

# GLENCOE CORRELATION

## ADVANCED MATHEMATICAL CONCEPTS

### CALIFORNIA

The California Mathematics Academic Content Standards  
TRIGONOMETRY

STANDARDS	LESSON REFERENCES
1. Students understand the notion of angle, and how to measure it, both in degrees and radians. They can convert between degrees and radians.	5-1
2. 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.	5-3, 5-4
3. Students know the identity $\cos^2(x) + \sin^2(x) = 1$ .	7-1
3.1 Students prove that this identity is equivalent to the Pythagorean theorem (i.e., students can prove this identity using the Pythagorean theorem, and conversely they can prove the Pythagorean theorem as a consequence of this identity).	5-3
3.2 Students prove other trigonometric identities, and simplify others using the identity $\cos^2(x) + \sin^2(x) = 1$ (e.g., students use this identity to prove that $\sec^2(x) = \tan^2(x) + 1$ ).	7-1
4. Students graph functions of the form $f(t) = A\sin(Bt + \phi)$ or $f(t) = A\cos(Bt + \phi)$ , and interpret $A$ , $B$ , and $\phi$ in terms of amplitude, frequency, period, and phase shift.	6-1, 6-3
5. Students know the definition of the tangent and cotangent functions, and can graph them.	6-1, 6-2, 6-3A, 6-3
6. Students know the definitions of the secant and cosecant functions, and can graph them.	6-1, 6-3A, 6-3
7. Students know that the tangent of the angle a line makes with the $x$ -axis is equal to the slope of the line.	3-6
8. Students know the definitions of the inverse trigonometric functions, and can graph the functions.	6-4, 6-5, 6-6A, 6-6
9. Students compute, by hand, the values of the trigonometric functions and the inverse trigonometric functions at various standard points.	5-3, 6-6
10. Students demonstrate understanding of the addition formulas for sines and cosines, their proofs, and use them to prove and/or simplify other trigonometric identities.	7-1, 7-2, 7-2B, 7-3, 7-4, 7-5A, 7-5

STANDARDS	LESSON REFERENCES
11. Students demonstrate understanding of half angle and double angle formulas for sines and cosines, and can use them to prove and/or simplify other trigonometric identities.	7-4
12. Students use trigonometry to determine unknown sides or angles in right triangles.	5-3, 5-4, 5-5, 5-6, 5-7
13. Students know the Laws of Sines and the Law of Cosines, and apply them to problems.	5-6, 5-7
14. Students determine the area of a triangle given one angle and the two adjacent sides.	5-8
15. Students are familiar with polar coordinates. In particular, they can determine polar coordinates of a point given in rectangular coordinates, and vice versa.	9-1, 9-2A, 9-3
16. Students represent equations given in rectangular coordinates in terms of polar coordinates.	9-4
17. 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.	9-5, 9-6, 9-7
18. Students know De Moivre's Theorem, and can give $n$ -th roots of a complex number given in polar form.	9-8
19. Students are adept at using trigonometry in a variety of applications and word problems.	5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 5-7, 5-8, 6-1, 6-2, 6-3, 6-4, 6-5, 6-6, 6-7, 7-1, 7-2, 7-3, 7-4, 7-5, 7-6, 7-7

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The California Mathematics Academic Content Standards  
MATHEMATICAL ANALYSIS

STANDARDS	LESSON REFERENCES
1. 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.	8-1, 8-2, 8-3, 9-1, 9-3
2. 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.	9-5, 9-6, 9-7, 9-8
3. Students can give proofs of various formulas using the technique of mathematical induction.	9-8, 12-8
4. Students know the statement of and can apply the Fundamental Theorem of Algebra.	4-1
5. Students are familiar with conic sections, both analytically and geometrically.	10-1, 10-2A, 10-2, 10-3, 10-4, 10-5, 10-6A, 10-6, 10-7A
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, etc.).	10-5, 10-6
5.2 Students can take a geometric description of a conic section (e.g. the locus of points whose sum of its distances from (1, 0) and (-1, 0) is 6), and derive a quadratic equation representing it.	10-1, 10-2, 10-3, 10-4, 10-5
6. Students find the roots and poles of a rational function, can graph the function, and can locate its asymptotes.	3-4A, 3-4
7. Students demonstrate an understanding of functions and equations defined parametrically, and can graph them.	8-6, 8-7
8. 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 if certain sequences converge or diverge.	12-3, 12-4, 17-1

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## ADVANCED MATHEMATICAL CONCEPTS

### CALIFORNIA

#### The California Mathematics Academic Content Standards LINEAR ALGEBRA

STANDARDS	LESSON REFERENCES
1. Students solve simultaneous linear equations in any number of variables using Gauss-Jordan elimination.	2-1
2. Students interpret linear systems as coefficient matrices and the Gauss-Jordan method as row operations on the coefficient matrix.	2-4
3. Students reduce rectangular matrices to row echelon form.	2-4
4. Students perform addition on matrices and vectors.	2-2, 8-2
5. Students perform matrix multiplication, multiply vectors by matrices and by scalars.	2-2, 8-2
6. Students demonstrate understanding that linear systems are either inconsistent (no solutions), have exactly one solution, or have infinitely many solutions.	2-1
7. Students demonstrate understanding of the geometric interpretation of vectors and vector addition (via parallelograms) for vectors in the plane and in three dimensional space.	8-2, 8-3
8. Students interpret the solution sets of systems of equations geometrically. 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.	10-7
9. Students demonstrate understanding of the notion of the inverse to a square matrix, and apply it to solve systems of linear equations.	2-3, 2-4
10. Students compute the determinants of 2 by 2 and 3 by 3 matrices, and are familiar with their geometric interpretations as area and volume of the parallelepipeds spanned by the images under the matrices of the standard basis vectors in 2-dimensional and 3-dimensional spaces.	2-3, 8-1, 8-3, 8-4
11. Students know that a square matrix is invertible if, and only if, its determinant is non-zero. They can compute the inverse to 2 by 2 and 3 by 3 matrices using row reduction methods or Cramer's rule.	2-3, 2-4
12. Students compute the scalar (dot) product of two vectors in $n$ -dimensional space, and know that perpendicular vectors have zero dot product.	8-4

**GLENCOE CORRELATION**  
**ADVANCED MATHEMATICAL CONCEPTS**  
**CALIFORNIA**  
The California Mathematics Academic Content Standards  
**PROBABILITY AND STATISTICS**

<b>STANDARDS</b>	<b>LESSON REFERENCES</b>
1. Students know the definition of the notion of independent events, and can use the addition, multiplication, and complementation rules to solve for probabilities of particular events in finite sample spaces.	14-1, 14-5, 14-7
2. Students know the definition of conditional probability, and use it to solve for probabilities in finite sample spaces.	14-7
3. Students demonstrate understanding of the notion of discrete random variables by using them to solve for the probabilities of outcomes, such as the probability of the occurrence of five heads in fourteen coin tosses.	14-4, 14-5, 14-6
4. Students are familiar with the standard distributions (normal, binomial, and exponential), and can use them to solve for events in problems where the distribution belongs to these families.	15-1, 15-2, 15-4
5. Students determine the mean and standard deviation of a normally distributed random variable.	15-4
6. Students know the definitions of the mean, median, and mode of distribution of real valued data, and can compute them in particular situations.	15-2
7. Students compute the variance and standard deviation of a distribution of data.	15-3
8. Students organize and describe distributions of data using a number of different methods, including frequency tables, histograms, standard line and bar graphs, stem and leaf displays, scatter plots, and box and whisker plots.	15-1, 15-2, 15-3, 15-6A, 15-6 15-6B
9. Students find the line of best fit to a given distribution of data using least squares regression.	15-6B