highlighted word or phrase that may be incorrect, which reveals a text box. The directions in the text box direct the student to replace the highlighted word or phrase with the correct word or phrase. For paper-based assessments, this item type may be replaced with another item type that assesses the same standard and can be scanned and scored electronically.
Editing Task Choice (ETC)	The student clicks a highlighted word or phrase, which reveals a drop-down menu containing options for correcting an error as well as the highlighted word or phrase as it is shown in the sentence to indicate that no correction is needed. The student then selects the correct word or phrase from the drop-down menu. For paper-based assessments, the item is modified so that it can be scanned and scored electronically. The student fills in a circle to indicate the correct word or phrase.

Item Format	Description
Equation Editor (EQ)	The student is presented with a toolbar that includes a variety of mathematical symbols that can be used to create a response. Responses may be in the form of a number, variable, expression, or equation, as appropriate to the test item. For paper-based assessments, this item type may be replaced with a modified version of the item that can be scanned and scored electronically or replaced with another item type that assesses the same standard and can be scanned and scored electronically.
Graphic Response Item Display (GRID)	The student selects numbers, words, phrases, or images and uses the drag-and-drop feature to place them into a graphic. This item type may also require the student to use the point, line, or arrow tools to create a response on a graph. For paper-based assessments, this item type may be replaced with another item type that assesses the same standard and can be scanned and scored electronically.
Hot Text (HT)	**Selectable Hot Text -** Excerpted sentences from the text are presented in this item type. When the student hovers over certain words, phrases, or sentences, the options highlight. This indicates that the text is selectable ("hot"). The student can then click on an option to select it. For paper- based assessments, a "selectable" hot text item is modified so that it can be scanned and scored electronically. In this version, the student fills in a circle to indicate a selection.
	Drag-and-Drop Hot Text - Certain numbers, words, phrases, or sentences may be designated "draggable" in this item type. When the student hovers over these areas, the text highlights. The student can then click on the option, hold down the mouse button, and drag it to a graphic or other format. For paper-based assessments, drag-and-drop hot text items will be replaced with another item type that assesses the same standard and can be scanned and scored electronically.
Matching Item (MI)	The student checks a box to indicate if information from a column header matches information from a row. For paper-based assessments, this item type may be replaced with another item type that assesses the same standard and can be scanned and scored electronically.
Multi-Select (MS)	The student is directed to select all of the correct answers from among a number of options. These items are different from multiple-choice items, which allow the student to select only one correct answer. These items appear in the online and paper-based assessments.
Open Response	The student uses the keyboard to enter a response into a text field. These items can usually be answered in a sentence or two. For paper-based assessments, this item type may be replaced with another item type that assesses the same standard and can be scanned and scored electronically.

Item Format	Description
Table Item (TI)	The student types numeric values into a given table. The student may complete the entire table or portions of the table depending on what is being asked. For paper-based assessments, this item type may be replaced with another item type that assesses the same standard and can be scanned and scored electronically.

Arizona's College and Career Ready Standards (AzCCRS)

Geometry (G)

4.G.A – Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

Measurement and Data (MD)

4.MD.A – Solve problems involving measurement and conversion of measurements.

4.MD.B – Represent and interpret data.

4.MD.C – Geometric measurement: understand concepts of angle and measure angles.

Numbers in Base Ten (NBT)

4.NBT.A – Generalize place value understanding for multi-digit whole numbers.

4.NBT.B – Use place value understanding and properties of operations to perform multi-digit arithmetic.

Numbers and Operations – Fractions (NF)

4.NF.A – Extend understanding of fraction equivalence and ordering.

4.NF.B – Build fractions from unit fractions.

4.NF.C – Understand decimal notation for fractions, and compare decimal fractions.

Operations and Algebraic Thinking (OA)

4.OA.A – Use the four operations with whole numbers to solve problems.

4.OA.B – Gain familiarity with factors and multiples.

4.OA.C – Generate and analyze patterns.

Grade 4 Math Item Specifications

Measurement and Data & Geometry

Content Standards	AzCCRS.Math.Content.4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.		
Explanations	Examples of points, line segments, lines, angles, parallelism, and perpendicularity can be seen daily. Students do not easily identify lines and rays because they are more abstract.		
Content Limits	All objects (point, line, line segment, angles) and properties (right, acute, obtuse, perpendicular, parallel) noted in the standard, as individual objects or within two-dimensional figures.		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is not allowed.	**Math Practices**	5, 6

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to identify geometric objects and properties, either as individual objects or as part of a more complex figure.	• Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response	6
Students will be required to construct a geometric figure based on given constraints/properties.		5, 6

Content Standards	AzCCRS.Math.Content.4.G.A.2 Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
Explanations	Two-dimensional figures may be classified using different characteristics such as, parallel or perpendicular lines or by angle measurement. Students should become familiar with the concept of parallel and perpendicular lines. Two lines are parallel if they never intersect and are always equidistant. Two lines are perpendicular if they intersect in right angles (90°). Students may use transparencies with lines to arrange two lines in different ways to determine that the 2 lines might intersect in one point or may never intersect. This expectation is closely connected to 4.MD.5, 4.MD.6, and 4.G.1. Students' experiences with drawing and identifying right, acute, and obtuse angles support them in classifying two-dimensional figures based on specified angle measurements. They use the Right triangles can be a category for classification. A right triangle has one right angle. There are different types of right triangles. An isosceles right triangle has two or more congruent sides and a scalene right triangle has no congruent sides.
Content Limits	For this standard, classifications should focus on parallel/perpendicular lines and the size of angles rather than their side lengths. Triangles: Right triangles, acute triangles, obtuse triangles, scalene triangles, isosceles triangles, and equilateral triangles Quadrilaterals: parallelograms, rectangles, squares, rhombi, trapezoids. Other polygons may be included where appropriate. There are two competing definitions for trapezoids - one that requires exactly one pair or parallel sides, and another that requires at least one pair of parallel sides (using this definition, parallelograms are trapezoids). Thus, items that require the s
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.

Context	Context is not allowed.	**Math Practices**	1, 2, 4, 7

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to identify types of triangles.	• Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response • Proposition Response	1, 7
Students will be required to construct a shape based on the shape name.		2, 4
Students will be required to classify shapes based on given attributes.		1, 7
Students will be required to given a set of shapes in two groups, explain why the shapes were classified this way.		1, 2, 7

Content Standards	AzCCRS.Math.Content.4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.		
Explanations	Students need experiences with figures which are symmetrical and non-symmetrical. Figures include both regular and non-regular polygons. Folding cut-out figures will help students determine whether a figure has one or more lines of symmetry.		
Content Limits	Be mindful of the graphic response answer space the students work with when considering the number of lines of symmetry of a shape. Avoid a busy figure with many of lines of symmetry that young students would find hard to work with. Items that require constructing a shape based on the number of lines of symmetry should specify the shape category with regards to the number of sides (quadrilateral, triangle, pentagon…).		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is not allowed.	**Math Practices**	4, 5, 6, 7

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to identify symmetric figures.	• Equation Response • Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response	4, 7
Students will be required to identify whether a line drawn on a figure represents a line of symmetry of the figure.		4, 5, 6, 7
Students will be required to determine the number of lines of symmetry a given figure has.		6, 7
Students will be required to construct lines of symmetry for a given shape.		4, 5, 6, 7
Students will be required to construct a complete figure based on half of the figure and its line of symmetry.		4, 5, 6, 7
Students will be required to construct a figure based on two attributes (e.g., the number of lines of symmetry and type of shape, or the lines of symmetry, already drawn, and type of shape).		4, 5, 6, 7

Content Standards	AzCCRS.Math.Content.4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.
Explanations	The units of measure that have not been addressed in prior years are pounds, ounces, kilometers, milliliters, and seconds. Students' prior experiences were limited to measuring length, mass, liquid volume, and elapsed time. Students did not convert measurements. Students need ample opportunities to become familiar with these new units of measure.
Content Limits	Measurement units are within a single system. Measurement conversions are from larger units to smaller units. Multiplication is limited to 4-digit numbers by 1-digit numbers and two 2-digit numbers. (4.NBT.B.5) Units of measurement include: kilometer, meter, centimeter, millimeter, liter, milliliter, kilogram, gram, milligram, mile, yard, foot, inch, gallon, quart, pint, cup, ton, pound, and ounce.
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.

Context	Context is allowed.	**Math Practices**	2, 5, 6

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to identify the relative size of a measurement unit.	• Equation Response • Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response • Table Response	2
Students will be required to calculate measurement conversions.		5, 6
Students will be required to order measurements given in different units within the same measurement system.		2, 5, 6

Content Standards	AzCCRS.Math.Content.4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.		
Explanations	Number line diagrams that feature a measurement scale can represent measurement quantities. Examples include: ruler, diagram marking off distance along a road with cities at various points, a timetable showing hours throughout the day, or a volume measure on the side of a container.		
Content Limits	Measurement conversions are from larger units to smaller units. Calculations are limited to simple fractions or decimals. Operations include addition, subtraction, multiplication, and division. Calculations involving fractions and decimals are limited to addition or subtraction.		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is required.	**Math Practices**	1, 2, 4, 5, 6

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to solve a word problem involving specified measurements.	• Equation Response • Graphic Response	1, 2, 4, 6
Students will be required to represent/model a problem involving specified measurements.		1, 2, 4, 5, 6

Content Standards	AzCCRS.Math.Content.4.MD.A.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.
Explanations	Students developed understanding of area and perimeter in 3rd grade by using visual models. While students are expected to use formulas to calculate area and perimeter of rectangles, they need to understand and be able to communicate their understanding of why the formulas work.
Content Limits	Figures are limited to rectangles. Fractions are limited to like denominators. Products of factor pairs are limited to the range 1-100. Multiplication and division is limited to 2-digit by 1-digit, or 2-digit by 2-digit, where one number is a multiple of 10. Addition and subtraction within 1000. When constructing rectangles, the minimum grid size is 20 pixels, and in the context of a situation, one grid must be labeled with the appropriate dimension. That dimension should be "1 ____", as items at this standard should not assess scale.
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.

Context	Context is allowed.	**Math Practices**	2, 4, 5, 6, 7

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to construct a rectangle with a given perimeter and/or area.	• Equation Response • Graphic Response • Multi-Select Response	4, 5, 6
Students will be required to calculate perimeter and/or area of a rectangle.		4, 5, 6, 7
Students will be required to calculate an unknown side length given an area or perimeter.		4, 5, 6, 7
Students will be required to model with an expression or equation the area or perimeter of a rectangle with an unknown side length.		2, 4, 5, 6, 7
Students will be required to construct a rectangle based on given parameters (i.e. ranges of possible areas and/or perimeters.)		2, 4, 5, 6, 7

Content Standards	AzCCRS.Math.Content.4.MD.B.4 Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots.		
Explanations	None		
Content Limits	Measurement units are limited to halves, quarters, and eighths. Addition and subtraction of fractions is limited to fractions with the same denominators. Multiplication and division is limited to 2-digit by 1-digit, or 2-digit by 2-digit, where one number is a multiple of 10. Addition and subtraction within 1000.		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is allowed.	**Math Practices**	2, 4, 5, 6, 7

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to construct a line plot based on given data.	• Equation Response • Graphic Response	4, 5, 6, 7
Students will be required to interpret data in a line plot to solve problems involving addition and subtraction.		2, 5, 6, 7
Students will be required to complete a line plot based on the information about the sum or difference of the data.		2, 4, 5, 6, 7

Content Standards	AzCCRS.Math.Content.4.MD.C.5 Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement: AzCCRS.Math.Content.4.MD.C.5a An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles. AzCCRS.Math.Content.4.MD.C.5b An angle that turns through n one-degree angles is said to have an angle measure of n degrees.		
Explanations	None		
Content Limits	Whole-number degree measures. Angles are less than or equal to 360º.		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is allowed.	**Math Practices**	6, 7

Sample Task Demands	Common Item Formats	Recommended Math Practices
Students will be required to identify an angle.	• Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response	6, 7
Students will be required to sort angles from other geometric objects.		6, 7
Students will be required to identify the unit used to measure angles.		6, 7
Students will be required to identify categories of angle measures.		6, 7

Content Standards	AzCCRS.Math.Content.4.MD.C.6 Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.		
Explanations	Before students begin measuring angles with protractors, they need to have some experiences with benchmark angles. They transfer their understanding that a 360º rotation about a point makes a complete circle to recognize and sketch angles that measure approximately 90º and 180º. They extend this understanding and recognize and sketch angles that measure approximately 45º and 30º. They use appropriate terminology (acute, right, and obtuse) to describe angles and rays (perpendicular).		
Content Limits	Whole-number degree measures. For identification, angles are less than 360º. For construction, angles are less than 180º.		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is not allowed.	**Math Practices**	2, 5, 6

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to measure a given angle.	• Equation Response • Graphic Response	5, 6
Students will be required to construct an angle based on a given measure.		2, 5, 6

<table>
<tr><td>Content Standards</td><td colspan="3">AzCCRS.Math.Content.4.MD.C.7 Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.</td></tr>
<tr><td>Explanations</td><td colspan="3">None</td></tr>
<tr><td>Content Limits</td><td colspan="3">Angles are less than or equal to 360º.</td></tr>
<tr><td>Common Item Formats</td><td colspan="3">The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.</td></tr>
<tr><td>Context</td><td>Context is allowed.</td><td>Math Practices</td><td>1, 2, 4, 6</td></tr>
<tr><td colspan="2">Sample Task Demands</td><td>Common Item Formats</td><td>Recommended Math Practices</td></tr>
<tr><td colspan="2">Students will be required to calculate an angle measure from a given sum or difference and/or a decomposed larger angle.</td><td rowspan="3">• Equation Response
• Multiple Choice Response
• Matching Item Response
• Multi-Select Response</td><td>1, 2, 6</td></tr>
<tr><td colspan="2">Students will be required to identify angles that can be used to construct other angles.</td><td>1, 2, 6</td></tr>
<tr><td colspan="2">Students will be required to show how to find an angle measure from a given sum or difference using an equation.</td><td>1, 2, 4, 6</td></tr>
</table>

Numbers and Operations – Fractions

Content Standards	AzCCRS.Math.Content.4.NF.A.1 Explain why a fraction a/b is equivalent to a fraction (n × a)/(n × b) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.
Explanations	This standard extends the work in third grade by using additional denominators (5, 10, 12, and 100).
Content Limits	Denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, 100 For denominators of 10 and 100, focus should not be on equivalence between these 2 denominators since this is addressed specifically in standards 4.NF.5 – 7, but should be more on equivalence between fractions with denominators of 2, 4, and 5 and fractions with denominators of 10 and 100. E.g. ½ = 5/10, 2/5 = 40/100, etc. Refer to the same whole Fraction models are limited to number lines, rectangles, circles, and squares. (The focus should not be on complex visual models.) Fractions a/bcan be improper fractions and students should not be guided to put fractions in lowest terms or to simplify.
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.

Context	Context is allowed.	**Math Practices**	2, 4, 7, 8

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to identify/recognize fractions that are equivalent to a given fraction.	• Equation Response • Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response • Proposition Response	2, 7, 8
Students will be required to identify/recognize fraction models that represent equivalent fractions.		2, 4, 7, 8
Students will be required to generate fractions that are equivalent to a given fraction or equivalent to fractions represented by a given fraction model.		2, 4, 7, 8
Students will be required to construct models representing fractions that are equivalent to given fractions or equivalent to fractions represented by given fraction models.		2, 4, 7, 8
Students will be required to give evidence or an explanation to support why fractions are equivalent or why fractions represented by models are equivalent.		2, 4, 7, 8

Content Standards	AzCCRS.Math.Content.4.NF.A.2 Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.		
Explanations	Benchmark fractions include common fractions between 0 and 1 such as halves, thirds, fourths, fifths, sixths, eighths, tenths, twelfths, and hundredths. Fractions can be compared using benchmarks, common denominators, or common numerators. Symbols used to describe comparisons include <, >, =.		
Content Limits	Denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, 100 Benchmarks limited to 0, 1/4, 1/2, 3/4, 1 Fractions a/bcan be improper fractions and students should not be guided to put fractions in lowest terms or to simplify.		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is allowed.	**Math Practices**	2, 4, 5, 7

Sample Task Demands	Common Item Formats	Recommended Math Practices
Students will be required to compare fractions relating them to benchmark fractions using visual models (e.g. number lines) and/or numeric reasoning.	• Equation Response • Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response • Proposition Response	2, 4, 7
Students will be required to interpret information about fractions to compare fractions using visual models or numeric reasoning.		2, 4, 5, 7
Students will be required to compare fractions using symbols <, >, and = with no situational context or visual model.		2, 4, 5, 7
Students will be required to develop logical arguments, draw conclusions, and relate use of models to numeric strategies to compare fractional quantities		2, 4, 5, 7

Content Standards	AzCCRS.Math.Content.4.NF.B.3 Understand a fraction a/b with a > 1 as a sum of fractions 1/b. AzCCRS.Math.Content.4.NF.B.3a Understand addition and subtraction of fractions as joining and separating parts referring to the same whole. AzCCRS.Math.Content.4.NF.B.3b Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. AzCCRS.Math.Content.4.NF.B.3c Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction. AzCCRS.Math.Content.4.NF.B.3d Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.
Explanations	A fraction with a numerator of one is called a unit fraction. When students investigate fractions other than unit fractions, such as 2/3, they should be able to decompose the non-unit fraction into a combination of several unit fractions. A separate algorithm for mixed numbers in addition and subtraction is not necessary. Students will tend to add or subtract the whole numbers first and then work with the fractions using the same strategies they have applied to problems that contained only fractions.
Content Limits	Denominators limited to 2, 3, 4, 5, 6, 8, 10, 12, 100 Use mixed numbers and fractions with like denominators Incorporate the concept of the same whole. Circle based models, rectangular models, and numbers line models, do not over use circle based area food models (i.e., pizza).
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.

Context	Context is allowed.	**Math Practices**	1, 2, 4, 5, 6, 7, 8

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to add or subtract fractions with like denominators.	• Equation Response • Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response	1, 6, 7
Students will be required to decompose a fraction into a sum of fractions in multiple ways.		1, 2, 6, 7, 8
Students will be required to add or subtract mixed numbers.		1, 6, 7, 8

Students will be required to solve word problems involving fractions or mixed numbers and represent sums and differences of fractions or mixed numbers.		1, 2, 4, 5, 6, 7, 8

Content Standards	AzCCRS.Math.Content.4.NF.B.4 Apply and extend previous understandings of multiplication to multiply a fraction by a whole number. AzCCRS.Math.Content.4.NF.B.4a Understand a fraction a/b as a multiple of 1/b. AzCCRS.Math.Content.4.NF.B.4b Understand a multiple of a/b as a multiple of 1/b, and use this understanding to multiply a fraction by a whole number. AzCCRS.Math.Content.4.NF.B.4c Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.
Explanations	Students need many opportunities to work with problems in context to understand the connections between models and corresponding equations. Contexts involving a whole number times a fraction lend themselves to modeling and examining patterns.
Content Limits	Fractions will only be multiplied by a whole number. Limit denominators to 2, 3, 4, 5, 6, 8, 10, 12, 100
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.

Context	Context is allowed.	**Math Practices**	1, 2, 4, 5, 6, 7, 8

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to model a non-unit fraction as the product of a whole number and a unit fraction.	• Equation Response • Graphic Response • Multiple Choice Response • Multi-Select Response	1, 4, 5, 6, 7, 8
Students will be required to multiply a fraction by a whole number.		1, 5, 6, 7, 8
Students will be required to identify a missing number in an equation that multiplies a fraction by a whole number.		1, 2, 4, 6, 7, 8
Students will be required to solve a word problem that involves multiplying a fraction by a whole number within a real-world context.		1, 2, 6, 7, 8
Students will be required to create and/or solve an equation that models a word problem involving multiplying a fraction by a whole number within a real-world context.		1, 2, 4, 5, 6, 7, 8

Content Standards	AzCCRS.Math.Content.4.NF.C.5 Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100.		
Explanations	Students can use base ten blocks, graph paper, and other place value models to explore the relationship between fractions with denominators of 10 and denominators of 100. Students may represent 3/10 with 3 longs and may also write the fraction as 30/100 with the whole in this case being the flat (the flat represents one hundred units with each unit equal to one hundredth). Students begin to make connections to the place value chart as shown in 4.NF.6. This work in fourth grade lays the foundation for performing operations with decimal numbers in fifth grade.		
Content Limits	Denominators must be either 10 or 100 Decimal notation is not assessed in this standard Equivalent fractions is an acceptable vocab word		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is allowed.	**Math Practices**	2, 4, 5, 7

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to express a fraction with denominator 10 as a fraction with denominator 100, and vice-versa.	• Equation Response • Multiple Choice Response • Matching Item Response • Multi-Select Response	2, 4, 5, 7
Students will be required to add two fractions with different denominators of 10 and 100.		2, 4, 5, 7
Students will be required to determine a fraction equivalent to another fraction represented by a model.		2, 4, 5, 7
Students will be required to identify a missing addend.		2, 4, 5, 7

Content Standards	AzCCRS.Math.Content.4.NF.C.6 Use decimal notation for fractions with denominators 10 or 100.		
Explanations	Students make connections between fractions with denominators of 10 and 100 and the place value chart. By reading fraction names, students say 32/100 as thirty-two hundredths and rewrite this as 0.32 or represent it on a place value model. Students use the representations explored in 4.NF.5 to understand 32/100 can be expanded to 3/10 and 2/100. Students represent values such as 0.32 or 32/100 on a number line. 32/100 is more than 30/100 (or 3/10) and less than 40/100 (or 4/10). It is closer to 30/100 so it would be placed on the number line near that value.		
Content Limits	Denominators of 10 and 100 Decimal notation to tenths and hundredths		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is not allowed.	**Math Practices**	2, 4, 5, 7

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to express a fraction or mixed number in decimal notation in 10ths or 100ths.	• Equation Response • Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response	2, 7
Students will be required to locate or plot a decimal on a number line/model.		2, 4, 5, 7
Students will be required to relate two fractional representations (denominators of 10 and 100) to one decimal representation. (Medium and Hard difficulty only)		2, 7

Content Standards	AzCCRS.Math.Content.4.NF.C.7 Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.
Explanations	Students build area and other models to compare decimals. Through these experiences and their work with fraction models, they build the understanding that comparisons between decimals or fractions are only valid when the whole is the same for both cases. When the wholes are the same, the decimals or fractions can be compared.
Content Limits	Examples reference the same whole value. Decimals limited to 10ths and 100ths Decimals should not be limited to values less than 1 Use mathematical symbols appropriately to compare values represented by models and not to compare models. (e.g., 0.62<0.89 instead of [model] < [model])
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.

Context	Context is allowed.	**Math Practices**	2, 4, 5, 7

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to compare two decimals using a model (i.e., numerical, number line, visual model) - can vary models (10ths and 100ths) as long as they both relate to the same whole.	• Equation Response • Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response • Table Response	2, 4, 5, 7
Students will be required to compare decimals by converting decimals to fractions with common denominators and/or by reasoning about place value.		2, 7
Students will be required to write or identify true comparisons between decimal numbers using symbols <, >, and =. Enter decimals or symbols to complete comparisons.		2, 4, 5, 7
Students will be required to explain conclusions about relationships and comparisons between decimals.		2, 7

Operations and Algebraic Thinking & Numbers in Base Ten

Content Standards	AzCCRS.Math.Content.4.NBT.A.1 Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.		
Explanations	Students should be familiar with and use place value as they work with numbers.		
Content Limits	Whole numbers within 1,000,000		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is not allowed.	**Math Practices**	2, 6, 7
Sample Task Demands		**Common Item Formats**	**Recommended Math Practices**
Students will be required to when presented with a multiplication problem, identify the power of 10 by which one number is greater than another.		• Equation Response	2, 6, 7
Students will be required to compare the value of a digit in different place values of two given numbers and identify the power of 10 by which one number is greater.			2, 6, 7

Content Standards	AzCCRS.Math.Content.4.NBT.A.2 Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.		
Explanations	The expanded form of 275 is 200 + 70 + 5. Students use place value to compare numbers. For example, in comparing 34,570 and 34,192, a student might say, both numbers have the same value of 10,000s and the same value of 1000s however, the value in the 100s place is different so that is where I would compare the two numbers.		
Content Limits	Whole numbers within 1,000,000		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is allowed.	**Math Practices**	2, 4, 6, 7

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to write a number with a given name in numeric form.	• Equation Response • Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response	2, 6, 7
Students will be required to identify the name of a given number.		2, 6, 7
Students will be required to write a number given in expanded form in numeric form or vice versa.		2, 4, 6, 7
Students will be required to compare two whole numbers in numeric form.		2, 4, 6, 7
Students will be required to order more than two whole numbers in numeric form.		2, 6, 7

Content Standards	AzCCRS.Math.Content.4.NBT.A.3 Use place value understanding to round multi-digit whole numbers to any place.		
Explanations	When students are asked to round large numbers, they first need to identify which digit is in the appropriate place.		
Content Limits	Greater than 1000 and within 1,000,000		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is not allowed.	**Math Practices**	2, 6
Sample Task Demands		**Common Item Formats**	**Recommended Math Practices**
Students will be required to identify the value of a given number rounded to the nearest place value.		• Equation Response • Matching Item Response • Multi-Select Response • Table Response	2, 6
Students will be required to identify the numbers that round to a given value.			2, 6
Students will be required to identify what place value a number was rounded to			2, 6
Students will be required to interpret and distinguish between different rounding procedures used in rounding to a number in order to create a number that fits certain parameters.			2, 6

Content Standards	AzCCRS.Math.Content.4.NBT.B.4 Fluently add and subtract multi-digit whole numbers using the standard algorithm.		
Explanations	Students build on their understanding of addition and subtraction, their use of place value and their flexibility with multiple strategies to make sense of the standard algorithm. They continue to use place value in describing and justifying the processes they use to add and subtract. When students begin using the standard algorithm their explanation may be quite lengthy. After much practice with using place value to justify their steps, they will develop fluency with the algorithm. Students should be able to explain why the algorithm works. Note: Students should know that it is mathematically possible to subtract a larger number from a smaller number but that their work with whole numbers does not allow this as the difference would result in a negative number.		
Content Limits	Whole numbers greater than 1,000 and within 1,000,000		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is not allowed.	**Math Practices**	2, 5, 7, 8

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to calculate the sum or difference of two or more numbers.	• Equation Response	2, 7, 8
Students will be required to identify a missing digit in an addition or subtraction problem.		2, 5, 7, 8

Content Standards	AzCCRS.Math.Content.4.NBT.B.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.		
Explanations	Students who develop flexibility in breaking numbers apart have a better understanding of the importance of place value and the distributive property in multi-digit multiplication. Students use base ten blocks, area models, partitioning, compensation strategies, etc. when multiplying whole numbers and use words and diagrams to explain their thinking. They use the terms factor and product when communicating their reasoning. Multiple strategies enable students to develop fluency with multiplication and transfer that understanding to division. Use of the standard algorithm for multiplication is an expectation in the 5th grade.		
Content Limits	Products up to 89,991 (9,999 x 9). Multiply four digits by one digit, three digits by one digit, two digits by one digit, and two digits by two digits		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is not allowed.	**Math Practices**	2, 3, 4, 5, 7

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to calculate the product of 2 numbers.	• Equation Response • Multi-Select Response	2, 4, 5, 7
Students will be required to select expressions that are equivalent to a given product.		2, 3, 4, 5, 7

<table>
<tr><td>Content Standards</td><td colspan="3">AzCCRS.Math.Content.4.NBT.B.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</td></tr>
<tr><td>Explanations</td><td colspan="3">In fourth grade, students build on their third grade work with division within 100. Students need opportunities to develop their understandings by using problems in and out of context.</td></tr>
<tr><td>Content Limits</td><td colspan="3">3-digit dividend and 1-digit divisor and 4-digit dividend and 1-digit divisor</td></tr>
<tr><td>Common Item Formats</td><td colspan="3">The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.</td></tr>
<tr><td>Context</td><td>Context is not allowed.</td><td>Math Practices</td><td>2, 3, 4, 5, 7</td></tr>
<tr><td colspan="2">Sample Task Demands</td><td>Common Item Formats</td><td>Recommended Math Practices</td></tr>
<tr><td colspan="2">Students will be required to calculate the quotient of 2 numbers.</td><td rowspan="2">• Equation Response
• Multi-Select Response</td><td>2, 4, 5, 7</td></tr>
<tr><td colspan="2">Students will be required to select expressions that are equivalent to a given quotient.</td><td>2, 3, 4, 5, 7</td></tr>
</table>

<table>
<tr><td>Content Standards</td><td colspan="3">AzCCRS.Math.Content.4.OA.A.1 Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.</td></tr>
<tr><td>Explanations</td><td colspan="3">A multiplicative comparison is a situation in which one quantity is multiplied by a specified number to get another quantity (e.g., “a is n times as much as b”). Students should be able to identify and verbalize which quantity is being multiplied and which number tells how many times.</td></tr>
<tr><td>Content Limits</td><td colspan="3">Whole numbers within 100.
Item must either include a verbal description of a multiplication equation or a division equation.
Multiplication situation must be a comparison, e.g. three times as many</td></tr>
<tr><td>Common Item Formats</td><td colspan="3">The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.</td></tr>
<tr><td>Context</td><td>Context is allowed.</td><td>Math Practices</td><td>2, 4</td></tr>
<tr><td colspan="2">Sample Task Demands</td><td>Common Item Formats</td><td>Recommended Math Practices</td></tr>
<tr><td colspan="2">Students will be required to given a verbal description, create an equation that models the multiplication context.</td><td rowspan="2">• Equation Response
• Multiple Choice Response
• Matching Item Response
• Multi-Select Response</td><td>2, 4</td></tr>
<tr><td colspan="2">Students will be required to given a multiplication equation, select a multiplicative comparison that describes the equation or vice versa.</td><td>2, 4</td></tr>
</table>

<table>
<tr><td>Content Standards</td><td colspan="3">AzCCRS.Math.Content.4.OA.A.2 Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.</td></tr>
<tr><td>Explanations</td><td colspan="3">Students need many opportunities to solve contextual problems.</td></tr>
<tr><td>Content Limits</td><td colspan="3">Multiplication situation must be a comparison, e.g. three times as many
Operations limited to multiplication and division.
Whole numbers within 100.</td></tr>
<tr><td>Common Item Formats</td><td colspan="3">The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.</td></tr>
<tr><td>Context</td><td>Context is required.</td><td>Math Practices</td><td>2, 4, 5, 7</td></tr>
<tr><td colspan="2">Sample Task Demands</td><td>Common Item Formats</td><td>Recommended Math Practices</td></tr>
<tr><td colspan="2">Students will be required to given a situation involving multiplicative comparison, create a multiplication or division equation (with an unknown value) to represent the situation.</td><td rowspan="2">• Equation Response
• Multiple Choice Response</td><td>2, 4, 5, 7</td></tr>
<tr><td colspan="2">Students will be required to given a situation involving multiplicative comparison, solve a multiplication or division word problem.</td><td>2, 4, 5, 7</td></tr>
</table>

Content Standards	AzCCRS.Math.Content.4.OA.A.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
Explanations	Students need many opportunities solving multistep story problems using all four operations. In division problems, the remainder is the whole number left over when as large a multiple of the divisor as possible has been subtracted. Estimation skills include identifying when estimation is appropriate, determining the level of accuracy needed, selecting the appropriate method of estimation, and verifying solutions or determining the reasonableness of situations using various estimatio
Content Limits	Whole numbers Only easy- and medium- difficulty addition and subtraction problems of numbers up to 1 million Multiplication of numbers of up to four digits by a one-digit number or of two numbers with two digits Quotients and remainders with up to four-digit dividends and one-digit divisors Only 2- and 3-step problems Problems involving remainders should require the student to interpret and use the remainder with respect to context Variables must be represented by a letter. Variables should be introduced in a separate phrase like "Use p to represent the number of pages in the book" rather than using an appositive clause.
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.

Context	Context is required.	**Math Practices**	1, 2, 4, 5, 6, 7

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to interpret remainders within the context of a division situation by giving a numeric answer or interpretation.	• Equation Response • Multiple Choice Response • Multi-Select Response • Proposition Response	1, 2, 5, 6, 7
Students will be required to explain the reasonableness of a solution in words.		2, 5, 7
Students will be required to reason through a word problem to find an unknown value (either the final answer or a key piece of information, given the final solution – e.g., working backward).		1, 2, 5, 6, 7
Students will be required to reason through a word problem to find an unknown value given only some information.		1, 2, 4, 5, 6, 7

Content Standards	AzCCRS.Math.Content.4.OA.A.3.1 Solve a variety of problems based on the multiplication principle of counting. AzCCRS.Math.Content.4.OA.A.3.1a Represent a variety of counting problems using arrays, charts, and systematic lists, e.g., tree diagram. AzCCRS.Math.Content.4.OA.A.3.1b Analyze relationships among representations and make connections to the multiplication principle of counting.		
Explanations	As students solve counting problems, they should begin to organize their initial random enumeration of possibilities into a systematic way of counting and organizing the possibilities in a chart (array), systematic list, or tree diagram. They note the similarities and differences among the representations and connect them to the multiplication principle of counting.		
Content Limits	The total number of different possibilities should be no more than 100.		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is required.	**Math Practices**	1, 2, 3, 4, 5, 7, 8

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to create a visual representation of a counting problem.	• Equation Response • Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response	2, 3, 4, 5, 7, 8
Students will be required to use the visual representation to solve counting problems.		1, 2, 3, 4, 5, 7, 8
Students will be required to analyze relationships using different representations of counting problems.		2, 3, 4, 5, 7, 8

Content Standards	AzCCRS.Math.Content.4.OA.B.4 Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite.
Explanations	Students should understand the process of finding factor pairs so they can do this for any number 1 -100. Multiples can be thought of as the result of skip counting by each of the factors. When skip counting, students should be able to identify the number of factors counted e.g., 5, 10, 15, 20 (there are 4 fives in 20). A prime number is a number greater than 1 that has only 2 factors, 1 and itself. Composite numbers have more than 2 factors. Students investigate whether numbers are prime or composite by building rectangles (arrays) within the given area and finding whi
Content Limits	Whole numbers in the range 1-100 Vocabulary includes prime, composite, factor or multiple
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.

Context	Context is allowed.	**Math Practices**	2, 7

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to identify factors or multiples of a given number.	• Equation Response • Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response • Table Response	2, 7
Students will be required to given a set of conditions (related to prime/composite, and factors), identify a number (or numbers) that meets those criteria.		2, 7
Students will be required to classify numbers as prime or composite.		2, 7
Students will be required to apply the concepts of prime numbers, composite numbers, and factors in problem-solving contexts.		2, 7

Content Standards	AzCCRS.Math.Content.4.OA.C.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.		
Explanations	Patterns involving numbers or symbols either repeat or grow. Students need multiple opportunities creating and extending number and shape patterns. Numerical patterns allow students to reinforce facts and develop fluency with operations. Patterns and rules are related. A pattern is a sequence that repeats the same process over and over. A rule dictates what that process will look like. Students investigate different patterns to find rules, identify features in the patterns, and justify the reason for those features. After students have identified rules and features from patterns, they need to generate a numerical or shape pattern from a given rule.		
Content Limits	Whole numbers Operations in patterns limited to addition, subtraction, multiplication, and division Growing shape patterns If generating a pattern from a given rule, ask for the next two to four terms.		
Common Item Formats	The Item Formats section on pages 10 through 12 provides a list of item formats that may be used to assess this standard. The common item formats include but are not limited to those shown with the sample task demands.		
Context	Context is allowed.	**Math Practices**	2, 4, 5, 7

Sample Task Demands	**Common Item Formats**	**Recommended Math Practices**
Students will be required to generate a number or shape pattern that follows a given rule.	• Equation Response • Graphic Response • Multiple Choice Response • Multi-Select Response • Proposition Response • Table Response	2, 4, 5, 7
Students will be required to identify apparent features (such as the pattern of odd and even numbers, all numbers are even, all numbers are odd, etc.) of the pattern.		2, 4, 5, 7