

Mathematics: Algebra Three

<p>Content Standard #4 Students will have demonstrated proficiency in mathematics by solving problems requiring number sense, accurate computation, accurate measurement, collection of data and statistics, algebraic methods and geometry.</p>
<p>#4A Number sense, properties, and operations</p>
<p>#4B Patterns, functions, and algebraic structures</p>
<p>#4C Data analysis, statistics, and probability</p>
<p>#4D Shape, dimension, and geometric relationships</p>

Description

This course extends the Algebra 2 curriculum and prepares students for Precalculus. Topics covered include sequences and series, logarithmic, rational and exponential functions, parametric equations, and trigonometry. Students will continue to review the functions that were covered in Algebra I and II. Graphing calculator technology is regularly used.

Time Allocation
Ninety minutes daily for one smear

Texts/References
Algebra 2, Holt, 2004
Math Mates, Educational Advantage Pty Ltd.

Assessments
Formative
Quizzes
Tests
Activities
Summative
Midterm and final exams

Grades and Achievement Levels
Grades are based on completion of assignments and quality of work.

Essential Concepts: Mathematics Algebra Three

Standard #4A Number sense, properties, and operations	Standard #4B Patterns, functions, and algebraic structures	Standard #4C Data analysis, statistics, and probability	Standard #4D Shape, dimension, and geometric relationships
<ul style="list-style-type: none"> • The complex number system includes real numbers and imaginary numbers • Formulate, represent, and use algorithms with real numbers flexibly, accurately, and efficiently • Systematic counting techniques are used to describe and solve problems 	<ul style="list-style-type: none"> • Functions model situations where on quantity determines another and can be represented algebraically, graphically, and using tables • Graphs and tables are used to describe the qualitative behavior of common types of functions • Parameters influence the shape of the graphs of functions • Expressions, equations, and inequalities can be expressed in multiple, equivalent forms • Solutions to equations, inequalities and systems of equations are found using a variety of tools • Quantitative relationships in the real world can be modeled and solved using functions 	<ul style="list-style-type: none"> • Statistical methods take variability into account, supporting informed decision-making through quantitative studies designed to answer specific questions • The design of an experiment or sample survey is of critical importance to analyzing the data and drawing conclusions • Visual displays and summary statistics condense the information in data sets into usable knowledge • Randomness is the foundation for using statistics to draw conclusions when testing a claim or estimating plausible values for a population characteristics • Probability models outcomes for situations in which there is inherent randomness, quantifying the degree of certainty in terms of relative frequency of occurrence 	<ul style="list-style-type: none"> • Attributes of two- and three-dimensional objects are measurable and can be quantified • Objects in the plane and their parts, attributes, and measurements can be analyzed deductively • Objects in the plane can be transformed, and those transformations can be described and analyzed mathematically • Right triangles are central to geometry and its applications

Expectations: Algebra Three

Standard #4A Number sense, properties, and operations	Standard #4B Patterns, functions, and algebraic structures	Standard #4C Data analysis, statistics, and probability	Standard #4D Shape, dimension, and geometric relationships
<ol style="list-style-type: none"> 1. Recognized and used equivalent representations of real numbers in a variety of forms including scientific notation, radicals, and other irrational numbers such as pi 2. Developed and tested conjectures about the properties of the real number system and common subsets of the real number system 3. Verified and applied exponential properties 4. Converted from one set of units to another 5. Determined when estimation is an appropriate method to solve a problem and described the error that may result from estimation 6. Applied appropriate computational methods to solve multi-step problems involving all types of numbers from the real number system 7. Showed that between any two rational numbers there are an infinite number of rational numbers, and that between any two irrational numbers that are also an infinite number of irrational numbers 8. Used appropriate computation methods that encompass estimation and calculation 	<ol style="list-style-type: none"> 1. Demonstrated the relationship between all representations of linear functions using point-slope, slope-intercept, and standard form of a line 2. Represented linear, quadratic, absolute value, power, exponential, logarithmic, rational, and step functions in a table, graph, and equation and converted from one representation to another 3. Evaluated a function at a given point in its domain given an equation, a table, and a graph 4. Identified the domain and range of a function given an equation, a table, and a graph 5. Identified intercepts, zeros, maxima, minima, and intervals of increase and decrease of a function given an equation, a table, and a graph 6. Made qualitative statements about the rate of change of a function, based on its graph or table 7. Applied transformations to a parent function and interpreted the results verbally, graphically, and symbolically 8. Categorized sequences as arithmetic, geometric, or neither and developed formulas for the general terms related to arithmetic and geometric sequences 	<ol style="list-style-type: none"> 1. Formulated appropriate research questions that can be answered with statistical analysis 2. Determined appropriate data collection methods to answer a research question 3. Explained how data might be analyzed to provide answers to a research question 4. Identified the characteristics of a well-designed and well-conducted survey 5. Identified the characteristics of a well-designed and well-conducted experiment 6. Differentiated between the inferences that can be drawn in experiments versus observational studies 7. Identified and chose appropriate ways to summarize numerical or categorical data using tables, graphical displays, numerical summary statistics and accounting for outliers when appropriate 8. Described the relationship between two categorical variables using percents 9. Drew and interpreted scatter plots 	<ol style="list-style-type: none"> 1. Used the Pythagorean Theorem and its converse to solve real-world problems 2. Used right triangle trigonometry to solve real-world problems 3. Solved SAS and SSS triangles 4. Found the area of SAS and SSS triangles 5. Found the value of trigonometric functions of acute angles 6. Determined the equation of various conic sections 7. Created a graphical representation of conic sections, including various attributes such as conjugate axis, minor/major axes, foci points, and asymptotes 8. Solved for unknown quantities in relationships involving perimeter, area, surface area, and volume 9. Applied the Pythagorean Theorem and its converse to solve real-world problems 10. Used appropriate measurements to solve problems indirectly (for example, find the height of a flagpole using similar triangles)

Expectations: Algebra Three continued

Standard #4A Number sense, properties, and operations	Standard #4B Patterns, functions, and algebraic structures	Standard #4C Data analysis, statistics, and probability	Standard #4D Shape, dimension, and geometric relationships
<ul style="list-style-type: none"> 9. Used technology to perform operations on numbers written in scientific notation 10. Described factors affecting take home pay and calculated the impact (PFL) 11. Designed and used a budget, including income and expenses to demonstrate how living within your means is essential for a secure financial future (PFL) 12. Use combinatorics (Fundamental Counting Principle, permutations and combinations) to solve problems in real-world contexts. 13. Used number sense to estimate and justify the reasonableness of solutions to problems involving rational and irrational numbers 	<ul style="list-style-type: none"> 9. Determined the inverse of a function from a graph, table, or equation 10. Performed and justified steps in generating equivalent expressions by identifying properties using the commutative, associative, inverse, and identity properties 11. Used appropriate measurements to solve problems indirectly (for example, find the height of a flagpole using similar triangles) 12. Solved equations for one variable in terms of the others 13. Found solutions to quadratic and cubic equations and inequalities by using appropriate algebraic methods such as factoring, completing the square, graphing or using the quadratic formula 14. Solved systems of linear equations and inequalities with two variables 15. Represented, solved, and interpreted problems in various contexts using linear, quadratic, rational, and exponential functions 16. Analyzed the impact of interest rates on a personal financial plan (PFL) 17. Analyzed various lending sources, services, and financial institutions (PFL) 	<ul style="list-style-type: none"> 10. Found the equation for various regression models, involving cubic, quadratic, exponential, and linear functions 11. Used Person's correlation coefficient as a measure of strength and interpreted the slope and y-intercept in the context of the problem 12. Explained the role of p-values in determining statistical significance 13. Determined the margin of error associated with an estimate of a population characteristic 14. Defined and explained the meaning of significance. 15. Analyzed the cost of insurance as a method to offset the risk of a situation (PFL) 16. Developed simulations that demonstrated probability as a long-run relative frequency 17. Applied and solved problems using the concepts of independence and conditional probability 18. Applied and solved problems using the concept of mutually exclusive properties when combining probabilities 	<ul style="list-style-type: none"> 11. Selected and used appropriate tools and techniques to measure quantities in order to achieve specified degrees of precision, accuracy, and error (or tolerance) or measurements 12. Found and analyzed relationships among geometric figures using transformation (for example, reflections, translations, rotations, dilations) in coordinate systems

Expectations: Algebra Three continued

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	<p>18. Applied the properties of positive and negative rational exponents to generate equivalent algebraic expressions including those involving nth roots</p> <p>19. Found solutions to equations involving power, exponential, rational, logarithmic, and radical functions</p>	<p>19. Evaluated and interpreted probabilities using normal distribution</p> <p>20. Found and interpreted the expected value and standard deviation of a discrete random variable x</p>	