

TAMALPAIS UNION HIGH SCHOOL DISTRICT
Larkspur, California

Course of Study

ALGEBRA 1-2

I. INTRODUCTION

Algebra 1-2 is the first year mathematics course for the college bound student. This course should be offered to students who demonstrate a thorough understanding of pre-algebra concepts. The intent of the course is to develop skill and understanding of the language of algebra, functions, number operations, solving and graphing equations and inequalities involving real-world concepts, ratios, and problem solving.

II. STUDENT LEARNING OUTCOMES

A. General Goals and District Outcomes

The goals of all mathematics courses offered in the Tamalpais Union High School District reflect the four overarching, curriculum standards of the *N.C.T.M. Standards for Curriculum and Evaluation*: communication, reasoning, problem solving, and making connections.

All mathematics courses include the following goals for students:

- Become active learners by investigating, conjecturing, verifying, applying, evaluating, and communicating mathematical ideas both collaboratively and individually in solving problems;
- Develop awareness of their own thinking and explain and justify their work and thinking both in oral and written form;
- Develop consistent study habits and organization skills and personal responsibility for learning;
- Develop confidence, perseverance, and an appreciation of mathematics; and
- Use appropriate technology including calculators and computers as an integral part of student work.

All mathematics courses contribute to attainment of the following district outcomes:

- Outcome 1 Communicate articulately, effectively, and persuasively when speaking and writing.
- Outcome 2 Students will read and analyze material in a variety of disciplines.

- Outcome 3 Use technology as a tool to access information, analyze and solve problems and communicate ideas.
- Outcome 5 Apply mathematical knowledge and skill to analyze and solve problems.

B. Course Outcomes

In support of the N.C.T.M. Standards for Curriculum and Evaluation, emphasis will be placed on writing equations and inequalities involving real world concepts and then solving them by algebraic and graphing methods. Upon successful completion of Algebra 1-2 students should be able to:

1. Use the Distributive Property, order of operations, factoring, and algebraic properties to reorganize algebraic expressions into more useful forms. Understand that algebraic relations can be tested by substitutions of numbers.
 - a) Factoring techniques include finding a common factor, factoring trinomials, difference of two squares, and perfect squares.
2. Understand and use such operations as taking the opposite, reciprocal, raising to a power, and taking a root.
 - a) Understand, model, and compute with signed numbers.
 - b) Develop and use the laws of exponents.
 - c) Understand scientific notation and its relationship to the metric system.
 - d) Simplify and compute with square roots.
3. Use variables and algebraic expressions to represent concrete situations, to generalize results, and to describe functions. Use tables and graphs as tools to interpret them.
4. Model real world situations with appropriate variables, equations, and graphs in order to problem solve. Use various problem-solving strategies in order to analyze a problem and formulate a solution.
 - a) Problems may include: perimeter, area, age, integer, motion, work, mixture, coin...
 - b) Draw a complete graph showing all critical features.
 - c) Model situations which exhibit constant rate of change.
 - d) Interpret and graph functions, in particular, but not limited to linear and quadratic functions.
 - e) Make scatter plots to analyze data. Fit a linear equation to the data and use it to make predictions.
5. Solve and graph linear equations and inequalities in one and two variables. Understand the relationship between the function or relation, its graph, and the solution to specific problems.
6. Solve and graph systems of linear and nonlinear equations.
 - a) Solve by a variety of techniques including: graphing method, substitution method, and linear combination.

7. Solve quadratic equations by factoring, using the quadratic formula, and by graphing.
 - a) Find the roots of a second degree polynomial and know the roots are the x-intercepts.
 - b) Determine whether the graph of a quadratic function will intersect the x-axis in zero, one, or two points.
 - c) Solve physical problems such as the motion of an object under the force of gravity.
8. Use appropriate technology to reinforce the algebraic and geometric connections of functions and their graphs.
 - a) Determine how change in slope and y-intercept effect both the graph of a linear function, its representative equation, and its data table.
9. Use ration, proportion, and direct variation from numerical, geometric, and algebraic perspectives particularly in the interpretation of the slope of a linear function.
 - a) Determine slope, rate of change, and intercepts. Write an equation of line given data points, slope and point, or graph.
 - b) Understand the concepts of parallel and perpendicular lines and how their slopes are related.
10. Simplify fractions with polynomials in the numerator and denominator by factoring both and reducing to lowest terms. Add, subtract, multiply, and divide rational expressions with monomials in the numerator and denominator. Solve equations with monomials in the numerator and denominator.
11. Calculate simple probabilities.

III. ASSESSMENT

A. Student Assessment

Assessment and instruction should be aligned and designed to promote mathematical thinking. Teachers should move towards the use of engaging problem situations that involve students in investigating, conjecturing, verifying, applying, evaluating, and communicating with their assessments.

Assessment should be made on the basis of a variety of means such as quizzes, tests, investigations, performance tasks, unit summaries, and projects. Informal assessments can involve daily work and writing samples. Because students will be spending class time learning concepts with group members, group assessments are possible. The use of student journals and portfolios to show growth and progress is encouraged.

B. Course Assessment

The success of the course will be judged by the number of students who

- 1 Pass with grades of C or better;
- 2 Meet the Tamalpais Union High School District's graduation requirements for Mathematics proficiency (Outcome #5: Comprehensive Exam of Basic Skills, Problem Solving Assessment score of 4 or higher, and Project score of 4 or higher);
- 3 Pass the Golden State Algebra Exam with student recognition or higher.

IV. METHODS / MATERIALS

A. Student Learning Activities

Instruction will be designed so that students are actively involved in the learning experience. Students will investigate, conjecture, verify, apply, evaluate, and communicate mathematical ideas both collaboratively and individually in solving problems. They will be expected to explain and justify their work. They will be given opportunities to summarize and reflect.

B. Materials

Teacher-generated materials will be utilized in conjunction with textbooks currently available. *Graphing calculators are needed for all students as funds become available.*

C. Technology

Use of calculators and computers as an integral part of instruction and student work will be infused into the course as equipment becomes available. The following technology skills will be taught to all algebra students:

1. Graph an equation or system of equations on a graphics calculator.
 - a) Set a reasonable window to view the graph using an appropriate domain, range, and scale.
 - b) Enter an equation, set and view its data table, graph, and trace to see data points, and point(s) of intersection.
2. Store and retrieve variables and use to evaluate algebraic expressions.

V. GENERAL INFORMATION

A. Prerequisites

Students will need a recommendation from their previous math teacher. Teachers will consider their algebra readiness test score along with the grade in the course and student work habits. Students who receive a C- or better in Algebra 1 may enroll in Algebra 2.

B. Requirements Met

Successful completion of Algebra 1-2 is accepted as partial fulfillment of the University of California's "c" admissions requirement. The course satisfies 10 credits of the Tamalpais Union High School District 30 credit mathematics graduation requirement.

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