MATH – GRADE 8

Assessment Anchors & Eligible Content

Pennsylvania Department of Education

2007

M8.A Numbers and Operations

M8.A.1 Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems.

M8.A.1.1	Represent numbers in equivalent forms. ***Reference: 2.1.8.A, 2.1.8.B***	**M8.A.1.1.1**	Represent numbers using scientific notation and/or exponential forms.
		M8.A.1.1.2	Find the square or cube of a whole number (single digit) and/or the square root of a perfect square (without a calculator) and explain the relationship between the two (i.e. square and square root).

M8.A Numbers and Operations

M8.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.

M8.A.2.1	Complete calculations by applying the order of operations. ***Reference: 2.2.8.A***	**M8.A.2.1.1**	Simplify numeric expressions involving integers, using the order of operations. (May include all types of grouping symbols. No combining negatives with exponents (4^{-3}) or compound exponents.)

M8.A Numbers and Operations

M8.A.2 Understand the meanings of operations, use operations and understand how they relate to each other.

M8.A.2.2	Represent or solve problems using rates, ratios, proportions and/or percents. ***Reference: 2.1.8.D, 2.3.8.B***	**M8.A.2.2.1**	Solve problems involving percents (e.g., tax, discounts, etc) Do not include percent increase or decrease.
		M8.A.2.2.2	Represent or solve rate problems (e.g., unit rates, simple interest, distance, etc.) Students may be asked to solve for any term (formulas provided on the reference sheet for distance and interest).

M8.A Numbers and Operations

M8.A.3 Compute accurately and fluently and make reasonable estimates.

M8.A.3.1	Determine the appropriateness of overestimating, underestimating or calculating an exact answer in problem-solving situations. ***Reference: 2.2.8.F***	**M8.A.3.1.1**	Identify, use and/or explain when it is appropriate to round up or round down.
		M8.A.3.1.2	Identify, apply and/or explain when an exact answer is needed or when estimation is appropriate.

M8.A Numbers and Operations

M8.A.3 Compute accurately and fluently and make reasonable estimates.

M8.A.3.2	Use estimation strategies in problem-solving situations. ***Reference: 2.2.8.D***	**M8.A.3.2.1**	Estimate answers to problems involving percents (percents will be limited to: 1%, 10%, 15%, 20%, 25%, 50% or 75%).

M8.A Numbers and Operations

M8.A.3 Compute accurately and fluently and make reasonable estimates.

M8.A.3.3	Compute and/or explain operations with integers, fractions and/or decimals. ***Reference: 2.2.8.B***	**M8.A.3.3.1**	Add, subtract, multiply and/or divide integers, fractions and/or decimals with and without a calculator (straight computation or word problems).

M8.B Measurement

M8.B.1 Demonstrate an understanding of measurable attributes of objects and figures, and the units, systems and processes of measurement.

M8.B.1.1	Convert measurements. ***Reference: 2.3.5.D***	**M8.B.1.1.1**	Convert among metric measurements (milli, centi, kilo using meter, liter and gram) (table of equivalency provided on the reference sheet).
		M8.B.1.1.2	Convert customary measurements up to 2 units above or below the given unit (e.g., inches to yards, pints to gallons) (table of equivalency provided on the reference sheet).
		M8.B.1.1.3	Convert time up to 2 units above or below given unit (e.g., seconds to hours).
		M8.B.1.1.4	Convert from Fahrenheit to Celsius or Celsius to Fahrenheit (formulas provided on the reference sheet).

M8.B Measurement

M8.B.2 Apply appropriate techniques, tools and formulas to determine measurements.

M8.B.2.1 Determine the measurement of a missing side(s) or angle(s) in a polygon.

Reference: 2.3.8.C, 2.9.8.D

M8.B.2.1.1 Determine the total number of degrees in the interior angles of a polygon in 3 - 8 sided figures (formula provided on the reference sheet).

M8.B.2.1.2 Determine the measurement of one interior angle of a regular polygon (3-8 sided polygons, formula provided on the reference sheet).

M8.B.2.1.3 Determine the number of sides of a polygon given the total number of degrees in the interior angles (3-8 sided polygons, formula provided on the reference sheet).

M8.B Measurement

M8.B.2 Apply appropriate techniques, tools and formulas to determine measurements.

M8.B.2.2	Use, describe and/or develop procedures to determine measures of perimeter, circumference, area, surface area and/or volume. ***Reference: 2.3.8.A, 2.3.8.D***	**M8.B.2.2.1**	Calculate the surface area of cubes and rectangular prisms (formula provided on the reference sheet).
		M8.B.2.2.2	Calculate the volume of cubes and rectangular prisms (formulas provided on the reference sheet).
		M8.B.2.2.3	Determine the appropriate type of measurement (circumference, perimeter, area, surface area, volume) for a given situation (e.g., which measurement is needed to determine the amount of carpeting for a room).

M8.C Geometry

M8.C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes and demonstrate understanding of geometric relationships.

M8.C.1.1 Identify, use, and/or describe properties of angles, triangles, quadrilaterals, circles, pyramids, cubes, prisms, spheres, cones and/or cylinders.

Reference: 2.3.8.C, 2.9.8.B, 2.9.8.E, 2.9.8.D

M8.C.1.1.1 Match the three-dimensional figure with its net (cube, cylinder, cone, prism, pyramid). Any measurements used should be consistent in the stem and answer choices.

M8.C.1.1.2 Define, identify and/or use properties of angles formed by intersecting lines (complementary, supplementary, adjacent and/or vertical angles).

M8.C.1.1.3 Define, identify and/or use properties of angles formed when two parallel lines are cut by a transversal (alternate interior, alternate exterior, vertical corresponding).

M8.C Geometry

M8.C.1 Analyze characteristics and properties of two- and three-dimensional geometric shapes and demonstrate understanding of geometric relationships.

M8.C.1.2	Compute measures of sides of right triangles using the Pythagorean Theorem. ***Reference: 2.10.8.A***	**M8.C.1.2.1**	Use the Pythagorean Theorem to find the measure of a missing side of a right triangle (formula provided on the reference sheet – whole numbers only).

M8.C Geometry

M8.C.2 Identify and/or apply concepts of transformations or symmetry.

Not assessed at Grade 8.

M8.C Geometry

M8.C.3 Locate points or describe relationships using the coordinate plane.

M8.C.3.1	Plot and/or identify ordered pairs on a coordinate plane. ***Reference: 2.8.5.H***	**M8.C.3.1.1**	Plot, locate or identify ordered pairs on a coordinate plane (the point may be a vertex of a polygon).

M8.D Algebraic Concepts

M8.D.1 Demonstrate an understanding of patterns, relations and functions.

M8.D.1.1	Analyze, extend or develop descriptions of patterns or functions. ***Reference: 2.8.8.B, 2.8.8.G, 2.11.8.C***	**M8.D.1.1.1**	Continue a numeric or algebraic pattern (pattern must show 3 repetitions – may include up to 2 operations, squares and square roots).
		M8.D.1.1.2	Find missing elements in numeric or geometric patterns and/or functions (may be given a table or rule – pattern must show 3 repetitions).
		M8.D.1.1.3	Determine the rule of a function (given elements in an input-output table, chart or list – limit to linear functions).

M8.D Algebraic Concepts

M8.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.

M8.D.2.1	Select and/or use a strategy to simplify an expression, solve an equation or inequality and/or check the solution for accuracy. ***Reference: 2.8.8.C, 2.8.8.E***	**M8.D.2.1.1**	Solve one- or two-step equations and inequalities (should not include absolute values – one variable only).
		M8.D.2.1.2	Use substitution to check the accuracy of a given value for an equation or inequality (simple inequalities with one variable).
		M8.D.2.1.3	Determine the value of an algebraic expression by simplifying and/or substituting a number for the variable.

M8.D Algebraic Concepts

M8.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.

M8.D.2.2	Create and/or interpret expressions, equations or inequalities that model problem situations. ***Reference: 2.8.8.C***	**M8.D.2.2.1**	Match a written situation to its numeric and/or algebraic expression, equation or inequality (up to two variables in equations or expressions – one variable with inequalities).
		M8.D.2.2.2	Write and/or solve an equation for a given problem situation (one variable only).

M8.D Algebraic Concepts

M8.D.3 Analyze change in various contexts.

Not assessed at grade 8.

M8.D Algebraic Concepts

M8.D.4 Describe or use models to represent quantitative relationships.

M8.D.4.1	Represent relationships with tables or graphs on the coordinate plane. ***Reference: 2.8.8.C, 2.8.8.H***	**M8.D.4.1.1**	Graph a linear function based on an x/y table (integers only).
		M8.D.4.1.2	Match the graph of a linear function to its x/y table (integers only).
		M8.D.4.1.3	Match the linear equation (y = mx + b form) to the x/y table (integers only in the table).

M8.E Data Analysis and Probability

M8.E.1 Formulate or answer questions that can be addressed with data and/or organize, display, interpret or analyze data.

M8.E.1.1	Choose, display or interpret data (tables, charts, graphs, etc.). ***Reference: 2.6.5.A, 2.6.8.E, 2.7.8.D, 2.6.3.B***	**M8.E.1.1.1**	Choose and/or explain the correct representation (graph) for a set of data.
		M8.E.1.1.2	Analyze data and/or answer questions pertaining to data shown in multiple line graphs, circle graphs or histograms.
		M8.E.1.1.3	Interpret data shown in stem-and-leaf or box-and-whisker plots.

M8.E Data Analysis and Probability

M8.E.2 Select and/or use appropriate statistical methods to analyze data.

Not assessed at grade 8.

M8.E Data Analysis and Probability

M8.E.3 Understand and/or apply basic concepts of probability or outcomes.

M8.E.3.1	Calculate the probability of an event. ***Reference: 2.7.8.E***	**M8.E.3.1.1**	Find the probability for a mutually exclusive or an independent event (written as a fraction in simplest form).

M8.E Data Analysis and Probability

M8.E.3 Understand and/or apply basic concepts of probability or outcomes.

M8.E.3.2	Determine the number of combinations and/or permutations for an event. ***Reference: 2.7.8.A***	**M8.E.3.2.1**	Determine/show the number of permutations and/or combinations for an event using up to four choices (e.g., organized list, etc.).

M8.E Data Analysis and Probability

M8.E.4 Develop and/or evaluate inferences and predictions or draw conclusions based on data or data displays.

M8.E.4.1	Draw conclusions, make inferences and/or evaluate hypotheses based on statistical and data displays. ***Reference: 2.6.8.C, 2.7.8.E***	**M8.E.4.1.1**	Fit a line to a scatter plot and/or describe any correlation between the two variables (positive, negative, strong, weak or none).
		M8.E.4.1.2	Make predictions based on survey results or graphs (bar, line, circle, scatterplots, etc.).