Additional Critical Areas for 7 PLUS

from Common Core Math 8

**1. Formulating and reasoning about expressions and equations and solving linear equations -** Students use linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions (*y*/*x* = *m* or *y* = *mx*) as special linear equations (*y* = *mx* + *b*), understanding that the constant of proportionality (*m*) is the slope, and the graphs are lines through the origin. They understand that the slope (*m*) of a line is a constant rate of change, so that if the input or *x*-coordinate changes by an amount *A*, the output or *y*-coordinate changes by the amount *m·A*.

Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation. Students use linear equations and their understanding of slope of a line to analyze situations and solve problems.

**2.** **Analyzing two-and three-dimensional space and figures using distance, angle, similarity, and congruence -** Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

Additional Standards for 7 PLUS

from Common Core Math 8

**THE NUMBER SYSTEM 8.NS**

**Know that there are numbers that are not rational, and approximate them by rational numbers.**

**8.NS.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.NS.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 (e.g., π2). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*

**EXPRESSIONS and EQUATIONS 8.EE**

**Work with radicals and integer exponents.**

**8.EE.1** Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3–5 = 3–3 = 1/33 = 1/27.

**8.EE.2**. 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.EE.3**  Use numbers expressed in the form of a single digit times a whole-number power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3 times 108 and the population of the world as 7 times 109, and determine that the world population is more than 20 times larger.*

**8.EE.4**  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 (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

**Understand the connections between proportional relationships, lines, and linear equations.**

**8.EE.5**  Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.

**8.EE.6**  Use similar triangles to explain why the slope m is the same between any two distinct points 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*.

**Analyze and solve linear equations and pairs of simultaneous linear equations.**

**8.EE.7** Solve linear equations in one variable.

b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

**GEOMETRY 8.G**

**Understand congruence and similarity using physical models, transparencies, or geometry software.**

**8.G.1**  Verify experimentally the properties of rotations, reflections, and translations:

1. Lines are taken to lines, and line segments to line segments of the same length.
2. Angles are taken to angles of the same measure.
3. Parallel lines are taken to parallel lines.

**8.G.2**. 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.G.3**  Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

**8.G.4**  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.G.5**  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. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*

**Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.**

**8.G.9**  Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.