

Mathematics

Pre-Algebra

10/2/2009

Number, Number Sense and Operations	Measurement
1. Demonstrate an understanding of place value using powers of 10 and write large and small numbers in scientific notation.	1. Select appropriate units for measuring derived measurements; e.g., miles per hour, revolutions per minute.
2. Explain meaning of exponents that are negative or 0.	2. Convert units of area and volume within the same measurement system using proportional reasoning and a reference table when appropriate; e.g., square feet to square yards, cubic meters to cubic centimeters.
3. Describe differences between rational and irrational numbers; e.g., use technology to show that some numbers (rational) can be expressed as terminating or repeating decimals and others (irrational) as non-terminating or non-repeating decimals.	3. Estimate a measurement to a greater degree of precision than the tool provides.
4. Use order of operations and properties to simplify numerical expressions involving integers, fractions and decimals.	4. Solve problems involving proportional relationships and scale factors; e.g., scale models that require unit conversions within the same measurement systems.
5. Explain the meaning and effect of adding, subtracting, multiplying, and dividing integers; e.g., how adding two integers can result in a lesser value.	5. Analyze problem situations involving measurement concepts, select appropriate strategies, and use an organized approach to solve narrative and increasingly complex problems.
6. Simplify numerical expressions involving integers and use integers to solve real-life problems.	6. Use strategies to develop a formula for finding the area of a trapezoid.
7. Solve problems using the appropriate form of a rational number including ratio & proportion, fraction, decimal or percent.	7. Derive and use formulas to find the surface area of cylinders, pyramids, and prisms.
8. Develop and analyze algorithms for computing with percents and integers, and demonstrate fluency in their use.	8. Use formulas to find the volume of cylinders, prisms, pyramids, cones, and spheres.
9. Represent and solve problem situations that can be modeled by and solved using concepts of absolute value, exponents and square roots (for perfect squares).	9. Develop strategies to find the area of composite shapes using the areas of triangles, parallelograms, circles and sectors.
10. Recognize that natural numbers, whole numbers, integers, rational numbers, and irrational numbers are subsets of the real number system.	10. Understand the difference between surface area and volume and demonstrate that two objects may have the same surface area, but different volumes or may have the same volume, but different surface areas.
11. Use prime factorization to find the greatest common factor and least common multiple of a set of whole numbers.	11. Describe what happens to the surface area and volume of a three-dimensional object when the measurements of the object are changed; e.g. length of sides are doubled.

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Geometry	Algebra
<ol style="list-style-type: none"> 1. Use proportional reasoning to describe and express relationships between parts and attributes of similar and congruent figures. 2. Determine and test sufficient (not necessarily minimal) properties that define a specific two-dimensional figure or three-dimensional object. For example: <ol style="list-style-type: none"> a. Determine when one set of figures is a subset of another; e.g. all squares are rectangles; b. Develop a set of properties that eliminates all but the desired figure; e.g. only squares are quadrilaterals with all sides congruent and all angles congruent. 3. Use and demonstrate understanding of the properties of triangles. For example: <ol style="list-style-type: none"> a. Use Pythagorean Theorem to solve problems involving right triangles. b. Use triangle angle sum relationships to solve problems. 4. Determine necessary conditions for congruence of triangles. For example: find sums of interior angles of convex polygons. 5. Apply properties of congruent or similar triangles to solve problems involving missing lengths and angle measures. For example: indirect measure. 6. Determine and use scale factors for similar figures to solve problems using proportional reasoning. 7. Identify the line and rotation symmetries of two-dimensional figures to solve problems. 8. Understand the difference between surface area and volume and demonstrate that two objects may have the same surface area, but different volumes or may have the same volume, but different surface areas. 9. Describe what happens to the surface area and volume of a three-dimensional object when the measurements of the object are changed; e.g., length of sides are doubled. 	<ol style="list-style-type: none"> 1. Represent and analyze patterns, rules and functions with word, tables, graphs and simple variable expressions. 2. Generalize patterns by describing in words how to find the next term. 3. Recognize and explain when numerical patterns are linear or nonlinear progressions; e.g., 1,3,5,7,... is linear and 1,3,4,8,16 ... is nonlinear. 4. Create visual representations of equation-solving processes that model the use of inverse operations. 5. Solve one-step and multistep equations and inequalities algebraically. 6. Represent linear equations/ inequalities by graphing them on the coordinate plane using a table or slope-intercept form. 7. Represent inequalities on a number line. 8. Justify that two forms of an algebraic expression are equivalent, and recognize when an expression is simplified; e.g., $4m = m + m + m + m$ or $5 + 4 = 5a + 4$. 9. Use formulas in problem-solving situations 10. Recognize a variety of uses for variables; e.g., placeholder for an unknown quantity in an equation, generalization for a pattern, formula. 11. Analyze linear and simple nonlinear relationships to explain how a change in one variable results in the change of another. 12. Evaluate functions at given values. 13. Apply algebraic properties to simplify algebraic expressions; e.g., commutative, associative, distributive, identity, or inverse.

Data Analysis and Probability

1. Read, create, and interpret box-and-whisker plots, scatter plots, stem-and-leaf plots, and other types of graphs, when appropriate.
2. Analyze how decisions about graphing affect the graphical representation; e.g., scale, size of classes in a histogram, number of categories in a circle graph.
3. Analyze a set of data by using and comparing combinations of measures of center (mean, mode, median) and measures of spread (range, quartile, interquartile range), and describe how the inclusion or exclusion of outliers affects those measure.
4. Construct convincing arguments (either supporting or opposing) based on analysis of the same data, using different graphical representations.
5. Compare data from two or more samples to determine how sample selection can influence results.
6. Identify misuses of statistical data in articles, advertisements, and other media.
7. Identify different ways of selecting samples, such as survey response, random sample, representative sample and convenience sample.
8. Compute probabilities of compound events; e.g., multiple coin tosses or multiple rolls of number cubes, using such methods as organized lists, tree diagrams and area models.
9. Make predictions based on theoretical probabilities, design and conduct an experiment to test the predictions, compare actual results to predicted, and explain differences.