



SIGNATURE

DATE

# Summative Mathematics 2011-2012 Benchmark Blueprint

Action Learning Systems

Assessments

Algebra I		1	2	3	4
4.0	Students simplify expressions before solving linear equations and inequalities in one variable, such as $3(2x - 5) + 4(x - 2) = 12$ .	3			
5.0	Students solve multistep problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.	3			
6.0	Students graph a linear equation and compute the x- and y- intercepts (e.g., graph $2x + 6y = 4$ ). They are also able to sketch the region defined by linear inequality (e.g., they sketch the region defined by $2x + 6y < 4$ ).	3			
7.0	Students verify that a point lies on a line, given an equation of the line. Students are able to derive linear equations by using the point-slope formula.	3			
8.0	Students understand the concepts of parallel lines and perpendicular lines and how those slopes are related. Students are able to find the equation of a line perpendicular to a given line that passes through a given point.	3			
10.0	Students add, subtract, multiply, and divide monomials and polynomials. Students solve multistep problems, including word problems, by using these techniques.	3			
11.0	Students apply basic factoring techniques to second- and simple third-degree polynomials. These techniques include finding a common factor for all terms in a polynomial, recognizing the difference of two squares, and recognizing perfect squares of binomials.	3			
12.0	Students simplify fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms.	3			
14.0	Students solve a quadratic equation by factoring or completing the square.	3			
15.0	Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.	3			
20.0	Students use the quadratic formula to find the roots of a second-degree polynomial and to solve quadratic equations.		3		
23.0	Students apply quadratic equations to physical problems, such as the motion of an object under the force of gravity.		3		
Geometry					
3.0	Students construct and judge the validity of a logical argument and give counterexamples to disprove a statement.			3	
4.0	Students prove basic theorems involving congruence and similarity.			3	
5.0	Students prove triangles are congruent or similar, and they are able to use the concept of corresponding parts of congruent triangles.			3	
7.0	Students prove and use theorems involving the properties of parallel lines cut by a transversal, the properties of quadrilaterals, and the properties of circles.			3	



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<b>Geometry (continued)</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
8.0	Students know, derive, and solve problems involving the perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures.			3	
9.0	Students compute the volumes and surface areas of prisms, pyramids, cylinders, cones, and spheres; and students commit to memory the formulas for prisms, pyramids, and cylinders.			3	
10.0	Students compute areas of polygons, including rectangles, scalene triangles, equilateral triangles, rhombi, parallelograms, and trapezoids.			3	
11.0	Students determine how changes in dimensions affect the perimeter, area, and volume of common geometric figures and solids.			3	
15.0	Students use the Pythagorean theorem to determine distance and find missing lengths of sides of right triangles.			3	
18.0	Students know the definitions of the basic trigonometric functions defined by the angles of a right triangle. They also know and are able to use elementary relationships between them. For example, $\tan(x) = \sin(x) / \cos(x)$ , $(\sin(x))^2 + (\cos(x))^2 = 1$ .			3	
19.0	Students use trigonometric functions to solve for an unknown length of a side of a right triangle, given an angle and a length of a side.			3	
21.0	Students prove and solve problems regarding relationships among chords, secants, tangents, inscribed angles, and inscribed and circumscribed polygons of circles.			3	
<b>Algebra II</b>					
2.0	Students solve systems of linear equations and inequalities (in two or three variables) by substitution, with graphs, or with matrices.		3		
3.0	Students are adept at operations on polynomials, including long division.		3		
4.0	Students factor polynomials representing the difference of squares, perfect square trinomials, and the sum and difference of two cubes.		3		
6.0	Students add, subtract, multiply, and divide complex numbers.		3		
7.0	Students add, subtract, multiply, divide, reduce, and evaluate rational expressions with monomial and polynomial denominators and simplify complicated rational expressions, including those with negative exponents in the denominator.		3		
8.0	Students solve and graph quadratic equations by factoring, completing the square, or using the quadratic formula. Students apply these techniques in solving word problems. They also solve quadratic equations in the complex number system.				3
10.0	Students graph quadratic functions and determine the maxima, minima, and zeros of the function.				3
11.1	Students understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.				3



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<b>Algebra II (continued)</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
12.0	Students know the laws of fractional exponents, understand exponential functions, and use these functions in problems involving exponential growth and decay.				3
14.0	Students understand and use the properties of logarithms to simplify logarithmic numeric expressions and to identify their approximate values.				3
19.0	Students use combinations and permutations to compute probabilities.				3
22.0	Students find the general term and the sums of arithmetic series and of both finite and infinite geometric series.				3
24.0	Students solve problems involving functional concepts, such as composition, defining the inverse function and performing arithmetic operations on functions.				3
<b>Probability and Statistics</b>					
1.0	Students know the definition of the notion of independent events and can use the addition, multiplication, and complementation to solve for probabilities of particular events in finite sample spaces.				3
2.0	Students know the definition of conditional probability and use it to solve for probabilities in finite sample spaces.				3
7.0	Students compute the variance and the standard deviation of a distribution of data.				3
<b>Total Number of Items</b>		<b>30</b>	<b>21</b>	<b>36</b>	<b>33</b>