California High School Math

Content Standards - Curriculum Frameworks, 1997

Trigonometry, Mathematical Analysis	Boardworks Precalculus and Trigonometry presentations
Trigonometry	
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.	The sine, cosine and tangent of any angle Trigonometric graphs and exact values Degrees and radians Solving equations using radians 3–D trigonometry Questions on trigonometry
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.	The sine, cosine and tangent of any angle Trigonometric graphs and exact values Trigonometric equations
3.0 Students know the identity $\cos^2(x) + \sin^2(x) = 1$	
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).	Trigonometric identities
3.2 Students prove other trigonometric identities and simplify others by using the identity $\cos^2(x) + \sin^2(x) = 1$.	Trigonometric identities Trigonometric identities using reciprocal functions The double angle formulas Expresssions of the form acos x plus bsinx Questions on trigonometry Parametric functions
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.	Transforming trigonometric functions
5.0 Students know the definitions of the tangent and cotangent functions and can graph them.	Trigonometric graphs and exact values The sine, cosine and tangent of any angle The reciprocal trigonometric functions
6.0 Students know the definitions of the secant and cosecant functions and can graph them.	The reciprocal trigonometric functions
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.	The sine, cosine and tangent of any angle Slopes and intercepts
8.0 Students know the definitions of the inverse trigonometric functions and can graph the functions.	The inverse trigonometric functions

9.0 Students compute, by hand, the values of the trigonometric functions and the inverse trigonometric functions at various standard points.	The sine, cosine and tangent of any angle Trigonometric graphs and exact values The inverse trigonometric functions Trigonometric equations Degrees and radians Trigonometric identities
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.	The addition formulas The double angle formulas Expressions of the form acos x plus bsin x Questions on trigonometry
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.	The addition formulas The double angle formulas Questions on trigonometry
12.0 Students use trigonometry to determine unknown sides or angles in right triangles.	The sine, cosine and tangent of any angle 3–D trigonometry Trigonometric graphs and exact values Questions on trigonometry The inverse trigonometric functions
13.0 Students know the law of sines and the law of cosines and apply those laws to solve problems.	The law of sines and the area of a triangle The law of cosines
14.0 Students determine the area of a triangle, given one angle and the two adjacent sides.	The law of sines and the area of a triangle
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.	Polar coordinates
16.0 Students represent equations given in rectangular coordinates in terms of polar coordinates.	Polar coordinates
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.	Polar coordinates
18.0 Students know DeMoivre's theorem and can give nth roots of a complex number given in polar form.	Polar coordinates

19.0 Students are adept at using trigonometry in a variety of applications and word problems.	The sine, cosine and tangent of any angle Transforming trigonometric functions Degrees and radians Solving equations using radians 3–D trigonometry Questions on trigonometry The inverse trigonometric functions
Mathematical Analysis	
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.	Polar coordinates Vectors in two and three dimensions The magnitude of a vector Adding and subtracing vectors Position vectors and coordinate geometry Vector arithmetic Using vectors Intersecting lines The vector equation of a line The intersection of a line and a plane The dot product Questions on vectors
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.	Polar coordinates
3.0 Students can give proofs of various formulas by using the technique of mathematical induction.	–
4.0 Students know the statement of, and can apply, the fundamental theorem of algebra.	Polynomials of degree 3 or more Dividing polynomials The Factor Theorem Solving quadratic equations
5.0 Students are familiar with conic sections, both analytically and	
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).	Conic sections part 1 Conic sections part 2 Solving quadratic equations

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.	Conic sections part 1 Conic sections part 2
6.0 Students find the roots and poles of a rational function and can graph the function and locate its asymptotes.	Graphing rational functions Solving rational equations
7.0 Students demonstrate an understanding of functions and equations defined parametrically and can graph them.	Parametric functions Parametric equations of curves Questions on vectors
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.	Plotting and sketching graphs Graphing rational functions Piecewise-defined functions Limits The sum of a geometric series