



ARIZONA
Academic Content Standards
High School
Advanced Mathematical Concepts
***Precalculus with Applications* © 2004**

CONTENT STANDARDS	PAGE REFERENCES
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.	SE: 206
PO 2. Identify properties of the real number system: commutative, associative, distributive, identity, inverse, and closure.	SE: <i>Graphing Calculator Exploration</i> 86
PO 3. Distinguish between finite and infinite sets of numbers.	SE: 774-783
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: 14 ex 2, 17 #10, 19 #34, 21 ex 2, 29 #10, 37 #34, 69 ex 4, 71 #32, 75 ex 3, 209 ex 5
PO 2. Solve word problems using grade level appropriate operations and numbers.	SE: 14 ex 2, 17 #10, 19 #34, 21 ex 2, 29 #10, 37 #34, 69 ex 4, 71 #32, 75 ex 3, 209 ex 5
PO 3. Simplify numerical expressions including signed numbers and absolute values.	SE: 586-587, 589 #1,
PO 4. Apply subscripts to represent ordinal position.	SE: 759-765, 766-773, 774-779 TWE: TT 759
PO 5. Use grade level appropriate mathematical terminology.	SE: 17 #3, 18 #29, 23 #4, 37 #32, 41 #2, 48 #3, 50 #27, 110 #24, 118 #22, 133 #4
PO 6. Compute using scientific notation.	SE: 273 #6, 282 #62, 695 ex 1, 700 #19, 727 ex 2
PO 7. Simplify numerical expressions using the order of operations.	SE: 64 ex 2, 65 #6
Concept 3: Estimation	
Use estimation strategies reasonably and fluently.	
PO 1. Solve grade level appropriate problems using estimation.	SE: 974 #45
PO 2. Determine if a solution to a problem is reasonable.	SE: 272 ex 2, 744 #6c, 745 #14c, 747 #21d, 974 #45
PO 3. Determine rational approximations of irrational numbers.	SE: <i>Test-Taking Tip</i> 548 TWE: TT 713

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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.	SE: 84 #49 <i>Internet Project 937</i>
PO 2. Organize collected data into an appropriate graphical representation.	SE: 84 #49
PO 3. Display data as lists, tables, matrices, and plots.	SE: 84 #49, 258-264, 270 #54-#55, 740-748, 889-896, 934 #11-#13 <i>Graphing Calculator Exploration 265-266</i> <i>Internet Project 937</i>
PO 4. Construct equivalent displays of the same data.	SE: 891 ex 2, 892 ex 3, 895 #13
PO 5. Identify graphic misrepresentations and distortions of sets of data.	SE: 895 #16
PO 6. Identify which of the measures of central tendency is most appropriate in a given situation.	SE: 899 ex 2d, 900 ex 3e, 903 #4, 904 #21g, 906 #31f
PO 7. Make reasonable predictions based upon linear patterns in data sets or scatter plots.	SE: 38-44, 51 #31, 60 #53, 61 #69, 145 #49, 151 #51, 258-264 TWE: AIN 40, 260 EC 44
PO 8. Make reasonable predictions for a set of data, based on patterns.	SE: 38-44, 51 #31, 60 #53, 61 #69, 145 #49, 151 #51, 258-264 TWE: AIN 40, 260 EC 44
PO 9. Draw inferences from charts, tables, graphs, plots, or data sets.	SE: 927 <i>Graphing Calculator Exploration 877</i> <i>Internet Project 885, 937</i>
PO 10. Apply the concepts of mean, median, mode, range, and quartiles to summarize data sets.	SE: 111 #33, 150 #43, 897-907, 908-917, 934 #14-#18, 935 #19-#22, 937 #41, 939 #9
PO 11. Evaluate the reasonableness of conclusions drawn from data analysis.	SE: 895 #16
PO 12. Recognize and explain the impact of interpreting data (making inferences or drawing conclusions) from a biased sample.	SE: 927-932, 936 #36-#39 TWE: AIN 929
PO 13. Draw a line of best fit for a scatter plot.	SE: 38-44, 51 #31, 60 #53, 61 #69, 145 #49, 151 #51, 258-264 TWE: AIN 40, 260 EC 44
PO 14. Determine whether a displayed data has positive, negative, or no correlation.	SE: 38-44, 51 #31, 60 #53, 61 #69, 145 #49, 151 #51, 258-264 TWE: AIN 40, 260 EC 44
PO 15. Identify a normal distribution.	SE: 918-925, 932 #34 <i>Graphing Calculator Exploration 926</i> TWE: A 925 EC 925
PO 16. Identify differences between sampling and census.	SE: 927-932

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PO 17. Identify differences between biased and unbiased samples.	TWE: TT 929
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.	SE: 837-845, 846-851, 852-858, 859-867, 868-874, 875-880, 883 #27-#34, 884 #37-#40, 886 ex 1 TWE: MTL 846
PO 2. Determine simple probabilities related to geometric figures.	TWE: EC 867
PO 3. Predict the outcome of a grade level appropriate probability experiment.	SE: <i>Graphing Calculator Exploration 877</i> TWE: A 880
PO 4. Record the data from performing a grade level appropriate probability experiment.	SE: <i>Graphing Calculator Exploration 877</i> TWE: A 880
PO 5. Compare the outcome of an experiment to predictions made prior to performing the experiment.	SE: 837-845, 883 #35-#36 TWE: TT 838
PO 6. Distinguish between independent and dependent events.	SE: 837-845, 883 #35-#36 TWE: TT 838
PO 7. Compare the results of two repetitions of the same grade level appropriate probability experiment.	TWE: MTL 852
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.	SE: 837, 839 ex 2 TWE: FTC 838
PO 2. Determine when to use combinations versus permutations in counting objects.	SE: 837-845, 846-851, 857 #45 TWE: A 845 AIN 848 EC 850 MTL 837
PO 3. Use combinations or permutations to solve contextual problems.	SE: 837-845, 846-851, 857 #45 TWE: A 845 AIN 841, 848 EC 845, 850 FTC 838 MTL 837
Concept 4: Vertex-Edge Graphs Understand and apply 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.	SE: 16 ex 3, 17 #9, 18 #25-#27, 707 ex 3, 714 #6, 760, 815 ex 1, 819 #10, 820 #31, 832 #45-#50
PO 2. Find the n^{th} term of an iterative or recursive pattern.	SE: 16 ex 3, 17 #9, 18 #25-#27, 707 ex 3, 714 #6, 760, 815 ex 1, 819 #10, 820 #31, 832 #45-#50

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PO 3. Evaluate problems using basic recursion formulas.	SE: 16 ex 3, 17 #9, 18 #25-#27, 707 ex 3, 714 #6, 760, 815 ex 1, 819 #10, 820 #31, 832 #45-#50
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: 6 ex 4, 9 #10-#11, 10 #32-#37, 19 #36, 25 #45, 31 #34, 37 #39, 44 #18, 51 #36 TWE: A 12
PO 2. Describe a contextual situation that is depicted by a given graph.	SE: 141 ex 5
PO 3. Identify a graph that models a given real-world situation.	SE: 154 ex 4, 156 #14, 157 #42, 183 ex 3, 186 #13, 209 ex 5, 211 #51, 239 ex 4, 240 #11, 241 #33
PO 4. Sketch a graph that models a given contextual situation.	SE: 154 ex 4, 156 #14, 157 #42, 183 ex 3, 186 #13, 209 ex 5, 211 #51, 239 ex 4, 240 #11, 241 #33
PO 5. Determine domain and range for a function.	SE: 5-6, 9 #10-#11, 10 #32-#37, 19 #34b
PO 6. Determine the solution to a contextual maximum/minimum problem, given the graphical representation.	SE: 171-179, 188 #48, 199 #44-#47 TWE: A 179 EC 178 MTL 171
PO 7. Express the relationship between two variables using tables/matrices, equations, or graphs.	SE: 5-12, 20-25, 31 #30, 32-37, 45-51
PO 8. Interpret the relationship between data suggested by tables/matrices, equations, or graphs.	SE: 78-86, 88-96, 98-105, 120 #20-#27, 179 #46, 250 #54 TWE: A 86, 105
PO 9. Determine from two linear equations whether the lines are parallel, perpendicular, coincident, or intersecting but not perpendicular.	SE: 32-37, 51 #32, 56 #29, 59 #47-#52, 72 #41, 96 #39, 104 #57 TWE: A 37 EC 37
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: 7 ex 6, 8 ex 7, 9 #13-#14, 11 #41-#47, 12 #56, 19 #37, 25 #43, 31 #32, 58 #11-#17
PO 2. Simplify algebraic expressions.	SE: 7 ex 6, 8 ex 7, 9 #13-#14, 11 #41-#47, 19 #37, 58 #11-#17, 431-436 TWE: EC 11, 436
PO 3. Multiply and divide monomial expressions with integral exponents.	SE: 124 ex 1, 125 #9, 695-702
PO 4. Translate a written expression or sentence into a mathematical expression or sentence.	SE: 14 ex 2, 18 #30, 25 #41, 37 #34, 64 ex 1, 65 #4
PO 5. Translate a sentence written in context into an algebraic equation involving multiple operations.	SE: 14 ex 2, 18 #30, 25 #41, 37 #34, 64 ex 1, 65 #4
PO 6. Write a linear equation for a table of values.	SE: 30 #27, 37 #34, 39 ex 1, 40 ex 2, 42 #6-#7, 43 #8-#11, 51 #31, 60 #53
PO 7. Write a linear algebraic sentence that represents a data set that models a contextual situation.	SE: 30 #27, 37 #34, 39 ex 1, 40 ex 2, 42 #6-#7, 43 #8-#11, 51 #31, 60 #53

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PO 8. Solve linear (first degree) equations in one variable (may include absolute value).	SE: 20 ex 1, 21 ex 3, 22 ex 4, 23 #2, 24 #24-#30
PO 9. Solve linear inequalities in one variable.	SE: 52-56 TWE: AIN 53
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: 27-31, 32-37, 44 #19, 51 #32, 59 #39-#52 <i>Extra Practice Lesson 1-4 A26</i> <i>Extra Practice Lesson 1-5 A27</i> TWE: A 37 EC 37
PO 11. Solve an algebraic proportion.	SE: 192 ex 4, 692 ex 2
PO 12. Solve systems of linear equations in two variables (integral coefficients and rational solutions).	SE: 67-72, 73-77, 86 #55, 96 #36, 104 #55 TWE: A 72, 77 AIN 75 EC 72, 76
PO 13. Add, subtract and perform scalar multiplication with matrices.	SE: 78-86, 88-96, 98-105, 120 #20-#27, 179 #46, 250 #54 TWE: A 86, 105
PO 14. Calculate powers and roots of real numbers, both rational and irrational, using technology when appropriate.	SE: 695-702 TWE: A 703
PO 15. Simplify square roots and cube roots with monomial radicands (including those with variables) that are perfect squares or perfect cubes.	SE: 695-702 TWE: A 703 FTC 699
PO 16. Solve square root radical equations involving only one radical.	SE: 251-257 TWE: A 257 AIN 253 EC 257, 702
PO 17. Solve quadratic equations.	SE: 213-221, 235 #30, 242 #40, 268 #16-#21, 271 #58, 298 #53, 674 ex 5 TWE: A 221 EC 220
PO 18. Identify the sine, cosine, and tangent ratios of the acute angles of a right triangle.	SE: 284-290, 291-298, 305-312 TWE: A 290, 298, 312 AIN 286, 295 EC 290, 298
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: 5-11, 171-179, 229-235, 236-242 TWE: AIN 232 EC 235 FTC 237 MTL 236 TT 230, 231
PO 2. Solve formulas for specified variables.	SE: 192 ex 5

CONTENT STANDARDS	PAGE REFERENCES
Strand 4: Geometry and Measurement	
Concept 1: Geometric Properties	
Analyze the attributes and properties of two- and three-dimensional shapes and develop mathematical arguments about their relationships.	
PO 1. Identify the attributes of special triangles. (isosceles, equilateral, right)	SE: 619 #3, 620 #9, 621 #30
PO 2. Identify the hierarchy of quadrilaterals.	See Glencoe's <i>Geometry</i> © 2004 pages 411-416, 424-430, and 431-437.
PO 3. Make a net to represent a three-dimensional object.	See Glencoe's <i>Geometry</i> © 2004 pages 645-646.
PO 4. Make a three-dimensional model from a net.	See Glencoe's <i>Geometry</i> © 2004 pages 644-646.
PO 5. Draw 2-dimensional and 3-dimensional figures with appropriate labels.	See Glencoe's <i>Geometry</i> © 2004 pages 636-642.
PO 6. Solve problems related to complementary, supplementary, or congruent angle concepts.	SE: 613 #8
PO 7. Solve problems by applying the relationship between circles, angles, and intercepted arcs.	SE: 345, 348 #11-#12, 349 #40-#42, 444 #56, 612, 628 #39, 951-952
PO 8. Solve problems by applying the relationship between radii, diameters, chords, tangents or secants.	SE: 345, 348 #11-#12, 349 #40-#42, 444 #56, 612, 628 #39, 951-952
PO 9. Solve problems using the triangle inequality property.	SE: 305-312 TWE: EC 311
PO 10. Solve problems using special case right triangles.	SE: 307 ex 4
PO 11. Determine when triangles are congruent by applying SSS, ASA, AAS or SAS.	See Glencoe's <i>Geometry</i> © 2004 pages 200-205 and 207-213.
PO 12. Determine when triangles are similar by applying SAS, SSS, or AA similarity postulates.	See Glencoe's <i>Geometry</i> © 2004 pages 298-305.
PO 13. Construct a triangle congruent to a given triangle.	See Glencoe's <i>Geometry</i> © 2004 pages 200, 202, and 207.
PO 14. Solve contextual situations using angle and side length relationships.	SE: 307 ex 4, 309 #14, 310 #46-#47, 311 #48-#50
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.	SE: 93 #9, 95 #26-#28
PO 2. Identify the properties of the planar figure that is the result of two or more transformations.	SE: 93 #9, 95 #26-#28
PO 3. Determine the new coordinates of a point when a single transformation is performed on a planar geometric figure.	SE: 89 ex 1, 91 ex 3, 92 ex 4
PO 4. Determine whether a given pair of figures on a coordinate plane represents a translation, reflection, rotation, or dilation.	SE: 95 #34
PO 5. Classify transformations based on whether they produce congruent or similar figures.	SE: 88-96, 535-542, 670-677, 717 #25
PO 6. Determine the effects of a single transformation on linear or area measurements of a planar geometric figure.	SE: 88-96, 535-542, 670-677, 717 #25

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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.	SE: 140 ex 4, 141 ex 5, 142 #8
PO 2. Graph a linear equation in two variables.	SE: 20-25, 31 #30, 37 #37, 44 #16a, 59 #31-#38 TWE: A 25 AIN 23 EC 25
PO 3. Graph a linear inequality in two variables.	SE: 52-56, 60 #59-#66, 72 #39, 77 #25, 86 #57 TWE: AIN 53 EC 56
PO 4. Determine the solution to a system of equations in two variables from a given graph.	SE: 67 ex 1, 70 #5-#6, 71 #14-#19
PO 5. Determine the midpoint between two points in a coordinate system.	SE: 272 ex 1, 618 ex 4, 619 #5-#7, 620 #12-#20, 688 #11-#13 TWE: AIN 618
PO 6. Determine changes in the graph of a linear function when constants and coefficients in its equation are varied.	SE: <i>Graphing Calculator Exploration 26</i>
PO 7. Determine the distance between two points in the coordinate system.	SE: 616 ex 1, 619 #5-#7, 620 #12-#20, 630 #50, 688 #11-#13 TWE: AIN 618
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.	SE: 257 #51, 533 #29, 549 #6, 684 #50
PO 2. Calculate the volumes of three-dimensional geometric figures.	SE: 168 #46, 178 #35, 192 ex 5, 226 #13, 233 #9, 235 #10
PO 3. Calculate the surface areas of three-dimensional geometric figures.	SE: 187 #44, 318 #42, 717 #6
PO 4. Compare perimeter, area, or volume of figures when dimensions are changed.	See Glencoe's <i>Geometry</i> © 2004 pages 708-709.
PO 5. Find the length of a circular arc.	SE: 346 ex 3, 348 #11-#12, 349 #40-#42, 376 #64, 402 #51, 414 #17-#20
PO 6. Find the area of a sector of a circle.	SE: 347 #5, 348 #13-#14, 349 #43-#48, 357 #44
PO 7. Solve for missing measures in a pyramid. (i.e., slant height, height)	See Glencoe's <i>Geometry</i> © 2004 pages 663.
PO 8. Find the sum of the interior and exterior angles of a polygon.	SE: 319 #1, 612 ex 1
PO 9. Solve scale factor problems using ratios and proportions.	SE: 234 #26
PO 10. Solve applied problems using similar triangles.	SE: 483 #8

CONTENT STANDARDS	PAGE REFERENCES
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.	SE: 7 ex 6, 8 ex 7, 9 #13-#14, 11 #41-#47, 19 #37, 58 #11-#17, 431-436 TWE: EC 11, 436
PO 2. Determine whether a given procedure for solving an equation is valid.	SE: 15 ex 3, 48 #4, 76 #3, 149 #3, 155 #1, 724 #61 TWE: A 77, 151, 168, 228
PO 3. Determine whether a given procedure for solving a linear inequality is valid.	See Glencoe's <i>Geometry</i> © 2004 pages 739-740.
PO 4. Select an algorithm that explains a particular mathematical process.	See Glencoe's <i>Geometry</i> © 2004 pages 89 and 97.
PO 5. Determine the purpose of a simple mathematical algorithm.	See Glencoe's <i>Geometry</i> © 2004 pages 236-237.
PO 6. Determine whether given simple mathematical algorithms are equivalent.	See Glencoe's <i>Geometry</i> © 2004 pages 21, 25, 32-33.
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.	See Glencoe's <i>Geometry</i> © 2004 pages 82-86.
PO 2. List related <i>if... then</i> statements in logical order.	See Glencoe's <i>Geometry</i> © 2004 pages 75-80.
PO 3. Write an appropriate conjecture given a certain set of circumstances.	SE: 87 #4, 95 #32, 319 #1
PO 4. Analyze assertions related to a contextual situation by using principles of logic.	See Glencoe's <i>Geometry</i> © 2004 pages 86 and 783.
PO 5. Identify a valid conjecture using inductive reasoning.	SE: 94 #25, 498 #43, 510 #40, 621 #28-#32, 724 #61, 822-828, 832 #51-#53
PO 6. Distinguish valid arguments from invalid arguments.	SE: 15 ex 3, 48 #4, 76 #3, 115 #3, 149 #3, 155 #1 TWE: A 77, 151, 168, 228
PO 7. Create inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.	SE: 94 #25, 498 #43, 510 #40, 621 #28-#32, 724 #61, 822-828, 832 #51-#53
PO 8. Critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.	SE: 615-622 TWE: A 622 EC 621
PO 9. Identify a counterexample for a given conjecture.	SE: 308 #3, 363 #1, 410 #11-#12, 411 #32-#37, 421-422, 427 #1, 438 #1a, 589 #3, 627 #4, 848 #3
PO 10. Construct a counterexample to show that a given conjecture is false.	SE: 308 #3, 363 #1, 410 #11-#12, 411 #32-#37, 421-422, 427 #1, 438 #1a, 589 #3, 627 #4, 848 #3
PO 11. State the inverse, converse, or contrapositive of a given statement.	See Glencoe's <i>Geometry</i> © 2004 pages 77-79.

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PO 12. Determine if the inverse, converse, or contrapositive of a given statement is true or false.	See Glencoe's <i>Geometry</i> © 2004 pages 77-79.
PO 13. Construct a simple formal or informal deductive proof.	SE: 94 #25, 498 #43, 510 #40, 621 #28-#32, 724 #61, 822-828, 832 #51-#53
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.	SE: 135 #40, 272-273, 617 ex 3, 618 ex 5, 619 #4, 620 #8-#9, 621 #33, 640 #55, 652 #51, 948 #57

Codes Used for TWE Pages

A	Assess
AIN	Addressing Individual Needs
EC	Extra Credit
FTC	From the Classroom of...
MTL	Motivating the Lesson
TT	Teaching Tip