2010 ACOS MATHEMATICS/ARMT+ SPECIFICATIONS CORRELATION

GRADE 8

2010 ACOS		ARMT+ Specifications					
CURRENT GRADE 8 CONTENT		2003 CONTENT STANDARD		ITEM TYPE	POINTS POSS.	ADDITIONAL INFORMATION	PAGES IN ITEM SPECS
8.1	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. [8-NS1]						
8.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions. [8-NS2]						
8.3	Know and apply the properties of integer exponents to generate equivalent numerical expressions. [8-EE1]	8.2	Simplify expressions containing natural number exponents by applying one or more of the laws of exponents.	Multiple-choice	4	• Word problems/real-life situations may be used. • Scientific notation may be used. • Fractions as bases may be used. • Answers may have negative exponents.	pp. 12-16
8.4	Use square root and cube root symbols to represent solutions to equations of the form x^2 = p and x^3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. [8-EE2]	8.2	Simplify expressions containing natural number exponents by applying one or more of the laws of exponents.	Multiple-choice	4	• Word problems/real-life situations may be used. • Scientific notation may be used. • Fractions as bases may be used. • Answers may have negative exponents.	pp. 12-16
8.5	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. [8-EE3]						
8.6	Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities[8-EE4]	8.3	Use order of operations to evaluate and simplify algebraic expressions.	Multiple-choice Gridded	4	• Substitution may be required. • Raising a number to a power may be required. • Word problems may be used.	pp. 17-21

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8.7	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. [8-EE5]	8.4	Graph linear relations by plotting points or by using the slope and y- intercept.	Multiple-choice Open-ended	9	• Identification of a graph given either the slope and *y*-intercept, *x*-intercept and *y*-intercept, ordered pairs, a table of values for *x* and *y*, or equation may be required. • Constructing a graph of a linear equation on a coordinate plane may be required. • Word problems/real-life situations may be used. • Equations may be expressed in standard form. • Determining the slopes and y-intercepts of a line may be required. • Options may be four graphs.	pp. 22-55
8.8	Use similar triangles to explain why the slope m is the same between any two distinct point on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b. [8-EE6]	8.4	Graph linear relations by plotting points or by using the slope and y- intercept.	Multiple-choice Open-ended	9	• Identification of a graph given either the slope and *y*-intercept, *x*-intercept and *y*-intercept, ordered pairs, a table of values for *x* and *y*, or equation may be required. • Constructing a graph of a linear equation on a coordinate plane may be required. • Word problems/real-life situations may be used. • Equations may be expressed in standard form. • Determining the slopes and y-intercepts of a line may be required. • Options may be four graphs.	pp. 22-55

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8.9 8.9a 8.9b	Solve linear equations in one variable. [8-EE7] a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers). [8-EE7a] b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. [8-EE7b]	8.5	Solve problems involving linear functions.	Multiple-choice Gridded	4	• Equations may be expressed in terms of f(x). • Determining the value of a variable in a linear equation given the values of other variables in the linear equation may be required. • A special relationship between lines on a coordinate plane may be required (same line, intersecting lines, parallel lines, and perpendicular lines). • Word problems/real-life situations may be used. • Determining the equation of a line given two ordered pairs or set of points may be required. • Determining the equation of a line given the line graphed on the coordinate plane may be required. • The options may be four graphs.	pp. 56-61
		8.6	Solve multistep linear equations, including equations requiring the use of the distributive property.	Multiple-choice Gridded	4	• Coefficients may be simple fractions or decimals. • One or two sets of parentheses may be used. • The solution to the equation may be a fraction or a decimal. • “No solution” may be a choice.	pp. 62-66
8.10 8.10a 8.10b 8.10c	Analyze and solve pairs of simultaneous linear equations. [8-EE8] a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs because points of intersection satisfy both equations simultaneously. [8-EE8a] b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. [8-EE8b] c. Solve real-world and mathematical problems leading to two linear equations in two variables. [8-EE8c]						
8.11	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. (Function notation is not required in Grade 8.) [8-F1]						

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8.12	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). [8-F2]						
8.13	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. [8-F3]						
8.14	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. [8-F4]	8.4	Graph linear relations by plotting points or by using the slope and y- intercept.	Multiple-choice Open-ended	9	• Identification of a graph given either the slope and *y*-intercept, *x*-intercept and *y*-intercept, ordered pairs, a table of values for *x* and *y*, or equation may be required. • Constructing a graph of a linear equation on a coordinate plane may be required. • Word problems/real-life situations may be used. • Equations may be expressed in standard form. • Determining the slopes and y-intercepts of a line may be required. • Options may be four graphs.	pp. 22-55
8.15.	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally. [8-F5]	8.4	Graph linear relations by plotting points or by using the slope and y- intercept.	Multiple-choice Open-ended	9	• Identification of a graph given either the slope and *y*-intercept, *x*-intercept and *y*-intercept, ordered pairs, a table of values for *x* and *y*, or equation may be required. • Constructing a graph of a linear equation on a coordinate plane may be required. • Word problems/real-life situations may be used. • Equations may be expressed in standard form. • Determining the slopes and y-intercepts of a line may be required. • Options may be four graphs.	pp. 22-55
8.16 8.16a 8.16b 8.16c	Verify experimentally the properties of rotations, reflections, and translations: [8-G1] a. Lines are taken to lines, and line segment to line segments of the same length. [8-G1a] b. Angles are taken to angles of the same measure. [8-G1b] c. Parallel lines are taken to parallel lines. [8-G1c]						

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8.17	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. [8-G2]	8.8	Compare quadrilaterals, triangles, and solids, using their properties and characteristics.	Multiple-choice	4	• Identifying the properties and characteristics of all types of quadrilaterals, triangles, and solids will be required. • Identifying the relationships between types of quadrilaterals, triangles, and solids will be required.	pp. 79-84
8.18	Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates. [8-G3]	8.8	Compare quadrilaterals, triangles, and solids, using their properties and characteristics.	Multiple-choice	4	• Identifying the properties and characteristics of all types of quadrilaterals, triangles, and solids will be required. • Identifying the relationships between types of quadrilaterals, triangles, and solids will be required.	pp. 79-84
8.19	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. [8-G4]	8.8	Compare quadrilaterals, triangles, and solids, using their properties and characteristics.	Multiple-choice	4	• Identifying the properties and characteristics of all types of quadrilaterals, triangles, and solids will be required. • Identifying the relationships between types of quadrilaterals, triangles, and solids will be required.	pp. 79-84
8.20	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. [8-G5]	8.9	Determine the measures of special angle pairs, including adjacent, vertical, supplementary, and complementary angles, and angles formed by parallel lines cut by a transversal.	Multiple-choice Gridded	4	• Diagrams may be included. • Knowledge of the sum of angles may be required. • Determining measurements of angles when the measurements of angles are expressed as algebraic expressions may be required.	pp. 85-95
8.21	Explain a proof of the Pythagorean Theorem and its converse. [8-G6]						
8.22	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. [8-G7]	8.7	Solve problems using the Pythagorean Theorem.	Multiple-choice Gridded Open-ended	6	• Word problems/real-life situations may be used. • Diagrams may be included. • Determining the missing leg or hypotenuse of a right triangle may be required. • Determining whether a figure is a right triangle may be required. • No radical will be included. • Extracting a perfect square root may be required.	pp. 67-78

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8.23	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. [8-G8]	8.7	Solve problems using the Pythagorean Theorem.	Multiple-choice Gridded Open-ended	6	• Word problems/real-life situations may be used. • Diagrams may be included. • Determining the missing leg or hypotenuse of a right triangle may be required. • Determining whether a figure is a right triangle may be required. • No radical will be included. • Extracting a perfect square root may be required.	pp. 67-78
8.24	Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. [8-G9]	8.11	Determine the surface area and volume of rectangular prisms, cylinders, and pyramids.	Multiple-choice Open-ended	6	• Word problems/real-life situations may be used. • Drawings may be used. • A fractional representation of a real number may be used.	pp. 103-118
8.25	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. [8-SP1]	8.13	Interpret data from populations, using given and collected data.	Multiple-choice Open-ended	6	• Word problems/real-life situations may be used. • Frequency tables may be used. • Constructing a graph to represent the data may be required. • Stem-and-leaf plots may be used. • Box-and-whisker plots may be used.	pp. 128-141
8.26	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line. [8-SP2]						
8.27	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. [8-SP3]						
8.28	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. [8-SP4]						

Additional Standards that Must Be Addressed for ARMT+

	2003 CONTENT STANDARD		ITEM TYPE	POINTS POSS.	ADDITIONAL INFORMATION	PAGES IN ITEM SPECS
	8.1	Use various strategies and operations to solve problems involving real numbers.	Multiple-choice Gridded	7	• Estimation may be required. • Word problems/real-life situations may be used. • Proportional reasoning may be required. • Any representation of a real number may be used.	pp. 5-11
	8.10	Find the perimeter and area of regular and irregular plane figures.	Multiple-choice Gridded	4	• Determining the area of a figure when given the perimeter of the figure may be required. • Word problems may be used. • Drawings may be used. • Determining the area of a part of a circle may be required. • Options may be left in terms of π. • Unnecessary dimensions may be given. • Inscribed figures may be used.	pp. 96-102
	8.12	Determine the lengths of missing sides and measures of angles in similar and congruent figures.	Multiple-choice Gridded	4	• Diagrams may be used. • Fraction or decimal representation of a real number may be used. • Determining the measurements of sides when the measurements of the sides are expressed as algebraic expressions may be required. • Inscribed figures may be used. • Reflected figures may be used.	pp. 119-127
	8.14	Determine the theoretical probability of an event.	Multiple-choice Gridded	4	• Both “and” and “or” situations may be included. • Fraction and percent may be used. • Word problems/real-life situations may be used.	pp. 142-147