

SAN MATEO UNION HIGH SCHOOL DISTRICT
INTEGRATED MATH 3-4

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| Approved by Board of Trustees May 22, 2008 |
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I. Description of the Course

A. Purpose

This class is designed to provide a balance of problem solving, skill development, and conceptual understanding. The course is based on strengthening algebraic and geometric skills in preparation for Algebra 3-4.

B. Grade Placement:

10th-12th grade

C. Prerequisites:

D or better in Geometry 2 or recommendation of teacher

D. Credit

10.0 credits of mathematics

II. Topics of the Course

- A. Equations and Inequalities involving Absolute Value
- B. Systems of Linear Equations and Inequalities
- C. Function Concepts
- D. Quadratic Functions
- E. Logical Reasoning and Proof
- F. Congruent and Similar Triangles
- G. Right Triangle Geometry
- H. Angle Relationships
- I. Constructions
- J. Transformations
- K. Probability

III. Content Standards

- A. Equations and Inequalities involving Absolute Value
 - 1) Students solve equations and inequalities involving absolute value. **(A3)**

- B. Systems of Linear Equations and Inequalities
 - 1) Students solve a system of two linear equations in two variables algebraically and are able to interpret the answer graphically. **(A9)**
 - 2) Students are able to solve a system of two linear inequalities in two variables and to sketch the solution set. **(A9)**

- C. Function Concepts
 - 1) Students understand the concepts of a relation and a function, determine whether a given relation defines a function, and give pertinent information about given relations and function. **(A16)**

- 2) Students determine the domain of independent variables and the range of dependent variables defined by a graph, a set of ordered pairs, or a symbolic expression. **(A17)**
- 3) Students determine whether a relation defined by a graph, a set of ordered pairs, or a symbolic expression is a function and justify the conclusion. **(A18)**

D. Quadratic Functions

- 1) Students graph quadratic functions and know that their roots are the x-intercepts. **(A21)**
- 2) Students use the quadratic formula or factoring techniques or both to determine whether the graph of a quadratic function will intersect the x-axis in zero, one, or two points. **(A22)**
- 3) Students apply quadratic equations to physical problems, such as the motion of an object under the force of gravity. **(A23)**

E. Logical Reasoning and Proof

- 1) Students explain the difference between inductive and deductive reasoning and identify and provide examples of each. **(G24.1)**
- 2) Students identify the hypothesis and conclusion in logical deduction. **(G24.2)**
- 3) Students use counterexamples to show that an assertion is false and recognize that a single counterexample is sufficient to refute an assertion. **(G24.3)**
- 4) Students demonstrate understanding by identifying and giving examples of undefined terms, axioms, theorems, and inductive and deductive reasoning. **(G1)**
- 5) Students write geometric proofs, including proofs by contradiction. **(G2)**
- 6) Students construct and judge the validity of a logical argument and give counterexamples to disprove a statement. **(G3)**

F. Congruent and Similar Triangles

- 1) Students prove basic theorems involving congruence and similarity. **(G4)**
- 2) Students prove that triangles are congruent or similar, and they are able to use the concept of corresponding parts of congruent triangles. **(G7)**

G. Right Triangle Geometry

- 1) Students prove the Pythagorean theorem. **(G14)**
- 2) Students use the Pythagorean theorem to determine distance and find missing lengths of sides of right triangles. **(G15)**
- 3) Students know the definitions of the basic trigonometric functions defined by the angles of right triangles. They also know and are able to use elementary relationships between them. **(G18)**
- 4) Students use trigonometric functions to solve for an unknown length of a side of a right triangle, given an angle and a length of a side. **(G19)**

- 5) Students know and are able to use angle and side relationships in problems with special right triangles, such as 30° , 60° , and 90° triangles, and 45° , 45° , and 90° triangles. **(G20)**

H. Angle Relationships

- 1) Students prove and use theorems involving the properties of parallel lines cut by a transversal, the properties of quadrilaterals and the properties of circles. **(G7)**
- 2) Students prove relationships between angles in polygons by using properties of complementary, supplementary, vertical, and exterior angles. **(G13)**

I. Constructions

- 1) Students perform basic constructions with a straightedge and compass, such as angle bisectors, perpendicular bisectors, and the line parallel to a given line through a point off the line. **(G16)**

J. Transformations

- 1) Students know the effect of rigid motions on figures in the coordinate plane and space, including rotations, translations, and reflections. **(G22)**

K. Probability

- 1) Students use fundamental counting principles to compute combinations and permutations. **(PS18)**
- 2) Students use combinations and permutations to compute probabilities. **(PS19)**
- 3) Students know the definition of the notion of independent events and can use the rules for addition, multiplication, and complementation to solve for probabilities of particular events in finite sample spaces. **(PS1)**

IV. Skill Objectives

Students will:

- A. Express mathematical thinking orally, in writing, and algebraically.
- B. Master a variety of problem-solving skills and choose appropriately from them.
- C. Use the appropriate technology.
- D. Work collaboratively.
- E. Use appropriate mathematical vocabulary and terminology.