

## ALGEBRA II

CREDIT 1

GRADE 11, 12

PREREQUISITES ALG I & GEO

An extension of topics and concepts developed in first year algebra with emphasis on quadratic functions, polynomial functions, conic sections, exponential and logarithmic functions, problem solving, probability, statistics and introduction to trigonometry and the unit circle. **NOTE: This course is required for graduation.**

State Standards for Algebra II may be found here:

<https://www.tn.gov/education/article/mathematics-standards>

### Embedded Standards

- Determine appropriate quantities for the purpose of descriptive modeling
- Create equations and inequalities in one variable and use them to solve problems
- Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution

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### First Nine Weeks

- Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.
- Rewrite expressions involving radicals and rational exponents using the properties of exponents.
- Know there is a complex number  $i$  such that  $i^2 = -1$
- Use the relation  $i^2 = -1$  and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
- Solve quadratic equations with real coefficients that have complex solutions
- Use the structure of an expression to identify ways to rewrite it.
- Know and apply the Remainder Theorem
- Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial
- Rewrite simple rational expressions in different forms, using inspection or long division
- Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise
- Solve quadratic equations in one variable by inspections, taking the square roots, completing the square, factoring, and the quadratic formula.
- Recognize when the quadratic formula gives complex solutions
- Solve systems of linear equations
- Solve a simple system consisting of a linear equation and a quadratic equation in two variables
- Explain why the x-coordinate of the points where the graphs of the equations  $y = f(x)$  and  $y = g(x)$  intersect are the solutions of the equation  $f(x) = g(x)$
- For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of quantities, and sketch graphs showing key features given a verbal description of the relationship
- Calculate and interpret the average rate of change of a function over a specified interval.
- Graph functions expressed symbolically and show key features of the graph
- Graph polynomial functions, identify zeros, and show end behavior
- Compare properties of two functions each represented in a different way
- Identify the effect of a transformation on a graph

- Find inverse functions
- Derive the equation of a parabola given a focus and directrix

\* **Common Formative Assessment #1**

\* **Common Formative Assessment #2**

\* **Common Formative Assessment #3**

**Second Nine Weeks**

- Derive the formula for the sum of a finite geometric series and use the formula to solve problems
- Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers
- Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
- Use the properties of exponents to interpret expressions for exponential functions
- Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms
- Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs.
- For exponential models, express as a logarithm the solution to  $ab^{ct} = d$  where a, c, and d are numbers and the base b is 2, 10, or e
- Evaluate a logarithm using technology
- Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle
- Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpret as radian measures of angles traversed counterclockwise around the unit circle
- Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline
- Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages.
- Represent data on two quantitative variables on a scatter plot, and describe how the variables are related
- Understand statistics as a process for making inferences about population parameters based on a random sample from that population
- Decide if a specified model is consistent with results from a given data-generating process
- Recognize the purpose of and difference among sample surveys, experiments, and observational studies, explain how randomization relates to each
- Use data from a randomized experiment to compare two treatments
- Evaluate reports based on data
- Describe events as subsets of a sample space using characteristics of the outcomes, or as unions, intersections, or complements of other events
- Understand that two events A and B are independent if the probability of A and B occurring at the same time is the product of their probabilities, and use this characteristic to determine if they are independent
- Understand the conditional probability of A given B and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B
- Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations
- Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in the terms of the model

- Apply the Addition Rule,  $P(A \text{ and } B) = P(A) + P(B) - P(A \text{ and } B)$ , and interpret the answer in terms of the model.

**\* Common Formative Assessment #4**

**\* Common Formative Assessment #5**

**\* Common Formative Assessment #6**

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For information regarding instructional objectives and materials, please contact the school principal.

\* Common assessments are scheduled within the nine weeks. Each school may adjust the week and/or day of the week to meet the individual school's schedule.

\*Formative assessments may be rescheduled due to inclement weather.