Statewide Dual Credit Learning Objectives
Precalculus

Topic 1: Equations

1a Apply various techniques, as appropriate, to simplify expressions and solve equations. This includes using exact symbolic (algebraic), approximation and graphical techniques. includes using exact symbolic (algebraic), approximation and graphical techniques.

1b Solve quadratic equations for both real and complex roots.

1c Solve polynomial equations of degree > 2 for both real and complex roots.

1d For factorable polynomial expressions, create factored forms via factoring by grouping, use synthetic division, or polynomial long division.

1e Solve equations involving absolute values exponential or logarithmic expressions and differentiate extraneous solutions from true solutions.

1f Identify equations that cannot be solved directly and use graphical or other approximations.

1g Use the properties of logarithms and exponentials to simplify expressions involving logs and exponentials.

1h Evaluate expressions containing powers of zero, negative exponents, or rational powers.

1i Expand the order of operations to include applying logarithmic, radical, and trigonometric functions, and evaluate expressions that feature those functions.

Topic 2: Inequalities

2a Apply various techniques (algebraic and graphical) to solve inequalities involving polynomials (including degree >2), and absolute values, and can express answers using interval notation.

2b Use algebra techniques to determine the intervals on which a function f(x) is positive, negative, or zero.

2c Express solution sets using interval notation and set builder notation.

Topic 3: Functions

3a Express properties and transformations of functions graphically and use a graph to determine function properties.

3b Identify the basic function transformations[f(x-a), f(x+a), f(x)+a, f(x)-a, f(ax), af(x)], and apply those transformations to the graph of the function or to its equation.

3c Using either the function equation or the graph of the function, identify the function's intercepts, asymptotes (vertical, horizontal, slant), domain, range, even/odd symmetry, and end behavior.

3d Using the graph of a function, identify its critical points and determine if each critical point is a minimum, maximum or neither, and locate intervals of increase/ decrease.

3e Manipulate functions as elements to get new functions via addition, subtraction, multiplication, division, and composition and can simplify the resulting expression (e.g., difference quotient).

3f Construct and evaluate inverse functions and use domain and/or range restriction appropriately.

Topic 4: Trigonometric Functions

4a Relate values on the unit circle to trig function values, and vice-versa, with numerical values at specific angles (0, $\pi/6$, $\pi/4$, $\pi/3$, $\pi/2$) and their periodic extensions.

4b Graph the six trigonometric functions and identify characteristics such as period, amplitude, phase shift, and asymptotes.

4c Use trigonometric identities to evaluate numerical values, simplify expressions and solve equations. For example, use sum/difference identities to evaluate cos ($\pi/12$.

6e Apply multiple identities to simplify expressions and solve equations, including ones involving inverse functions.

6f Solve trigonometric equations by factoring, by using identities, and by graphing.

Topic 5: Geometry

5a   Identify missing side lengths or interior angles of a right triangle using the Pythagorean Theorem and/or trigonometric techniques.

5b   Solve for missing characteristics of any triangle using the Law of Sines or the Law of Cosines.

5c   Determine the magnitude and direction of a vector given its i, j components, or vice versa.

5d   Using the completion of squares, convert the general forms of equations for parabolas or circles into their standard forms.

5e   Identify the center and radius of a circle by comparing an equation to the standard form equation for a circle (provided on formula sheet).

5f   Calculate basic geometric properties like area of a sector, arc length, and the relation between the area of a sector and the inscribed triangle.

5g   Relate, through the unit circle, polar coordinates to Cartesian coordinates and vice versa.

Topic 6: Models and Applications

6a   Create functions that model given conditions for objects in constant velocity, free fall, simple harmonic motion, or constant angular velocity.

6b   Using right triangles, model applications involving angles of elevation, angles of depression, bearings, and headings, and employ trigonometric techniques to solve the model.

6c   Identify or create appropriate models for situations involving direct and inverse proportionality, average rate of change, exponential growth and decay, logarithmic relations, and periodic behavior.

6d   Use appropriate units for a model.

6e   Interpret the solutions in terms of the original problem.