



ARIZONA
Academic Content Standards Grade 6
MathScape: Seeing and Thinking Mathematically
Course 1 © 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. Express fractions as ratios, comparing two whole numbers. (e.g., $\frac{3}{4}$ is equivalent to 3:4 and 3 to 4)	SE: 309-311 TG: 106-107
PO 2. Compare two proper fractions, improper fractions or mixed numbers.	SE: 110-111, 112-113, 114-115, 148, 149, 150 TG: 110A, 112A, 115A
PO 3. Order three or more proper fractions, improper fractions or mixed numbers.	SE: 110-111, 112-113, 148, 150, 217, 259 TG: 112A, 113A, 217A
PO 4. Determine the equivalency between and among fractions, decimals, and percents in contextual situations.	SE: 111, 113, 114-115, 148, 149, 212-213, 232-233, 238-239, 257, 265, 266, 268, 312, 316, 317, 319 TG: 110A, 113A, 114A, 212A, 213A, 230-231, 232A, 238A
PO 5. Identify the greatest common factor for two whole numbers.	SE: 98-99, 143 TG: 98A, 99A
PO 6. Determine the least common multiple for two whole numbers.	SE: 100-101, 144 TG: 100A, 101A, 116
PO 7. Express a whole number as a product of its prime factors using exponents when appropriate.	SE: 72-73, 74-75, 88, 89, 98-99, 100-101, 142, 143 TG: 72A, 74A, 75A, 98A, 102A
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: 102-103, 104-105, 126-127, 141, 142, 143, 144, 151, 155, 159, 161 TG: 95, 102A, 104A, 126A, 127A, 133A, 135A, 136A, 137A
PO 2. Solve word problems using grade level appropriate operations and numbers.	SE: 104-105, 127, 141, 146, 151, 157, 161 TG: 95, 102A, 104A, 117, 141A
PO 3. Apply grade level appropriate properties to assist in computation.	SE: 68-69 TG: 104A
PO 4. Apply the symbols for “...” or “—” to represent repeating decimals and “:” to represent ratios, superscripts as exponents.	SE: 72-73, 74-75, 88, 89, 228-229, 264 TG: 74A, 102A, 228A, 229A
PO 5. Use grade level appropriate mathematical terminology.	SE: 97, 99, 100, 110, 119, 122, 123, 137, 146 TG: 97A, 99A, 102A, 105A, 110A, 112A, 119A
PO 6. Simplify fractions to lowest terms.	SE: 309-311, 315, 317 TG: 120A

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PO 7. Add or subtract proper fractions and mixed numbers with unlike denominators with regrouping.	SE: 118-119, 120-121, 122-123, 124-125, 126-127, 151-155 TG: 117, 118A, 120A, 123A, 124A, 126A
PO 8. Demonstrate the process of multiplication of proper fractions using models.	SE: 130-131, 132-133, 156, 157 TG: 128, 130A, 131A, 132A
PO 9. Multiply proper fractions.	SE: 130-131, 132-133, 140-141, 156, 157, 161 TG: 128-129, 130A, 131A, 133A
PO 10. Multiply mixed numbers.	SE: 134-135, 140-141, 158, 161 TG: 135A, 141A
PO 11. Demonstrate that division is the inverse of multiplication of proper fractions.	SE: 136-137, 140-141, 159, 161 TG: 128-129, 131A, 136A, 137A, 141A
PO 12. Divide proper fractions.	SE: 136-137, 140-141, 159, 161 TG: 131A, 136A, 137A, 140A, 141A
PO 13. Divide mixed numbers.	SE: 136-137, 140-141, 159, 161 TG: 137A, 141A
PO 14. Solve problems involving fractions or decimals (including money) in contextual situations.	SE: 151, 155, 157, 159, 161, 210-211, 256 TG: 105A, 120A, 125A, 141A, 210A, 211A
PO 15. Simplify numerical expressions using the order of operations with grade appropriate operations on number sets.	SE: 102-103, 104-105, 145, 146 TG: 95, 102A, 104A
Concept 3: Estimation	
Use estimation strategies reasonably and fluently.	
PO 1. Solve grade level appropriate problems using estimation.	SE: 104-105, 138-139, 284-285, 286-287, 291 TG: 105A, 107, 139A, 230-231, 234A, 291A
PO 2. Use estimation to verify the reasonableness of a calculation. (e.g., Is $5/9 \times 3/7$ more than 1?)	SE: 134-135, 138-139, 158, 160, 216-217, 259, 284-285, 291, 295, 314 TG: 134A, 139A, 216A, 230-231, 234A, 284A, 285A, 291A, 295A
PO 3. Round to estimate quantities in contextual situations. (e.g., round up or round down)	SE: 216-217, 228-229, 259, 264 TG: 216A, 219, 229A
PO 4. Estimate and measure for the area and perimeter of polygons using a grid.	SE: 182-183, 201, 284-285, 292-293, 294-295 TG: 182A, 284A, 285A, 293A, 295A
PO 5. Verify the reasonableness of estimates made from calculator results within a contextual situation.	SE: 212-213, 222-223, 224-225, 226-227, 228-229, 257, 261, 262, 263 TG: 213A, 223A, 225A, 227A, 228A
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: 6-7, 10-11, 14-15, 18-19, 39, 41 TG: 6A, 11A, 15A, 18A
PO 2. Construct a histogram, line graph, scatter plot, or stem-and-leaf plot with appropriate labels and title from organized data.	SE: 10-11, 22-23, 24-25, 26-27, 36, 38, 42, 43, 44 TG: 10A, 20-21, 22A, 26A
PO 3. Interpret simple displays of data including double bar graphs, tally charts, frequency tables, circle graphs, and line graphs.	SE: 6-7, 14-15, 16-17, 18-19, 22-23, 24-25, 26-27, 40, 41, 42, 43, 265 TG: 7A, 8A, 12-13, 14A, 16A, 17A, 20-21, 25A
PO 4. Answer questions based on simple displays of data including double bar graphs, tally charts, frequency tables, circle graphs, and line graphs.	SE: 6-7, 14-15, 16-17, 18-19, 22-23, 24-25, 26-27, 40, 41, 42, 43, 265 TG: 5, 6A, 7A, 14A, 16A, 18A, 20-21, 22A, 25A

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PO 5. Find the mean, median (odd number of data points), mode, range, and extreme values of a given numerical data set.	SE: 6-7, 8-9, 10-11, 18-19, 22-23, 26-27, 36-38, 42, 43 TG: 4, 6A, 7A, 8A, 9A, 11A, 19A, 22A, 27A
PO 6. Identify a trend (variable increasing, decreasing, remaining constant) from displayed data.	SE: 6-7, 8-9, 10-11, 16-17, 18-19, 22-23, 24-25, 26-27, 36, 38, 39, 40, 41 TG: 6A, 8A, 16A, 19A, 20-21, 22A, 25A
PO 7. Compare trends in data related to the same investigation.	SE: 6-7, 10-11, 16-17, 18-19, 22-23, 26-27, 34-35, 36, 38, 40, 41, 47 TG: 16A, 19A, 22A, 26A
PO 8. Solve contextual problems using bar graphs, tally charts, and frequency tables.	SE: 6-7, 8-9, 10-11, 14-15, 16-17, 36, 39, 40 TG: 5, 6A, 8A, 10A, 12-13, 14A, 16A, 17A
Concept 2: Probability Understand and apply the basic concepts of probability.	
PO 1. Name the possible outcomes for a probability experiment.	SE: 30-31, 32-33, 34-35, 45, 46, 47 TG: 28-29, 30A, 31A, 32A, 33A, 34A
PO2. Express probabilities of a single event as a decimal.	SE: 32-33, 46 TG: 32A
PO 3. Predict the outcome of a grade level appropriate probability experiment.	SE: 30-31, 32-33, 34-35, 45-47 TG: 28-29, 30A, 31A, 33A, 34A, 35A
PO 4. Record the data from performing a grade level appropriate probability experiment.	SE: 30-31, 32-33, 34-35, 45-47 TG: 28-29, 32A, 33A, 35A
PO 5. Compare the outcome of an experiment to predictions made prior to performing the experiment.	SE: 31, 33, 46 #12 TG: 30A, 31A, 33A
PO 6. Make predictions from the results of student-generated experiments using objects (e.g., coins, spinners, number cubes, and cards).	SE: 30-31, 32-33, 34-35, 45-47 TG: 31A, 32A, 33A, 35A
PO 7. Compare the results of two repetitions of the same grade level appropriate probability experiment.	SE: 32, 35, 46, 47 TG: 32A, 33A, 35A
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 3 sets of 3 items, using a systematic approach. (e.g., 3 different shirts, 3 different pairs of pants, and 3 different belts)	The fundamental counting principle is found in <i>MathScape: Seeing and Thinking Mathematically Course 3</i> © 2005 page 29.
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.	See the number tree diagram on page 142. For additional coverage, see <i>MathScape: Seeing and Thinking Mathematically Course 3</i> © 2005 pages 27, 28-29, 42.
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).	See <i>MathScape: Seeing and Thinking Mathematically Course 3</i> © 2005 pages 62-63, 83.

CONTENT STANDARDS	PAGE REFERENCES
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.	SE: 328-329, 332-333, 334-335, 348-349, 356, 357, 358, 363 TG: 322-323, 330-331, 332A, 333A, 334A, 348A, 349A
PO 2. Extend a grade level appropriate iterative pattern.	SE: 200 #14, 318 #18, 324-325, 350-351, 354, 362 TG: 325A, 350A
PO 3. Solve grade level appropriate iterative pattern problems.	SE: 200 #14, 318 #18, 324-325, 350-351, 354, 362 TG: 325A, 350A
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: 326-327, 328-329, 332-333, 334-335, 336-337, 342-343, 344-345, 355, 356, 357, 358, 359, 361, 362 TG: 326A, 327A, 328A, 334A, 335A, 338-339, 342A, 343A
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 $n= \frac{1}{2}$)	SE: 332-333, 334-335, 336-337, 358, 359 #9 Fractions could be used in the following examples. TG: 334A, 336A, 337A
PO 2. Use variables in contextual situations.	SE: 332-333, 334-335, 336-337, 357, 358, 359 TG: 332A, 334A, 335A, 336A, 337A
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: 332-333, 334-335, 357, 358 TG: 332A, 334A
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: 332-333, 334-335, 336-337, 357, 358 TG: 332A, 334A, 335A, 337A
PO 5. Solve one-step equations with one variable represented by a letter or symbol, using inverse operations with whole numbers.	SE: 329, 334-335, 226-227, 349, 356, 363, 364 TG: 329A, 335A, 349A
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: 18-19, 22-23, 24-25, 26-27, 41, 42, 44, 342-343, 344-345 TG: 20-21, 25A, 26A, 27A, 342A, 344A, 345A

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. Classify polygons by their attributes. (e.g., number of sides, length of sides, angles, parallelism, perpendicularity)	SE: 166-167, 170-171, 176-177, 180-181, 182-183, 186-187, 188-189, 192-193, 194, 196, 198, 199-203, 205 TG: 166A, 170A, 174-175, 176A, 183A, 184-185, 186A, 187A
PO 2. Draw a geometric figure showing specified properties, such as parallelism and perpendicularity.	SE: 168-169, 170-171, 172-173, 176-177, 180-181, 186-187, 188-189, 192-193, 195, 196, 198, 202, 203, 205 TG: 166A, 168A, 170A, 174-175, 176A, 181A, 186A, 187A, 188A
PO 3. Classify prisms, pyramids, cones, and cylinders by base shape and lateral surface shape.	SE: 186-187, 188-189, 190-191, 192-193, 202-205 TG: 186A, 187A, 188A, 192A
PO 4. Classify three-dimensional figures by their attributes.	SE: 186-187, 188-189, 190-191, 192-193, 202-205 TG: 184-185, 186A, 187A, 188A
PO 5. Compare attributes of two-dimensional figures with three-dimensional figures.	SE: 166-167, 168-169, 170-171, 176-177, 186-187, 190-191, 192-193, 194, 195, 196, 198, 202, 204, 205 TG: 166A, 168A, 170A, 176A, 186A, 191A
PO 6. Draw triangles with appropriate labels.	SE: 176-177, 182-183, 192-193, 198, 201, 205 TG: 176A, 182A
PO 7. Identify supplementary or complementary angles.	SE: 178-179, 180-181, 182-183, 192-193, 199, 200, 201, 205 TG: 178A, 192A
PO 8. Identify the diameter, radius and circumference of a circle or sphere.	See <i>MathScape: Seeing and Thinking Mathematically Course 2</i> © 2005 pages 292-301, 310-313.
PO 9. Draw a two-dimensional shape with a given number of lines of symmetry.	SE: 166-167, 170-171, 176-177, 192-193, 194, 196, 198, 205 TG: 166A, 171A, 176A, 177A, 192A
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.	SE: 168-169, 176-177, 195, 198, 312, 318 #18 TG: 168A, 169A, 176A
PO 2. Perform elementary transformations to create a tessellation.	SE: 168-169, 170-171, 176-177, 195, 196, 198, 318 #18 TG: 168A, 169A, 170A, 175, 176A
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.	SE: 340-341, 342-343, 360, 361 TG: 340A, 341A, 342A
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)	SE: 340-341, 342-343, 344-345, 360, 361, 362 TG: 340A, 341A, 342A

CONTENT STANDARDS	PAGE REFERENCES
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?)	SE: 286-287, 292-293, 294, 295, 296-297, 306-307, 311, 313, 314, 315, 319 TG: 286A, 292A, 296A, 306A
PO 2. Determine the appropriate tool needed to measure to the needed accuracy.	SE: 178-179, 282-283, 292-293, 301, 302-303, 306-307, 309, 313, 316, 317, 319 TG: 178A, 281A, 283A, 292A
PO 3. Determine a linear measurement to the appropriate degree of accuracy.	Linear measurement is units for measuring lengths and distance. The following pages will help meet this objective: 178-179, 199, 284-285, 304-305, 306-307, 310, 342-343 TG: 284A, 305A, 342A.
PO 4. Measure angles using a protractor.	SE: 178-179, 199 TG: 178A
PO 5. Convert within a single measurement system (US customary or metric). (e.g., how many ounces are equivalent to 2 pounds?)	SE: 149 #21-#25, 280-281, 292-293, 294-295, 308, 310 #15, 313, 315 TG: 281A, 292A, 293A
PO 6. Solve problems involving the perimeter of polygons.	SE: 182-183, 201, 312 #18, 313 #19-#20 TG: 182A
PO 7. Determine the area of triangles.	SE: 182-183, 201, 314 #11-#13 TG: 182A
PO 8. Distinguish between the perimeter and area in contextual situation.	SE: 182-183, 201, 313 #19-#20 TG: 182A
PO 9. Solve problems for the areas of parallelograms (includes rectangles).	SE: 158 #21-#22, 182-183, 201, 262 #21-#22, 314 #11-#13 TG: 182A
PO 10. Identify parallelograms having the same perimeter or area.	SE: 182-183, 201, 313 #19-#20, 319 #9-#10 TG: 182A
PO 11. Determine the actual measure of objects using a scale drawing or map.	SE: 280-281, 282-283, 290-291, 300-301, 302-303, 309, 310 #17, 312, 316, 317 TG: 280A, 281A, 283A, 290A, 301A, 302A
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.	SE: 6-7, 10-11, 16-17, 18-19, 22-23, 24-25, 36, 38, 40, 41, 42, 43 TG: 6A, 10A, 11A, 16A, 19A, 25A
PO 2. Analyze algorithms for computing with decimals.	SE: 220-221, 222-223, 224-225, 226-227, 228-229, 260-264, 269 #13 TG: 218-219, 220A, 221A, 222A, 223A, 226A
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. (Which of three different people live in which of three different colored houses?)	SE: 39 #10, 43 #6, 297, 303, 324-325, 326-327, 328-329, 348-349, 354, 355, 356, 363 TG: 297A, 303A, 326A, 328A