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

# Math Item Specifications

## GRADE 3

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.**<br><br>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**.<br><br>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.**<br><br>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.**<br><br>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.**<br><br>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.**<br><br>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.**<br><br>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 $7 \times 8$ 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 $2 \times 7$ 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.**<br><br>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 3 | | |
|---|---|---|
| **Domain** | **Minimum** | **Maximum** |
| Measurement and Data & Geometry | 26% | 30% |
| Number and Operations - Fractions | 18% | 22% |
| Operations and Algebraic Thinking & Numbers in Base Ten | 49% | 53% |

*Approximately 70% of the assessment for Grade 3 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 3** | 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 3.

# 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 3 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)

3.G.A – Reason with shapes and their attributes.

Measurement and Data (MD)

3.MD.A – Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.

3.MD.B – Represent and interpret data.

3.MD.C – Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

3.MD.D – Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.

Numbers in Base Ten (NBT)

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

Numbers and Operations – Fractions (NF)

3.NF.A – Develop understanding of fractions as numbers.

Operations and Algebraic Thinking (OA)

3.OA.A – Represent and Solve Problems Involving Multiplication and Division

3.OA.B – Understand properties of multiplication and the relationship between multiplication and division.

3.OA.C – Multiply and divide within 100

3.OA.D – Solve problems involving the four operations, and identify and explain patterns in arithmetic.

# Grade 3 Math Item Specifications

## Measurement and Data & Geometry

| | |
|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.G.A.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories. |
| **Explanations** | In third grade, students identify and draw triangles, quadrilaterals, pentagons, and hexagons. Third graders build on this experience and further investigate quadrilaterals (technology may be used during this exploration). Students recognize shapes that are and are not quadrilaterals by examining the properties of the geometric figures. They conceptualize that a quadrilateral must be a closed figure with four straight sides and begin to notice characteristics of the angles and the relationship between opposite sides. Students should be encouraged to provide details and use proper vocabulary when describing the properties of quadrilaterals. They sort geometric figures and identify squares, rectangles, and rhombuses as quadrilaterals. |
| **Content Limits** | Shapes include two dimensional shapes and the following quadrilaterals in particular: rhombus, rectangle, and square.<br><br>Attributes include: number of sides, number of angles, whether the shape has a right angle or not, whether sides are the same length or not, whether the sides are straight lines or not. Do not include references to parallel or perpendicular sides - this is assessed in grade 4. |
| **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, 7 |

| **Sample Task Demand** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to select attributes that are shared by a set of shapes. | • Graphic Response<br>• Multiple Choice Response<br>• Matching Item Response<br>• Multi-Select Response<br>• Open Response | 6, 7 |
| Students will be required to select shapes that belong to the same sub-categories. | | 6, 7 |
| Students will be required to use a set of attributes to construct a shape. | | 5, 6, 7 |
| Students will be required to use a set of attributes to name a shape. | | 6, 7 |
| Students will be required to classify shapes based on attributes. | | 6, 7 |
| Students will be required to explain why the shapes were classified in a given way, given a set of shapes in two groups. | | 6, 7 |

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.G.A.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. | | |
| **Explanations** | Given a shape, students partition it into equal parts, recognizing that these parts all have the same area. They identify the fractional name of each part and are able to partition a shape into parts with equal areas in several different ways. | | |
| **Content Limits** | Fractions can have denominators of 2, 3, 4, 6, and 8 (per 3.NF).<br>The fractions must be unit fractions.<br>Shapes include quadrilateral (rhombus, rectangle, square, isosceles trapezoid), isosceles triangle, regular hexagon, circle (these are all the shapes covered in geometry standards K-3).<br>The shape used and the number of partitions should be suitable for this grade. For example, having a student partition a hexagon into 6 parts is acceptable, but 8 is not. | | |
| **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 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to recognize the fraction an area of a shape represents. | • Equation Response<br>• Graphic Response<br>• Multi-Select Response<br>• Table Response | 2, 4 |
| Students will be required to identify the shapes that are divided into equal parts. | | 2, 4 |
| Students will be required to partition a shape into equal areas. | | 2, 4, 5 |
| Students will be required to shade a fraction of shape. | | 2, 4, 5 |
| Students will be required to match given partitions with the fraction each represents. | | 2, 4, 5 |
| Students will be required to construct a complete shape given only one of the partitioned areas of the whole shape. | | 2, 4, 5 |

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.MD.A.1 Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram. | | |
| **Explanations** | Students in second grade learned to tell time to the nearest five minutes. In third grade, they extend telling time and measure elapsed time both in and out of context using clocks and number lines. | | |
| **Content Limits** | Times should be to the nearest minute.<br>Addition and 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 allowed. | **Math Practices** | 1, 4, 6 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to recognize and identify a time shown to a single-minute increment on a clock. | • Equation Response<br>• Graphic Response<br>• Multiple Choice Response<br>• Table Response | 1, 6 |
| Students will be required to calculate a change of time. | | 1, 6 |
| Students will be required to show change of time on a number line or clock. | | 1, 4, 6 |
| Students will be required to construct a schedule by adding and subtracting time intervals. | | 1, 4, 6 |

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. | | |
| **Explanations** | Students need multiple opportunities weighing classroom objects and filling containers to help them develop a basic understanding of the size and weight of a liter, a gram, and a kilogram. Milliliters may also be used to show amounts that are less than a liter. | | |
| **Content Limits** | Excludes compound units such as cm3 and finding the geometric volume of a container.<br>Excludes multiplicative comparison problems (problems involving notions of "times as much"). | | |
| **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 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to identify a given measured amount. | • Equation Response<br>• Multiple Choice Response | 1, 2, 4, 6 |
| Students will be required to estimate an unknown quantity by comparing it with a given measurement. | | 1, 2, 4, 5, 6 |
| Students will be required to interpret and calculate a one-step word problem involving measurement. | | 1, 2, 4, 5, 6 |

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. | | |
| **Explanations** | Students should have opportunities reading and solving problems using scaled graphs before being asked to draw one. The following graphs all use five as the scale interval, but students should experience different intervals to further develop their understanding of scale graphs and number facts. | | |
| **Content Limits** | Categories are five or fewer and use multiplication and division within 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, 4, 6, 7 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to compare two or more data values from a given graph to solve one- and two-step word problems. | • Equation Response<br>• Graphic Response<br>• Table Response | 1, 4, 6, 7 |
| Students will be required to construct a scaled bar or picture graph based on given data. | | 1, 4, 6, 7 |
| Students will be required to create a scale for given data and construct a graph. | | 1, 4, 6, 7 |
| Students will be required to construct a scaled bar or picture graph based on parameters. | | 1, 4, 6, 7 |

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.MD.B.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units-whole numbers, halves, or quarters. | | |
| **Explanations** | Students in second grade measured length in whole units using both metric and U.S. customary systems. It's important to review with students how to read and use a standard ruler including details about halves and quarter marks on the ruler. Students should connect their understanding of fractions to measuring to one-half and one-quarter inch. Third graders need many opportunities measuring the length of various objects in their environment.<br>Some important ideas related to measuring with a ruler are: The starting point of where one places a ruler to begin measuring; Measuring is approximate (Items that students measure will not always measure exactly 1/4, 1/2 or one whole inch. Students will need to decide on an appropriate estimate length); Making paper rulers and folding to find the half and quarter marks will help students develop a stronger understanding of measuring length.<br>Students generate data by measuring and create a line plot to display their findings. | | |
| **Content Limits** | Units are limited to whole numbers, halves, or quarters.<br>Standard rulers should not be used - only special rulers that are marked off in halves or quarters.<br>Measurements are limited to inches. | | |
| **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, 4, 6 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to measure the length of a given object. | • Equation Response<br>• Graphic Response<br>• Matching Item Response<br>• Multi-Select Response | 4, 6 |
| Students will be required to classify and/or sort objects based on their measure. | | 1, 4, 6 |
| Students will be required to construct a line plot for given data. | | 1, 4, 6 |

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.MD.C.5 Recognize area as an attribute of plane figures and understand concepts of area measurement.<br><br>AzCCRS.Math.Content.3.MD.C.5a A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.<br><br>AzCCRS.Math.Content.3.MD.C.5b A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.<br><br>AzCCRS.Math.Content.3.MD.C.6 Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). | | |
| **Explanations** | Students develop understanding of using square units to measure area by: Using different sized square units, filling in an area with the same sized square units and counting the number of square units.<br><br>Using different sized graph paper, students can explore the areas measured in square centimeters and square inches. | | |
| **Content Limits** | Plane figures that can be covered by unit squares.<br><br>Note: Exponential notation is not expected at this grade level (square cm is acceptable, but cm2 is not) | | |
| **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 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to identify what the area of a figure means and represents. (5a/5b) | • Equation Response<br>• Multiple Choice Response<br>• Multi-Select Response | 2, 4, 6 |
| Students will be required to recognize a square with side length 1 unit as a unit square. (5a) | | 2, 4, 6 |
| Students will be required to find the area of a rectilinear figure by counting squares. (6) | | 2, 4, 5, 6 |

| | |
|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.MD.C.7 Relate area to the operations of multiplication and addition.<br><br>AzCCRS.Math.Content.3.MD.C.7a Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.<br><br>AzCCRS.Math.Content.3.MD.C.7b Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.<br><br>AzCCRS.Math.Content.3.MD.C.7c Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a × b and a × c. Use area models to represent the distributive property in mathematical reasoning.<br><br>AzCCRS.Math.Content.3.MD.C.7d Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. |
| **Explanations** | Students tile areas of rectangles, determine the area, record the length and width of the rectangle, investigate the patterns in the numbers, and discover that the area is the length times the width. |
| **Content Limits** | Rectangles and shapes that can be decomposed into rectangles.<br>Whole-number side lengths<br>Multiplication is within 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 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to find the area of a rectangle using various strategies, such as multiplying side lengths and using tiling to demonstrate the distributive property as it relates to area. | • Equation Response<br>• Graphic Response<br>• Matching Item Response<br>• Multi-Select Response | 1, 2, 4, 5, 6 |
| Students will be required to find the area of rectilinear figures by decomposing them into non-overlapping rectangles. | | 1, 2, 4, 5, 6 |
| Students will be required to draw conclusions about unknown side lengths in order to calculate the area of a rectilinear figure. | | 1, 2, 4, 5, 6 |

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.MD.D.8 Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters. | | |
| **Explanations** | Students develop an understanding of the concept of perimeter by walking around the perimeter of a room, using rubber bands to represent the perimeter of a plane figure on a geoboard. They find the perimeter of objects; use addition to find perimeters; and recognize the patterns that exist when finding the sum of the lengths and widths of rectangles. | | |
| **Content Limits** | Polygons that can be tiled with square units.<br>Whole-number side lengths<br>Multiplication is within 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, 4, 7 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to construct a polygon with a given perimeter or area. | • Equation Response<br>• Graphic Response<br>• Multiple Choice Response<br>• Multi-Select Response | 1, 4, 7 |
| Students will be required to find the perimeter of a polygon given the side lengths. | | 1, 4, 7 |
| Students will be required to find an unknown side length of a polygon given the perimeter. | | 1, 4, 7 |
| Students will be required to construct a rectangle with a given perimeter based on area (or a given area based on perimeter). | | 1, 4, 7 |

## Numbers and Operations - Fractions

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.NF.A.1 Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b. | | |
| **Explanations** | Students express fractions as fair sharing, parts of a whole, and parts of a set. They use various contexts (candy bars, fruit, and cakes) and a variety of models (circles, squares, rectangles, fraction bars, and number lines) to develop understanding of fractions and represent fractions. Students need many opportunities to solve word problems that require fair sharing.<br><br>To develop understanding of fair shares, students first participate in situations where the number of objects is greater than the number of children and then progress into situations where the number of objects is less than the number of children. | | |
| **Content Limits** | Denominators limited to 2, 3, 4, 6, and 8.<br><br>Combining or putting together unit fractions rather than formal addition or subtraction of fractions.<br><br>Maintain concept of a whole as one entity that can be equally partitioned in various ways when working with unit fractions. Limit usage of the words numerator and denominator in items—focus should not be on assessing vocabulary terms.<br><br>Fractions a/b can be improper fractions and students should not be guided to put fractions in lowest terms or to simplify.<br><br>Focus more on area models since 3.NF.2 uses number lines exclusively. | | |
| **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, 4, 7 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to identify a model given a fraction. | • Equation Response<br>• Graphic Response<br>• Multiple Choice Response<br>• Matching Item Response<br>• Multi-Select Response | 1, 4, 7 |
| Students will be required to identify a fraction given a model. | | 1, 4, 7 |
| Students will be required to partition a whole into equal parts and identify that each part is a unit fraction. | | 1, 4, 7 |
| Students will be required to recognize fractions in the form of a/b where a > b. | | 1, 4, 7 |
| Students will be required to build fractions from unit fractions using expressions or area models. | | 1, 4, 7 |
| Students will be required to specify a fractional part of a whole and construct the whole figure. | | 1, 4, 7 |

| | |
|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.NF.A.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram.<br><br>AzCCRS.Math.Content.3.NF.A.2a Represent a fraction 1/b on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/b and that the endpoint of the part based at 0 locates the number 1/b on the number line.<br><br>AzCCRS.Math.Content.3.NF.A.2b Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line. |
| **Explanations** | Students transfer their understanding of parts of a whole to partition a number line into equal parts. There are two new concepts addressed in this standard which students should have time to develop. |
| **Content Limits** | Denominators limited to 2, 3, 4, 6, and 8.<br><br>Models restricted to number lines starting at 0. Part A: number line interval from 0 to 1. Part B: number lines can extend from 0 to 1+. |
| **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, 4, 7 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to identify and represent unit fractions of 1/b on a number line. | • Equation Response<br>• Graphic Response<br>• Multiple Choice Response<br>• Multi-Select Response | 1, 4, 7 |
| Students will be required to identify and represent fractions of size a/b as "a" lengths 1/b from 0 on the number line. | | 1, 4, 7 |
| Students will be required to identify and interpret fractional values on number lines. | | 1, 4, 7 |
| Students will be required to reason, compare and draw conclusions about partitioning wholes and constructing fractional models and number line representations to justify. | | 1, 4, 7 |

| | |
|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.NF.A.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.<br><br>AzCCRS.Math.Content.3.NF.A.3a Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.<br><br>AzCCRS.Math.Content.3.NF.A.3b Recognize and generate simple equivalent fractions, (e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.<br><br>AzCCRS.Math.Content.3.NF.A.3c Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.<br><br>AzCCRS.Math.Content.3.NF.A.3d Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, a |
| **Explanations** | An important concept when comparing fractions is to look at the size of the parts and the number of the parts.<br><br>Students recognize when examining fractions with common denominators, the wholes have been divided into the same number of equal parts. So the fraction with the larger numerator has the larger number of equal parts.<br><br>To compare fractions that have the same numerator but different denominators, students understand that each fraction has the same number of equal parts but the size of the parts are different. They can infer that the same number of smaller pieces is less |
| **Content Limits** | Denominators limited to 2, 3, 4, 6, and 8.<br><br>Fractions must refer to the same whole unless intent of item is to assess reasoning about wholes.<br><br>The vocabulary of lowest terms or simplify should not be used.<br><br>Limit to a maximum of 3 when ordering fractions.<br><br>Visual models primarily used include number lines and area models (circles, rectangles, regular polygons - see shapes from geometry standards). |
| **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, 3, 4, 6, 7, 8 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to represent equivalent fractions. | • Graphic Response<br>• Multiple Choice Response<br>• Matching Item Response<br>• Multi-Select Response<br>• Table Response | 1, 2, 4, 6, 7, 8 |
| Students will be required to compare fractions with the same denominator. | | 1, 2, 3, 4, 6, 7, 8 |

| | | |
|---|---|---|
| Students will be required to express whole numbers as fractions (over 1) and recognize equivalent fraction forms of whole numbers (n*p/0p). | | 1, 2, 4, 6, 7, 8 |
| Students will be required to represent and explain equivalent fractions by creating fraction models. | | 1, 2, 3, 4, 6, 7, 8 |
| Students will be required to compare fractions with the same numerator and unlike denominators. Note: see sample items to see how this is differentiated from 4.NF.2. | | 1, 2, 3, 4, 6, 7, 8 |

## Operations and Algebraic Thinking & Numbers in Base Ten

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|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.NBT.A.1 Use place value understanding to round whole numbers to the nearest 10 or 100. | | |
| **Explanations** | Students learn when and why to round numbers. They identify possible answers and halfway points. Then they narrow where the given number falls between the possible answers and halfway points. They also understand that by convention if a number is exactly at the halfway point of the two possible answers, the number is rounded up. | | |
| **Content Limits** | Whole numbers up to 1000.<br>Avoid situations where the place the student rounded to is ambiguous. For example, asking a student to round 697 to the nearest ten is not a good item, as the student would get the exact same answer if he or she mistakenly rounded to the nearest hundred. | | |
| **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, 7, 8 |

| **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 10 or 100. | • Equation Response<br>• Graphic Response<br>• Matching Item Response<br>• Multi-Select Response<br>• Table Response | 7, 8 |
| Students will be required to identify the numbers that round to a given value. | | 7, 8 |
| Students will be required to plot points to represent values that round to a given value. | | 5, 7, 8 |
| 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. | | 7, 8 |

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.NBT.A.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction. | | |
| **Explanations** | Problems should include both vertical and horizontal forms, including opportunities for students to apply the commutative and associative properties. Adding and subtracting fluently refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently. Students explain their thinking and show their work by using strategies and algorithms, and verify that their answer is reasonable. An interactive whiteboard or document camera may be used to show and share student thinking. | | |
| **Content Limits** | Addends and sums are less than or equal to 1000.<br>Minuends, subtrahends, and differences are less than or equal to 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 not allowed. | **Math Practices** | 2, 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<br>• Multi-Select Response | 2, 7, 8 |

<table>
<tr><td>Content Standards</td><td colspan="3">AzCCRS.Math.Content.3.NBT.A.3 Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.</td></tr>
<tr><td>Explanations</td><td colspan="3">Students use base ten blocks, diagrams, or hundreds charts to multiply one-digit numbers by multiples of 10 from 10-90. They apply their understanding of multiplication and the meaning of the multiples of 10.</td></tr>
<tr><td>Content Limits</td><td colspan="3">Largest product is 810 (9 x 90 = 810)</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, 7, 8</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 product of a one-digit number by a multiple of 10 without context.</td><td rowspan="2">• Equation Response<br>• Matching Item Response<br>• Multi-Select Response</td><td>2, 7, 8</td></tr>
<tr><td colspan="2">Students will be required to calculate the product of a one-digit number by a multiple of 10 within the context of a word problem.</td><td>2, 7, 8</td></tr>
</table>

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.OA.A.1 Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. | | |
| **Explanations** | Students recognize multiplication as a means to determine the total number of objects when there are a specific number of groups with the same number of objects in each group. Multiplication requires students to think in terms of groups of things rather than individual things. Students learn that the multiplication symbol 'x' means "groups of" and problems such as 5 x 7 refer to 5 groups of 7.<br>To further develop this understanding, students interpret a problem situation requiring multiplication using pictures, objects, words, numbers, and equations. Then, given a multiplication expression (e.g., 5 x 6) students interpret the expression using a multiplication context. (See Table 2) They should begin to use the terms, factor and product, as they describe multiplication. | | |
| **Content Limits** | Products within 100.<br>Whole number factors. | | |
| **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, 4, 7 |

| Sample Task Demands | Common Item Formats | Recommended Math Practices |
|---|---|---|
| Students will be required to interpret and/or describe what factor pairs represent in a given arrangement. | • Equation Response<br>• Multiple Choice Response<br>• Multi-Select Response<br>• Proposition Response<br>• Table Response | 1, 4, 7 |
| Students will be required to create a multiplication problem that describes a given arrangement. | | 1, 4, 7 |
| Students will be required to create multiple pairs of factors to create a given arrangement. | | 1, 4, 7 |

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.OA.A.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. | | |
| **Explanations** | Students recognize the operation of division in two different types of situations. One situation requires determining how many groups and the other situation requires sharing (determining how many in each group). Students should be exposed to appropriate terminology (quotient, dividend, divisor, and factor).<br>To develop this understanding, students interpret a problem situation requiring division using pictures, objects, words, numbers, and equations. Given a division expression (e.g., 24 ÷ 6) students interpret the expression in contexts that require both interpretations of division. (See Table 2) | | |
| **Content Limits** | Dividends up to 100.<br>Whole number dividends.<br>Whole number quotients. | | |
| **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, 4, 7 |

| Sample Task Demands | Common Item Formats | Recommended Math Practices |
|---|---|---|
| Students will be required to identify the quotient for a given problem. | • Equation Response<br>• Graphic Response<br>• Multiple Choice Response<br>• Multi-Select Response<br>• Proposition Response | 4, 7 |
| Students will be required to find a number to answer a question based on the interpretation of a quotient within a context. | | 1, 4 |

| | |
|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.OA.A.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. |
| **Explanations** | Students use a variety of representations for creating and solving one-step word problems, i.e., numbers, words, pictures, physical objects, or equations. They use multiplication and division of whole numbers up to 10 x10. Students explain their thinking, show their work by using at least one representation, and verify that their answer is reasonable. |
| **Content Limits** | All numbers must be 100 or less.<br>Use whole numbers only.<br>Give only one unknown per equation. Unknown may be in any position.<br>Do not use letter variables for the unknown in this standard. Instead, use a box or other symbol to represent the unknown.<br>Do not use the words "times as much/many." |
| **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, 4, 7 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to solve a simple word problem involving multiplication or division. | • Equation Response<br>• Graphic Response<br>• Multiple Choice Response<br>• Multi-Select Response | 1 |
| Students will be required to create an equation to model a simple situation with multiplication or division. | | 1, 4 |
| Students will be required to model multiplication and division equations by sorting objects into equal groups. | | 1, 4, 7 |
| Students will be required to create an equation to model a complex situation with multiplication or division. | | 1, 4, 7 |
| Students will be required to create a model using a multiplication or division equation that represents a complex situation. | | 1, 4, 7 |

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.OA.A.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. | | |
| **Explanations** | This standard is strongly connected to 3.AO.3 when students solve problems and determine unknowns in equations. Students should also experience creating story problems for given equations. When crafting story problems, they should carefully consider the question(s) to be asked and answered to write an appropriate equation. Students may approach the same story problem differently and write either a multiplication equation or division equation.<br>Students apply their understanding of the meaning of the equal sign as "the same as" to interpret an equation with an unknown.<br>Equations in the form of a x b = c and c = a x b should be used interchangeably, with the unknown in different positions. | | |
| **Content Limits** | Product is less than 100.<br>Whole number factors and quotients.<br>Equation must be given, and not created. | | |
| **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, 6, 7 |
| **Sample Task Demands** | | **Common Item Formats** | **Recommended Math Practices** |
| Students will be required to find the unknown number in a given multiplication or division equation. | | • Equation Response<br>• Multiple Choice Response | 1, 2, 6, 7 |

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.OA.B.5 Apply properties of operations as strategies to multiply and divide. | | |
| **Explanations** | Students represent expressions using various objects, pictures, words and symbols in order to develop their understanding of properties. They multiply by 1 and 0 and divide by 1. They change the order of numbers to determine that the order of numbers does not make a difference in multiplication (but does make a difference in division). Given three factors, they investigate changing the order of how they multiply the numbers to determine that changing the order does not change the product. They also decompose numbers to build fluency with multiplication.<br>Students are introduced to the distributive property of multiplication over addition as a strategy for using products they know to solve products they don't know.<br>To further develop understanding of properties related to multiplication and division, students use different representations and their understanding of the relationship between multiplication and division to determine if the following types of equations | | |
| **Content Limits** | Whole numbers.<br>Product or dividend must be 100 or less.<br>Factors, divisors, and quotients should be 10 or less. | | |
| **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, 4, 7, 8 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to create an equivalent expression and/or equation based on applying a particular property (i.e., Commutative, Associative, Distributive). | • Equation Response<br>• Graphic Response<br>• Multiple Choice Response<br>• Matching Item Response<br>• Multi-Select Response | 1, 4, 7, 8 |

<table>
<tr><td>Content Standards</td><td colspan="3">AzCCRS.Math.Content.3.OA.B.6 Understand division as an unknown-factor problem.</td></tr>
<tr><td>Explanations</td><td colspan="3">Multiplication and division are inverse operations and that understanding can be used to find the unknown. Fact family triangles demonstrate the inverse operations of multiplication and division by showing the two factors and how those factors relate to the product and/or quotient.<br><br>Students use their understanding of the meaning of the equal sign as “the same as” to interpret an equation with an unknown.<br><br>Equations in the form of a ÷ b = c and c = a ÷ b need to be used interchangeably, with the unknown in different positions.</td></tr>
<tr><td>Content Limits</td><td colspan="3">Whole numbers.<br><br>Quotients up to 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 not allowed.</td><td>Math Practices</td><td>1, 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 write division problems as equivalent multiplication problems.</td><td>• Equation Response<br>• Graphic Response<br>• Multiple Choice Response<br>• Multi-Select Response</td><td>1, 7</td></tr>
</table>

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.OA.C.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers. | | |
| **Explanations** | By studying patterns and relationships in multiplication facts and relating multiplication and division, students build a foundation for fluency with multiplication and division facts. Students demonstrate fluency with multiplication facts through 10 and the related division facts. Multiplying and dividing fluently refers to knowledge of procedures, knowledge of when and how to use them appropriately, and skill in performing them flexibly, accurately, and efficiently.<br>General Note: Students should have exposure to multiplication and division problems presented in both vertical and horizontal forms. | | |
| **Content Limits** | Whole numbers.<br>Multiply and divide within 100.<br>Factors, divisors, and quotients should be 10 or less. | | |
| **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, 7, 8 |
| **Sample Task Demands** | | **Common Item Formats** | **Recommended Math Practices** |
| Students will be required to find the product or dividend. | | • Equation Response<br>• Multiple Choice Response<br>• Multi-Select Response<br>• Table Response | 2, 7, 8 |

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.OA.D.8 Solve two-step word problems using the four operations. 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 should be exposed to multiple problem-solving strategies (using any combination of words, numbers, diagrams, physical objects or symbols) and be able to choose which ones to use.<br>When students solve word problems, they use various estimation skills which 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 solutions. | | |
| **Content Limits** | Whole numbers.<br>Adding and subtracting whole numbers within 1,000.<br>Multiplying and dividing whole numbers within 100.<br>Problems that use a letter for the unknown quality should be scaffolded appropriately for a grade 3 student. Consider using a graphic response item where the student drags appropriate quantities to complete an equation. | | |
| **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 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to determine a solution to a two-step word problem. | • Equation Response<br>• Graphic Response<br>• Multiple Choice Response<br>• Proposition Response | 1, 2, 4, 5 |
| Students will be required to determine whether an answer is reasonable based on estimation and/or rounding. | | 1, 2, 4 |
| Students will be required to construct an equation that models a multi-step word problem. | | 1, 2, 4 |

| | | | |
|---|---|---|---|
| **Content Standards** | AzCCRS.Math.Content.3.OA.D.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. | | |
| **Explanations** | Students need ample opportunities to observe and identify important numerical patterns related to operations. They should build on their previous experiences with properties related to addition and subtraction. Students investigate addition and multiplication tables in search of patterns and explain why these patterns make sense mathematically.<br>Students also investigate a hundreds chart in search of addition and subtraction patterns. They record and organize all the different possible sums of a number and explain why the pattern makes sense. | | |
| **Content Limits** | Adding and subtracting whole numbers within 1,000.<br>Multiplying and dividing whole numbers within 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 not allowed. | **Math Practices** | 1, 2, 3, 6, 7 |

| **Sample Task Demands** | **Common Item Formats** | **Recommended Math Practices** |
|---|---|---|
| Students will be required to identify numbers in a well-known pattern, such as an addition or multiplication table. | • Equation Response<br>• Graphic Response<br>• Multiple Choice Response<br>• Multi-Select Response<br>• Proposition Response<br>• Table Response | 1, 2, 6, 7 |
| Students will be required to identify unknown numbers in a pattern. | | 1, 2, 3, 6, 7 |
| Students will be required to identify the pattern in a sequence of numbers. | | 1, 2, 3, 6, 7 |
| Students will be required to determine characteristics or trends across numerical situations such as sum, doubles, and/or multiples. | | 1, 2, 3, 6, 7 |