

**2016-2017 Algebra I****Power Standards**

1. The student will be able to apply knowledge of their understanding of expressions, equations and inequalities.
2. The student will be able to express and describe algebraic functions graphically.
3. The student will be able to apply knowledge of their understanding of linear, exponential and quadratic relationships.
4. The student will be able to summarize and interpret data.

**Learning target**

- 1.1 I can create and/or solve equations that describe numbers or relationships.
- 1.2 I can create and/or solve inequalities that describe numbers or relationships.
- 1.3 I can create and/or solve systems of equations.
- 1.4 I can create and/or solve systems of inequalities.
- 1.5 I can apply the properties of exponents (including rational exponents).
- 1.6 I can apply arithmetic operations on polynomials (add, subtract, multiply).
- 1.7 I can represent a polynomial as a product of factors.
- 2.1 I can represent and solve linear relationships graphically.
- 2.2 I can represent and solve exponential relationships graphically.
- 2.3 I can represent and solve quadratic relationships graphically.
- 2.4 I can analyze and interpret relationships between linear, exponential and quadratic graphs.
- 3.1. I can construct, compare and solve problems involving linear, exponential, quadratic and absolute value models.
- 4.1 I can apply regression techniques to describe approximate linear relationships between quantities.
- 4.2. I can calculate and apply measures of central tendency.

**Course Details**

**UNIT: Simplifying Expressions and Solving Equations** -- 13 Day(s)

**UNIT: Inequalities** -- 7 Day(s)

**UNIT: Relations and Functions** -- 12 Day(s)

**UNIT: Linear Functions** -- 16 Day(s)

**UNIT: Systems of Linear Functions** -- 7 Day(s)

**UNIT: Absolute Value Functions and Linear Equations** -- 10 Day(s)

**UNIT: Properties of Exponents** -- 11 Day(s)

**UNIT: Factoring Polynomials** -- 6 Day(s)

**UNIT: Quadratic Functions** -- 12 Day(s)

**UNIT: Exponential Functions and Data Analysis** -- 7 Day(s)

**Power Standards**

1. The student will be able to model with mathematics.
2. The student will be able to solve problems involving geometric figures.
3. The student will be able to use precise measurements.

**Learning target**

- 1.1 I can model 1D, 2D and 3D situations geometrically.
- 1.2 I can model geometric situations using algebraic equations and expressions.
- 1.3 I can reason logically.
- 1.4 I can analyze geometric situations in the coordinate plane.
- 2.1 I can apply properties of triangles.
- 2.2 I can apply properties of quadrilaterals.
- 2.3 I can apply properties of regular polygons.
- 2.4 I can apply properties of circles.
- 2.5 I can apply properties of parallel and perpendicular lines.
- 3.1 I can solve problems involving area of 2D and 3D figures.
- 3.2 I can solve problems involving volume of 3D figures.

**Course Details**

**UNIT: Foundations for Geometry** -- 4 Week(s)

**UNIT: Geometric Reasoning** -- 3 Week(s)

**UNIT: Parallel and Perpendicular Lines** -- 4 Week(s)

**UNIT: Triangles** -- 7 Week(s)

**UNIT: Polygons and Quadrilaterals** -- 7 Week(s)

**UNIT: Area and Perimeter** -- 3 Week(s)

**UNIT: Surface Area** -- 4 Week(s)

**UNIT: Volume** -- 3 Week(s)

**UNIT: Transformational Geometry** -- 3 Week(s)

**2016-2017 Algebra II****Power Standards**

1. The students will be able to apply properties of functions to solve problems.
2. The students will be able to analyze functions.
3. The students will be able to model mathematical situations.

**Learning target**

- 1.1: Students will be able to solve systems of linear equations and inequalities.
- 1.2: Students will be able to solve polynomial equations.
- 1.3: Students will be able to solve radical and rational equations.
- 1.4: Students will be able to solve exponential and logarithmic equations.
- 2.1: Students will be able to interpret systems of linear equations and inequalities.
- 2.2: Students will be able to interpret quadratic functions.
- 2.3: Students will be able to interpret exponential and logarithmic functions.
- 3.1: Students will be able to model systems of linear equations and inequalities.
- 3.2: Students will be able to model polynomial functions.
- 3.3: Students will be able to model exponential and logarithmic equations.
- 3.4: Students will be able to summarize data on a single variable.
- 3.5: Students will be able to make inferences and justify conclusions using statistics.
- 3.6: Students will be able to recognize and apply the characteristics of normal distributions.

**Course Details**

**UNIT: Systems of Equations** -- 4 Week(s)

**UNIT: Quadratic Functions** -- 5 Week(s)

**UNIT: Polynomial Functions** -- 5 Week(s)

**UNIT: Rational Functions** -- 5 Week(s)

**UNIT: Exponential and Logarithmic Functions** -- 5 Week(s)

**UNIT: Probability and Statistics** -- 5 Week(s)

**UNIT: Trigonometric Functions** -- 4 Week(s)

**2016-2017 Trigonometry**

Math

Grades 11 - 12, Duration 1 Semester, .5 Credits

Elective Course

**Power Standards**

1. The student will be able to extend the domain of trigonometric functions using the unit circle.
2. The student will be able to model periodic phenomena with trigonometric functions.
3. The student will be able to prove and apply trigonometric identities.

**Learning target**

- 1.1 I can understand and apply the relationships between radian and degree measure of an angle.
- 1.2 I can use the unit circle to express the value for the six trig functions.
- 1.3 I can use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.
- 1.4 I can use Right triangle trig, law of sines, or law of cosines to solve application problems.
- 2.1 I can choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, vertical shift and phase shift.
- 2.2 I can understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.
- 2.3 I can use inverse functions to solve trigonometric equations that arise in modeling contexts and evaluate the solutions using technology as needed.
- 3.1 I can prove and apply the Pythagorean identities.
- 3.2 I can apply the addition, subtraction, double, and half angle formulas for sine, cosine, and tangent and use them to solve problems.

**Course Details**

**UNIT: Trigonometric Functions** -- 19 Day(s)

**UNIT: Application of Trigonometric Functions** -- 13 Day(s)

**UNIT: Graphing Trigonometric Functions** -- 20 Day(s)

**UNIT: Analytic Trigonometry** -- 30 Day(s)

## 2016-2017 Advanced Math Topics

Math

Grades 11 - 12, Duration 1 Year, 1 Credit

Elective Course

### Power Standards

1. The student will be able to apply social choice algorithms.
2. The student will be able to solve management science problems.
3. The student will be able to analyze numerical information.

### Learning target

- 1.1 I can solve problems involving election theory.
- 1.2 I can solve problems involving weighted voting.
- 1.3 I can apply various fair division algorithms to solve problems.
- 1.4 I can solve apportionment problems.
- 2.1 I can apply Euler's theorems and properties of connected graphs to solve problems.
- 2.2 I can use properties of Hamilton graphs to solve problems.
- 2.3 I can model situations with trees and directed graphs.
- 3.1 I can represent and analyze one-variable data.
- 3.2 I can use various methods to compute the probabilities of events.
- 3.3 I can apply properties of normal distributions.
- 3.4 I can solve problems related to finance (i.e. loans, investments, annuities).

### Course Details

**UNIT: Election Theory** -- 4 Week(s)

**UNIT: Weighted Voting Methods** -- 2 Week(s)

**UNIT: Fair Division** -- 4 Week(s)

**UNIT: Graph Theory** -- 7 Week(s)

**UNIT: Descriptive Statistics** -- 3 Week(s)

**UNIT: Probability and Counting** -- 18 Day(s)

**UNIT: Distributions** -- 28 Day(s)

**UNIT: Mathematics of Money** -- 2 Week(s)

**2016-2017 Analytic Geometry**

Math

Grades 11 - 12, Duration 1 Semester, .5 Credits

Elective Course

**Power Standards**

1. The student will be able to apply geometric formulas to prove properties in the coordinate plane.
2. The student will be able to analyze the relationships between polar coordinates and the complex plane.
3. The student will be able to prove and analyze the properties of vectors.
4. The student will be able to analyze the properties of conic sections in rectangular and polar form.

**Learning target**

- 1.1 I can understand the distance formula in the Cartesian plane.
- 1.2 I can understand the point-of-division formula
- 1.3 I can apply the concept of slope to comprehend angle of inclination.
- 1.4 I can use properties of trigonometric formulas to compute the angle from one line to another.
- 2.1 I can graph polar coordinates and convert from polar coordinates to rectangular coordinates /vice versa; analyze the results.
- 2.2 I can transform equations from polar coordinates to rectangular and vice versa; analyze the results.
- 2.3 I can apply properties of polar coordinates to graph and recognize equations in polar coordinate form.
- 2.4 I can graph complex numbers in the complex plane and convert from complex form to polar form/vice versa; analyze the results.
- 2.5 I can apply DeMoivre's Theorem and roots of complex numbers to apply properties of complex numbers.
- 3.1 I can graph vectors in the coordinate plane.
- 3.2 I can apply the algebra of vectors to solve problems.
- 3.3 I can apply properties of vectors to analyze objects in static equilibrium.
- 3.4 I can apply the inner product (dot product) of two vectors to solve problems.
- 4.1 I can apply and analyze properties of circles in rectangular and polar form.
- 4.2 I can apply and analyze properties of parabolas in rectangular and polar form.
- 4.3 I can apply and analyze properties of ellipses in rectangular and polar form.
- 4.4 I can apply and analyze properties of hyperbolas in rectangular and polar form.
- 4.5 I can transform equations of conic sections by a rotation of axes. Analyze the results.

**Course Details****UNIT: Plane Analytic Geometry** -- 15 Day(s)**UNIT: Polar Coordinates and Complex Numbers** -- 20 Day(s)**UNIT: Vectors** -- 15 Day(s)**UNIT: Conic Sections** -- 26 Day(s)

**2016-2017 College Algebra**

Math

Grades 11 - 12, Duration 1 Year, 1 Credit

Elective Course

**Power Standards**

1. The students will be able to apply properties of functions to solve problems.
2. The students will be able to analyze functions graphically.
3. The students will be able to model mathematical situations.

**Learning target**

- 1.1 I can follow order of operations when simplifying, solving or evaluating expressions or equations.
- 1.2 I can factor basic quadratic, by grouping, using perfect squares, the sum and difference of two cubes, or special cases.
- 1.3 I can solve linear equations and inequalities.
- 1.4 I can solve quadratic equations and inequalities.
- 1.5 I can solve exponential and logarithmic equations.
- 1.6 I can solve systems of linear equations and inequalities.
- 1.7 I can solve polynomial equations.
- 1.8 I can simplify and solve radical equations.
- 1.9 I can solve rational equations.
- 2.1 I can graph and interpret linear functions and linear inequalities.
- 2.2 I can graph and interpret quadratic functions.
- 2.3 I can graph and interpret polynomial functions.
- 3.1 I can model problems using linear equations and inequalities.
- 3.2 I can model problems using quadratic functions.
- 3.3 I can model problems using rational functions.

**Course Details**

**UNIT: Fundamentals of Algebra** -- 4 Week(s)

**UNIT: Rational Equations and Expressions** -- 3 Week(s)

**UNIT: Basic Linear and Quadratic Equations** -- 12 Day(s)

**UNIT: Complex Equations and Inequalities** -- 12 Day(s)

**UNIT: Coordinates and Graphs** -- 2 Week(s)

**UNIT: Functions and Graphs** -- 2 Week(s)

**2016-2017 Dual Credit College Algebra**

Math

Grades 11 - 12, Duration 1 Semester, .5 Credits

Elective Course

**Power Standards**

1. The students will be able to apply properties of functions to solve problems.
2. The students will be able to analyze functions and relations graphically.
3. The students will be able to model mathematical situations

**Learning target**

- 1.1: I can solve linear equations and inequalities.
- 1.2: I can solve quadratic equations and inequalities.
- 1.3: I can solve exponential and logarithmic equations.
- 1.4: I can solve systems of linear equations and inequalities.
- 2.1: I can graph and interpret linear functions and linear inequalities.
- 2.2: I can graph and interpret quadratic functions.
- 2.3: I can graph and interpret polynomial functions
- 2.4: I can graph and interpret rational functions.
- 2.5: I can graph and interpret radical functions.
- 3.1: I can model problems using quadratic functions.
- 3.2: I can model problems using rational functions.
- 3.3: I can model problems using exponential and logarithmic functions.
- 3.4: I can model problems using systems of linear equations and inequalities.

**Course Details**

**UNIT: Equations and Inequalities** -- 3 Week(s)

**UNIT: Linear and Quadratic Equations** -- 3 Week(s)

**UNIT: Polynomial and Rational Functions** -- 13 Day(s)

**UNIT: Exponential and Logarithmic Functions** -- 13 Day(s)

**UNIT: Matrices** -- 3 Week(s)



**2016-2017 Statistics**

Math

Grades 11 - 12, Duration 1 Semester, .5 Credits

Elective Course

**Power Standards**

1. The students will be able to analyze and interpret data.
2. The students will be able to make inferences about a population based on assessment of sample data and interpret the results.

**Learning target**

- 1.1: Students will be able to interpret and compare measures of central tendency
- 1.2: Students will be able to model data sets and their measures of central tendency.
- 1.3: Students will be able to calculate and interpret probabilities for discrete random variables.
- 1.4 Students will be able to calculate and interpret probabilities for continuous random variables.
- 1.5 Students will be able to apply the central limit theorem and calculate and interpret the mean and standard deviation for a sampling distribution.
- 2.1: Students will be able to estimate a population parameter and interpret the results
- 2.2: Students will be able to conduct an hypothesis test about a population parameter and interpret the results
- 2.3: Students will be able to estimate the difference between two population parameters and interpret the results.
- 2.4: Students will be able to conduct an hypothesis test about the difference between two population parameters and interpret the results.

**Course Details**

**UNIT: Introduction to Descriptive Statistics** -- 4 Week(s)

**UNIT: Basic Probability and Discrete Random Variables** -- 4 Week(s)

**UNIT: Probability and the Normal Distribution** -- 4 Week(s)

**UNIT: Inferential Statistics** -- 4 Week(s)

## 2016-2017 Calculus

**Power Standards**

1. The student will demonstrate an understanding of the properties of limits and their applications graphically, numerically and analytically.
2. The student will demonstrate an understanding of the rules of differentiation and their applications graphically, numerically and analytically.
3. The student will demonstrate an understanding of the techniques of integration and their applications graphically, numerically and analytically.
4. The student will demonstrate an understanding of the convergence and divergence of an infinite series by applying convergence tests, and to represent non-polynomial functions as an infinite series.

**Learning target**

- 1.1 I can state and explain the definition of a limit; explain the conditions for the existence of a limit, give a variety of examples including finding limits from a given graph and justify using properties/theorems of limits (Formal and Informal)
- 1.2 I can use trigonometric identities to evaluate limits with trigonometric functions and derive the limits of  $\sin(x)/x$  and  $(1 - \cos(x))/x$  as  $x \rightarrow 0$ .
- 1.3 I can explain the meaning of the continuity of a function at a point, and analyze and describe the discontinuities of a function on an interval.
- 1.4 I can explain how a limit is used to define a tangent line to a function at a given point, and write the equations of the tangent and normal lines.
- 1.5 I can use a limit to define the derivative of a function, and use the definition of the derivative to find the derivatives of given functions (both analytically and graphically).
- 2.1 I can compare and contrast average rate of change on an interval with instantaneous rate of change at a point, and explain the connection to the slope of a tangent line.
- 2.2 I can explain how the slopes of tangent lines are used to determine where a function is increasing or decreasing.
- 2.3 I can evaluate higher order derivatives, explain the connection between a function's graph and the graph of its derivatives, and explain their connection to position, velocity, and acceleration.
- 2.4 I can calculate the derivatives of a variety of composite functions using the chain rule.
- 2.5 I can use implicit differentiation to find the derivatives of a variety of implicitly defined functions, including logarithmic differentiation.
- 2.6 I can use differentiation to solve related rates problems in a variety of pure and applied contexts (e.g. ladder, cone) and explain how implicit differentiation is applied in determining the solution.
- 2.7 I can explain the relationship between the derivative of a function and the derivative of the inverse function, including deriving the derivatives of the inverse sine, cosine and tangent functions.
- 2.8 I can explain how to manipulate limits of indeterminate form ( $0/0$ ,  $1^{+\infty}$ ,  $\infty-\infty$ ,  $\infty/\infty$ ,  $0^0$ ,  $0^{\infty}$ ) in order to determine the value of the limit by applying L'Hospital's Rule
- 2.9 I can use the first derivative of a function to determine where the function is increasing/decreasing and where the function might have relative extrema.
- 2.10 I can explain how to use the second derivative of a function to determine concavity and possible inflection points.
- 2.11 I can apply Rolle's Theorem and the Mean Value Theorem for derivatives.
- 2.12 I can solve by using differentiation to solve optimization problems (max/min) in a variety of pure and applied contexts.
- 3.1 I can find an integral (definite and indefinite) using substitution of variables, give examples with definite and indefinite integrals-- this is connected to the chain rule.
- 3.2 I can apply the Fundamental Theorem of Calculus (part 2)--
- 3.3 I can explain how to find the solution set of a differential equation graphically using slope fields (i.e. direction fields).
- 3.4 I can integrate functions by integration by parts.
- 3.5 I can integrate functions by the method of trigonometric substitution.
- 3.6 I can integrate functions by the method of partial fractions.
- 3.7 I can use definite integrals to determine the area of a region in the plane.
- 3.8 I can apply definite integrals to determine the volume of a variety of solids including solids of revolution with known cross sections.
- 3.9 I can apply definite integrals to determine the surface area of a variety of solids.
- 3.10 I can apply definite integrals to determine the arc length of a curve.
- 3.11 I can apply definite integrals to determine the center of mass of a region in the coordinate plane.
- 3.12 I can apply the Mean Value Theorem for Integrals to compute the average value of a function.
- 4.1 I can determine whether an infinite sequence converges or diverges
- 4.2 I can determine whether an infinite series converges or diverges.
- 4.3 I can find or approximate the infinite sum of certain convergent series.
- 4.4 I can find the Taylor or Maclaurin polynomial approximation of elementary functions.

## Course Details

**UNIT: Integration of Functions and Applications** -- 9 Week(s)

**UNIT: Limits and Continuity** -- 9 Week(s)

**UNIT: Sequence and Series**-- 9 Week(s)

**UNIT: Derivatives of Functions** -- 9 Week(s)

**2016-2017 Continued Math Studies**

**Power Standards**

1. The student will be able to apply properties of functions to solve problems.
2. The student will be able to analyze functions graphically.
3. The student will be able to model mathematical situations.

**Learning target**

- 1.1 I can solve systems of equations and inequalities.
- 1.2 I can solve polynomial equations.
- 1.3 I can solve exponential and logarithmic equations.
- 2.1 I can graph systems of equations and inequalities.
- 2.2 I can graph polynomial functions.
- 3.1 I can model problems using systems of equations and inequalities.
- 3.2 I can model problems using polynomial functions.
- 3.3 I can model problems using exponential and logarithmic functions.
- 3.4 I can model problems involving central tendency and probability. (experimental and theoretical)
- 3.5 I can model problems involving plan and coordinate geometry.

**Course Details**

**UNIT: Linear Algebra (Review)** -- 2 Week(s)

**UNIT: Systems of Equations** -- 2 Week(s)

**UNIT: Plane and Coordinate Geometry** -- 3 Week(s)

**UNIT: Polynomial Functions** -- 5 Week(s)

**UNIT: Exponential and Logarithmic Functions** -- 3 Week(s)

**UNIT: Probability and Statistics** -- 3 Day(s)

