



Math Item Specifications

GRADE 7

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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.

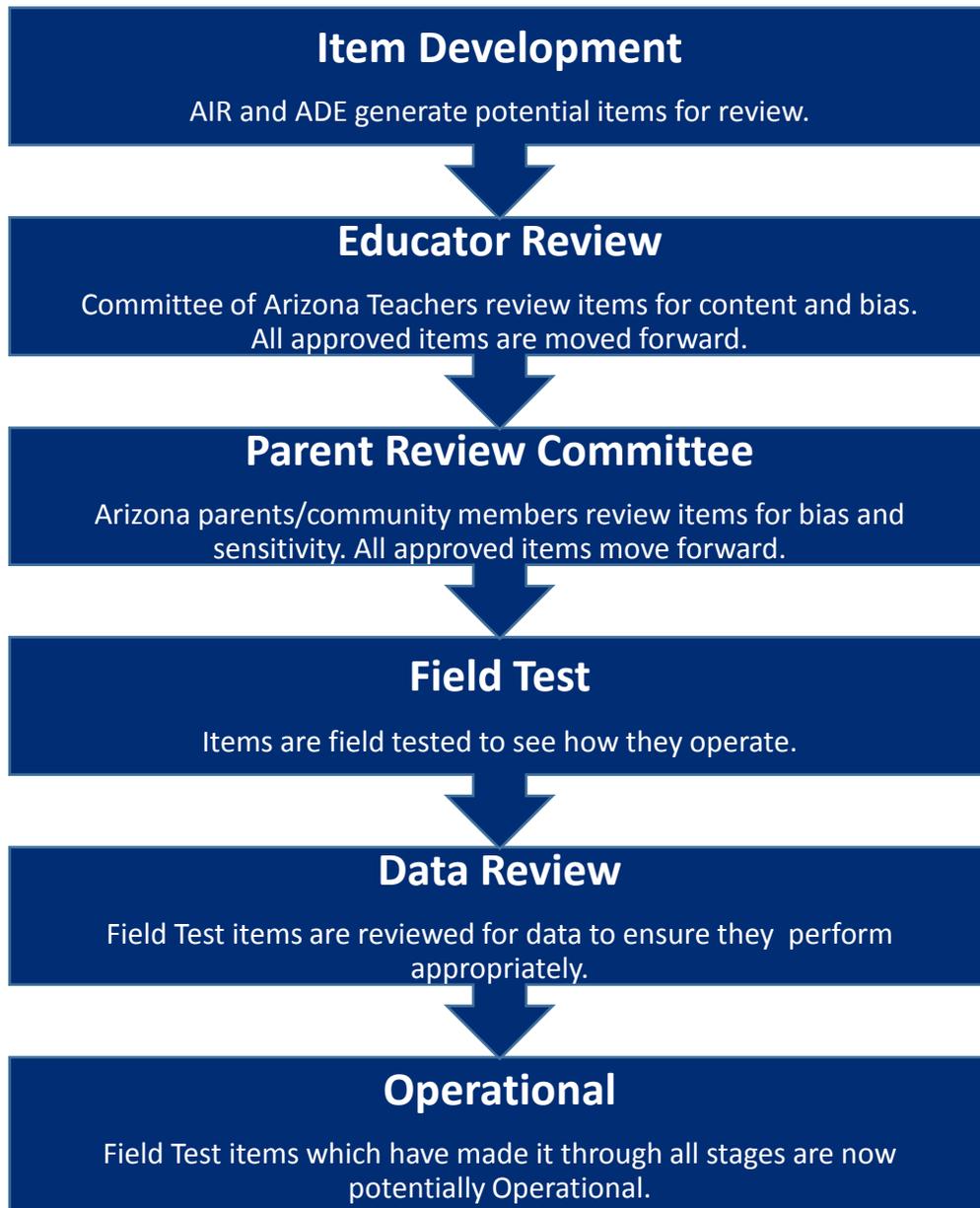
During the item-development process, all AzMERIT items are written in accordance with the Item Specifications and are reviewed and approved by a committee of Arizona educators to confirm alignment and appropriateness for inclusion in the test. AzMERIT items are generally representative of Arizona’s geographic 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	<p>Make sense of problems and persevere in solving them.</p> <p>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.</p>

Math Practice (MP)	Description
<p style="text-align: center;">Math Practice 2</p>	<p>Reason abstractly and quantitatively.</p> <p>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.</p>
<p style="text-align: center;">Math Practice 3</p>	<p>Construct viable arguments and critique the reasoning of others.</p> <p>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.</p>

Math Practice (MP)	Description
<p style="text-align: center;">Math Practice 4</p>	<p>Model with mathematics.</p> <p>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.</p>
<p style="text-align: center;">Math Practice 5</p>	<p>Use appropriate tools strategically.</p> <p>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.</p>

Math Practice (MP)	Description
<p style="text-align: center;">Math Practice 6</p>	<p>Attend to precision.</p> <p>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.</p>
<p style="text-align: center;">Math Practice 7</p>	<p>Look for and make use of structure.</p> <p>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.</p>
<p style="text-align: center;">Math Practice 8</p>	<p>Look for and express regularity in repeated reasoning.</p> <p>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.</p>

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 7		
Domain	Minimum	Maximum
Expressions and Equations	23%	27%
Geometry	12%	16%
The Number System	19%	23%
Ratio and Proportional Relationships	19%	23%
Statistics & Probability	15%	19%

Approximately 70% of the assessment for Grade 7 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 7	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

Calculators are permitted for the first session only on both the paper-based or computer-based assessment for Math Grade 7.

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 7 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
<p>Equation Editor (EQ)</p>	<p>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.</p>
<p>Graphic Response Item Display (GRID)</p>	<p>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.</p>
<p>Hot Text (HT)</p>	<p>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.</p> <p>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.</p>
<p>Matching Item (MI)</p>	<p>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.</p>
<p>Multi-Select (MS)</p>	<p>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.</p>
<p>Open Response</p>	<p>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.</p>

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)

Expressions and Equations (EE)

7.EE.A – Use properties of operations to generate equivalent expressions.

7.EE.B – Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Geometry (G)

7.G.A – Draw, construct, and describe geometrical figures and describe the relationships between them.

7.G.B – Solve real-life and mathematical problems involving angle measure, area, surface area and volume.

The Number System (NS)

7.NS.A – Apply and extend previous understandings of operations with fractions.

Ratios and Proportional Relationships (RP)

7.RP.A – Analyze proportional relationships and use them to solve real-world and mathematical problems.

Statistics and Probability (SP)

7.SP.A – Use random sampling to draw inferences about a population.

7.SP.B – Draw informal comparative inferences about two populations.

7.SP.C – Investigate chance processes and develop, use, and evaluate probability models.

Grade 7 Math Item Specifications

Expressions and Equations

Content Standards	AzCCRS.Math.Content.7.EE.A.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.		
Explanations	None		
Content Limits	Using negative numbers and multiple operations should be emphasized to distinguish from 6.EE.3 Linear expressions Do not use the word “simplify” in items - wording for items using the EQ response mechanism must be precise in order to elicit a correct form of the expression (i.e. use “by combining all like terms” so that the given expression is not a correct answer)		
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, 6, 7
Sample Task Demands	Common Item Formats	Recommended Math Practices	
Students will be required to perform operations to construct equivalent expressions.	<ul style="list-style-type: none"> Equation Response Multiple Choice Response Multi-Select Response 	2, 6, 7	

Content Standards	AzCCRS.Math.Content.7.EE.A.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.		
Explanations	None		
Content Limits	Rational numbers Linear expressions with an unknown		
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	2, 6, 7, 8
Sample Task Demands		Common Item Formats	Recommended Math Practices
Students will be required to given an expression within a context, identify an equivalent expression that shows a feature of that context.		<ul style="list-style-type: none"> • Equation Response • Multiple Choice Response • Multi-Select Response • Proposition Response 	2, 7, 8
Students will be required to given a context and an expression with different values than given in the context, interpret part of the expression that is not found in the context.			2, 6, 7, 8

Content Standards	AzCCRS.Math.Content.7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.		
Explanations	Estimation strategies for calculations with fractions and decimals extend from students' work with whole number operations.		
Content Limits	Rational numbers No variables Items involving estimation to assess reasonableness should not allow the student to respond with the exact answer.		
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, 5, 6, 7, 8
Sample Task Demands	Common Item Formats	Recommended Math Practices	
Students will be required to solve a problem where only the information needed is given.	<ul style="list-style-type: none"> Equation Response Multiple Choice Response 	1, 2, 5, 6, 7, 8	
Students will be required to choose which value is reasonable based on estimation.		1, 2, 3, 7, 8	
Students will be required to solve a problem where extra information not needed to find the solution is given.		1, 2, 3, 4, 5, 6, 7, 8	

Content Standards	<p>AzCCRS.Math.Content.7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.</p> <p>AzCCRS.Math.Content.7.EE.B.4a Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.</p> <p>AzCCRS.Math.Content.7.EE.B.4b Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.</p>		
Explanations	None		
Content Limits	Rational numbers		
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, 5, 6, 7, 8
Sample Task Demands		Common Item Formats	Recommended Math Practices
Students will be required to solve an equation or inequality for an unknown value, without context. (a, b)		<ul style="list-style-type: none"> • Equation Response • Graphic Response • Multiple Choice Response • Multi-Select Response 	1, 2, 4, 5, 6, 7, 8
Students will be required to create an equation or inequality that models the situation, and then find the solution. (a, b)			1, 2, 4, 5, 6, 7, 8
Students will be required to construct an algebraic equation or inequality that models a word problem. (a, b)			1, 2, 4, 5, 7, 8
Students will be required to graph the solution set of an inequality. (b)			1, 2, 4, 5, 7, 8
Students will be required to interpret the solution set of an inequality in the context of the problem. (b)			1, 2, 3, 4, 5, 6, 7, 8

Geometry & Statistics and Probability

Content Standards	AzCCRS.Math.Content.7.G.A.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.		
Explanations	None		
Content Limits	Two-dimensional polygons Keep any conversions within one system (e.g., inches to feet is okay but inches to meters is not okay).		
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, 5, 6, 7, 8
Sample Task Demands	Common Item Formats	Recommended Math Practices	
Students will be required to find the length of a side or measure of area/perimeter given a shape and a scale factor.	<ul style="list-style-type: none"> • Equation Response • Graphic Response 	1, 2, 4, 5, 6, 7, 8	
Students will be required to find the scale factor given two figures where one is a scale drawing of the other.		1, 2, 4, 5, 6, 7, 8	
Students will be required to draw a scale model given a shape and a scale factor.		1, 2, 4, 5, 6, 7, 8	
Students will be required to determine a scale factor and create a scale model based on given parameters.		1, 2, 3, 4, 5, 6, 7, 8	

Content Standards	AzCCRS.Math.Content.7.G.A.2 Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.		
Explanations	Conditions may involve points, line segments, angles, parallelism, congruence, angles, and perpendicularity.		
Content Limits	<p>Limit to two-dimensional polygons</p> <p>Include questions about the sum of two side lengths of a triangle is greater than the third side length.</p> <p>Given conditions should not focus on similarity or congruence or that sum of angles in a triangle is 180 degrees.</p> <p>Be aware of the scoring capabilities for the graphic response tool when designing these items.</p> <p>To distinguish from previous grades, conditions should include factors outside of parallel/perpendicular lines and angle measure, such as symmetry and side length.</p>		
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	4, 5, 6, 7, 8
Sample Task Demands		Common Item Formats	Recommended Math Practices
Students will be required to draw a figure based on given conditions.		<ul style="list-style-type: none"> • Equation Response • Graphic Response • Multiple Choice Response • Multi-Select Response 	4, 5, 7, 8
Students will be required to select appropriate side lengths that will determine a triangle.			4, 5, 6, 7, 8

Content Standards	AzCCRS.Math.Content.7.G.A.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.		
Explanations	None		
Content Limits	Limited to right prisms and pyramids up to ones with a hexagonal base. Spheres, cones and cylinders are allowed. Diagonals are limited to slices which will result in shapes that have been described in previous grade level 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	2, 4, 5, 7
Sample Task Demands	Common Item Formats	Recommended Math Practices	
Students will be required to match a two-dimensional cross section with its (possible) 3-D figure(s).	<ul style="list-style-type: none"> • Graphic Response • Multiple Choice Response • Matching Item Response • Multi-Select Response 	2, 4, 5, 7	
Students will be required to draw a two-dimensional figure that represents the cross section of a 3-D figure.		2, 4, 5, 7	

Content Standards	AzCCRS.Math.Content.7.G.B.4 Know the formulas for the area and circumference of a circle and solve problems; give an informal derivation of the relationship between the circumference and area of a circle.		
Explanations	None		
Content Limits	Circles and semi-circles.		
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, 5, 6, 7, 8
Sample Task Demands		Common Item Formats	Recommended Math Practices
Students will be required to find the area of a circle given diameter or radius.		<ul style="list-style-type: none"> Equation Response 	1, 2, 5, 6, 7
Students will be required to find the radius or diameter of a circle given the circumference.			1, 2, 5, 6, 7
Students will be required to find circumference given the radius or diameter.			1, 2, 5, 6, 7
Students will be required to find the area of shapes created by the intersection of circles and other shapes.			1, 2, 4, 5, 6, 7, 8
Students will be required to find the area given the circumference.			1, 2, 3, 4, 5, 6, 7, 8

Content Standards	AzCCRS.Math.Content.7.G.B.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.		
Explanations	Angle relationships that can be explored include but are not limited to: same-side (consecutive) interior and same-side (consecutive) exterior angles are supplementary.		
Content Limits	Angle measurements are shown only in degrees and should not be greater than 180. Students should not be required to know the sum of the interior angles of any polygon.		
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	3, 4, 5, 6, 7
Sample Task Demands		Common Item Formats	Recommended Math Practices
Students will be required to find the unknown measure of a supplementary, complementary, vertical, or adjacent angle.		<ul style="list-style-type: none"> Equation Response 	3, 4, 5, 6, 7
Students will be required to create an expression that can be used to find an unknown angle measurement.			3, 4, 5, 6, 7

Content Standards	AzCCRS.Math.Content.7.G.B.6 Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.		
Explanations	Students understanding of volume can be supported by focusing on the area of base times the height to calculate volume. Students understanding of surface area can be supported by focusing on the sum of the area of the faces. Nets can be used to evaluate surface area calculations.		
Content Limits	3D shapes include right prisms and pyramids. If the base of the right prism has more than four sides, then the area of the base should be given.		
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, 5, 6
Sample Task Demands	Common Item Formats	Recommended Math Practices	
Students will be required to find the volume or surface area of an object.	<ul style="list-style-type: none"> Equation Response Table Response 	1, 2, 5, 6	
Students will be required to find dimensions when the area, surface area, or volume is given.		1, 2, 5, 6	
Students will be required to find the volume of a cube given the surface area. (Area of each face is limited to 100 square units)		1, 2, 5, 6	
Students will be required to find the volume of an object composed of two objects.		1, 2, 3, 4, 5, 6	

Content Standards	AzCCRS.Math.Content.7.SP.A.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.		
Explanations	None		
Content Limits	None		
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	3, 6
Sample Task Demands		Common Item Formats	Recommended Math Practices
Students will be required to identify a valid sample (random, representative, and proportional to population)		<ul style="list-style-type: none"> • EBSR Response • Multiple Choice Response • Multi-Select Response 	3, 6
Students will be required to justify a chosen sampling method.			3, 6

Content Standards	AzCCRS.Math.Content.7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.		
Explanations	None		
Content Limits	Rational numbers Given dot plots should have an approximately normal distribution		
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, 6, 7
Sample Task Demands		Common Item Formats	Recommended Math Practices
Students will be required to draw inferences about a population based on a set of random samples.		<ul style="list-style-type: none"> • Equation Response • Graphic Response • Multiple Choice Response 	1, 2, 3, 4, 5, 7
Students will be required to explore the variation among a set of random samples.			1, 2, 3, 4, 5, 6, 7

Content Standards	<p>AzCCRS.Math.Content.7.SP.B.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.</p> <p>AzCCRS.Math.Content.7.SP.B.4 Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.</p>		
Explanations	<p>Researching data sets provides opportunities to connect mathematics to their interests and other academic subjects. Students can utilize statistic functions in graphing calculators or spreadsheets for calculations with larger data sets or to check their computations. Students calculate mean absolute deviations in preparation for later work with standard deviations.</p> <p>Measures of center include mean, median, and mode. The measures of variability include range, mean absolute deviation, and interquartile range.</p>		
Content Limits	Data displays should be dot plots or box plots with approximately normal distributions		
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, 5, 6, 7
Sample Task Demands	Common Item Formats	Recommended Math Practices	
Students will be required to given sets of data displays that represent data distributions, select the set that shows the most visual overlap. (3)	<ul style="list-style-type: none"> • Equation Response • Graphic Response • Multiple Choice Response • Multi-Select Response 	1, 2, 3, 4, 5, 7	
Students will be required to given two data displays with different centers but the same variability, compute the difference in centers in terms of the mean absolute deviation and informally assess the degree of overlap. (3)		1, 2, 3, 4, 5, 6, 7	
Students will be required to evaluate data displays or measures regarding evidence (center and variation, based on overlap of the data) that the data for one population is greater than another. (4)		1, 2, 3, 4, 5, 6, 7	

Content Standards	AzCCRS.Math.Content.7.SP.C.5 Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.		
Explanations	Probability can be expressed in terms such as impossible, unlikely, likely, or certain or as a number between 0 and 1 as illustrated on the number line.		
Content Limits	Rational numbers Probabilities should not be given as percentages		
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	4, 5, 6, 7
Sample Task Demands		Common Item Formats	Recommended Math Practices
Students will be required to identify the likelihood of a chance event occurring.		<ul style="list-style-type: none"> • Equation Response • Multiple Choice Response • Matching Item Response • Multi-Select Response 	4, 5, 7
Students will be required to given a likelihood of an event occurring, identify a possible probability.			5, 6, 7
Students will be required to compare probabilities as being more or less likely.			4, 5, 6, 7

Content Standards	AzCCRS.Math.Content.7.SP.C.6 Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.		
Explanations	Students can perform experiments multiple times, pool data with other groups, or increase the number of trials in a simulation to look at the long-run relative frequencies.		
Content Limits	Probabilities should not be given as percentages All numbers are whole, other than probabilities For TD1, the student should only be required to find one probability		
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
Sample Task Demands	Common Item Formats	Recommended Math Practices	
Students will be required to approximate/estimate the probability of a chance event by observing collected data (empirical/experimental probability).	<ul style="list-style-type: none"> Equation Response 	1, 2, 3, 4, 5	
Students will be required to predict the approximate relative frequency given the theoretical probability.		1, 2, 3, 4, 5	

Content Standards	<p>AzCCRS.Math.Content.7.SP.C.7 Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.</p> <p>AzCCRS.Math.Content.7.SP.C.7a Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.</p> <p>AzCCRS.Math.Content.7.SP.C.7b Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.</p>		
Explanations	<p>Students need multiple opportunities to perform probability experiments and compare these results to theoretical probabilities. Critical components of the experiment process are making predictions about the outcomes by applying the principles of theoretical probability, comparing the predictions to the outcomes of the experiments, and replicating the experiment to compare results. Experiments can be replicated by the same group or by compiling class data.</p>		
Content Limits	Rational numbers		
Common Item Formats	<p>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.</p>		
Context	Context is required.	Math Practices	1, 2, 3, 4, 5, 6, 7, 8
Sample Task Demands		Common Item Formats	Recommended Math Practices
<p>Students will be required to, given a probability model, find the probability of a combination of events contained in the model. (a, b)</p>		<ul style="list-style-type: none"> • Equation Response • Table Response 	1, 2, 4, 5, 6, 7, 8
<p>Students will be required to, given a situation that is clearly uniform (a), or given data (b), create a probability model.</p>			1, 2, 4, 5, 6, 7, 8
<p>Students will be required to, given a situation that is clearly uniform (a), or given data (b), create a probability model and find the probability of a combination of events contained in the model.</p>			1, 2, 3, 4, 5, 6, 7, 8

Content Standards	<p>AzCCRS.Math.Content.7.SP.C.8 Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.</p> <p>AzCCRS.Math.Content.7.SP.C.8a Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.</p> <p>AzCCRS.Math.Content.7.SP.C.8b Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.</p> <p>AzCCRS.Math.Content.7.SP.C.8c Design and use a simulation to generate frequencies for compound events.</p>		
Explanations	None		
Content Limits	Rational numbers		
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, 7, 8
Sample Task Demands		Common Item Formats	Recommended Math Practices
Students will be required to model sample spaces for compound events.		<ul style="list-style-type: none"> • Equation Response • Graphic Response • Multiple Choice Response • Multi-Select Response 	1, 2, 4, 5, 7, 8
Students will be required to identify the outcomes in a sample space which represent a compound event.			1, 2, 4, 5, 7, 8
Students will be required to determine the probability of a compound event.			1, 2, 4, 5, 7, 8

The Number System

Content Standards	<p>AzCCRS.Math.Content.7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.</p> <p>AzCCRS.Math.Content.7.NS.A.1a Describe situations in which opposite quantities combine to make 0.</p> <p>AzCCRS.Math.Content.7.NS.A.1b Understand $p + q$ as the number located a distance q from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.</p> <p>AzCCRS.Math.Content.7.NS.A.1c Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.</p> <p>AzCCRS.Math.Content.7.NS.A.1d Apply properties of operations as strategies to add and subtract rational numbers.</p>		
Explanations	Visual representations may be helpful as students begin this work; they become less necessary as students become more fluent with the operations.		
Content Limits	Rational numbers: use integers, fractions, and decimals Limit decimals to the hundredths place Limit fractions to halves, fourths, and eighths.		
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
Sample Task Demands		Common Item Formats	Recommended Math Practices
Students will be required to calculate the sum of a number and its opposite. (b)		<ul style="list-style-type: none"> • Equation Response • Graphic Response • Multiple Choice Response • Multi-Select Response 	2, 7
Students will be required to calculate the distance between two points on a number line. (b or c)			2, 4, 7
Students will be required to identify the location of a point that is a specified distance from another point on a number line. (b or c)			2, 4, 7
Students will be required to find the sum or difference of two rational numbers. (d)			2, 7

<p>Students will be required to model each step of a multi-part addition/subtraction expression on number lines, and identify the value of the expression. (b or c)</p>		<p>2, 4, 7</p>
<p>Students will be required to identify properties of values given a number line or calculation, using variables rather than actual numbers. (b or c)</p>		<p>2, 4, 7</p>

Content Standards	<p>AzCCRS.Math.Content.7.NS.A.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.</p> <p>AzCCRS.Math.Content.7.NS.A.2a Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.</p> <p>AzCCRS.Math.Content.7.NS.A.2b Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.</p> <p>AzCCRS.Math.Content.7.NS.A.2c Apply properties of operations as strategies to multiply and divide rational numbers.</p> <p>AzCCRS.Math.Content.7.NS.A.2d Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.</p>		
	Explanations	Multiplication and division of integers is an extension of multiplication and division of whole numbers.	
	Content Limits	Rational numbers 7.NS.2a and 2b require the incorporation of a negative value	
	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
Sample Task Demands		Common Item Formats	Recommended Math Practices
Students will be required to convert a rational number to a decimal.		<ul style="list-style-type: none"> • Equation Response • Graphic Response • Multiple Choice Response • Multi-Select Response 	2, 7
Students will be required to determine a product or quotient given an expression or real-world situation.			2, 4, 7
Students will be required to identify properties of values given a number line or calculation, using variables rather than actual numbers.			2, 4, 7

Content Standards	AzCCRS.Math.Content.7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.		
Explanations	None		
Content Limits	Rational numbers Complex fractions can be used, but should contain fractions with single-digit numerators and denominators		
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, 5, 6, 7, 8
Sample Task Demands	Common Item Formats	Recommended Math Practices	
Students will be required to solve simple problems involving rational numbers given a scenario.	<ul style="list-style-type: none"> Equation Response Table Response 	1, 2, 5, 6, 7, 8	
Students will be required to solve complex problems involving rational numbers given a scenario.		1, 2, 5, 6, 7, 8	

Ratio and Proportional Relationships

Content Standards	AzCCRS.Math.Content.7.RP.A.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.		
Explanations	None		
Content Limits	<p>Rational numbers - some items may include one rational number and one whole number (other than 1), but the bulk of items from this standard should involve ratios expressed as fractions, including complex fractions</p> <p>Ratios can be expressed as fractions, with “:”, or with words</p> <p>Units can be the same or different across the two quantities</p>		
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, 6
Sample Task Demands	Common Item Formats	Recommended Math Practices	
Students will be required to find a unit rate for a given ratio from information within a situational context, table or mathematical problem.	<ul style="list-style-type: none"> • Equation Response • Graphic Response • Multiple Choice Response • Multi-Select Response • Table Response 	2, 6	

Content Standards	<p>AzCCRS.Math.Content.7.RP.A.2 Recognize and represent proportional relationships between quantities.</p> <p>AzCCRS.Math.Content.7.RP.A.2a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.</p> <p>AzCCRS.Math.Content.7.RP.A.2b Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.</p> <p>AzCCRS.Math.Content.7.RP.A.2c Represent proportional relationships by equations.</p> <p>AzCCRS.Math.Content.7.RP.A.2d Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.</p>		
	Explanations	Graphing proportional relationships represented in a table helps students recognize that the graph is a line through the origin $(0,0)$ with a constant of proportionality equal to the slope of the line.	
	Content Limits	<p>Rational numbers</p> <p>Ratios can be expressed as fractions, with “:”, or with words</p> <p>Units can be the same or different across the two quantities</p> <p>Items should not require creating a graph of a proportional relationship (this is 8.EE.5), only interpreting given graphs</p>	
	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, 5, 6, 7, 8
Sample Task Demands		Common Item Formats	Recommended Math Practices
Students will be required to recognize a proportional relationship within a representation (description, graph, table, etc). (a)		<ul style="list-style-type: none"> • Equation Response • Multiple Choice Response • Multi-Select Response • Simulator Response 	1, 2, 4, 5, 7, 8
Students will be required to identify the unit rate in a proportional relationship, given a description, graph with $(1, r)$ plotted, equation, or table of equivalent ratios. (b)			1, 2, 4, 5, 7, 8
Students will be required to identify equivalent proportional relationship across representations. (c or d)			1, 2, 4, 5, 7, 8
Students will be required to solve real-world problems involving a proportional relationship, given an equation or graph. (c or d)			1, 2, 4, 5, 6, 7, 8

<p>Students will be required to create an equation to represent a proportional relationship; in some cases, also apply the equation to the situation. (c)</p>		<p>1, 2, 3, 4, 5, 6, 7, 8</p>
<p>Students will be required to explain the points (0,0) and (1,r) and their significance in a graph of a proportional relationship, where r is the unit rate. (d)</p>		<p>1, 2, 3, 4, 5, 6, 7, 8</p>

Content Standards	AzCCRS.Math.Content.7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems.		
Explanations	Students should be able to explain or show their work using a representation (numbers, words, pictures, physical objects, or equations) and verify that their answer is reasonable. Models help students to identify the parts of the problem and how the values are related. For percent increase and decrease, students identify the starting value, determine the difference, and compare the difference in the two values to the starting value.		
Content Limits	Limit to rational numbers Units can be the same or different across the two quantities		
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, 5, 6, 7, 8
Sample Task Demands	Common Item Formats	Recommended Math Practices	
Students will be required to calculate the solution for percent and ratio problems.	<ul style="list-style-type: none"> Equation Response Graphic Response Multiple Choice Response 	1, 2, 5, 6, 7, 8	
Students will be required to create an expression that can be used to find a specified percent or percentage increase/decrease of a given whole.		1, 2, 4, 5, 6, 7, 8	
Students will be required to use percent increase or decrease to find two quantities given their relationship in a real world context.		1, 2, 3, 4, 5, 6, 7, 8	
Students will be required to interpret a proportional pattern from percent increase/decrease problems as a graph or as an equation.		1, 2, 3, 4, 5, 6, 7, 8	