

NPSD Middle & High School Curriculum

Department: Mathematics

Course: Precalculus

Students will be able to recognize and apply the foundational Calculus AB Concepts (Sigma Notation, Area Under Curve, AROC, IROC, Derivatives) through an assortment of problems, situations, and modeling.

Promise Standards

- 1a - I can write a sum of values in Summation Notation.
- 1b - I can analyze a graph that utilizes Area Under the Curve.
- 1c - I can find the AROC and IROC of a function at a point.
- 1d - I can apply the relationship between position and velocity.

Essential Learning Targets

- ELT 1 - I can write a sum of values in Summation Notation.
- ELT 2 - I can use Summation Notation to estimate Area Under the Curve.
- ELT 3 - I can find the Average Rate of Change at a point.
- ELT 4 - I can find the Instantaneous Rate of Change at a point.
- ELT 5 - I can describe the relationship between position and velocity.
- ELT 6 - I can find position given velocity.
- ELT 7 - I can find velocity given position.

Students will be able to find the limits of functions graphically and analytically.

Promise Standards

- 2a - I can determine the end behavior of a function.
- 2b - I can determine the limit from a graph.
- 2c - I can determine the limit from an equation by using algebra.

Essential Learning Targets

- ELT 1 - I can find the end behavior of a given function. (F.IF.C.7)
- ELT 2 - I can find the limit given a graph.
- ELT 3 - I can find the limit given an equation algebraically.
- ELT 4 - I can describe what it means for a function to be continuous.
- ELT 5 - I can use the definition of continuity.
- ELT 6 - I can determine the limit from a given equation using algebra.

Students will be able to recognize and apply Piecewise Functions and Vectors through an assortment of problems, situations, and modeling.

Promise Standards

- 3a - I can graph, evaluate, and interpret piecewise functions.
- 3b - I can understand and apply vector terminology.
- 3c - I can apply vectors to a situation and use them to solve real world problems.

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Essential Learning Targets

- ELT 1 - I can graph piece-wise defined functions. (F.IF.7b)
- ELT 2 - I can evaluate a piece-wise defined function.
- ELT 4 - I can find the magnitude of a vector. (N.VM.A.1)
- ELT 5 - I can find the direction of a vector. (N.VM.A.1)
- ELT 6 - I can add vectors. (N.VM.B.4)
- ELT 7 - I can subtract vectors. (N.VM.B.4)
- ELT 8 - I can multiply a vector by a scalar. (N.VM.B.5)
- ELT 9 - I can find the magnitude of a vector sum. (N.VM.B.4)
- ELT 10 - I can find the direction of a vector sum. (N.VM.B.4)
- ELT 11 - I can model a situation using a vector.

Students will be able to model polynomial functions by graphing, simplifying, and solving applicable situations.

Promise Standards

- 4a - I can simplify, evaluate, and solve polynomial functions/inequalities.
- 4b - I can solve a system of equations algebraically and geometrically.
- 4c - I can find the equation of a polynomial given a point and its roots.
- 4d - I can divide polynomials

Essential Learning Targets

- ELT 1 - I can write numbers in complex form $a+bi$. ([N.CN.A.1](#))
- ELT 2 - I can solve quadratic equations (real and complex). ([N.CN.C.7](#))
- ELT 3 - I can solve polynomial equations with real and complex roots. (N.CN.C.8 - conjugate roots+)
- ELT 4 - I can apply the Fundamental Theorem of Algebra to determine the number of roots in a polynomial (real and complex). (N.CN.C.9 +)
- ELT 5 - I can interpret parts of an expression (terms, factors, coefficients). (A.SSE.A.1a)
- ELT 6 - I can rewrite expressions by using the structure of an expression to identify ways to rewrite it (factoring, rewriting, distributing, conjugate). (A.SSE.A.2)
- ELT 7 - I can factor, use quadratic formula, or complete the square to reveal the zeros of the function. (A.SSE.B.3a)
- ELT 8 - I can use the zeros to construct a rough graph of a polynomial. (A.APR.B.3)
- ELT 9 - I can create a polynomial function from the zeros/roots. (A.CED.A.2)
- ELT 10 - I can divide polynomials. (A.APR.D.6)

Students will be able to model exponential functions by graphing, simplifying, and solving applicable situations.

Promise Standards

- 5a - I can solve an exponential/logarithmic equation.
- 5b - I can write/solve exponential equations from a situation.
- 5c - I can rewrite an exponential function.

Essential Learning Targets

- ELT 1 - I can solve exponential equations using logarithms. (F.BF.B.4a, F.LE.A.4)

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- ELT 2 - I can write the equation of an exponential function given 2 points. (F.LE.A.2) solve complex logarithmic equations. (F.BF.B.5)
- ELT 3 - I can write an exponential equation given a situation.
- ELT 4 - I can solve an exponential equation given a situation.
- ELT 5 - I can apply the properties of logarithms (power, product, quotient).
- ELT 6 - I can solve basic logarithmic equations. (F.BF.B.5, F.LE.A.4)
- ELT 7 - I can solve complex logarithmic equations. (F.BF.B.5)
- ELT 8 - I can use properties of exponential functions to rewrite them.

Students will be able to model rational functions by graphing, simplifying, and solving applicable situations.

Promise Standards

- 6a - I can recognize and apply exponent properties to expressions/equations.
- 6b - I can find the inverse of a function.
- 6c - I can simplify complex rational expressions.
- 6d - I can graph rational functions and describe their characteristics based off of the equation.

Essential Learning Targets

- ELT 1 - I can simplify expressions involving rational exponents (multiplication, division, power). (N.RN.A.2)
- ELT 2 - I can find inverse functions and relations (undoing, table, graph, equation) (F.BF.B.4a, F.IF.5, A.CED.4)
- ELT 3 - I can identify inverse functions (verify from table, graph, equation, composition) (F.BF.B.4c +, F.BF.B.4b)
- ELT 4 - I can restrict the domain of a function to get an invertible function. (F.BF.B.4d +, F.IF.5)
- ELT 5 - I can graph inverse functions (including cube root). (F.IF.C.7, F.IF.C.7b)
- ELT 6 - I can rewrite simple rational expressions in different forms (polynomial division). (A.APR.D.6)
- ELT 7 - I can add, subtract, multiply, and divide rational expressions. (A.APR.D.7+)
- ELT 8 - I can solve simple rational and radical equations in one variable. (extraneous solutions). (A.REI.A.2)

Students will be able to model trigonometric functions by graphing, simplifying, and solving applicable situations.

Promise Standards

- 7a - I can evaluate the Unit Circle/Trigonometric Functions and give exact values.
- 7b - I can model using the Unit Circle/Trigonometric Functions.
- 7c - I can analyze and describe periodic functions.
- 7d - I can find solutions to a trigonometric equation.
- 7e - I can graph a periodic function.
- 7f - I can find the missing measurement of non-right triangles.
- 7g - I can model a real life situation using a sinusoidal function.
- 7h - I can simplify/prove trigonometric identities.

Essential Learning Targets

- ELT 1 - I can use special triangles to determine geometrically the values of sine, cosine, and tangent. (F.TF.A.3)
- ELT 2 - I can model cyclic functions (F.TF.B.5)
- ELT 3 - I can construct the unit circle (degrees/radians). (F.TF.A.2)
- ELT 4 - I can graph trigonometric functions. (F.IF.7e)
- ELT 5 - I can identify the effect that a, b, h, and k have. (F.BF.B.3)

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- ELT 6 - I can understand and apply the relationship between the unit circle and a trig graph. ([F.TF.A.4](#))
- ELT 7 - I can use special right triangles to find exact values within the unit circle. (F.TF.A.3 +)
- ELT 8 - I can understand and apply degrees to solve trigonometric situations. (G.SRT.C.8 - supporting standard)
- ELT 9 - I can convert between degrees and radians. (G.C.B.5, [F.TF.1](#))
- ELT 10 - I can understand and apply radians to solve trigonometric situations. (F.TF.A.1, [F.TF.A.2](#))
- ELT 11 - I can develop the equation for trigonometric situations. (F.TF.B.5)
- ELT 12 - I can model a trigonometric function with a graph (sine, cosine, tangent). (F.TF.B.5, F.IF.C.7e)
- ELT 13 - I can convert between graphs and equations of trigonometric functions.
- ELT 14 - I can transform trig functions (equation/graph). (F.IF.C9, F.TF.B.5, [F.IF.C.7e](#))
- ELT 15 - I can use the unit circle to explain symmetry of trigonometric functions. ([F.TF.A.4](#))
- ELT 16 - I can use the unit circle to explain periodicity of trigonometric functions. ([F.TF.A.4](#))
- ELT 17 - I can prove trigonometric identities. (F.TF.C.9)
- ELT 18 - I can apply trigonometric identities. (F.TF.C.9)