



ARIZONA
Academic Content Standards Grade 8
MathScape: Seeing and Thinking Mathematically
Course 3 © 2005

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. Locate rational numbers on a number line.	TG: 135E Also see Glencoe's <i>MathScape: Seeing and Thinking Mathematically Course 1</i> © 2005 SE: 112-113, 114-115, 118-119, 130-131, 216-127, 244-245, 246-247 TG: 112A, 118A, 119A, 131A, 242, 244A, 246A
PO 2. Identify irrational numbers.	SE: 238-239 TG: 239A
PO 3. Classify real numbers as rational or irrational.	SE: 162-163, 176, 238-239, 261 TG: 163A, 239A
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: 79, 214, 219, 220, 221, 258, 259, 261, 311, 313
PO 2. Solve word problems using grade level appropriate operations and numbers.	SE: 79, 126, 127, 167, 211, 214, 220, 310, 311, 313
PO 3. Determine the square of an integer.	SE: 290-291, 309
PO 4. Determine the square root of an integer.	SE: 150-151, 171 TG: 135E
PO 5. Identify squaring and finding square roots as inverse operations.	See Glencoe's <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 106-107, 111, 112-113, 128, 131 TG: 106A, 111A
PO 6. Apply grade level appropriate properties to assist in computation.	SE: 184, 192-193, 204-205, 206-207, 211, 213, 214, 219, 220, 298
PO 7. Apply the symbols " $\sqrt{\quad}$ " to represent square root, " \pm " to represent roots, " $\{\}$ " as grouping symbols.	See Glencoe's <i>MathScape: Seeing and Thinking Mathematically Course 1</i> © 2005 for grouping information. SE: 102, 145, 334 TG: 102A, 335A See Glencoe's <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 for square root information. SE: 106-107

CONTENT STANDARDS	PAGE REFERENCES
PO 8. Use grade level appropriate mathematical terminology.	SE: 11, 33, 107, 111, 129, 149, 189, 207, 251, 273
PO 9. Calculate the missing value in a percentage problem.	SE: 6, 34, 163, 176
PO 10. Convert standard notation to scientific notation and vice versa.	SE: 300-301, 313 TG: R5 (<i>Comparing Function Families</i>)
PO 11. Simplify numerical expressions using the order of operations with grade appropriate operations on number sets.	SE: 298, 312 Simplifying algebraic expressions is found on pages: SE: 194-195, 196-197, 199, 202-203, 215, 216, 217, 218
Concept 3: Estimation Use estimation strategies reasonably and fluently.	
PO 1. Solve grade level appropriate problems using estimation.	SE: 22-23, 41, 99, 119, 166, 227, 228, 256, 257, 310
PO 2. Use estimation to verify the reasonableness of a calculation. (e.g., Is 32 the square root of 64?)	The following can be used to discuss the use of estimation to verify the reasonableness of a result: SE: 99, 227, 228, 242, 256, 257, 311
PO 3. Express answers to the appropriate place or degree of precision. (e.g., time and money)	SE: 52-53, 79, 99, 119, 132, 219
PO 4. Verify the reasonableness of estimates made from calculator results within a contextual situation.	SE: 140-141, 158-159, 162-163, 167, 174, 176 TG: 140A, 158A, 163A
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.	The following pages in <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 228-229, 230-231, 244-245, 246-247, 248-249, 264, 265, 266 TG: 228A, 231A, 246A, 249A
PO 2. Construct box-and-whisker plots.	After illustrating examples of box-and-whisker plots, the following pages can be used. SE: 6-7, 8-9, 34, 35 TG: 7A, 8A
PO 3. Determine the appropriate type of graphical display for a given data set.	This objective can be met during a teacher/class discussion using the following pages: SE: 34, 73, 78 TG: R6 (<i>Correlations, Rankings, and Permutations</i>)
PO 4. Interpret box-and-whisker plots, circle graphs and scatter plots.	SE: 18-19, 20-21, 22-23, 39, 40, 41 TG: R3 (<i>Correlations, Rankings, and Permutations</i>)
PO 5. Answer questions based on box-and-whisker plots, circle graphs and scatter plots.	SE: 18-19, 20-21, 22-23, 39, 40, 41 TG: R3 (<i>Correlations, Rankings, and Permutations</i>)
PO 6. Solve problems in contextual situations using the mean, median, mode, and range of a given data set.	SE: 6, 8-9, 10-11, 12-13, 35, 36, 37 TG: R2-R3 (<i>Correlations, Rankings, and Permutations</i>)

CONTENT STANDARDS	PAGE REFERENCES
PO 7. Formulate reasonable predictions based on a given set of data.	SE: 138-139, 144-145, 148, 151, 154, 158-159, 160, 166, 169, 171
PO 8. Compare trends in data related to the same investigation.	SE: 7, 9, 13, 17, 18-19, 20-21, 38, 39
PO 9. Solve contextual problems using scatter plots, box-and-whisker plots, and double line graphs of continuous data.	SE: 22-23, 41, 154-155 TG: R3 (<i>Correlations, Rankings, and Permutations</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?)	This objective can be met during a teacher/class discussion using the following pages: SE: 10-11, 36 TG: 3G
PO 11. Identify a line of best fit for a scatter plot.	SE: 21, 23 TG: 3H, R3 (<i>Correlations, Rankings, and Permutations</i>)
PO 12. Distinguish between causation and correlation.	This objective can be met during a teacher/class discussion using the following pages: SE: 20-21, 23, 40, 41
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.	Experimental and theoretical probability is found on pages: SE: 26-27, 33, 42, 44, 45 TG: R4 (<i>Correlations, Rankings, and Permutations</i>)
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?)	SE: 26-27, 31, 33, 42, 44, 45
PO 3. Predict the outcome of a grade level appropriate probability experiment.	TG: 26A, 30A
PO 4. Record the data from performing a grade level appropriate probability experiment.	SE: 26, 30 TG: R16 (<i>Correlations, Rankings, and Permutations</i>)
PO 5. Compare the outcome of an experiment to predictions made prior to performing the experiment.	TG: 26A, 30A
PO 6. Distinguish between independent and dependent events.	The following pages in <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 cover independent events. SE: 66-67, 68-69, 86, 87 TG: 64-65, 66A, 68A
PO 7. Compare the results of two repetitions of the same grade level appropriate probability experiment.	This objective can be met through repetition of the following probability experiments: SE: 26, 30
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 6 sided number cube 4 times how many possible outcomes are possible?)	SE: 27, 28-29, 32-33, 42, 43, 44, 45

CONTENT STANDARDS	PAGE REFERENCES
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?")	SE: 30-31, 32-33, 44, 45
Concept 4: Vertex-Edge Graphs	
Understand and apply vertex-edge graphs.	
PO 1. Solve contextual problems represented by vertex-edge graphs.	After defining the term, use the following pages to meet this objective: SE: 62-63, 83 TG: 62A
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: 140-141, 142-143, 144, 152, 158, 160, 167, 168, 169, 175
PO 2. Extend a grade level appropriate iterative or recursive pattern.	SE: 142, 149, 154, 158, 166, 168, 169, 174 TG: R4 (<i>Modeling and Predicting</i>)
PO 3. Solve grade level appropriate iterative or recursive pattern problems.	SE: 144-145, 150-151, 154-155, 158-159, 167, 168, 169, 171, 173, 174
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: 55, 80, 272, 302
PO 2. Distinguish between linear and nonlinear functions, given graphic examples.	Linear, quadratic, and exponential functions are covered on the following pages: SE: 280-285, 288-293, 296-301, 305-313
PO 3. Determine whether a graph or table are related to a given an equation of the form $y=ax^2$ where 'a' is a natural number.	SE: 291, 309
PO 4. Identify independent and dependent variables for a contextual situation.	After defining the terms, use the following pages to meet this objective: SE: 167, 272-273, 288-289, 302-305, 308, 310 TG: 272A, 288A
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: 170, 184-185, 211, 213 TG: 179E, R2 (<i>Writing and Solving Equations</i>)
PO 2. Use variables in contextual situations.	SE: 151, 189, 198-199, 208-209, 215, 216, 217, 221
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: 55, 80, 208, 221
PO 4. Translate a sentence written in context into an algebraic equation involving two operations.	SE: 55, 80, 208, 221

CONTENT STANDARDS	PAGE REFERENCES
PO 5. Translate a contextual situation into an algebraic inequality. (e.g., Joe earns more than \$5.00 an hour; therefore, $x > 5$)	Inequalities can be found on the following pages in <i>MathScape: Seeing and Thinking Mathematically Course 1</i> © 2005 SE: 112, 114, 149, 150, 217, 258, 259, 270 Also see <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 186-187, 213 TG: 186a, 187A
PO 6. Identify an equation or inequality that represents a contextual situation.	Writing equations for contextual situations can be found on pages: SE: 55, 80, 303, 309 Also see <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 184-185, 188-189, 212, 214 TG: 185A, 188A
PO 7. Solve one-step equations with rational numbers as coefficients or as solutions.	SE: 219
PO 8. Solve one-step equations that model contextual situations.	SE: 219 Multi-step equations that model contextual situations are found on pages: SE: 208-209, 220, 221
PO 9. Solve two-step equations with rational coefficients and integer solutions. (e.g., $3x + 5 = 11$, $4x - 20 = 8$)	SE: 204-205, 206-207, 208-209, 219, 220, 221 TG: R4 (<i>Writing and Solving Equations</i>)
PO 10. Graph an inequality on a number line.	See <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 186-187, 206-207, 213, 221 TG: 186A, 207A
PO 11. Solve a simple algebraic proportion.	SE: 120, 229, 244-245, 247, 257, 258, 263, 264 TG: 241, R4 (<i>Slopes, Angles, and Ratios</i>)
PO 12. Solve applied problems using the Pythagorean theorem.	SE: 238-239, 247, 261, 264 TG: R3 (<i>Slopes, Angles, and Ratios</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: 242-243, 262, 280-281, 305 TG: 242A
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. Draw a model that demonstrates basic geometric relationships such as parallelism, perpendicularity, similarity/proportionality, and congruence.	SE: 120, 229, 231, 238, 257, 258, 267
PO 2. Draw three-dimensional figures by applying properties of each. (e.g., parallelism, perpendicularity and congruency)	This objective can be met with an activity for the following pages: SE: 94-95, 98-101, 104-111, 114-117
PO 3. Recognize the three-dimensional figure represented by a net.	SE: 94-95, 104, 108, 114, 122 TG: 91G, R2 (<i>Thinking Three-Dimensionally</i>)

CONTENT STANDARDS	PAGE REFERENCES
PO 4. Represent the surface area of rectangular prisms and cylinders as the area of their net.	SE: 98, 104, 108-109, 128 TG: 98A
PO 5. Draw regular polygons with appropriate labels.	See <i>MathScape: Seeing and Thinking Mathematically Course 1</i> © 2005 SE: 176-177, 180-181, 198, and 200. Also see <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 280-281, 284-285, 286-287, 290-291 TG: 281A, 282-283, 284A, 287A, 291A
PO 6. Identify the properties of angles created by a transversal intersecting two parallel lines (e.g., corresponding angles are congruent).	See <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 274-275, 276-277 TG: 274A, 276A
PO 7. Recognize the relationship between inscribed angles and intercepted arcs.	See <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 274-275, 294-295, 302, 210 TG: 274A, 275A, 294A
PO 8. Identify tangents and secants of a circle.	After providing the definitions for tangents and secants as they apply only to circles, the following can be used to meet this objective: See <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 294-295, 310 TG: 294A
PO 9. Determine whether three given lengths can form a triangle.	See <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 276-277, 278-279, 303, 304 TG: 277A, 278A
PO 10. Identify corresponding angles of similar polygons as congruent and sides as proportional.	Similar figures can be found on the following pages in <i>MathScape: Seeing and Thinking Mathematically Course 1</i> © 2005 SE: 280-281, 282-283, 286-287, 290-291, 300-301, 302-303 Also see <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 274, 276-277, 280-281, 288-289 TG: 276A, 277A, 280A, 281A, 283, 288A
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.	See <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 288-289, 290-291, 308 TG: 288A, 289A
PO 2. Model a simple transformation on a coordinate grid. (e.g., translate right four units and down two units)	See <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 288-289, 290-291, 308 TG: 283, 288A, 289A

CONTENT STANDARDS	PAGE REFERENCES
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: 274-275, 276-277, 282, 303, 304 TG: 269E
PO 2. Determine the midpoint given two points on a number line.	SE: 62-63, 83 TG: 62A, 63A
PO 3. Determine the distance between two points on a number line.	SE: 62-63, 83 TG: 62A, 63A
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.	See <i>MathScape: Seeing and Thinking Mathematically Course 1</i> © 2005 SE: 182-183 See <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 154-155, 174 TG: 155A
PO 2. Solve problems involving the volume of rectangular prisms and cylinders.	SE: 98-99, 105, 109, 121, 124, 126, 128, 133 TG: R2-R3 (<i>Thinking Three-Dimensionally</i>)
PO 3. Calculate the surface area of rectangular prisms or cylinders.	SE: 98-99, 100-101, 104, 108, 121, 124, 125, 126, 128, 133
PO 4. Identify rectangular prisms and cylinders having the same volume.	SE: 100, 133
PO 5. Find the measure of a missing interior angle in a triangle or quadrilateral.	SE: 235, 251, 254, 259, 265, 267 TG: R3 (<i>Slopes, Angles, and Ratios</i>)
PO 6. Solve problems using ratios and proportions, given the scale factor.	SE: 243, 244-245, 247, 250-251, 254-255, 262, 263, 264, 265, 267
PO 7. Calculate the length of a side given two similar triangles.	Calculating missing measurements in similar figures can be found on the following pages in <i>MathScape: Seeing and Thinking Mathematically Course 1</i> © 2005 SE: 282-283, 290-292, 309-312, 314-317, 319 Also see <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 276-277, 278-279, 280-281, 303, 304, 305 TG: 277A, 280A
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: 244-245, 247, 258
PO 2. Analyze algorithms.	This objective can be met during teacher/class discussions of the following: SE: 104-105, 106-107, 108-109, 114-115, 117 TG: 98A, 241

CONTENT STANDARDS	PAGE REFERENCES
<p>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.</p>	
<p>PO 1. Solve a logic problem given the necessary information.</p>	<p>See <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 122-123, 135 TG: 122A, 123A</p>
<p>PO 2. Identify simple valid arguments using if...then statements. (e.g., All squares are rectangles. If quadrilateral ABCD is a rectangle, is it a square?)</p>	<p>See <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 SE: 232-233, 236-237, 240-241, 252-255 TG: 232A, 233A, 236A, 237A, 252A, 253A, 255A</p>
<p>PO 3. Model a contextual situation using a flow chart.</p>	<p>After defining and illustrating a flowchart, use <i>MathScape: Seeing and Thinking Mathematically Course 1</i> © 2005, which shows a step-by-step process. SE: 121, 127, 173</p>
<p>PO 4. Verify the Pythagorean theorem using an area dissection argument.</p>	<p>This objective can be met with an activity for the following pages: SE: 236-237</p>