

Publisher: Glencoe/McGraw-Hill

Program Title: Advanced Mathematical Concepts © 2004

Components:

- Applications**
- Math and Science Activities Masters
- Problem Solving and Applications Masters
- Assessment and Evaluation**
- Assessment and Evaluation Masters
- TestCheck and Worksheet Builder CD-ROM
- SAT Practice and Sample Test Workbook
- ACT Practice and Sample Test Workbook
- Standardized Test Preparation CD-ROM
- Internet Support**
- Meeting Individual Needs**
- Enrichment Masters
- Prerequisite Skills Masters
- Study Guide and Practice Masters
- Teaching Aids**
- Answer Key Masters
- Answer Key Transparencies
- Block Schedule Planning Guide
- 5-Minute Check Transparencies
- Interactive Lesson Planner
- Lesson Planning Guide
- Solutions Manual
- Teaching Transparencies
- Technology/Multimedia**
- Advanced MathPASS CD-ROM
- Graphing Calculator Keystroke Masters
- Multimedia Applications CD-ROM
- Spreadsheet Applications Masters
- Standardized Test Preparation CD-ROM
- TeacherWorks
- TI-92 and CBL Interdisciplinary Activities Masters

Grade Level(s): 10 through 12

Intended Audience: Students who have successfully completed Algebra II.

\* For more information, see Notes.

**Standards Map - Basic Comprehensive Program  
Grades Eight Through Twelve - Mathematics**

The standards for grades eight through twelve are organized differently from those for kindergarten through grade seven. In this section strands are not used for organizational purposes as they are in the elementary grades because the mathematics studied in grades eight through twelve falls naturally under discipline headings: algebra, geometry, and so forth. Many schools teach this material in traditional courses; others teach it in an integrated fashion. To allow local educational agencies and teachers flexibility in teaching the material, the standards for grades eight through twelve do not mandate that a particular discipline be initiated and completed in a single grade. The core content of these subjects must be covered; students are expected to achieve the standards however these subjects are sequenced.

Grade	Standard #	Text of Standard	PUBLISHER CITATIONS*			FOR LEA USE ONLY		
			Introduced	Practiced	Taught to Mastery	Meets Standard		Local Education Agency Evaluator Notes
DISCIPLINE					Y	N		
<b>Algebra I</b>		<b>Symbolic reasoning and calculations with symbols are central in algebra. Through the study of algebra, a student develops an understanding of the symbolic language of mathematics and the sciences. In addition, algebraic skills and concepts are developed and used in a wide variety of problem-solving situations.</b>	*1	*1	*1			
8-12	1.0	Students identify and use the arithmetic properties of subsets of integers and rational, irrational, and real numbers, including closure properties for the four basic arithmetic operations where applicable:						
8-12	1.1	Students use properties of numbers to demonstrate whether assertions are true or false.						
8-12	2.0	Students understand and use such operations as taking the opposite, finding the reciprocal, taking a root, and raising to a fractional power. They understand and use the rules of exponents.						
8-12	3.0	Students solve equations and inequalities involving absolute values.						
8-12	4.0	Students simplify expressions before solving linear equations and inequalities in one variable, such as $3(2x-5) + 4(x-2) = 12$ .						

\* For more information, see Notes.

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Grade	Standard #	Text of Standard	Introduced	Practiced	Taught to Mastery	Meets Standard		Local Education Agency Evaluator Notes
						Y	N	
8-12	5.0	Students solve multistep problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.						
8-12	6.0	Students graph a linear equation and compute the x - and y -intercepts (e.g., graph $C262x + 6y = 4$ ). They are also able to sketch the region defined by linear inequality (e.g., they sketch the region defined by $(2x + 6y < 4)$ ).						
8-12	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.						
8-12	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.						

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Grade	Standard #	Text of Standard	Introduced	Practiced	Taught to Mastery	Meets Standard		Local Education Agency Evaluator Notes
						Y	N	
8-12	9.0	Students solve a system of two linear equations in two variables algebraically and are able to interpret the answer graphically. Students are able to solve a system of two linear inequalities in two variables and to sketch the solution sets.						
8-12	10.0	Students add, subtract, multiply, and divide monomials and polynomials. Students solve multistep problems, including word problems, by using these techniques.						
8-12	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.						
8-12	12.0	Students simplify fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms.						
8-12	13.0	Students add, subtract, multiply, and divide rational expressions and functions. Students solve both computationally and conceptually challenging problems by using these techniques.						
8-12	14.0	Students solve a quadratic equation by factoring or completing the square.						
8-12	15.0	Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.						
8-12	16.0	Students understand the concepts of a relation and a function, determine whether a given relation defines a function, and give pertinent information about given relations and functions.						

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Grade	Standard #	Text of Standard	Introduced	Practiced	Taught to Mastery	Meets Standard		Local Education Agency Evaluator Notes
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8-12	17.0	Students determine the domain of independent variables and the range of dependent variables defined by a graph, a set of ordered pairs, or a symbolic expression.						
8-12	18.0	Students determine whether a relation defined by a graph, a set of ordered pairs, or a symbolic expression is a function and justify the conclusion.						
8-12	19.0	Students know the quadratic formula and are familiar with its proof by completing the square.						
8-12	20.0	Students use the quadratic formula to find the roots of a second-degree polynomial and to solve quadratic equations.						
8-12	21.0	Students graph quadratic functions and know that their roots are the x-intercepts.						
8-12	22.0	Students use the quadratic formula or factoring techniques or both to determine whether the graph of a quadratic function will intersect the x-axis in zero, one, or two points.						
8-12	23.0	Students apply quadratic equations to physical problems, such as the motion of an object under the force of gravity.						
8-12	24.0	Students use and know simple aspects of a logical argument:						
8-12	24.1	Students explain the difference between inductive and deductive reasoning and identify and provide examples of each.						
8-12	24.2	Students identify the hypothesis and conclusion in logical deduction.						
8-12	24.3	Students use counterexamples to show that an assertion is false and recognize that a single counterexample is sufficient to refute an assertion.						

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8-12	25.0	Students use properties of the number system to judge the validity of results, to justify each step of a procedure, and to prove or disprove statements:						
8-12	25.1	Students use properties of numbers to construct simple, valid arguments (direct and indirect) for, or formulate counterexamples to, claimed assertions.						
8-12	25.2	Students judge the validity of an argument according to whether the properties of the real number system and the order of operations have been applied correctly at each step.						
8-12	25.3	Given a specific algebraic statement involving linear, quadratic, or absolute value expressions or equations or inequalities, students determine whether the statement is true sometimes, always, or never.						

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Grade	Standard #	Text of Standard	Introduced	Practiced	Taught to Mastery	Meets Standard		Local Education Agency Evaluator Notes
						Y	N	
<b>DISCIPLINE</b>		<b>Geometry</b> The geometry skills and concepts developed in this discipline are useful to all students. Aside from learning these skills and concepts, students will develop their ability to construct formal, logical arguments and proofs in geometric settings and problems.	*2	*2	*2			
8-12	1.0	Students demonstrate understanding by identifying and giving examples of undefined terms, axioms, theorems, and inductive and deductive reasoning.						
8-12	2.0	Students write geometric proofs, including proofs by contradiction.						
8-12	3.0	Students construct and judge the validity of a logical argument and give counterexamples to disprove a statement.						
8-12	4.0	Students prove basic theorems involving congruence and similarity.						
8-12	5.0	Students prove that triangles are congruent or similar, and they are able to use the concept of corresponding parts of congruent triangles.						
8-12	6.0	Students know and are able to use the triangle inequality theorem.						
8-12	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.						
8-12	8.0	Students know, derive, and solve problems involving the perimeter, circumference, area, volume, lateral area, and surface area of common geometric figures.						

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8-12	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.						
8-12	10.0	Students compute areas of polygons, including rectangles, scalene triangles, equilateral triangles, rhombi, parallelograms, and trapezoids.						
8-12	11.0	Students determine how changes in dimensions affect the perimeter, area, and volume of common geometric figures and solids.						
8-12	12.0	Students find and use measures of sides and of interior and exterior angles of triangles and polygons to classify figures and solve problems.						
8-12	13.0	Students prove relationships between angles in polygons by using properties of complementary, supplementary, vertical, and exterior angles.						
8-12	14.0	Students prove the Pythagorean theorem.						
8-12	15.0	Students use the Pythagorean theorem to determine distance and find missing lengths of sides of right triangles.						
8-12	16.0	Students perform basic constructions with a straightedge and compass, such as angle bisectors, perpendicular bisectors, and the line parallel to a given line through a point off the line.						
8-12	17.0	Students prove theorems by using coordinate geometry, including the midpoint of a line segment, the distance formula, and various forms of equations of lines and circles.						

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8-12	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, $\tan(x) = \sin(x)/\cos(x)$ , $(\sin(x))^2 + (\cos(x))^2 = 1$ .						
8-12	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.						
8-12	20.0	Students know and are able to use angle and side relationships in problems with special right triangles, such as 30°, 60°, and 90° triangles and 45°, 45°, and 90° triangles.						
8-12	21.0	Students prove and solve problems regarding relationships among chords, secants, tangents, inscribed angles, and inscribed and circumscribed polygons of circles.						
8-12	22.0	Students know the effect of rigid motions on figures in the coordinate plane and space, including rotations, translations, and reflections.						

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						Y	N	
<b>DISCIPLINE</b>		<b>Algebra II</b> This discipline complements and expands the mathematical content and concepts of algebra I and geometry. Students who master algebra II will gain experience with algebraic solutions of problems in various content areas, including the solution of systems of quadratic equations, logarithmic and exponential functions, the binomial theorem, and the complex number system.						
8-12	1.0	Students solve equations and inequalities involving absolute value.	*3	*3	*3			
8-12	2.0	Students solve systems of linear equations and inequalities (in two or three variables) by substitution, with graphs, or with matrices.	<i>SE and TWE:</i> 67-70, 73-76, 107-109	<i>SE:</i> 70-72, 76-77 <i>109-111</i>	<i>SE and TWE:</i> 67-70, 73-76, 107-109			
8-12	3.0	Students are adept at operations on polynomials, including long division.	*3	*3	*3			
8-12	4.0	Students factor polynomials representing the difference of squares, perfect square trinomials, and the sum and difference of two cubes.	*3	*3	*3			
8-12	5.0	Students demonstrate knowledge of how real and complex numbers are related both arithmetically and graphically. In particular, they can plot complex numbers as points in the plane.	<i>SE and TWE:</i> 206, 586-587	<i>SE:</i> 589-590	<i>SE and TWE:</i> 206, 586-587			
8-12	6.0	Students add, subtract, multiply, and divide complex numbers.	<i>SE and TWE:</i> 580-582, 593-595	<i>SE:</i> 583-585, 596-597	<i>SE and TWE:</i> 580-582, 593-595			

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						Y	N	
8-12	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	*3	*3			
8-12	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.	<i>SE and TWE:</i> 213-218	<i>SE:</i> 218-220	<i>SE and TWE:</i> 213-218			
8-12	9.0	Students demonstrate and explain the effect that changing a coefficient has on the graph of quadratic functions; that is, students can determine how the graph of a parabola changes as $a$ , $b$ , and $c$ vary in the equation $y = a(x-b)^2 + c$ .	<i>SE and TWE:</i> 137-140	<i>SE:</i> 142-143	<i>SE and TWE:</i> 137-140			
8-12	10.0	Students graph quadratic functions and determine the maxima, minima, and zeros of the function.	<i>SE and TWE:</i> 171-174	<i>SE:</i> 176-177	<i>SE and TWE:</i> 171-174			
8-12	11.0	Students prove simple laws of logarithms.	*3	*3	*3			
8-12	11.1	Students understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	<i>SE and TWE:</i> 718-719	<i>SE:</i> 722-723	<i>SE and TWE:</i> 718-719			
8-12	11.2	Students judge the validity of an argument according to whether the properties of real numbers, exponents, and logarithms have been applied correctly at each step.	*3	*3	*3			

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8-12	12.0	Students know the laws of fractional exponents, understand exponential functions, and use these functions in problems involving exponential growth and decay.	<i>SE and TWE:</i> 704-708	<i>SE:</i> 708-711	<i>SE and TWE:</i> 704-708			
8-12	13.0	Students use the definition of logarithms to translate between logarithms in any base.	<i>SE and TWE:</i> 718-722, 726-729, 733-735	<i>SE:</i> 722-725, 730-732, 735-737	<i>SE and TWE:</i> 718-722, 726-729, 733-735			
8-12	14.0	Students understand and use the properties of logarithms to simplify logarithmic numeric expressions and to identify their approximate values.	<i>SE and TWE:</i> 718-722	<i>SE:</i> 722-725	<i>SE and TWE:</i> 718-722			
8-12	15.0	Students determine whether a specific algebraic statement involving rational expressions, radical expressions, or logarithmic or exponential functions is sometimes true, always true, or never true.	*3	*3	*3			
8-12	16.0	Students demonstrate and explain how the geometry of the graph of a conic section (e.g., asymptotes, foci, eccentricity) depends on the coefficients of the quadratic equation representing it.	<i>SE and TWE:</i> 623-626, 631-637, 642-649, 653-658	<i>SE:</i> 627-629, 637-640, 649-652, 658-660	<i>SE and TWE:</i> 623-626, 631-637, 642-649, 653-658			
8-12	17.0	Given a quadratic equation of the form $ax^2 + by^2 + cx + dy + e = 0$ , students can use the method for completing the square to put the equation into standard form and can recognize whether the graph of the equation is a circle, ellipse, parabola, or hyperbola. Students can then graph the equation.	<i>SE and TWE:</i> 662-663	<i>SE:</i> 667	<i>SE and TWE:</i> 662-663			
8-12	18.0	Students use fundamental counting principles to compute combinations and permutations.	<i>SE and TWE:</i> 837-842	<i>SE:</i> 842-845	<i>SE and TWE:</i> 837-842			
8-12	19.0	Students use combinations and permutations to compute probabilities.	<i>SE and TWE:</i> 853	<i>SE:</i> 855-857	<i>SE and TWE:</i> 853			

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						Y	N	
8-12	20.0	Students know the binomial theorem and use it to expand binomial expressions that are raised to positive integer powers.	<i>SE and TWE:</i> 801-803	<i>SE:</i> 803-805	<i>SE and TWE:</i> 801-803			
8-12	21.0	Students apply the method of mathematical induction to prove general statements about the positive integers.	<i>SE and TWE:</i> 822-825	<i>SE:</i> 826-828	<i>SE and TWE:</i> 822-825			
8-12	22.0	Students find the general term and the sums of arithmetic series and of both finite and infinite geometric series.	<i>SE and TWE:</i> 759-762, 766-770, 774-780	<i>SE:</i> 762-765, 771-773, 780-783	<i>SE and TWE:</i> 759-762, 766-770, 774-780			
8-12	23.0	Students derive the summation formulas for arithmetic series and for both finite and infinite geometric series.	<i>SE and TWE:</i> 761-762, 769-770	<i>SE:</i> 762, 771	<i>SE and TWE:</i> 761-762, 769-770			
8-12	24.0	Students solve problems involving functional concepts, such as composition, defining the inverse function and performing arithmetic operations on functions.	<i>SE and TWE:</i> 13-16, 152-155	<i>SE:</i> 17-19, 155, 158	<i>SE and TWE:</i> 13-16, 152-155			
8-12	25.0	Students use properties from number systems to justify steps in combining and simplifying functions.	<b>*3</b>	<b>*3</b>	<b>*3</b>			

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						Y	N	
<b>DISCIPLINE</b>		<b>Trigonometry</b> Trigonometry uses the techniques that students have previously learned from the study of algebra and geometry. The trigonometric functions studied are defined geometrically rather than in terms of algebraic equations. Facility with these functions as well as the ability to prove basic identities regarding them is especially important for students intending to study calculus, more advanced mathematics, physics and other sciences, and engineering in college.						
10-12	1.0	Students understand the notion of angle and how to measure it, in both degrees and radians. They can convert between degrees and radians.	<i>SE and TWE:</i> 277-280, 343-347	<i>SE:</i> 280-283, 347-351	<i>SE and TWE:</i> 277-280, 343-347			
10-12	2.0	Students know the definition of sine and cosine as y- and x-coordinates of points on the unit circle and are familiar with the graphs of the sine and cosine functions.	<i>SE and TWE:</i> 291-295	<i>SE:</i> 296-298	<i>SE and TWE:</i> 291-295			
10-12	3.0	Students know the identity $\cos^2(x) + \sin^2(x) = 1$ :	<i>SE and TWE:</i> 421-426	<i>SE:</i> 427-429	<i>SE and TWE:</i> 421-426			
10-12	3.1	Students prove that this identity is equivalent to the Pythagorean theorem (i.e., students can prove this identity by using the Pythagorean theorem and, conversely, they can prove the Pythagorean theorem as a consequence of this identity).	<i>SE and TWE:</i> 421-426	<i>SE:</i> 427-429	<i>SE and TWE:</i> 421-426			

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						Y	N	
10-12	3.2	Students prove other trigonometric identities and simplify others by using the identity $\cos^2(x) + \sin^2(x) = 1$ . For example, students use this identity to prove that $\sec^2(x) = \tan^2(x) + 1$ .	<i>SE and TWE:</i> 431-433	<i>SE:</i> 433-436	<i>SE and TWE:</i> 431-433			
10-12	4.0	Students graph functions of the form $f(t) = A \sin(Bt + C)$ or $f(t) = A \cos(Bt + C)$ and interpret $A$ , $B$ , and $C$ in terms of amplitude, frequency, period, and phase shift.	<i>SE and TWE:</i> 359-362, 368-372	<i>SE:</i> 363-366, 372-376	<i>SE and TWE:</i> 359-362, 368-372			
10-12	5.0	Students know the definitions of the tangent and cotangent functions and can graph them.	<i>SE and TWE:</i> 285-287, 395-399, 406-409	<i>SE:</i> 287-290, 400-402, 410-412	<i>SE and TWE:</i> 285-287, 395-399, 406-409			
10-12	6.0	Students know the definitions of the secant and cosecant functions and can graph them.	<i>SE and TWE:</i> 285-287, 395-399	<i>SE:</i> 287-290, 400-402	<i>SE and TWE:</i> 285-287, 395-399			
10-12	7.0	Students know that the tangent of the angle that a line makes with the x-axis is equal to the slope of the line.	<i>SE and TWE:</i> 292-295	<i>SE:</i> 296-298	<i>SE and TWE:</i> 292-295			
10-12	8.0	Students know the definitions of the inverse trigonometric functions and can graph the functions.	<i>SE and TWE:</i> 305-306, 405-409	<i>SE:</i> 308-309, 410-412	<i>SE and TWE:</i> 305-306, 405-409			
10-12	9.0	Students compute, by hand, the values of the trigonometric functions and the inverse trigonometric functions at various standard points.	<i>SE and TWE:</i> 305-306	<i>SE:</i> 308-309	<i>SE and TWE:</i> 305-306			
10-12	10.0	Students demonstrate an understanding of the addition formulas for sines and cosines and their proofs and can use those formulas to prove and/or simplify other trigonometric identities.	<i>SE and TWE:</i> 437-441	<i>SE:</i> 441-444	<i>SE and TWE:</i> 437-441			
10-12	11.0	Students demonstrate an understanding of half-angle and double-angle formulas for sines and cosines and can use those formulas to prove and/or simplify other trigonometric identities.	<i>SE and TWE:</i> 448-453	<i>SE:</i> 453-455	<i>SE and TWE:</i> 448-453			

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10-12	12.0	Students use trigonometry to determine unknown sides or angles in right triangles.	<i>SE and TWE:</i> 305-308	<i>SE:</i> 308-311	<i>SE and TWE:</i> 305-308			
10-12	13.0	Students know the law of sines and the law of cosines and apply those laws to solve problems.	<i>SE and TWE:</i> 313-315, 320-323, 327-330	<i>SE:</i> 316-318, 324-326, 330-332	<i>SE and TWE:</i> 313-315, 320-323, 327-330			
10-12	14.0	Students determine the area of a triangle, given one angle and the two adjacent sides.	<i>SE and TWE:</i> 315	<i>SE:</i> 316-318	<i>SE and TWE:</i> 315			
10-12	15.0	Students are familiar with polar coordinates. In particular, they can determine polar coordinates of a point given in rectangular coordinates and vice versa.	<i>SE and TWE:</i> 553-557, 568-571	<i>SE:</i> 557-560, 571-573	<i>SE and TWE:</i> 553-557, 568-571			
10-12	16.0	Students represent equations given in rectangular coordinates in terms of polar coordinates.	<i>SE and TWE:</i> 574-577	<i>SE:</i> 577-579	<i>SE and TWE:</i> 574-577			
10-12	17.0	Students are familiar with complex numbers. They can represent a complex number in polar form and know how to multiply complex numbers in their polar form.	<i>SE and TWE:</i> 586-589, 593-595	<i>SE:</i> 589-591, 596-597	<i>SE and TWE:</i> 586-589, 593-595			
10-12	18.0	Students know DeMoivre's theorem and can give $n$ th roots of a complex number given in polar form.	<i>SE and TWE:</i> 599-604	<i>SE:</i> 604-606	<i>SE and TWE:</i> 599-604			
10-12	19.0	Students are adept at using trigonometry in a variety of applications and word problems.	<i>SE and TWE:</i> 299-301, 307	<i>SE:</i> 301-303, 309-311	<i>SE and TWE:</i> 299-301, 307			

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<b>DISCIPLINE</b>		<b>Mathematical Analysis</b> This discipline combines many of the trigonometric, geometric, and algebraic techniques needed to prepare students for the study of calculus and strengthens their conceptual understanding of problems and mathematical reasoning in solving problems. These standards take a functional point of view toward those topics. The most significant new concept is that of limits. Mathematical analysis is often combined with a course in trigonometry or perhaps with one in linear algebra to make a year-long precalculus course.						
10-12	1.0	Students are familiar with, and can apply, polar coordinates and vectors in the plane. In particular, they can translate between polar and rectangular coordinates and can interpret polar coordinates and vectors graphically.	<i>SE and TWE:</i> 553-557, 568-571	<i>SE:</i> 557-560, 571-573	<i>SE and TWE:</i> 553-557, 568-571			
10-12	2.0	Students are adept at the arithmetic of complex numbers. They can use the trigonometric form of complex numbers and understand that a function of a complex variable can be viewed as a function of two real variables. They know the proof of DeMoivre's theorem.	<i>SE and TWE:</i> 586-589, 593-595, 599-604	<i>SE:</i> 589-591, 596-597, 604-606	<i>SE and TWE:</i> 586-589, 593-595, 599-604			
10-12	3.0	Students can give proofs of various formulas by using the technique of mathematical induction.	<i>SE and TWE:</i> 822-825	<i>SE:</i> 826-828	<i>SE and TWE:</i> 822-825			
10-12	4.0	Students know the statement of, and can apply, the fundamental theorem of algebra.	<i>SE and TWE:</i> 207-209	<i>SE:</i> 209-212	<i>SE and TWE:</i> 207-209			

\* For more information, see Notes.

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Grade	Standard #	Text of Standard	Introduced	Practiced	Taught to Mastery	Meets Standard		Local Education Agency Evaluator Notes
						Y	N	
10-12	5.0	Students are familiar with conic sections, both analytically and geometrically:	<i>SE and TWE:</i> 623-626, 631-637, 642-649, 653-658	<i>SE:</i> 627-629, 637-640, 649-652, 658-660	<i>SE and TWE:</i> 623-626, 631-637, 642-649, 653-658			
10-12	5.1	Students can take a quadratic equation in two variables; put it in standard form by completing the square and using rotations and translations, if necessary; determine what type of conic section the equation represents; and determine its geometric components (foci, asymptotes, and so forth).	<i>SE and TWE:</i> 653-658	<i>SE:</i> 658-660	<i>SE and TWE:</i> 653-658			
10-12	5.2	Students can take a geometric description of a conic section—for example, the locus of points whose sum of its distances from (1, 0) and (-1, 0) is 6—and derive a quadratic equation representing it.	<i>SE and TWE:</i> 653-658	<i>SE:</i> 658-660	<i>SE and TWE:</i> 653-658			
10-12	6.0	Students find the roots and poles of a rational function and can graph the function and locate its asymptotes.	<i>SE and TWE:</i> 180-185	<i>SE:</i> 185-188	<i>SE and TWE:</i> 180-185			
10-12	7.0	Students demonstrate an understanding of functions and equations defined parametrically and can graph them.	<i>SE and TWE:</i> 520-523, 526, 527-530, 663-666	<i>SE:</i> 523-525, 526, 531-533, 667-669	<i>SE and TWE:</i> 520-523, 526, 527-530, 663-666			
10-12	8.0	Students are familiar with the notion of the limit of a sequence and the limit of a function as the independent variable approaches a number or infinity. They determine whether certain sequences converge or diverge.	<i>SE and TWE:</i> 774-780, 786-790	<i>SE:</i> 780-783, 790-793	<i>SE and TWE:</i> 774-780, 786-790			

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Grade	Standard #	Text of Standard	Introduced	Practiced	Taught to Mastery	Meets Standard		Local Education Agency Evaluator Notes
						Y	N	
<b>DISCIPLINE</b>		<b>Linear Algebra</b> The general goal in this discipline is for students to learn the techniques of matrix manipulation so that they can solve systems of linear equations in any number of variables. Linear algebra is most often combined with another subject, such as trigonometry, mathematical analysis, or precalculus.						
10-12	1.0	Students solve linear equations in any number of variables by using Gauss-Jordan elimination.	*3	*3	*3			
10-12	2.0	Students interpret linear systems as coefficient matrices and the Gauss-Jordan method as row operations on the coefficient matrix.	<i>SE and TWE:</i> 100-101	<i>SE:</i> 102-104	<i>SE and TWE:</i> 100-101			
10-12	3.0	Students reduce rectangular matrices to row echelon form.	<i>SE and TWE:</i> 106	<i>SE:</i> 106	<i>SE and TWE:</i> 106			
10-12	4.0	Students perform addition on matrices and vectors.	<i>SE and TWE:</i> 486-487	<i>SE:</i> 490-491	<i>SE and TWE:</i> 486-487			
10-12	5.0	Students perform matrix multiplication and multiply vectors by matrices and by scalars.	<i>SE and TWE:</i> 98-101, 488-490, 505-508	<i>SE:</i> 102-104, 490-492, 508-510	<i>SE and TWE:</i> 98-101, 488-490, 505-508			
10-12	6.0	Students demonstrate an understanding that linear systems are inconsistent (have no solutions), have exactly one solution, or have infinitely many solutions.	<i>SE and TWE:</i> 67-70, 73-76	<i>SE:</i> 70-72, 76-77	<i>SE and TWE:</i> 67-70, 73-76			
10-12	7.0	Students demonstrate an understanding of the geometric interpretation of vectors and vector addition (by means of parallelograms) in the plane and in three-dimensional space.	<i>SE and TWE:</i> 485-490	<i>SE:</i> 490-492	<i>SE and TWE:</i> 485-490			

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						Y	N	
10-12	8.0	Students interpret geometrically the solution sets of systems of equations. For example, the solution set of a single linear equation in two variables is interpreted as a line in the plane, and the solution set of a two-by-two system is interpreted as the intersection of a pair of lines in the plane.	<i>SE and TWE:</i> 20-23, 67-70	<i>SE:</i> 23-25, 70-72	<i>SE and TWE:</i> 20-23, 67-70			
10-12	9.0	Students demonstrate an understanding of the notion of the inverse to a square matrix and apply that concept to solve systems of linear equations.	<i>SE and TWE:</i> 98-101	<i>SE:</i> 102-104	<i>SE and TWE:</i> 98-101			
10-12	10.0	Students compute the determinants of 2 x 2 and 3 x 3 matrices and are familiar with their geometric interpretations as the area and volume of the parallelepipeds spanned by the images under the matrices of the standard basis vectors in two-dimensional and three-dimensional spaces.	<i>SE and TWE:</i> 98-101	<i>SE:</i> 102-104	<i>SE and TWE:</i> 98-101			
10-12	11.0	Students know that a square matrix is invertible if, and only if, its determinant is nonzero. They can compute the inverse to 2 x 2 and 3 x 3 matrices using row reduction methods or Cramer's rule.	<i>SE and TWE:</i> 98-101	<i>SE:</i> 102-104	<i>SE and TWE:</i> 98-101			
10-12	12.0	Students compute the scalar (dot) product of two vectors in $n$ -dimensional space and know that perpendicular vectors have zero dot product.	<i>SE and TWE:</i> 506-508	<i>SE:</i> 508-510	<i>SE and TWE:</i> 506-508			

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						Y	N	
<b>DISCIPLINE</b>		<b>Probability and Statistics</b> This discipline is an introduction to the study of probability, interpretation of data, and fundamental statistical problem solving. Mastery of this academic content will provide students with a solid foundation in probability and facility in processing statistical information.						
8-12	1.0	Students know the definition of the notion of <i>independent events</i> and can use the rules for addition, multiplication, and complementation to solve for probabilities of particular events in finite sample spaces.	<i>SE and TWE:</i> 837-838	<i>SE:</i> 842-845	<i>SE and TWE:</i> 837-838			
8-12	2.0	Students know the definition of <i>conditional probability</i> and use it to solve for probabilities in finite sample spaces.	<i>SE and TWE:</i> 868-870	<i>SE:</i> 870-874	<i>SE and TWE:</i> 868-870			
8-12	3.0	Students demonstrate an understanding of the notion of <i>discrete random variables</i> by using them to solve for the probabilities of outcomes, such as the probability of the occurrence of five heads in 14 coin tosses.	<i>SE and TWE:</i> 859-863	<i>SE:</i> 863-867	<i>SE and TWE:</i> 859-863			
8-12	4.0	Students are familiar with the standard distributions (normal, binomial, and exponential) and can use them to solve for events in problems in which the distribution belongs to those families.	<i>SE and TWE:</i> 918-922	<i>SE:</i> 922-925	<i>SE and TWE:</i> 918-922			
8-12	5.0	Students determine the mean and the standard deviation of a normally distributed random variable.	<i>SE and TWE:</i> 918-922	<i>SE:</i> 922-925	<i>SE and TWE:</i> 918-922			
8-12	6.0	Students know the definitions of the <i>mean</i> , <i>median</i> , and <i>mode</i> of a distribution of data and can compute each in particular situations.	<i>SE and TWE:</i> 908-913	<i>SE:</i> 914-917	<i>SE and TWE:</i> 908-913			

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						Y	N	
8-12	7.0	Students compute the variance and the standard deviation of a distribution of data.	<i>SE and TWE:</i> 908-913	<i>SE:</i> 914-917	<i>SE and TWE:</i> 908-913			
8-12	8.0	Students organize and describe distributions of data by using a number of different methods, including frequency tables, histograms, standard line and bar graphs, stem-and-leaf displays, scatterplots, and box-and-whisker plots.	<i>SE and TWE:</i> 889-892	<i>SE:</i> 892-896	<i>SE and TWE:</i> 889-892			

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 Math 8-12th Grade Standards Map --Approved by the State Board of Education on February 6, 2002.

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Grade	Standard #	Text of Standard	Introduced	Practiced	Taught to Mastery	Meets Standard		Local Education Agency Evaluator Notes
						Y	N	
<b>DISCIPLINE</b>		<b>Advanced Placement Probability and Statistics</b> This discipline is a technical and in-depth extension of probability and statistics. In particular, mastery of academic content for advanced placement gives students the background to succeed in the Advanced Placement examination in the subject.						
11-12	1.0	Students solve probability problems with finite sample spaces by using the rules for addition, multiplication, and complementation for probability distributions and understand the simplifications that arise with independent events.	<i>SE and TWE:</i> 852-855, 859-863, 868-870	<i>SE:</i> 856-855, 863-867, 870-874	<i>SE and TWE:</i> 852-855, 859-863, 868-870			
11-12	2.0	Students know the definition of <i>conditional probability</i> and use it to solve for probabilities in finite sample spaces.	<i>SE and TWE:</i> 868-870	<i>SE:</i> 870-874	<i>SE and TWE:</i>			
11-12	3.0	Students demonstrate an understanding of the notion of <i>discrete random variables</i> by using this concept to solve for the probabilities of outcomes, such as the probability of the occurrence of five or fewer heads in 14 coin tosses.	<i>SE and TWE:</i> 859-863	<i>SE:</i> 863-867	<i>SE and TWE:</i> 859-863			
11-12	4.0	Students understand the notion of a <i>continuous random variable</i> and can interpret the probability of an outcome as the area of a region under the graph of the probability density function associated with the random variable.	*3	*3	*3			
11-12	5.0	Students know the definition of the <i>mean of a discrete random variable</i> and can determine the mean for a particular discrete random variable.	<i>SE and TWE:</i> 897-902	<i>SE:</i> 903-907	<i>SE and TWE:</i> 897-902			

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						Y	N	
11-12	6.0	Students know the definition of the <i>variance of a discrete random variable</i> and can determine the variance for a particular discrete random variable.	<i>SE and TWE:</i> 908-913	<i>SE:</i> 914-917	<i>SE and TWE:</i> 908-913			
11-12	7.0	Students demonstrate an understanding of the standard distributions (normal, binomial, and exponential) and can use the distributions to solve for events in problems in which the distribution belongs to those families.	<i>SE and TWE:</i> 918-922	<i>SE:</i> 922-925	<i>SE and TWE:</i> 918-922			
11-12	8.0	Students determine the mean and the standard deviation of a normally distributed random variable.	<i>SE and TWE:</i> 918-922	<i>SE:</i> 922-925	<i>SE and TWE:</i> 918-922			
11-12	9.0	Students know the central limit theorem and can use it to obtain approximations for probabilities in problems of finite sample spaces in which the probabilities are distributed binomially.	<i>SE and TWE:</i> 875-877	<i>SE:</i> 878-880	<i>SE and TWE:</i> 875-877			
11-12	10.0	Students know the definitions of the <i>mean, median, and mode of distribution</i> of data and can compute each of them in particular situations.	<i>SE and TWE:</i> 908-913	<i>SE:</i> 914-917	<i>SE and TWE:</i> 908-913			
11-12	11.0	Students compute the variance and the standard deviation of a distribution of data.	<i>SE and TWE:</i> 908-913	<i>SE:</i> 914-917	<i>SE and TWE:</i> 908-913			
11-12	12.0	Students find the line of best fit to a given distribution of data by using least squares regression.	<i>SE and TWE:</i> 38-41	<i>SE:</i> 41-44	<i>SE and TWE:</i> 38-41			
11-12	13.0	Students know what the <i>correlation coefficient of two variables</i> means and are familiar with the coefficient's properties.	<i>SE and TWE:</i> 38-41	<i>SE:</i> 41-44	<i>SE and TWE:</i> 38-41			

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						Y	N	
11-12	14.0	Students organize and describe distributions of data by using a number of different methods, including frequency tables, histograms, standard line graphs and bar graphs, stem-and-leaf displays, scatterplots, and box-and-whisker plots.	<i>SE and TWE:</i> 889-892	<i>SE:</i> 892-896	<i>SE and TWE:</i> 889-892			
11-12	15.0	Students are familiar with the notions of a statistic of a distribution of values, of the sampling distribution of a statistic, and of the variability of a statistic.	<i>SE and TWE:</i> 908-913, 927-929	<i>SE:</i> 914-917, 930-932	<i>SE and TWE:</i> 908-913, 927-929			
11-12	16.0	Students know basic facts concerning the relation between the mean and the standard deviation of a sampling distribution and the mean and the standard deviation of the population distribution.	<i>SE and TWE:</i> 927-929	<i>SE:</i> 930-932	<i>SE and TWE:</i> 927-929			
11-12	17.0	Students determine confidence intervals for a simple random sample from a normal distribution of data and determine the sample size required for a desired margin of error.	<i>SE and TWE:</i> 927-929	<i>SE:</i> 930-932	<i>SE and TWE:</i> 927-929			
11-12	18.0	Students determine the <i>P</i> -value for a statistic for a simple random sample from a normal distribution.	<i>SE and TWE:</i> 918-922	<i>SE:</i> 922-925	<i>SE and TWE:</i> 918-922			
11-12	19.0	Students are familiar with the <i>chi</i> -square distribution and <i>chi</i> -square test and understand their uses.	<i>Problem Solving and Applications Masters:</i> 27	<i>Problem Solving and Applications Masters:</i> 27	<i>Problem Solving and Applications Masters:</i> 27			

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Grade	Standard #	Text of Standard	Introduced	Practiced	Taught to Mastery	Meets Standard		Local Education Agency Evaluator Notes
						Y	N	
<b>DISCIPLINE</b>		<p><b>Calculus</b>            When taught in high school, calculus should be presented with the same level of depth and rigor as are entry-level college and university calculus courses. These standards outline a complete college curriculum in one variable calculus. Many high school programs may have insufficient time to cover all of the following content in a typical academic year. For example, some districts may treat differential equations lightly and spend substantial time on infinite sequences and series. Others may do the opposite. Consideration of the College Board syllabi for the Calculus AB and Calculus BC sections of the Advanced Placement Examination in Mathematics may be helpful in making curricular decisions. Calculus is a widely applied area of mathematics and involves a beautiful intrinsic theory. Students mastering this content will be exposed to both aspects of the subject.</p>						
11-12	1.0	<p>Students demonstrate knowledge of both the formal definition and the graphical interpretation of limit of values of functions. This knowledge includes one-sided limits, infinite limits, and limits at infinity. Students know the definition of convergence and divergence of a function as the domain variable approaches either a number or infinity:</p>	<i>SE and TWE:</i> 941-945	<i>SE and TWE:</i> 941-945	<i>SE and TWE:</i> 941-945			

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						Y	N	
11-12	1.1	Students prove and use theorems evaluating the limits of sums, products, quotients, and composition of functions.	<i>SE and TWE:</i> 941-945	<i>SE and TWE:</i> 941-945	<i>SE and TWE:</i> 941-945			
11-12	1.2	Students use graphical calculators to verify and estimate limits.	<i>SE and TWE:</i> 949-950	<i>SE:</i> 950	<i>SE and TWE:</i> 949-950			
11-12	1.3	Students prove and use special limits, such as the limits of $(\sin(x))/x$ and $(1-\cos(x))/x$ as $x$ tends to 0.	<i>SE and TWE:</i> 949-950	<i>SE:</i> 950	<i>SE and TWE:</i> 949-950			
11-12	2.0	Students demonstrate knowledge of both the formal definition and the graphical interpretation of continuity of a function.	<i>SE and TWE:</i> 941-945	<i>SE and TWE:</i> 941-945	<i>SE and TWE:</i> 941-945			
11-12	3.0	Students demonstrate an understanding and the application of the intermediate value theorem and the extreme value theorem.	<i>SE and TWE:</i> 941-945	<i>SE and TWE:</i> 941-945	<i>SE and TWE:</i> 941-945			
11-12	4.0	Students demonstrate an understanding of the formal definition of the derivative of a function at a point and the notion of differentiability:	<i>SE and TWE:</i> 951-957	<i>SE:</i> 957-960	<i>SE and TWE:</i> 951-957			
11-12	4.1	Students demonstrate an understanding of the derivative of a function as the slope of the tangent line to the graph of the function.	<i>SE and TWE:</i> 951-957	<i>SE:</i> 957-960	<i>SE and TWE:</i> 951-957			
11-12	4.2	Students demonstrate an understanding of the interpretation of the derivative as an instantaneous rate of change. Students can use derivatives to solve a variety of problems from physics, chemistry, economics, and so forth that involve the rate of change of a function.	<i>SE and TWE:</i> 951-957	<i>SE:</i> 957-960	<i>SE and TWE:</i> 951-957			
11-12	4.3	Students understand the relation between differentiability and continuity.	<i>SE and TWE:</i> 951-957	<i>SE:</i> 957-960	<i>SE and TWE:</i> 951-957			
11-12	4.4	Students derive derivative formulas and use them to find the derivatives of algebraic, trigonometric, inverse trigonometric, exponential, and logarithmic functions.	<i>SE and TWE:</i> 951-957	<i>SE:</i> 957-960	<i>SE and TWE:</i> 951-957			

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						Y	N	
11-12	5.0	Students know the chain rule and its proof and applications to the calculation of the derivative of a variety of composite functions.	<i>SE and TWE:</i> 951-957	<i>SE:</i> 957-960	<i>SE and TWE:</i> 951-957			
11-12	6.0	Students find the derivatives of parametrically defined functions and use implicit differentiation in a wide variety of problems in physics, chemistry, economics, and so forth.	<i>SE and TWE:</i> 951-957	<i>SE:</i> 957-960	<i>SE and TWE:</i> 951-957			
11-12	7.0	Students compute derivatives of higher orders.	<i>SE and TWE:</i> 951-957	<i>SE:</i> 957-960	<i>SE and TWE:</i> 951-957			
11-12	8.0	Students know and can apply Rolle's theorem, the mean value theorem, and L'Hôpital's rule.	<i>SE and TWE:</i> 951-957	*4	*4			
11-12	9.0	Students use differentiation to sketch, by hand, graphs of functions. They can identify maxima, minima, inflection points, and intervals in which the function is increasing and decreasing.	<i>SE and TWE:</i> 951-957	<i>SE:</i> 957-960	<i>SE and TWE:</i> 951-957			
11-12	10.0	Students know Newton's method for approximating the zeros of a function.	<i>SE and TWE:</i> 951-957	*4	*4			
11-12	11.0	Students use differentiation to solve optimization (maximum-minimum problems) in a variety of pure and applied contexts.	<i>SE and TWE:</i> 961-965	<i>SE:</i> 966-968	<i>SE and TWE:</i> 961-965			
11-12	12.0	Students use differentiation to solve related rate problems in a variety of pure and applied contexts.	<i>SE and TWE:</i> 961-965	<i>SE:</i> 966-968	<i>SE and TWE:</i> 961-965			
11-12	13.0	Students know the definition of the definite integral by using Riemann sums. They use this definition to approximate integrals.	<i>SE and TWE:</i> 961-965	<i>SE:</i> 966-968	<i>SE and TWE:</i> 961-965			
11-12	14.0	Students apply the definition of the integral to model problems in physics, economics, and so forth, obtaining results in terms of integrals.	<i>SE and TWE:</i> 961-965	<i>SE:</i> 966-968	<i>SE and TWE:</i> 961-965			

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						Y	N	
11-12	15.0	Students demonstrate knowledge and proof of the fundamental theorem of calculus and use it to interpret integrals as antiderivatives.	<i>SE and TWE:</i> 970-972	<i>SE:</i> 972-975	<i>SE and TWE:</i> 970-972			
11-12	16.0	Students use definite integrals in problems involving area, velocity, acceleration, volume of a solid, area of a surface of revolution, length of a curve, and work.	<i>SE and TWE:</i> 961-965	<i>SE:</i> 966-968	<i>SE and TWE:</i> 961-965			
11-12	17.0	Students compute, by hand, the integrals of a wide variety of functions by using techniques of integration, such as substitution, integration by parts, and trigonometric substitution. They can also combine these techniques when appropriate.	<i>SE and TWE:</i> 961-965	<i>SE:</i> 966-968	<i>SE and TWE:</i> 961-965			
11-12	18.0	Students know the definitions and properties of inverse trigonometric functions and the expression of these functions as indefinite integrals.	<i>SE and TWE:</i> 305-306, 405-409	<i>SE:</i> 308-309, 410-412	<i>SE and TWE:</i> 305-306, 405-409			
11-12	19.0	Students compute, by hand, the integrals of rational functions by combining the techniques in standard 17.0 with the algebraic techniques of partial fractions and completing the square.	<i>SE and TWE:</i> 961-965, 970-972	<i>SE:</i> 966-968, 972-975	<i>SE and TWE:</i> 961-965, 970-972			
11-12	20.0	Students compute the integrals of trigonometric functions by using the techniques noted above.	<i>SE and TWE:</i> 961-965	*4	*4			
11-12	21.0	Students understand the algorithms involved in Simpson's rule and Newton's method. They use calculators or computers or both to approximate integrals numerically.	<i>SE and TWE:</i> 961-965	*4	*4			
11-12	22.0	Students understand improper integrals as limits of definite integrals.	<i>SE and TWE:</i> 970-972	<i>SE:</i> 972-975	<i>SE and TWE:</i> 970-972			

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						Y	N	
11-12	23.0	Students demonstrate an understanding of the definitions of convergence and divergence of sequences and series of real numbers. By using such tests as the comparison test, ratio test, and alternate series test, they can determine whether a series converges.	<i>SE and TWE:</i> 786-790	<i>SE:</i> 790-793	<i>SE and TWE:</i> 786-790			
11-12	24.0	Students understand and can compute the radius (interval) of the convergence of power series.	<i>SE and TWE:</i> 961-965	*4	*4			
11-12	25.0	Students differentiate and integrate the terms of a power series in order to form new series from known ones.	<i>SE and TWE:</i> 961-965	*4	*4			
11-12	26.0	Students calculate Taylor polynomials and Taylor series of basic functions, including the remainder term.	<i>SE and TWE:</i> 961-965	*4	*4			
11-12	27.0	Students know the techniques of solution of selected elementary differential equations and their applications to a wide variety of situations, including growth-and-decay problems.	<i>SE and TWE:</i> 961-965	*4	*4			

Publisher Notes/Additional Comments (note to publishers: please include grade level/standard when listing comments):

(1) Covered in Glencoe Algebra 1, 2003. (Grade 8-12, Algebra I Standards)

(2) Covered in Glencoe Geometry 2004. (Grade 8-12, Geometry Standards)

(3) Covered in Glencoe Algebra 2, 2003. (Grade 8-12, Algebra II Standards 1.0, 3.0, 4.0, 7.0, 11.0, 11.2, 15.0, 25.0; Grade 10-12, Linear Algebra Standard 1.0; Grade 11-12, Advanced Placement Probability and Statistics Standard 4.0)

(4) Not covered in this book.

\* For more information, see Notes.