



RADNOR TOWNSHIP SCHOOL DISTRICT
Course Overview
Seminar Algebra 2 (05040430)



General Information

Prerequisite: Seminar Geometry Honors with a grade of “C” or teacher recommendation.

Length: Full Year

Format: meets daily for one period

Course Description

Seminar Algebra 2 is an Honors level course and receives weighted grading.

Seminar level courses are intended for the highly motivated math students and are designed to challenge the most mathematically capable students. The courses will involve rigorous pacing and workload with teacher expectations intended to challenge the student. The course will require more independent and self guided learning (with an emphasis on writing explanations) than all other courses.

Seminar Algebra 2 H is an enriched and extended study of the topics of Algebra 2 H (0453). In addition, it includes an in-depth study of exponential and logarithmic functions, quadratic relations (conics), sequences and series, probability, matrix algebra and the graphs of rational functions. This course uses an exploration/discovery approach to develop course content. There is a heavy emphasis on real-world applications. Written explanations are a part of assessment. Students are required, on a regular basis, to make connections within and between mathematical concepts.

Course Objectives:

At the end of the 1st quarter, student should be able to successfully complete the following skills:

- Name a polynomial by degree and by number of terms.
- Multiply polynomials
- Solve absolute value equations.
- Identify extraneous solutions.
- Solve equations using zero product property.
- Solve inequalities and absolute value inequalities.
- Graph an equation in two variables.
- Sketch a reasonable graph of a real world situation.
- Tell whether a relation is a function.
- Identify the domain and range of functions.
- Graph linear functions.
- Find the intercepts and slope of linear functions.
- Given information about the graph of a linear function, write its particular equation.
- Use a linear function as a mathematical model.
- Solve linear systems using substitution and linear combination.
- Solve linear systems using Cramer’s Rule, matrix equations and augmented matrices.
- Solve word problems involving systems of linear equations.
- Solve systems of linear equations with three or more variables algebraically.
- Identify inconsistent and independent systems (two or three variables).
- Solve and graph solutions of inequalities.
- Use linear programming to solve real world problems, and inequalities.

At the end of the 2nd quarter, student should be able to successfully complete the following skills:

- Given a quadratic function, calculate the location of the vertex by completing the square.
- Solve quadratic equations using the quadratic formula.
- Identify the nature of the solutions of a quadratic equation using the discriminant.
- Solve a quadratic equation whose solutions are complex numbers.
- Find the particular equation of a quadratic function given three points.
- Use quadratic functions as mathematical models for real world applications.
- Graph exponential and logarithmic functions.
- Use the properties of exponentiation to transform expressions.
- Evaluate powers and simplify expressions involving rational exponents.
- Transform numbers to or from scientific notation.
- Given the equation of a function, find the equation of its inverse and draw the graph of the inverse.
- Solve exponential and logarithmic equations.
- Use the properties of logarithms to transform expressions.
- Prove the properties of logarithms.

Use exponential functions as mathematical models.

At the end of the 3rd quarter, student should be able to successfully complete the following skills:

- Factor sum and difference of two cubes.
- Factor by grouping.
- Graph polynomial functions.
- Identify and list the central behaviors and end behaviors of polynomial functions.
- Use long division and synthetic division of polynomials.
- Use remainder theorem, factor theorem and rational zeros theorem to identify the roots of a polynomial function.
- Use Descartes' rule of signs to help search for zeros of polynomial functions.
- Add, subtract, multiply and divide rational expressions.
- Simplify complex rational expressions.
- Solve rational equations.
- Solve rational inequalities using interval testing.
- Solve word problems using rational equations.
- Identify the end behaviors of rational functions including horizontal, oblique and parabolic asymptotes.
- Identify the central behaviors of rational functions including vertical asymptotes, removable discontinuities and intercepts.
- Graph rational functions.
- Write the rational function from its graph.
- Solve word problems involving direct, inverse, joint and combined variations.
- Graph irrational functions
- Simplify radical expressions.

Solve radical equations and identify extraneous solutions.

At the end of the 4th quarter, student should be able to successfully complete the following skills:

- Graph the equation of a circle.
- Sketch the graph of an ellipse.
- Calculate the focal radius and plot the foci of an ellipse.
- Identify the vertices, major and minor axes of an ellipse.
- Sketch the graph of a hyperbola.
- Identify vertices, foci, asymptotes, conjugate and transverse axes of a hyperbola.
- Given the equation of a parabola, find the vertex, intercepts, axis of symmetry, symmetrical point and directrix.

- Sketch a parabola.
- Calculate the solution set of a system of two equations in two variables, where at least one equation is quadratic (and none are higher degree).
- Given the first few terms of a sequence, discover a pattern, write a few more terms of the sequence, get a formula for t_n , use the formula to calculate other terms values and draw a graph of the sequence.
- Tell whether a sequence is arithmetic, geometric or neither.
- Find a specific term for an arithmetic or a geometric sequence.
- Find the term number of a specified term in an arithmetic or geometric sequence.
- Given two numbers, be able to find a specified number of arithmetic or geometric means between them.
- Given a partial sum in sigma notation, evaluate it by writing all the terms, then adding them.
- Given the first few terms of a series, write S_n using sigma notation.
- Given an arithmetic or geometric series, be able to calculate S_n the n^{th} partial sum and vice versa.
- Given a geometric series, tell whether it converges. If it does converge, find the limit to which it converges.
- Given a repeating decimal, write it as a convergent geometric series, and find the rational number equal to the decimal.
- Use an arithmetic or geometric sequence or series as a mathematical model.
- Use the definition of factorial to simplify expressions.
- Discover patterns followed by the signs, exponents, and coefficients in a binomial series.
- Expand a binomial power as a binomial series.
- Find the specified term in a binomial expansion.
- Be able to distinguish among the various words used to describe probability.
- Be able to determine the number of outcomes in an event or sample space without listing and counting them.
- Given the description of the desired permutation, find the probability of getting that permutation if an arrangement is selected at random.
- Be able to calculate the number of combinations containing r elements that can be made from a set that has n elements.

Given $P(A)$ and $P(B)$, the probabilities of events A and B , be able to calculate $P(A \text{ then } B)$, $P(A \text{ or } B)$, $P(\text{not } A)$ and $P(\text{not } B)$.

Common Assessments:

Grades will be based on quizzes and tests. In addition, teachers may use homework, group activities, and/or projects for grading purposes. All students will take departmental midyear and final exams. The Radnor High School grading system and scale will be used to determine letter grades.

Major Units of Study:

MARKING PERIOD 1 - TOPICS

- Polynomials
- Absolute value equations
- Zero product property
- Absolute value inequalities
- Graphs of equations in two variables
- Graphs of a real world situations
- Relations and Functions
- Domain and range of functions
- Graphs of linear functions
- Intercepts
- Slope

- Linear functions as a mathematical models
- Systems of linear equations
- Cramer's Rule
- Augmented matrices
- Word problems involving systems of linear equations
- Inconsistent and independent systems (two or three variables)
- Linear inequalities
- Linear programming

MARKING PERIOD 2 - TOPICS

- Quadratic Functions
- Discriminant
- Complex numbers
- Quadratic functions as mathematical models for real world applications
- Graphs of exponential and logarithmic functions
- Exponentiation
- Rational exponents
- Scientific notation
- Inverses
- Solving exponential and logarithmic equations
- Properties of logarithms
- Exponential functions as mathematical models

MARKING PERIOD 3 - TOPICS

- Factoring
- Graphs of polynomial functions
- Central behaviors and end behaviors of polynomial functions
- Long division and synthetic division of polynomials
- Remainder Theorem, Factor Theorem and Rational Zeros Theorem
- Descartes' Rule of Signs
- Rational expressions
- Complex rational expressions
- Rational equations
- Solve rational inequalities using interval testing
- Solve word problems using rational equations
- End behaviors of rational functions
- Central behaviors of rational functions including vertical asymptotes, removable discontinuities and intercepts
- Rational functions
- Direct, inverse, joint and combined variations
- Radical expressions
- Radical equations

MARKING PERIOD 4 - TOPICS

- Conic Sections
- Nonlinear systems of equations
- Sequences and series
- Binomial expansion
- Probability

Materials & Texts

MATERIALS

TI-8_ Graphing Calculator & Supplemental Worksheets

TEXTS

Algebra 2 and Trigonometry – Functions and Applications, Paul A. Foerster, Addison Wesley, 1994

Summer Assignment

N/A