

Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
Strand 1: Number Sense and Operations	
Concept 1: Number Sense	
Understand and apply numbers, ways of representing numbers, the relationships among numbers and different number systems.	
PO 1. Classify real numbers as members of one or more subsets: natural, whole, integers, rational, or irrational numbers.	
PO 2. Identify properties of the real number system: commutative, associative, distributive, identity, inverse, and closure.	
PO 3. Distinguish between finite and infinite sets of numbers.	
Concept 2: Numerical Operations	
Understand and apply numerical operations and their relationship to one another.	
PO 1. Select the grade-level appropriate operation to solve word problems.	
PO 2. Solve word problems using grade-level appropriate operations and numbers.	
PO 3. Simplify numerical expressions including signed numbers and absolute values.	SE: pp. 36–39
PO 4. Apply subscripts to represent ordinal position.	
PO 5. Use grade level-appropriate mathematical terminology.	
PO 6. Compute using scientific notation.	
PO 7. Simplify numerical expressions using the order of operations.	SE: pp. 4–7
Concept 3: Estimation	
Use estimation strategies reasonably and fluently.	
PO 1. Solve grade-level appropriate problems using estimation.	
PO 2. Determine if a solution to a problem is reasonable.	

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
PO 3. Determine rational approximations of irrational numbers.	
Strand 2: Data Analysis, Probability, and Discrete Mathematics	
Concept 1: Data Analysis (Statistics)	
Understand and apply data collection, organization, and representation to analyze and sort data.	
PO 1. Formulate questions to collect data in contextual situations.	
PO 2. Organize collected data into an appropriate graphical representation.	
PO 3. Display data as lists, tables, matrices, and plots.	
PO 4. Construct equivalent displays of the same data.	
PO 5. Identify graphic misrepresentations and distortions of sets of data.	
PO 6. Identify which of the measures of central tendency is most appropriate in a given situation.	
PO 7. Make reasonable predictions based upon linear patterns in data sets or scatter plots.	SE: pp. 48–51
PO 8. Make reasonable predictions for a set of data, based on patterns.	
PO 9. Draw inferences from charts, tables, graphs, plots, or data sets.	
PO 10. Apply the concepts of mean, median, mode, range, and quartiles to summarize data sets.	
PO 11. Evaluate the reasonableness of conclusions drawn from data analysis.	
PO 12. Recognize and explain the impact of interpreting data (making inferences or drawing conclusions) from a biased sample.	
PO 13. Draw a line of best fit for a scatter plot.	SE: pp. 48–51

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PO 14. Determine whether displayed data has positive, negative, or no correlation.	SE: pp. 48–51
PO 15. Identify a normal distribution.	
PO 16. Identify differences between sampling and census.	
PO 17. Identify differences between biased and unbiased samples.	
Concept 2: Probability Understand and apply the basic concepts of probability.	
PO 1. Find the probability that a specific event will occur, with or without replacement.	
PO 2. Determine simple probabilities related to geometric figures.	
PO 3. Predict the outcome of a grade-level appropriate probability experiment.	
PO 4. Record the data from performing a grade-level appropriate probability experiment.	
PO 5. Compare the outcome of an experiment to predictions made prior to performing the experiment.	
PO 6. Distinguish between independent and dependent events.	
PO 7. Compare the results of two repetitions of the same grade-level appropriate probability experiment.	
Concept 3: Discrete Mathematics – Systematic Listing and Counting Understand and demonstrate the systematic listing and counting of possible outcomes.	
PO 1. Determine the number of possible outcomes for a contextual event using a chart, a tree diagram, or the counting principle.	
PO 2. Determine when to use combinations versus permutations in counting objects.	
PO 3. Use combinations or permutations to solve contextual problems.	

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Concept 4: Vertex-Edge Graphs	
Understand and apply vertex-edge graphs.	
(Grades K–8)	
Strand 3: Patterns, Algebra, and Functions	
Concept 1: Patterns	
Identify patterns and apply pattern recognition to reason mathematically.	
PO 1. Communicate a grade-level appropriate iterative or recursive pattern, using symbols or numbers.	
PO 2. Find the n^{th} term of an iterative or recursive pattern.	
PO 3. Evaluate problems using basic recursion formulas.	
Concept 2: Functions and Relationships	
Describe and model functions and their relationships.	
PO 1. Determine if a relationship is a function, given a graph, table, or set of ordered pairs.	SE: pp. 44–47
PO 2. Describe a contextual situation that is depicted by a given graph.	
PO 3. Identify a graph that models a given real-world situation.	
PO 4. Sketch a graph that models a given contextual situation.	SE: pp. 16–19
PO 5. Determine domain and range for a function.	SE: pp. 44–47
PO 6. Determine the solution to a contextual maximum/minimum problem, given the graphical representation.	SE: pp. 64–67
PO 7. Express the relationship between two variables using tables/matrices, equations, or graphs.	SE: pp. 64–67, 72–75, 76–79
PO 8. Interpret the relationship between data suggested by tables/matrices, equations, or graphs.	SE: pp. 64–67, 72–75, 76–79

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PO 9. Determine from two linear equations whether the lines are parallel, perpendicular, coincident, or intersecting but not perpendicular.	
Concept 3: Algebraic Representations Represent and analyze mathematical situations and structures using algebraic representations.	
PO 1. Evaluate algebraic expressions, including absolute value and square roots.	SE: pp. 12–15, 36–39
PO 2. Simplify algebraic expressions.	
PO 3. Multiply and divide monomial expressions with integral exponents.	SE: pp. 12–15
PO 4. Translate a written expression or sentence into a mathematical expression or sentence.	SE: pp. 4–7, 72–75
PO 5. Translate a sentence written in context into an algebraic equation involving multiple operations.	SE: pp. 8–11, 12–15, 20–23, 36–39, 40–43, 52–55, 56–59, 76–79
PO 6. Write a linear equation for a table of values.	
PO 7. Write a linear algebraic sentence that represents a data set that models a contextual situation.	
PO 8. Solve linear (first degree) equations in one variable (may include absolute value).	
PO 9. Solve linear inequalities in one variable.	SE: pp. 16–19
PO 10. Write an equation of the line given: two points on the line, the slope and a point on the line, or the graph of the line.	SE: pp. 28–31, 32–35
PO 11. Solve an algebraic proportion.	SE: pp. 72–75, 76–79
PO 12. Solve systems of linear equations in two variables (integral coefficients and rational solutions).	SE: pp. 52–55, 56–59
PO 13. Add, subtract, and perform scalar multiplication with matrices.	

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PO 14. Calculate powers and roots of real numbers, both rational and irrational, using technology when appropriate.	SE: pp. 60–63, 64–67, 68–71
PO 15. Simplify square roots and cube roots with monomial radicands (including those with variables) that are perfect squares or perfect cubes.	SE: pp. 60–63, 64–67, 68–71
PO 16. Solve square root radical equations involving only one radical.	SE: pp. 68–71
PO 17. Solve quadratic equations.	SE: pp. 60–63
PO 18. Identify the sine, cosine, and tangent ratios of the acute angles of a right triangle.	
Concept 4: Analysis of Change Analyze change in a variable over time and in various contexts.	
PO 1. Determine slope, x-, and y-intercepts of a linear equation.	SE: pp. 24–27, 28–31, 32–35
PO 2. Solve formulas for specified variables.	SE: pp. 12–15, 60–63
Strand 4: Geometry and Measurement	
Concept 1: Geometric Properties Analyze the attributes and properties of 2- and 3-dimensional shapes and develop mathematical arguments about their relationships.	
PO 1. Identify the attributes of special triangles (isosceles, equilateral, right).	
PO 2. Identify the hierarchy of quadrilaterals.	
PO 3. Make a net to represent a 3-dimensional object.	
PO 4. Make a 3-dimensional model from a net.	
PO 5. Draw 2-dimensional and 3-dimensional figures with appropriate labels.	
PO 6. Solve problems related to complementary, supplementary, or congruent angle concepts.	

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PO 7. Solve problems by applying the relationship between circles, angles, and intercepted arcs.	
PO 8. Solve problems by applying the relationship between radii, diameters, chords, tangents, or secants.	
PO 9. Solve problems using the triangle inequality property.	
PO 10. Solve problems using special case right triangles.	
PO 11. Determine when triangles are congruent by applying SSS, ASA, AAS, or SAS.	
PO 12. Determine when triangles are similar by applying SAS, SSS, or AA similarity postulates.	
PO 13. Construct a triangle congruent to a given triangle.	
PO 14. Solve contextual situations using angle and side length relationships.	
Concept 2: Transformation of Shapes Apply spatial reasoning to create transformations and use symmetry to analyze mathematical situations.	
PO 1. Sketch the planar figure that is the result of two or more transformations.	
PO 2. Identify the properties of the planar figure that is the result of two or more transformations.	
PO 3. Determine the new coordinates of a point when a single transformation is performed on a planar geometric figure.	
PO 4. Determine whether a given pair of figures on a coordinate plane represents a translation, reflection, rotation, or dilation.	
PO 5. Classify transformations based on whether they produce congruent or similar figures.	
PO 6. Determine the effects of a single transformation on linear or area measurements of a planar geometric figure.	

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Concept 3: Coordinate Geometry	
Specify and describe spatial relationships using coordinate geometry and other representational systems.	
PO 1. Graph a quadratic equation with lead coefficient equal to one.	
PO 2. Graph a linear equation in two variables.	SE: pp. 20–23
PO 3. Graph a linear inequality in two variables.	SE: pp. 40–43
PO 4. Determine the solution to a system of equations in two variables from a given graph.	
PO 5. Determine the midpoint between two points in a coordinate system.	SE: pp. 68–71
PO 6. Determine changes in the graph of a linear function when constants and coefficients in its equation are varied.	
PO 7. Determine the distance between two points in the coordinate system.	SE: pp. 68–71
Concept 4: Measurement – Units of Measure, Geometric Objects	
Understand and apply appropriate units of measure, measurement techniques, and formulas to determine measurements.	
PO 1. Calculate the area of geometric shapes composed of two or more geometric figures.	
PO 2. Calculate the volumes of 3-dimensional geometric figures.	
PO 3. Calculate the surface areas of 3-dimensional geometric figures.	
PO 4. Compare perimeter, area, or volume of figures when dimensions are changed.	
PO 5. Find the length of a circular arc.	
PO 6. Find the area of a sector of a circle.	
PO 7. Solve for missing measures in a pyramid (i.e., slant height, height).	

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PO 8. Find the sum of the interior and exterior angles of a polygon.	
PO 9. Solve scale factor problems using ratios and proportions.	
PO 10. Solve applied problems using similar triangles.	
Strand 5: Structure and Logic	
Concept 1: Algorithms and Algorithmic Thinking	
Use reasoning to solve mathematical problems in contextual situations.	
PO 1. Determine whether a given procedure for simplifying an expression is valid.	
PO 2. Determine whether a given procedure for solving an equation is valid.	
PO 3. Determine whether a given procedure for solving a linear inequality is valid.	
PO 4. Select an algorithm that explains a particular mathematical process.	
PO 5. Determine the purpose of a simple mathematical algorithm.	
PO 6. Determine whether given simple mathematical algorithms are equivalent.	
Concept 2: Logic, Reasoning, Arguments, and Mathematical Proof	
Evaluate situations, select problem-solving strategies, draw logical conclusions, develop and describe solutions and recognize their applications.	
PO 1. Draw a simple valid conclusion from a given <i>if...then</i> statement and a minor premise.	
PO 2. List related <i>if... then</i> statements in logical order.	
PO 3. Write an appropriate conjecture given a certain set of circumstances.	
PO 4. Analyze assertions related to a contextual situation by using principles of logic.	
PO 5. Identify a valid conjecture using inductive reasoning.	

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PO 6. Distinguish valid arguments from invalid arguments.	
PO 7. Create inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.	
PO 8. Critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.	
PO 9. Identify a counterexample for a given conjecture.	
PO 10. Construct a counterexample to show that a given conjecture is false.	
PO 11. State the inverse, converse, or contrapositive of a given statement.	
PO 12. Determine if the inverse, converse, or contrapositive of a given statement is true or false.	
PO 13. Construct a simple formal or informal deductive proof.	
PO 14. Verify characteristics of a given geometric figure using coordinate formulas such as distance, mid-point, and slope to confirm parallelism, perpendicularity, and congruency.	

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Strand 1: Number Sense and Operations	
Concept 1: Number Sense	
Understand and apply numbers, ways of representing numbers, the relationships among numbers and different number systems.	
PO 1. Express fractions as ratios, comparing two whole numbers (e.g., $\frac{3}{4}$ is equivalent to 3:4 and 3 to 4).	
PO 2. Compare two proper fractions, improper fractions, or mixed numbers.	SE: pp. 40–43
PO 3. Order three or more proper fractions, improper fractions, or mixed numbers.	
PO 4. Determine the equivalency between and among fractions, decimals, and percents in contextual situations.	SE: pp. 60–63, 64–67, 68–71
PO 5. Identify the greatest common factor for two whole numbers.	
PO 6. Determine the least common multiple for two whole numbers.	
PO 7. Express a whole number as a product of its prime factors, using exponents when appropriate.	
Concept 2: Numerical Operations	
Understand and apply numerical operations and their relationships to one another.	
PO 1. Select the grade-level appropriate operation to solve word problems.	SE: pp. 4–7, 20–23, 24–27, 28–31, 32–35, 36–39
PO 2. Solve word problems using grade-level appropriate operations and numbers.	SE: pp. 4–7, 8–11, 24–27, 28–31, 32–35, 36–39
PO 3. Apply grade-level appropriate properties to assist in computation.	SE: pp. 24–27, 28–31, 32–35, 36–39
PO 4. Apply the symbols for “...” or “_____” to represent repeating decimals and “:” to represent ratios, superscripts as exponents.	SE: pp. 40–43

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PO 5. Use grade-level appropriate mathematical terminology.	
PO 6. Simplify fractions to lowest terms.	SE: pp. 40–43
PO 7. Add or subtract proper fractions and mixed numbers with unlike denominators with regrouping.	
PO 8. Demonstrate the process of multiplication of proper fractions using models.	
PO 9. Multiply proper fractions.	
PO 10. Multiply mixed numbers.	
PO 11. Demonstrate that division is the inverse of multiplication of proper fractions.	
PO 12. Divide proper fractions.	
PO 13. Divide mixed numbers.	
PO 14. Solve problems involving fractions or decimals (including money) in contextual situations.	SE: pp. 44–47, 48–51, 52–55, 56–59, 60–63, 64–67, 68–69
PO 15. Simplify numerical expressions using the order of operations with grade-appropriate operations on number sets.	SE: pp. 12–15, 16–19
Concept 3: Estimation Use estimation strategies reasonably and fluently.	
PO 1. Solve grade-level appropriate problems using estimation.	
PO 2. Use estimation to verify the reasonableness of a calculation (e.g., Is $5/9 \times 3/7$ more than 1?).	
PO 3. Round to estimate quantities in contextual situations (e.g., round up or round down).	
PO 4. Estimate and measure for the area and perimeter of polygons using a grid.	
PO 5. Verify the reasonableness of estimates made from calculator results within a contextual situation.	

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Strand 2: Data Analysis, Probability, and Discrete Mathematics	
Concept 1: Data Analysis (Statistics)	
Understand and apply data collection, organization, and representation to analyze and sort data.	
PO 1. Formulate questions to collect data in contextual situations.	
PO 2. Construct a histogram, line graph, scatter plot, or stem-and-leaf plot with appropriate labels and title from organized data.	
PO 3. Interpret simple displays of data including double bar graphs, tally charts, frequency tables, circle graphs, and line graphs.	
PO 4. Answer questions based on simple displays of data including double bar graphs, tally charts, frequency tables, circle graphs, and line graphs.	
PO 5. Find the mean, median (odd number of data points), mode, range, and extreme values of a given numerical data set.	
PO 6. Identify a trend (variable increasing, decreasing, remaining constant) from displayed data.	
PO 7. Compare trends in data related to the same investigation.	
PO 8. Solve contextual problems using bar graphs, tally charts, and frequency tables.	
Concept 2: Probability	
Understand and apply the basic concepts of probability.	
PO 1. Name the possible outcomes for a probability experiment.	
PO 2. Express probabilities of a single event as a decimal.	
PO 3. Predict the outcome of a grade-level appropriate probability experiment.	

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PO 4. Record the data from performing a grade-level appropriate probability experiment.	
PO 5. Compare the outcome of an experiment to predictions made prior to performing the experiment.	
PO 6. Make predictions from the results of student-generated experiments using objects (e.g., coins, spinners, number cubes, cards).	
PO 7. Compare the results of two repetitions of the same grade-level appropriate probability experiment.	
Concept 3: Discrete Mathematics – Systematic Listing and Counting Understand and demonstrate the systematic listing and counting of possible outcomes.	
PO 1. Determine all possible outcomes involving a combination of three sets of three items, using a systematic approach (e.g., 3 different shirts, 3 different pairs of pants, and 3 different belts).	
PO 2. Determine all possible arrangements given a set with four or fewer objects using a systematic list, table or tree diagram when order is not important.	
Concept 4: Vertex-Edge Graphs Understand and apply vertex-edge graphs.	
PO 1. Find the shortest route on a map from one site to another (vertex-edge graph).	
Strand 3: Patterns, Algebra, and Functions	
Concept 1: Patterns Identify patterns and apply pattern recognition to reason mathematically.	
PO 1. Communicate a grade-level appropriate recursive pattern, using symbols or numbers.	
PO 2. Extend a grade-level appropriate iterative pattern.	
PO 3. Solve grade-level appropriate iterative pattern problems.	SE: pp. 9, 11

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Concept 2: Functions and Relationships	
Describe and model functions and their relationships.	
PO 1. Describe the rule used in a simple grade-level appropriate function (e.g., T-chart, input/output model).	SE: pp. 72–75
Concept 3: Algebraic Representations	
Represent and analyze mathematical situations and structures using algebraic representations.	
PO 1. Evaluate expressions involving the four basic operations by substituting given fractions for the variable (e.g., $n+3$, when $n=$ _).	
PO 2. Use variables in contextual situations.	
PO 3. Translate a written phrase to an algebraic expression (e.g., The quotient of m and 5 is $\frac{m}{5}$ or $m \div 5$).	SE: pp. 48–51
PO 4. Translate a phrase written in context into an algebraic expression (e.g., Write an expression to describe the situation: John has x pieces of candy and buys three more. $x + 3$).	SE: pp. 16–19, 20–23, 24–27, 28–31, 32–35, 36–39, 48–51, 64–67, 68–71, 72–75
PO 5. Solve one-step equations with one variable represented by a letter or symbol, using inverse operations with whole numbers.	SE: pp. 16–19, 24–27, 28–31, 32–35, 36–39, 72–75
Concept 4: Analysis of Change	
Analyze change in a variable over time and in various contexts.	
PO 1. Identify values on a given line graph or scatter plot (e.g., Given a line showing wages earned per hour, what is the wage at five hours?).	SE: pp. 76–79

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Strand 4: Geometry and Measurement	
Concept 1: Geometric Properties	
Analyze the attributes and properties of 2- and 3-dimensional shapes and develop mathematical arguments about their relationships.	
PO 1. Classify polygons by their attributes (e.g., number of sides, length of sides, angles, parallelism, perpendicularity).	
PO 2. Draw a geometric figure showing specified properties, such as parallelism and perpendicularity.	
PO 3. Classify prisms, pyramids, cones, and cylinders by base shape and lateral surface shape.	
PO 4. Classify 3-dimensional figures by their attributes.	
PO 5. Compare attributes of 2-dimensional figures with 3-dimensional figures.	
PO 6. Draw triangles with appropriate labels.	
PO 7. Identify supplementary or complementary angles.	
PO 8. Identify the diameter, radius, and circumference of a circle or sphere.	
PO 9. Draw a 2-dimensional shape with a given number of lines of symmetry.	
Concept 2: Transformation of Shapes	
Apply spatial reasoning to create transformations and use symmetry to analyze mathematical situations.	
PO 1. Identify reflections and translations using pictures.	
PO 2. Perform elementary transformations to create a tessellation.	
Concept 3: Coordinate Geometry	
Specify and describe spatial relationships using coordinate geometry and other representational systems.	
PO 1. Graph a polygon in the first quadrant using ordered pairs.	

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PO 2. State the missing coordinate of a given figure in the first quadrant of a coordinate grid using geometric properties (e.g., Find the coordinates of the missing vertex of a rectangle when two adjacent sides are drawn.).	
Concept 4: Measurement – Units of Measure, Geometric Objects Understand and apply appropriate units of measure, measurement techniques, and formulas to determine measurements.	
PO 1. Determine the appropriate measure of accuracy within a system for a given contextual situation (e.g., Would you measure the length of your bedroom wall using inches or feet?).	
PO 2. Determine the appropriate tool needed to measure to the needed accuracy.	
PO 3. Determine a linear measurement to the appropriate degree of accuracy.	
PO 4. Measure angles using a protractor.	
PO 5. Convert within a single measurement system (U.S. customary or metric) (e.g., How many ounces are equivalent to 2 pounds?).	
PO 6. Solve problems involving the perimeter of polygons.	
PO 7. Determine the area of triangles.	
PO 8. Distinguish between perimeter and area in contextual situation.	
PO 9. Solve problems for the areas of parallelograms (includes rectangles).	
PO 10. Identify parallelograms having the same perimeter or area.	
PO 11. Determine the actual measure of objects using a scale drawing or map.	SE: pp. 56–59

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Strand 5: Structure and Logic	
Concept 1: Algorithms and Algorithmic Thinking	
Use reasoning to solve mathematical problems in contextual situations.	
PO 1. Discriminate necessary information from unnecessary information in a given grade-level appropriate word problem.	
PO 2. Analyze algorithms for computing with decimals.	
Concept 2: Logic, Reasoning, Arguments, and Mathematical Proof	
Evaluate situations, select problem-solving strategies, draw logical conclusions, develop and describe solutions and recognize their applications.	
PO 1. Solve a simple logic problem from given information (e.g., Which of three different people live in which of three different colored houses?).	

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Strand 1: Number Sense and Operations	
Concept 1: Number Sense	
Understand and apply numbers, ways of representing numbers, the relationships among numbers and different number systems.	
PO 1. Express fractions as terminating or repeating decimals.	
PO 2. Identify the greatest common factor for a set of whole numbers.	
PO 3. Determine the least common multiple for a set of whole numbers.	SE: pp. 40–43
PO 4. Choose the appropriate signed real number to represent a contextual situation.	
PO 5. Recognize the absolute value of a number used in contextual situations.	
PO 6. Locate integers on a number line.	
PO 7. Order integers.	
PO 8. Classify rational numbers as natural, whole, or integers.	
Concept 2: Numerical Operations	
Understand and apply numerical operations and their relationships to one another.	
PO 1. Add integers.	SE: pp. 20–23
PO 2. Subtract integers.	SE: pp. 20–23
PO 3. Select the grade-level appropriate operation to solve word problems.	SE: pp. 20–23, 24–27, 28–31, 44–47
PO 4. Solve word problems using grade-level appropriate operations and numbers.	SE: pp. 20–23, 24–27, 28–31, 40–43, 44–47
PO 5. Multiply integers.	SE: pp. 24–27

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PO 6. Divide integers.	SE: pp. 24–27
PO 7. Apply grade-level appropriate properties to assist in computation.	SE: pp. 20–23, 24–27, 28–31
PO 8. Apply the symbols + and – to represent positive and negative, and “ __ ” to represent absolute value.	
PO 9. Use grade-level appropriate mathematical terminology.	SE: pp. 32–35
PO 10. Calculate the percent of a given number.	SE: pp. 60–63, 64–67
PO 11. Convert numbers expressed in standard notation to scientific notation and vice versa (positive exponents only).	SE: pp. 4–7
PO 12. Simplify numerical expressions using the order of operations with grade- appropriate operations on number sets.	SE: pp. 8–11
Concept 3: Estimation Use estimation strategies reasonably and fluently.	
PO 1. Solve grade-level appropriate problems using estimation.	
PO 2. Use estimation to verify the reasonableness of a calculation (e.g., Is -2.5×18 about -50 ?).	
PO 3. Determine whether an estimation of an area is approximately equal to the actual measure.	
PO 4. Determine whether an estimation of an angle is approximately equal to the actual measure.	
PO 5. Determine whether an estimation of the circumference of a circle is approximately equal to the actual measure.	
PO 6. Verify the reasonableness of estimates made from calculator results within a contextual situation.	

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Strand 2: Data Analysis, Probability, and Discrete Mathematics	
Concept 1: Data Analysis (Statistics)	
Understand and apply data collection, organization, and representation to analyze and sort data.	
PO 1. Formulate questions to collect data in contextual situations.	
PO 2. Construct a circle graph with appropriate labels and title from organized data.	
PO 3. Determine when it is appropriate to use histograms, line graphs, double bar graphs, and stem-and-leaf plots.	
PO 4. Interpret data displays including histograms, stem-and-leaf plots, circle graphs, and double line graphs.	
PO 5. Answer questions based on data displays including histograms, stem-and-leaf plots, circle graphs, and double line graphs.	
PO 6. Find the mean, median, mode, and range of a given numerical data set.	
PO 7. Interpret trends from displayed data.	
PO 8. Compare trends in data related to the same investigation.	
PO 9. Solve contextual problems using histograms, line graphs of continuous data, double bar graphs, and stem-and-leaf plots.	
Concept 2: Probability	
Understand and apply the basic concepts of probability.	
PO 1. Determine the probability that a specific event will occur in a single stage probability experiment (e.g., Find the probability of drawing a red marble from a bag with 3 red, 5 blue, and 9 black marbles.).	

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PO 2. Compare probabilities to determine the fairness of a contextual situation (e.g. If John wins when two or greater shows after a six-sided number cube is rolled and Joaquin wins otherwise, is this a fair game?).	
PO 3. Predict the outcome of a grade-level appropriate probability experiment.	
PO 4. Record the data from performing a grade-level appropriate probability experiment.	
PO 5. Compare the outcome of an experiment to predictions made prior to performing the experiment.	
PO 6. Make predictions from the results of student-generated experiments using objects (e.g., coins, spinners, number cubes, cards).	
PO 7. Compare the results of two repetitions of the same grade-level appropriate probability experiment.	
Concept 3: Discrete Mathematics – Systematic Listing and Counting Understand and demonstrate the systematic listing and counting of possible outcomes.	
PO 1. Determine all possible outcomes involving the combination of up to three sets of objects (e.g., How many outfits can be made with 3 pants, 2 tee shirts and 2 pairs of shoes?).	
PO 2. Determine all possible arrangements of a given set, using a systematic list, table, tree diagram, or other representation.	
Concept 4: Vertex-Edge Graphs Understand and apply vertex-edge graphs.	
PO 1. Find the shortest circuit on a map that makes a tour of specified sites (vertex-edge graph).	

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Strand 3: Patterns, Algebra, and Functions	
Concept 1: Patterns	
Identify patterns and apply pattern recognition to reason mathematically.	
PO 1. Communicate a grade-level appropriate recursive pattern, using symbols or numbers.	
PO 2. Extend a grade-level appropriate recursive pattern.	
PO 3. Solve grade-level appropriate recursive pattern problems.	SE: pp. 72–75
Concept 2: Functions and Relationships	
Describe and model functions and their relationships.	
PO 1. Describe the rule used in a simple grade-level appropriate function (e.g., T-chart, input/output model).	SE: pp. 72–75, 76–79
Concept 3: Algebraic Representations	
Represent and analyze mathematical situations and structures using algebraic representations.	
PO 1. Evaluate an expression containing two variables by substituting integers for the variable (e.g., $7x + m$, when $x = -4$ and $m = 12$).	
PO 2. Use variables in contextual situations.	SE: pp. 12–15, 16–19
PO 3. Translate a written sentence into a one-step, one-variable algebraic equation.	
PO 4. Translate a sentence written in context into an algebraic equation involving one operation.	SE: pp. 12–15, 16–19, 20–23, 24–27, 32–35, 52–55
PO 5. Solve one-step equations using inverse operations with positive rational numbers (e.g., $\frac{2}{3}n = 6$).	SE: pp. 12–15, 20–23, 24–27, 28–31, 36–39, 52–55

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
Concept 4: Analysis of Change	
Analyze change in a variable over time and in various contexts.	
PO 1. Analyze change in various linear contextual situations.	SE: pp. 68–71
Strand 4: Geometry and Measurement	
Concept 1: Geometric Properties	
Analyze the attributes and properties of 2- and 3-dimensional shapes and develop mathematical arguments about their relationships.	
PO 1. Draw a geometric figure showing specified properties (e.g., Draw an obtuse triangle.).	
PO 2. Classify 3-dimensional solids by their configuration and properties (e.g., parallelism, perpendicularity and congruency).	
PO 3. Identify the net (2-dimensional representation) that corresponds to a rectangular prism, cone, or cylinder.	
PO 4. Distinguish between length, area, and volume, using 2- and 3-dimensional geometric figures.	
PO 5. Draw polygons with appropriate labels.	
PO 6. Identify the angles created by two lines and a transversal.	
PO 7. Recognize the relationship between central angles and intercepted arcs.	
PO 8. Identify arcs and chords of a circle.	
PO 9. Model the triangle inequality theorem using manipulatives.	
PO 10. Identify corresponding parts of congruent polygons as congruent.	
Concept 2: Transformation of Shapes	
Apply spatial reasoning to create transformations and use symmetry to analyze mathematical situations.	
PO 1. Identify rotations about a point, using pictorial models.	

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
PO 2. Recognize simple single rotations, translations or reflections on a coordinate grid.	
Concept 3: Coordinate Geometry Specify and describe spatial relationships using coordinate geometry and other representational systems.	
PO 1. Graph data points in (x, y) form in any quadrant of a coordinate grid.	
PO 2. State the missing coordinate of a given figure in any quadrant of a coordinate grid using geometric properties (e.g., Find the coordinates of the missing vertex of a rectangle when two adjacent sides are drawn.).	
Concept 4: Measurement – Units of Measure, Geometric Objects Understand and apply appropriate units of measure, measurement techniques, and formulas to determine measurements.	
PO 1. Identify the appropriate unit of measure for the volume of an object (e.g., cubic inches or cubic cm).	
PO 2. Measure to the appropriate degree of accuracy.	
PO 3. Convert a measurement from U.S. customary to metric, and vice versa.	SE: pp. 48–51
PO 4. Solve problems involving the circumference of a circle	
PO 5. Solve problems involving the area of a circle.	
PO 6. Solve problems for the areas of parallelograms, triangles, and circles.	
PO 7. Identify polygons having the same perimeter or area.	
PO 8. Compare estimated to actual lengths based on scale drawings or maps.	SE: pp. 56–59

Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra,</i> New Readers Press
Strand 5: Structure and Logic	
Concept 1: Algorithms and Algorithmic Thinking	
Use reasoning to solve mathematical problems in contextual situations.	
PO 1. Discriminate necessary information from unnecessary information in a given grade-level appropriate word problem.	
PO 2. Analyze algorithms for computing with fractions.	
Concept 2: Logic, Reasoning, Arguments, and Mathematical Proof	
Evaluate situations, select problem-solving strategies, draw logical conclusions, develop and describe solutions and recognize their applications.	
PO 1. Solve a logic problem using multiple variables.	SE: pp. 52–55

Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
Strand 1: Number Sense and Operations	
Concept 1: Number Sense	
Understand and apply numbers, ways of representing numbers, the relationships among numbers and different number systems.	
PO 1. Locate rational numbers on a number line.	
PO 2. Identify irrational numbers.	
PO 3. Classify real numbers as rational or irrational.	
Concept 2: Numerical Operations	
Understand and apply numerical operations and their relationship to one another.	
PO 1. Select the grade-level appropriate operation to solve word problems.	SE: pp. 12–15, 16–19, 36–39
PO 2. Solve word problems using grade-level appropriate operations and numbers.	SE: pp. 12–15, 16–19
PO 3. Determine the square of an integer.	
PO 4. Determine the square root of an integer.	
PO 5. Identify squaring and finding square roots as inverse operations.	
PO 6. Apply grade-level appropriate properties to assist in computation.	SE: pp. 4–7
PO 7. Apply the symbols “ $\sqrt{\quad}$ ” to represent square root, “ \pm ” to represent roots, and “ $\{\}$ ” as grouping symbols.	
PO 8. Use grade-level appropriate mathematical terminology.	
PO 9. Calculate the missing value in a percentage problem.	SE: pp. 44–47, 48–51
PO 10. Convert standard notation to scientific notation, and vice versa.	
PO 11. Simplify numerical expressions using the order of operations with grade- appropriate operations on number sets.	SE: pp. 8–11

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
Concept 3: Estimation	
Use estimation strategies reasonably and fluently.	
PO 1. Solve grade-level appropriate problems using estimation.	
PO 2. Use estimation to verify the reasonableness of a calculation (e.g., Is 32 the square root of 64?).	
PO 3. Express answers to the appropriate place or degree of precision (e.g., time, money).	
PO 4. Verify the reasonableness of estimates made from calculator results within a contextual situation.	
Strand 2: Data Analysis, Probability, and Discrete Mathematics	
Concept 1: Data Analysis (Statistics)	
Understand and apply data collection, organization, and representation to analyze and sort data.	
PO 1. Formulate questions to collect data in contextual situations.	
PO 2. Construct box-and-whisker plots.	
PO 3. Determine the appropriate type of graphical display for a given data set.	
PO 4. Interpret box-and-whisker plots, circle graphs, and scatter plots.	
PO 5. Answer questions based on box-and-whisker plots, circle graphs, and scatter plots.	
PO 6. Solve problems in contextual situations using the mean, median, mode, and range of a given data set.	
PO 7. Formulate reasonable predictions based on a given set of data.	
PO 8. Compare trends in data related to the same investigation.	SE: pp. 56–59
PO 9. Solve contextual problems using scatter plots, box-and-whiskers plots, and double line graphs of continuous data.	SE: pp. 56–59

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
PO 10. Evaluate the effects of missing or incorrect data on the results of an investigation (e.g., Susie’s teacher recorded a 39 instead of a 93 for her last quiz, what will happen to Susie’s average?).	
PO 11. Identify a line of best fit for a scatter plot.	
PO 12. Distinguish between causation and correlation.	
Concept 2: Probability Understand and apply the basic concepts of probability.	
PO 1. Determine the probability that a specific event will occur in a 2-stage probability experiment.	
PO 2. Solve contextual situations using probability (e.g., If the probability of Michelle making a free throw is 0.25, what is the probability that she will make three free throws in a row?).	
PO 3. Predict the outcome of a grade-level appropriate probability experiment.	
PO 4. Record the data from performing a grade-level appropriate probability experiment.	
PO 5. Compare the outcome of an experiment to predictions made prior to performing the experiment.	
PO 6. Distinguish between independent and dependent events.	
PO 7. Compare the results of two repetitions of the same grade-level appropriate probability experiment.	
Concept 3: Discrete Mathematics – Systematic Listing and Counting Understand and demonstrate the systematic listing and counting of possible outcomes.	
PO 1. Determine all possible outcomes involving the combination of two or more sets of objects (e.g., If you roll a six-sided number cube 4 times, how many possible outcomes are possible?).	

Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
PO 2. Determine all possible arrangements given a set (e.g., How many ways can you arrange a set of 7 books on a shelf?).	
Concept 4: Vertex-Edge Graphs Understand and apply vertex-edge graphs.	
PO 1. Solve contextual problems represented by vertex-edge graphs.	
Strand 3: Patterns, Algebra, and Functions	
Concept 1: Patterns Identify patterns and apply pattern recognition to reason mathematically.	
PO 1. Communicate a grade-level appropriate iterative or recursive pattern, using symbols or numbers.	
PO 2. Extend a grade-level appropriate iterative or recursive pattern.	
PO 3. Solve grade-level appropriate iterative or recursive pattern problems.	
Concept 2: Functions and Relationships Describe and model functions and their relationships.	
PO 1. Describe the rule used in a simple grade-level appropriate function (e.g., T-chart, input/output model).	SE: pp. 52–55
PO 2. Distinguish between linear and nonlinear functions, given graphic examples.	
PO 3. Determine whether a graph or table is related to a given equation of the form $y = ax^2$ where 'a' is a natural number.	
PO 4. Identify independent and dependent variables for a contextual situation.	

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
Concept 3: Algebraic Representations	
Represent and analyze mathematical situations and structures using algebraic representations.	
PO 1. Evaluate algebraic expressions by substituting rational values for variables [e.g., $2(ab+ac+bc)$, when $a = 2$, $b = 3/5$, and $c = 4$].	SE: pp. 4–7, 8–11, 48–51
PO 2. Use variables in contextual situations.	
PO 3. Translate a written sentence or phrase into an algebraic equation or expression, and vice versa (e.g., Three less than twice a number is $2n-3$).	SE: pp. 8–11, 12–15, 16–19, 20–23, 48–51, 52–55, 64–67, 68–71, 72–75, 76–79
PO 4. Translate a sentence written in context into an algebraic equation involving two operations.	SE: pp. 32–35
PO 5. Translate a contextual situation into an algebraic inequality (e.g., Joe earns more than \$5.00 an hour; therefore, $x > 5$).	SE: pp. 24–27, 28–31
PO 6. Identify an equation or inequality that represents a contextual situation.	
PO 7. Solve one-step equations with rational numbers as coefficients or as solutions.	
PO 8. Solve one-step equations that model contextual situations.	SE: pp. 12–15, 16–19, 24–27
PO 9. Solve two-step equations with rational coefficients and integer solutions (e.g., $3x + 5 = 11$, $4x - 20 = 8$).	SE: pp. 20–23, 28–31, 32–35, 64–67
PO 10. Graph an inequality on a number line.	SE: pp. 68–71
PO 11. Solve a simple algebraic proportion.	SE: pp. 36–39
PO 12. Solve applied problems using the Pythagorean theorem.	

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
Concept 4: Analysis of Change Analyze change in a variable over time and in various contexts.	
PO 1. Identify the slope of a line as the rate of change (the ratio of rise over run).	SE: pp. 60–63
Strand 4: Geometry and Measurement	
Concept 1: Geometric Properties Analyze the attributes and properties of 2- and 3-dimensional shapes and develop mathematical arguments about their relationships.	
PO 1. Draw a model that demonstrates basic geometric relationships such as parallelism, perpendicularity, similarity/proportionality, and congruence.	
PO 2. Draw 3-dimensional figures by applying properties of each (e.g., parallelism, perpendicularity, congruency).	
PO 3. Recognize the 3-dimensional figure represented by a net.	
PO 4. Represent the surface area of rectangular prisms and cylinders as the area of their net.	
PO 5. Draw regular polygons with appropriate labels.	
PO 6. Identify the properties of angles created by a transversal intersecting two parallel lines (e.g., corresponding angles are congruent).	
PO 7. Recognize the relationship between inscribed angles and intercepted arcs.	
PO 8. Identify tangents and secants of a circle.	
PO 9. Determine whether three given lengths can form a triangle.	
PO 10. Identify corresponding angles of similar polygons as congruent and sides as proportional.	

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
Concept 2: Transformation of Shapes Apply spatial reasoning to create transformations and use symmetry to analyze mathematical situations.	
PO 1. Identify the planar geometric figure that is the result of a given rigid transformation.	
PO 2. Model a simple transformation on a coordinate grid (e.g., Translate right four units and down two units.).	
Concept 3: Coordinate Geometry Specify and describe spatial relationships using coordinate geometry and other representational systems.	
PO 1. Use a table of values to graph a linear equation.	SE: pp. 64–67, 76–79
PO 2. Determine the midpoint given two points on a number line.	
PO 3. Determine the distance between two points on a number line.	
Concept 4: Measurement – Units of Measure, Geometric Objects Understand and apply appropriate units of measure, measurement techniques, and formulas to determine measurements.	
PO 1. Solve problems for the area of a trapezoid.	
PO 2. Solve problems involving the volume of rectangular prisms and cylinders.	
PO 3. Calculate the surface area of rectangular prisms or cylinders.	
PO 4. Identify rectangular prisms and cylinders having the same volume.	
PO 5. Find the measure of a missing interior angle in a triangle or quadrilateral.	
PO 6. Solve problems using ratios and proportions, given the scale factor.	SE: pp. 40–43
PO 7. Calculate the length of a side, given two similar triangles.	SE: pp. 40–43

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
Strand 5: Structure and Logic	
Concept 1: Algorithms and Algorithmic Thinking	
Use reasoning to solve mathematical problems in contextual situations.	
PO 1. Describe how to use a proportion to solve a problem in context.	SE: pp. 36–39, 44–47
PO 2. Analyze algorithms.	
Concept 2: Logic, Reasoning, Arguments, and Mathematical Proof	
Evaluate situations, select problem-solving strategies, draw logical conclusions, develop and describe solutions and recognize their applications.	
PO 1. Solve a logic problem given the necessary information.	
PO 2. Identify simple valid arguments using <i>if...then</i> statements (e.g., All squares are rectangles. If quadrilateral ABCD is a rectangle, is it a square?).	
PO 3. Model a contextual situation using a flow chart.	
PO 4. Verify the Pythagorean theorem using an area dissection argument.	

Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
Strand 1: Number Sense and Operations	
Concept 1: Number Sense	
Understand and apply numbers, ways of representing numbers, the relationships among numbers and different number systems.	
PO 1. Classify real numbers as members of one or more subsets: natural, whole, integers, rational, or irrational numbers.	
PO 2. Identify properties of the real number system: commutative, associative, distributive, identity, inverse, and closure.	
PO 3. Distinguish between finite and infinite sets of numbers.	
Concept 2: Numerical Operations	
Understand and apply numerical operations and their relationship to one another.	
PO 1. Select the grade-level appropriate operation to solve word problems.	SE: pp. 8–11
PO 2. Solve word problems using grade-level appropriate operations and numbers.	SE: pp. 8–11
PO 3. Simplify numerical expressions including signed numbers and absolute values.	
PO 4. Apply subscripts to represent ordinal position.	
PO 5. Use grade level-appropriate mathematical terminology.	
PO 6. Compute using scientific notation.	
PO 7. Simplify numerical expressions using the order of operations.	SE: pp. 4–7
Concept 3: Estimation	
Use estimation strategies reasonably and fluently.	
PO 1. Solve grade-level appropriate problems using estimation.	
PO 2. Determine if a solution to a problem is reasonable.	

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
PO 3. Determine rational approximations of irrational numbers.	
Strand 2: Data Analysis, Probability, and Discrete Mathematics	
Concept 1: Data Analysis (Statistics)	
Understand and apply data collection, organization, and representation to analyze and sort data.	
PO 1. Formulate questions to collect data in contextual situations.	
PO 2. Organize collected data into an appropriate graphical representation.	
PO 3. Display data as lists, tables, matrices, and plots.	
PO 4. Construct equivalent displays of the same data.	
PO 5. Identify graphic misrepresentations and distortions of sets of data.	
PO 6. Identify which of the measures of central tendency is most appropriate in a given situation.	
PO 7. Make reasonable predictions based upon linear patterns in data sets or scatter plots.	SE: pp. 44–47
PO 8. Make reasonable predictions for a set of data, based on patterns.	
PO 9. Draw inferences from charts, tables, graphs, plots, or data sets.	
PO 10. Apply the concepts of mean, median, mode, range, and quartiles to summarize data sets.	
PO 11. Evaluate the reasonableness of conclusions drawn from data analysis.	
PO 12. Recognize and explain the impact of interpreting data (making inferences or drawing conclusions) from a biased sample.	
PO 13. Draw a line of best fit for a scatter plot.	SE: pp. 44–47

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
PO 14. Determine whether displayed data has positive, negative, or no correlation.	SE: pp. 44–47
PO 15. Identify a normal distribution.	
PO 16. Identify differences between sampling and census.	
PO 17. Identify differences between biased and unbiased samples.	
Concept 2: Probability Understand and apply the basic concepts of probability.	
PO 1. Find the probability that a specific event will occur, with or without replacement.	
PO 2. Determine simple probabilities related to geometric figures.	
PO 3. Predict the outcome of a grade-level appropriate probability experiment.	
PO 4. Record the data from performing a grade-level appropriate probability experiment.	
PO 5. Compare the outcome of an experiment to predictions made prior to performing the experiment.	
PO 6. Distinguish between independent and dependent events.	
PO 7. Compare the results of two repetitions of the same grade-level appropriate probability experiment.	
Concept 3: Discrete Mathematics – Systematic Listing and Counting Understand and demonstrate the systematic listing and counting of possible outcomes.	
PO 1. Determine the number of possible outcomes for a contextual event using a chart, a tree diagram, or the counting principle.	
PO 2. Determine when to use combinations versus permutations in counting objects.	
PO 3. Use combinations or permutations to solve contextual problems.	

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
Concept 4: Vertex-Edge Graphs	
Understand and apply vertex-edge graphs.	
(Grades K–8)	
Strand 3: Patterns, Algebra, and Functions	
Concept 1: Patterns	
Identify patterns and apply pattern recognition to reason mathematically.	
PO 1. Communicate a grade-level appropriate iterative or recursive pattern, using symbols or numbers.	
PO 2. Find the n^{th} term of an iterative or recursive pattern.	
PO 3. Evaluate problems using basic recursion formulas.	
Concept 2: Functions and Relationships	
Describe and model functions and their relationships.	
PO 1. Determine if a relationship is a function, given a graph, table, or set of ordered pairs.	SE: pp. 40–43
PO 2. Describe a contextual situation that is depicted by a given graph.	SE: pp. 28–31
PO 3. Identify a graph that models a given real-world situation.	SE: pp. 64–67
PO 4. Sketch a graph that models a given contextual situation.	SE: pp. 24–27
PO 5. Determine domain and range for a function.	SE: pp. 40–43
PO 6. Determine the solution to a contextual maximum/minimum problem, given the graphical representation.	
PO 7. Express the relationship between two variables using tables/matrices, equations, or graphs.	SE: pp. 24–27, 72–75, 76–79
PO 8. Interpret the relationship between data suggested by tables/matrices, equations, or graphs.	SE: pp. 72–75, 76–79

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra,</i> New Readers Press
PO 9. Determine from two linear equations whether the lines are parallel, perpendicular, coincident, or intersecting but not perpendicular.	
Concept 3: Algebraic Representations Represent and analyze mathematical situations and structures using algebraic representations.	
PO 1. Evaluate algebraic expressions, including absolute value and square roots.	SE: pp. 20–23, 60–63
PO 2. Simplify algebraic expressions.	SE: pp. 8–11, 12–15
PO 3. Multiply and divide monomial expressions with integral exponents.	SE: pp. 16–19
PO 4. Translate a written expression or sentence into a mathematical expression or sentence.	SE: pp. 4–7, 8–11, 12–15
PO 5. Translate a sentence written in context into an algebraic equation involving multiple operations.	SE: pp. 20–23, 32–35, 36–39, 60–63, 64–67, 76–79
PO 6. Write a linear equation for a table of values.	
PO 7. Write a linear algebraic sentence that represents a data set that models a contextual situation.	SE: pp. 24–27
PO 8. Solve linear (first degree) equations in one variable (may include absolute value).	SE: pp. 24–27
PO 9. Solve linear inequalities in one variable.	SE: pp. 48–51
PO 10. Write an equation of the line given: two points on the line, the slope and a point on the line, or the graph of the line.	SE: pp. 28–31, 36–39
PO 11. Solve an algebraic proportion.	SE: pp. 72–75, 76–79
PO 12. Solve systems of linear equations in two variables (integral coefficients and rational solutions).	SE: pp. 52–55, 56–59
PO 13. Add, subtract, and perform scalar multiplication with matrices.	

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
PO 14. Calculate powers and roots of real numbers, both rational and irrational, using technology when appropriate.	SE: pp. 68–71
PO 15. Simplify square roots and cube roots with monomial radicands (including those with variables) that are perfect squares or perfect cubes.	SE: pp. 68–71
PO 16. Solve square root radical equations involving only one radical.	
PO 17. Solve quadratic equations.	SE: pp. 60–63
PO 18. Identify the sine, cosine, and tangent ratios of the acute angles of a right triangle.	
Concept 4: Analysis of Change Analyze change in a variable over time and in various contexts.	
PO 1. Determine slope, x-, and y-intercepts of a linear equation.	SE: pp. 28–31, 32–35, 36–39
PO 2. Solve formulas for specified variables.	SE: pp. 60–63
Strand 4: Geometry and Measurement	
Concept 1: Geometric Properties Analyze the attributes and properties of 2- and 3-dimensional shapes and develop mathematical arguments about their relationships.	
PO 1. Identify the attributes of special triangles (isosceles, equilateral, right).	
PO 2. Identify the hierarchy of quadrilaterals.	
PO 3. Make a net to represent a 3-dimensional object.	
PO 4. Make a 3-dimensional model from a net.	
PO 5. Draw 2-dimensional and 3-dimensional figures with appropriate labels.	
PO 6. Solve problems related to complementary, supplementary, or congruent angle concepts.	

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
PO 7. Solve problems by applying the relationship between circles, angles, and intercepted arcs.	
PO 8. Solve problems by applying the relationship between radii, diameters, chords, tangents, or secants.	
PO 9. Solve problems using the triangle inequality property.	
PO 10. Solve problems using special case right triangles.	
PO 11. Determine when triangles are congruent by applying SSS, ASA, AAS, or SAS.	
PO 12. Determine when triangles are similar by applying SAS, SSS, or AA similarity postulates.	
PO 13. Construct a triangle congruent to a given triangle.	
PO 14. Solve contextual situations using angle and side length relationships.	
Concept 2: Transformation of Shapes Apply spatial reasoning to create transformations and use symmetry to analyze mathematical situations.	
PO 1. Sketch the planar figure that is the result of two or more transformations.	
PO 2. Identify the properties of the planar figure that is the result of two or more transformations.	
PO 3. Determine the new coordinates of a point when a single transformation is performed on a planar geometric figure.	
PO 4. Determine whether a given pair of figures on a coordinate plane represents a translation, reflection, rotation, or dilation.	
PO 5. Classify transformations based on whether they produce congruent or similar figures.	
PO 6. Determine the effects of a single transformation on linear or area measurements of a planar geometric figure.	

Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
Concept 3: Coordinate Geometry	
Specify and describe spatial relationships using coordinate geometry and other representational systems.	
PO 1. Graph a quadratic equation with lead coefficient equal to one.	SE: pp. 64–67
PO 2. Graph a linear equation in two variables.	SE: pp. 24–27, 32–35, 36–39
PO 3. Graph a linear inequality in two variables.	SE: pp. 48–50, 56–59
PO 4. Determine the solution to a system of equations in two variables from a given graph.	SE: pp. 56–59
PO 5. Determine the midpoint between two points in a coordinate system.	
PO 6. Determine changes in the graph of a linear function when constants and coefficients in its equation are varied.	
PO 7. Determine the distance between two points in the coordinate system.	SE: pp. 68–71
Concept 4: Measurement – Units of Measure, Geometric Objects	
Understand and apply appropriate units of measure, measurement techniques, and formulas to determine measurements.	
PO 1. Calculate the area of geometric shapes composed of two or more geometric figures.	
PO 2. Calculate the volumes of 3-dimensional geometric figures.	
PO 3. Calculate the surface areas of 3-dimensional geometric figures.	
PO 4. Compare perimeter, area, or volume of figures when dimensions are changed.	
PO 5. Find the length of a circular arc.	
PO 6. Find the area of a sector of a circle.	
PO 7. Solve for missing measures in a pyramid (i.e., slant height, height).	

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
PO 8. Find the sum of the interior and exterior angles of a polygon.	
PO 9. Solve scale factor problems using ratios and proportions.	
PO 10. Solve applied problems using similar triangles.	
Strand 5: Structure and Logic	
Concept 1: Algorithms and Algorithmic Thinking	
Use reasoning to solve mathematical problems in contextual situations.	
PO 1. Determine whether a given procedure for simplifying an expression is valid.	
PO 2. Determine whether a given procedure for solving an equation is valid.	
PO 3. Determine whether a given procedure for solving a linear inequality is valid.	
PO 4. Select an algorithm that explains a particular mathematical process.	
PO 5. Determine the purpose of a simple mathematical algorithm.	
PO 6. Determine whether given simple mathematical algorithms are equivalent.	
Concept 2: Logic, Reasoning, Arguments, and Mathematical Proof	
Evaluate situations, select problem-solving strategies, draw logical conclusions, develop and describe solutions and recognize their applications.	
PO 1. Draw a simple valid conclusion from a given <i>if...then</i> statement and a minor premise.	SE: pp. 40–43
PO 2. List related <i>if... then</i> statements in logical order.	
PO 3. Write an appropriate conjecture given a certain set of circumstances.	
PO 4. Analyze assertions related to a contextual situation by using principles of logic.	
PO 5. Identify a valid conjecture using inductive reasoning.	

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Arizona Mathematics Standards	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
PO 6. Distinguish valid arguments from invalid arguments.	
PO 7. Create inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.	
PO 8. Critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.	
PO 9. Identify a counterexample for a given conjecture.	
PO 10. Construct a counterexample to show that a given conjecture is false.	
PO 11. State the inverse, converse, or contrapositive of a given statement.	
PO 12. Determine if the inverse, converse, or contrapositive of a given statement is true or false.	
PO 13. Construct a simple formal or informal deductive proof.	
PO 14. Verify characteristics of a given geometric figure using coordinate formulas such as distance, mid-point, and slope to confirm parallelism, perpendicularity, and congruency.	

Learning Standards for Mathematics	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
Number Sense and Operations	
<i>Students engage in problem solving, communicating, reasoning, connecting, and representing as they:</i>	
10.N.1 Identify and use the properties of operations on real numbers, including the associative, commutative, and distributive properties; the existence of the identity and inverse elements for addition and multiplication; the existence of n^{th} roots of positive real numbers for any positive integer n ; and the inverse relationship between taking the n^{th} root of and the n^{th} power of a positive real number.	SE: pp. 8–11, 12–15, 16–19
10.N.2 Simplify numerical expressions, including those involving positive integer exponents or the absolute value, e.g., $3(2^4 - 1) = 45$, $4 3 - 5 + 6 = 14$; apply such simplifications in the solution of problems.	SE: pp. 36–39, 60–63, 68–71
10.N.3 Find the approximate value for solutions to problems involving square roots and cube roots without the use of a calculator, e.g., $\sqrt{3^2 - 1} \approx 2.8$.	SE: pp. 12–15, 60–63, 68–71
10.N.4 Use estimation to judge the reasonableness of results of computations and of solutions to problems involving real numbers.	
Patterns, Relations and Algebra	
<i>Students engage in problem solving, communicating, reasoning, connecting, and representing as they:</i>	
10.P.1 Describe, complete, extend, analyze, generalize, and create a wide variety of patterns, including iterative, recursive (e.g., Fibonacci Numbers), linear, quadratic, and exponential functional relationships.	

Learning Standards for Mathematics	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
10.P.2 Demonstrate an understanding of the relationship between various representations of a line. Determine a line's slope and x- and y-intercepts from its graph or from a linear equation that represents the line. Find a linear equation describing a line from a graph or a geometric description of the line, e.g., by using the "point-slope" or "slope y-intercept" formulas. Explain the significance of a positive, negative, zero, or undefined slope.	SE: pp. 24–27, 28–31, 32–35, 48–51
10.P.3 Add, subtract, and multiply polynomials. Divide polynomials by monomials.	
10.P.4 Demonstrate facility in symbolic manipulation of polynomial and rational expressions by rearranging and collecting terms; factoring (e.g., $a^2 - b^2 = (a + b)(a - b)$, $x^2 + 10x + 21 = (x + 3)(x + 7)$, $5x^4 + 10x^3 - 5x^2 = 5x^2(x^2 + 2x - 1)$); identifying and canceling common factors in rational expressions; and applying the properties of positive integer exponents.	SE: pp. 60–63, 68–71, 76–79
10.P.5 Find solutions to quadratic equations (with real roots) by factoring, completing the square, or using the quadratic formula. Demonstrate an understanding of the equivalence of the methods.	SE: pp. 60–63, 64–67
10.P.6 Solve equations and inequalities including those involving absolute value of linear expressions (e.g., $ x - 2 > 5$) and apply to the solution of problems.	SE: pp. 16–19, 36–39, 40–43
10.P.7 Solve everyday problems that can be modeled using linear, reciprocal, quadratic, or exponential functions. Apply appropriate tabular, graphical, or symbolic methods to the solution. Include compound interest, and direct and inverse variation problems. Use technology when appropriate.	SE: pp. 4–7, 8–11, 20–23, 40–43, 44–47, 72–75, 76–79

Learning Standards for Mathematics	<i>Write Math Answers to Open-Ended Questions in Algebra,</i> New Readers Press
10.P.8 Solve everyday problems that can be modeled using systems of linear equations or inequalities. Apply algebraic and graphical methods to the solution. Use technology when appropriate. Include mixture, rate, and work problems.	SE: pp. 52–55, 56–59
Geometry	
<i>Students engage in problem solving, communicating, reasoning, connecting, and representing as they:</i>	
10.G.1 Identify figures using properties of sides, angles, and diagonals. Identify the figures' type(s) of symmetry.	
10.G.2 Draw congruent and similar figures using a compass, straightedge, protractor, and other tools such as computer software. Make conjectures about methods of construction. Justify the conjectures by logical arguments.	
10.G.3 Recognize and solve problems involving angles formed by transversals of coplanar lines. Identify and determine the measure of central and inscribed angles and their associated minor and major arcs. Recognize and solve problems associated with radii, chords, and arcs within or on the same circle.	
10.G.4 Apply congruence and similarity correspondences (e.g., $\triangle ABC \cong \triangle XYZ$) and properties of the figures to find missing parts of geometric figures, and provide logical justification.	
10.G.5 Solve simple triangle problems using the triangle angle sum property and/or the Pythagorean theorem.	
10.G.6 Use the properties of special triangles (e.g., isosceles, equilateral, $30^\circ\text{--}60^\circ\text{--}90^\circ$, $45^\circ\text{--}45^\circ\text{--}90^\circ$) to solve problems.	

Learning Standards for Mathematics	<i>Write Math Answers to Open-Ended Questions in Algebra,</i> New Readers Press
10.G.7 Using rectangular coordinates, calculate midpoints of segments, slopes of lines and segments, and distances between two points, and apply the results to the solutions of problems.	SE: pp. 48–51, 68–71
10.G.8 Find linear equations that represent lines either perpendicular or parallel to a given line and through a point, e.g., by using the “point-slope” form of the equation.	
10.G.10 Draw the results, and interpret transformations on figures in the coordinate plane, e.g., translations, reflections, rotations, scale factors, and the results of successive transformations. Apply transformations to the solutions of problems.	
10.G.11 Demonstrate the ability to visualize solid objects and recognize their projections and cross sections.	
10.G.12 Use vertex-edge graphs to model and solve problems.	
Measurement	
<i>Students engage in problem solving, communicating, reasoning, connecting, and representing as they:</i>	
10.M.1 Calculate perimeter, circumference, and area of common geometric figures such as parallelograms, trapezoids, circles, and triangles.	
10.M.2 Given the formula, find the lateral area, surface area, and volume of prisms, pyramids, spheres, cylinders, and cones, e.g., find the volume of a sphere with a specified surface area.	
10.M.3 Relate changes in the measurement of one attribute of an object to changes in other attributes, e.g., how changing the radius or height of a cylinder affects its surface area or volume.	
10.M.4 Describe the effects of approximate error in measurement and rounding on measurements and on computed values from measurements.	

Learning Standards for Mathematics	<i>Write Math Answers to Open-Ended Questions in Algebra,</i> New Readers Press
Data Analysis, Statistics, and Probability	
<i>Students engage in problem solving, communicating, reasoning, connecting, and representing as they:</i>	
10.D.1 Select, create, and interpret an appropriate graphical representation (e.g., scatterplot, table, stem-and-leaf plots, box-and-whisker plots, circle graph, line graph, and line plot) for a set of data and use appropriate statistics (e.g., mean, median, range, and mode) to communicate information about the data. Use these notions to compare different sets of data.	SE: pp. 48–51
10.D.2 Approximate a line of best fit (trend line) given a set of data (e.g., scatterplot). Use technology when appropriate.	
10.D.3 Describe and explain how the relative sizes of a sample and the population affect the validity of predictions from a set of data.	

Learning Standards for Algebra I	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
Number Sense and Operations	
<i>Students engage in problem solving, communicating, reasoning, connecting, and representing as they:</i>	
AI.N.1 Identify and use the properties of operations on real numbers, including the associative, commutative, and distributive properties; the existence of the identity and inverse elements for addition and multiplication; the existence of n^{th} roots of positive real numbers for any positive integer n ; the inverse relationship between taking the n^{th} root of and the n^{th} power of a positive real number; and the density of the set of rational numbers in the set of real numbers.	SE: pp. 8–11, 12–15, 16–19
AI.N.2 Simplify numerical expressions, including those involving positive integer exponents or the absolute value, e.g., $3(2^4 - 1) = 45$, $4 3 - 5 + 6 = 14$; apply such simplifications in the solution of problems.	SE: pp. 36–39, 60–63
AI.N.3 Find the approximate value for solutions to problems involving square roots and cube roots without the use of a calculator, e.g., $\sqrt{3^2 - 1} \approx 2.8$.	SE: pp. 12–15, 60–63
AI.N.4 Use estimation to judge the reasonableness of results of computations and of solutions to problems involving real numbers.	
Patterns, Relations and Algebra	
<i>Students engage in problem solving, communicating, reasoning, connecting, and representing as they:</i>	
AI.P.1 Describe, complete, extend, analyze, generalize, and create a wide variety of patterns, including iterative, recursive (e.g., Fibonacci Numbers), linear, quadratic, and exponential functional relationships.	
AI.P.2 Use properties of the real number system to judge the validity of equations and inequalities, to prove or disprove statements, and to justify every step in a sequential argument.	SE: pp. 4–7, 8–11

Learning Standards for Algebra I	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
AI.P.3 Demonstrate an understanding of relations and functions. Identify the domain, range, dependent, and independent variables of functions.	SE: pp. 44–47, 64–67
AI.P.4 Translate between different representations of functions and relations: graphs, equations, point sets, and tabular.	SE: pp. 20–23, 44–47
AI.P.5 Demonstrate an understanding of the relationship between various representations of a line. Determine a line's slope and x- and y-intercepts from its graph or from a linear equation that represents the line. Find a linear equation describing a line from a graph or a geometric description of the line, e.g., by using the "point-slope" or "slope y-intercept" formulas. Explain the significance of a positive, negative, zero, or undefined slope.	SE: pp. 24–27, 28–31, 32–35, 48–51
AI.P.6 Find linear equations that represent lines either perpendicular or parallel to a given line and through a point, e.g., by using the "point-slope" form of the equation.	
AI.P.7 Add, subtract, and multiply polynomials. Divide polynomials by monomials.	
AI.P.8 Demonstrate facility in symbolic manipulation of polynomial and rational expressions by rearranging and collecting terms, factoring (e.g., $a^2 - b^2 = (a + b)(a - b)$, $x^2 + 10x + 21 = (x + 3)(x + 7)$, $5x^4 + 10x^3 - 5x^2 = 5x^2(x^2 + 2x - 1)$), identifying and canceling common factors in rational expressions, and applying the properties of positive integer exponents.	SE: pp. 60–63, 68–71, 76–79
AI.P.9 Find solutions to quadratic equations (with real roots) by factoring, completing the square, or using the quadratic formula. Demonstrate an understanding of the equivalence of the methods.	SE: pp. 60–63, 64–67

Learning Standards for Algebra I	<i>Write Math Answers to Open-Ended Questions in Algebra, New Readers Press</i>
AI.P.10 Solve equations and inequalities including those involving absolute value of linear expressions (e.g., $ x - 2 > 5$) and apply to the solution of problems.	SE: pp. 16–19, 36–39, 40–43
AI.P.11 Solve everyday problems that can be modeled using linear, reciprocal, quadratic, or exponential functions. Apply appropriate tabular, graphical, or symbolic methods to the solution. Include compound interest, and direct and inverse variation problems. Use technology when appropriate.	SE: pp. 4–7, 8–11, 20–23, 40–43, 44–47, 72–75, 76–79
AI.P.12 Solve everyday problems that can be modeled using systems of linear equations or inequalities. Apply algebraic and graphical methods to the solution. Use technology when appropriate. Include mixture, rate, and work problems.	SE: pp. 52–55, 56–59
Data Analysis, Statistics, and Probability	
<i>Students engage in problem solving, communicating, reasoning, connecting, and representing as they:</i>	
AI.D.1 Select, create, and interpret an appropriate graphical representation (e.g., scatterplot, table, stem-and-leaf plots, circle graph, line graph, and line plot) for a set of data and use appropriate statistics (e.g., mean, median, range, and mode) to communicate information about the data. Use these notions to compare different sets of data.	
AI.D.2 Approximate a line of best fit (trend line) given a set of data (e.g., scatterplot). Use technology when appropriate.	
AI.D.3 Describe and explain how the relative sizes of a sample and the population affect the validity of predictions from a set of data.	