

**SANTA ROSA CITY SCHOOLS
CONTENT AND PERFORMANCE STANDARDS
TRIGONOMETRY/PRECALCULUS**

Properties of Circular Functions:

Enduring Understanding	ILLUSTRATIONS
<p>T/PC 1 The student will understand and apply the properties of circular functions.</p> <p>T/PC 1.2 The student will demonstrate meeting the standard in understanding and applying the properties of circular functions by defining and using the trigonometric functions (i.e., sine, cosine and tangent, including their relationship to coordinates on the unit circle) to solve problems and model real world phenomena.</p> <p>T/PC 1.6 The student will demonstrate meeting the standard in understanding and applying the properties of circular functions by applying the Law of Sines and the Law of Cosines to solve for missing sides and angles in triangles and in models of real world problems.</p>	<p>1.1 a) Express $\frac{11\pi}{20}$ in degree measure.</p> <p>1.1 b) Find the length of an arc in a circle with radius 7.2 cm and a central angle of $\frac{7\pi}{12}$.</p> <p>1.2 a) Which trigonometric ratios are positive in Quadrant II?</p> <p>1.2 b) State the sine of the angle in standard position with terminal side through the point $(-2,7)$.</p> <p>1.2 c) <i>See Application Pages</i></p> <p>1.3 a) Given that $\sin 17^\circ = m$, then $\cos 17^\circ = ?$</p> <p>1.3 b) Given that $\sin 17^\circ = m$, then $\csc 17^\circ = ?$ Select one:</p> <p style="text-align: center;">1) $\frac{-1}{m}$ 2) $\frac{1}{m}$</p> <p style="text-align: center;">3) $\sqrt{m^2 - 1}$ 4) $\sqrt{1 - m^2}$</p> <p>1.3 c) Determine the exact value of $\cos(75^\circ)$.</p> <p>1.4 a) For $f(x) = 7 + 5 \sin\left(3x - \frac{\pi}{4}\right)$ determine the amplitude, phase shift and maximum possible values.</p>
Important to Know and Do	
<p>T/PC 1.1 The student will demonstrate meeting the standard in understanding and applying the properties of circular functions by understanding radian measure, including facility with converting between degrees and radians, and being able to apply properties of radian measures in a given context.</p> <p>T/PC 1.3 The student will demonstrate meeting the standard in understanding and applying the properties of circular functions by finding the exact values of trigonometric functions for angles in multiples of 30° and 45° (includes the use of the reciprocal, complement, ratio, Pythagorean, addition, half angle, double angle, sum to product and product to sum formulas).</p> <p>T/PC 1.4 The student will demonstrate meeting the standard in understanding and applying the properties of circular functions by identifying the key characteristics (i.e., domain, range, amplitude, period, phase shift and vertical shift) of trigonometric functions in algebraic or graphical form, and interpret these characteristics within a context.</p> <p>T/PC 1.5 The student will demonstrate meeting the standard in understanding and applying the properties of circular functions by proving basic trigonometric identities and making substitutions using the identities.</p> <p>T/PC 1.7 The student will demonstrate meeting the standard in understanding and applying the properties of circular functions by interpreting and graphing generalized inverse trigonometric functions, and solving simple equations involving them.</p> <p>T/PC 1.8 The student will demonstrate meeting the standard in understanding and applying the properties of circular functions by using a graphing utility to graph and solve circular functions.</p>	

Worth Being Familiar With	1.4 b) <i>See Application Pages</i>
	1.5 <i>See Application Pages</i>
	1.6 a) Solve each triangle: <ul style="list-style-type: none"> • $\angle A = 74^\circ, \angle C = 37^\circ, a = 34\text{cm}$ • $\angle A = 37^\circ, a = 14\text{cm}, B = 17\text{cm}$
	1.6 b) <i>See Application Pages</i>
	1.7 a) Solve for x: <ul style="list-style-type: none"> • $3 \sin x + 4 = 0$ • $3 \sin x + 2 = \cos x$
	1.7 b) <i>See Application Pages</i>
	1.8 <i>See Application Pages</i>

Polynomial, Exponential, Logarithmic, Rational and Radical Functions:

Enduring Understanding	ILLUSTRATIONS
<p>T/PC 2 The student will be familiar with polynomial, exponential, logarithmic, rational and radical functions.</p>	<p>2.1 a) Determine the zeros, intercepts and the end behavior for the function</p>
<p>Important to Know and Do</p>	$f(x) = (x - 2)(x + 3)(x + 1)^2.$
<p>T/PC 2.1 The student will demonstrate meeting the standard of familiarity with polynomial, exponential, logarithmic, rational and radical functions by describing general characteristics of the graphs of polynomial exponential or rational functions, based on their algebraic representations (i.e., finding the roots, intercepts, asymptotes, and general shape), and interpret these results graphically and within a context.</p>	<p>2.1 b) Determine the asymptotes for $\frac{(x+1)(x-2)}{(x+1)(x+2)}$.</p> <p>2.1 c) <i>See Application Pages</i></p>
<p>T/PC 2.2 The student will demonstrate meeting the standard of familiarity with polynomial, exponential, logarithmic, rational and radical functions by understanding the concept of a limit and being able to record asymptotic behavior in limit notation.</p>	<p>2.2 a) Graph $f(x) = \frac{(6x+5)}{(x+3)}$ and not the vertical asymptote(s) in limit notation.</p> <p>2.2 b) <i>See Application Pages</i></p>
<p>T/PC 2.3 The student will demonstrate meeting the standard of familiarity with polynomial, exponential, logarithmic, rational and radical functions by determining polynomial, exponential or rational functions to match a graph, and modeling real world phenomena (e.g., growth and decay).</p>	<p>2.3 <i>See Application Pages</i></p>
<p>T/PC 2.5 The student will demonstrate meeting the standard of familiarity with polynomial, exponential, logarithmic, rational and radical functions by understanding the meaning of the value e and know general applications, such as the base for the natural logarithm and continuous compound interest problems.</p>	<p>2.4 Solve for x:</p> <ul style="list-style-type: none"> • $3^{2x+1} = 7^x$ • $\log_2(x^2 - 8x + 15) - \log_2(x - 3) = 3$
<p>T/PC 2.6 The student will demonstrate meeting the standard of familiarity with polynomial, exponential, logarithmic, rational and radical functions by using a graphing utility to solve and graph polynomial, rational, exponential and logarithmic functions, and understanding the appropriateness of calculator results.</p>	<p>2.5 a) Given $A = Pe^{rt}$, if \$7200 is invested at 6.25% continuously compounded interest, how much is available at the end of 3 years?</p> <p>b) <i>See Application Pages</i></p>
<p>Worth Being Familiar With</p>	<p>2.6 a) For $f(x) = e^x + x^3 - 3x - 2$, sketch a graph and determine the zeros (to the nearest thousandth).</p>
<p>T/PC 2.4 The student will demonstrate meeting the standard of familiarity with polynomial, exponential, logarithmic, rational and radical functions by solving exponential and logarithmic equations, including the change of base formula, basic properties of logarithms and the difference between the common and natural logarithmic functions.</p>	<p>2.6 b) <i>See Application Pages</i></p>

Polar Equations and Complex Numbers:

Enduring Understanding	ILLUSTRATIONS
Important to Know and Do	
T/PC 3 The student will be able to work with polar equations and complex numbers.	
T/PC 3.1 The student will demonstrate meeting the standard of working with polar equations and complex numbers by understanding the polar coordinate system and be able to convert between rectangular and polar coordinates.	3.1 a) Convert $(3,-5)$ into polar coordinates. b) <i>See Application Pages</i>
T/PC 3.2 The student will demonstrate meeting the standard of working with polar equations and complex numbers by converting equations between polar and rectangular forms.	3.2 Convert $x^2 + y^2 - 5x = 0$ to polar form.
T/PC 3.3 The student will demonstrate meeting the standard of working with polar equations and complex numbers by understanding complex numbers, representing a complex number in polar form, and multiplying complex numbers in their polar form.	3.3 a) Convert $3 + 4i$ into polar form. b) Simplify $(5cis60^\circ) \cdot (3cis40^\circ)$.
T/PC 3.4 The student will demonstrate meeting the standard of working with polar equations and complex numbers by knowing and applying DeMoivre's Theorem to give the n th roots of a complex number given in polar form.	3.4 Which is one of the fifth roots of 32? 1) $2cis72^\circ$ 2) $2cis60^\circ$ 3) $2cis90^\circ$ 4) $2cis180^\circ$
Worth Being Familiar With	

Vectors:

Enduring Understanding	ILLUSTRATIONS
T/PC 4 The student will understand how to use vectors.	
T/PC 4.1 The student will demonstrate meeting the standard of using vectors by creating two-dimensional vector diagrams, performing simple operations (sum, difference and scalar multiplication), and applying them to solve problems.	4.1 a) Show graphically $(2\vec{i} + 3\vec{j}) + (4\vec{i} - 1\vec{j})$. 4.1 b) <i>See Application Pages</i> 4.2 a) Find the vector equation of the line through $(-2,1)$ and $(5,3)$. 4.2 b) <i>See Application Pages</i>

Important to Know and Do	
T/PC 4.2 The student will demonstrate meeting the standard of using vectors by solving vector and parametric equations and applying these equations to model real world phenomena, such as flight trajectory or force problems.	
Worth Being Familiar With	

Sequence and Series:

Enduring Understanding	ILLUSTRATIONS
T/PC 5 The student will understand sequence and series.	5.1 a) For $t_n = 3n + 2$, $t_4 = ?$ 5.1 b) $t_n = 2 \cdot 3^n$, $t_4 = ?$
Important to Know and Do	5.2 a) If $x = 3 + 4t$ and $y = 2 - t^2$, what is the graph for $0 \leq t \leq 4$? 5.2 b) <i>See Application Pages</i>
T/PC 5.1 The student will demonstrate meeting the standard of understanding sequences and series by determining an indicated term in a sequence and interpret the results within a context.	5.3 a) Determine the sum of this infinite sequence: 20,10,5,2.5,... .
T/PC 5.2 The student will demonstrate meeting the standard of understanding sequences and series by determining an arithmetic or geometric sequence to model a set of data.	5.3 b) <i>See Application Pages</i>
T/PC 5.3 The student will demonstrate meeting the standard of understanding sequences and series by using a summative notation to describe the sums in a series, and determining the sum of a finite series and of an infinite geometric series.	5.4 Evaluate each limit: 1) $\lim_{n \rightarrow \infty} \left(\frac{2n+3}{n-4} \right)$ 2) $\lim_{n \rightarrow \infty} \left(\frac{2n^2+3}{n-4} \right)$ 3) $\lim_{n \rightarrow \infty} \left(\frac{2n+3}{n^2-4} \right)$
T/PC 5.4 The student will demonstrate meeting the standard of understanding sequences and series by understanding the notion of limit in applications of sequences and determining if a sequence converges or diverges.	5.5 <i>See Application Pages</i>
Worth Being Familiar With	
T/PC 5.5 The student will demonstrate meeting the standard of understanding sequences and series by giving proofs of various formulas using mathematical induction.	

Probability and Data Analysis:

<p style="text-align: center;">Enduring Understanding</p>	<p style="text-align: center;">ILLUSTRATIONS</p>
<p>T/PC 6 The students will understand and apply simple probability and data analysis.</p>	<p>6.1 <i>See Application Pages</i></p>
<p style="text-align: center;">Important to Know and Do</p>	<p>6.2 <i>See Application Pages</i></p>
<p>T/PC 6.1 The student will demonstrate meeting the standard of understanding and applying simple probability and data analysis by defining, calculating and applying measures of central tendency and dispersion.</p> <p>T/PC 6.2 The student will demonstrate meeting the standard of understanding and applying simple probability and data analysis by describing a normal distribution and the properties of the normal curve, and interpreting these in the context of real problems.</p> <p>T/PC 6.3 The student will demonstrate meeting the standard of understanding and applying simple probability and data analysis by distinguishing between experimental and theoretical probability and using each appropriately to represent and solve probability problems.</p> <p>T/PC 6.4 The student will demonstrate meeting the standard of understanding and applying simple probability and data analysis by understanding and applying conditional probability to solve problems.</p> <p>T/PC 6.5 The student will demonstrate meeting the standard of understanding and applying simple probability and data analysis by using the binomial distribution to answer probability questions.</p> <p>T/PC 6.6 The student will demonstrate meeting the standard of understanding and applying simple probability and data analysis by choosing an appropriate probability model (replacement or non-replacement, combination or permutation), and using it to arrive at a theoretical probability for a simple or compound chance event.</p>	<p>6.3 <i>See Application Pages</i></p> <p>6.5 <i>See Application Pages</i></p> <p>6.6 <i>See Application Pages</i></p>
<p style="text-align: center;">Worth Being Familiar With</p>	

Limits, Continuity and Simple Derivatives:

Enduring Understanding	ILLUSTRATIONS
T/PC 7 The student will understand limits, continuity and simple derivatives.	7.1 <i>See Application Pages</i>
Important to Know and Do	7.2 <i>See Application Pages</i>
T/PC 7.1 The student will demonstrate meeting the standard of understanding limits, continuity and simple derivatives by determining limits for polynomial, composite, rational, radical, exponential and logarithmic functions both from algebraic and graphical representations, displaying results both graphically and in limit notation, and interpreting results in a given context.	7.3 <i>See Application Pages</i>
T/PC 7.2 The student will demonstrate meeting the standard of understanding limits, continuity and simple derivatives by identifying continuous and discontinuous functions and locating points of discontinuity from graphs and algebraic expressions.	
T/PC 7.3 The student will demonstrate meeting the standard of understanding limits, continuity and simple derivatives by determining the derivative of a function at a point and understanding its relationship to instantaneous rate of change and the slope of the line tangent to the point.	
Worth Being Familiar With	