

San Mateo Union High School District
Course of Study

INTENSIVE ALGEBRA 1-2

I. Course Description

- A. UC/CSU “a-g” Subject Area: c) Mathematics
- B. Grade Level: 9
- C. Credits: 20 (10 Algebra 1-2, 10 Elective)
- D. Pre-Requisites: None (see Appendix for placement criteria)
- E. Brief Course Description:

Approved by BOARD OF TRUSTEES May 19, 2011
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Intensive Algebra 1-2 (IA) is a standards-aligned course designed to give students who are significantly below grade level the skills they need to meet the California Algebra I Standards. This course will have a smaller class size than regular Algebra 1-2 (20 or less is recommended). Additionally, the class is focused on giving students the algebra skills needed to score at the proficient level on the Math section of the California High School Exit Exam and the California STAR Test for Algebra 1. The course mirrors the Algebra 1-2 curriculum with a more appropriate pace, more accessible problem selection, more scaffolding, conceptual mathematics building, practical and real world applications, unit theme problems and more time built in to re-teach. Students will be assessed on a regular basis to determine how well they are meeting the Algebra I standards. Following the pacing guide for Algebra 1-2, the class is organized around semester instructional periods and tangible products that offer success to students in a meaningful way. Recursively built on itself—with repeated questions, strategies, and curriculum—the class allows students to see that algebra has practical value in their lives. Upon successful completion of this course, students will be placed in Geometry 1-2 or Integrated Math 1-2.

- II. **Course Purpose:** Algebra is a way of thinking and a set of concepts and skills that enable students to generalize, model, and analyze mathematical situations. Algebra provides a systematic way to investigate relationships, helping to describe, organize, and understand the world. (NCTM)

A. Goals:

Students will:

1. Practice and relearn prerequisite skills and concepts that support learning Algebra I topics.
2. Build understanding of the concepts and applications of mathematics.
3. Solve practical applications of algebra problems.
4. Learn the essential California Algebra I standards as specified by SMUHSD math council.
5. Recognize and solve conceptual and practical problems involving linear and quadratic relationships.
6. Practice and reinforce the use of academic language specific to the core Algebra I class.
7. Develop test-taking skills and strategies.
8. Learn foundational math skills in preparation for the California High School Exit Exam.
9. Develop and practice study skills and goal-setting methods.
10. Develop an understanding that algebraic thinking is an accessible and powerful tool that can be used to model and solve practical and real world problems.

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B. Student Outcomes:

Students will demonstrate the skills necessary to:

1. Simplify expressions before solving linear equations/inequalities in one variable (Alg I - 4.0)
2. Solve multi-step problems, including word problems, involving linear equations/inequalities in one variable and provide justification for each step (Alg I - 5.0)
3. Derive linear equations. (Alg I - 7.0)
4. Graph a linear equation and compute the x and y-intercepts. Graph a linear inequality and shade the solution region. (Alg I – 6.0)
5. Solve a system of two linear equations in two variables algebraically. (Alg I – 9.0)
6. Solve equations and inequalities involving absolute value (Alg I – 3.0)
7. Simplify expressions and solve equations having integer exponents and square roots (Alg I – 2.0)
8. Decide if a quadratic equation has 0, 1 or 2 solutions and whether its function graph has 0, 1 or 2 x-intercepts (Alg I – 22.0)
9. Apply basic factoring techniques to second and simple third-degree polynomials. (Alg I – 11.0)
10. Add, subtract, and multiply monomials and polynomials. (Alg I – 10.0)
11. Solve a quadratic equation by both factoring techniques and the quadratic formula. (Alg I – 14.0, 20.0)
12. Graph quadratic functions. (Alg I – 21.0)
13. Demonstrate understanding of mathematical academic language through usage.
14. Use algebraic techniques to solve practical problems such as performance based tasks that will be given on Common Core assessments.
15. Address Common Core Algebra I Standards
 - a. Core Idea 1: Functions and Relations
 - i. Understand patterns, relations, and functions.
 - ii. Generalize patterns using explicitly defined functions.
 - iii. Understand relations and functions and select, convert flexibly among, and use various representations for them.
 - iv. Analyze functions of one variable by investigating local and global behavior, including slopes as rates of change, intercepts, and zeros.
 - b. Core Idea 2: Mathematical Reasoning
 - i. Employ forms of mathematical reasoning and proof appropriate to the solution of the problem, including deductive and inductive reasoning, making and testing conjectures, and using counterexamples and indirect proof.
 - ii. Show mathematical reasoning in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams, and models.
 - iii. Explain the logic inherent in a solution process.

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- iv. Use induction to make conjectures and use deductive reasoning to prove conclusions.
- v. Draw reasonable conclusions about a situation being modeled.
- c. Core Idea 3: Algebraic Properties and Representations
 - i. Represent and analyze mathematical situations and structures using algebraic symbols.
 - ii. Compare and contrast the properties of numbers and number systems including real numbers.
 - iii. Understand the meaning of equivalent forms of expressions, equations, inequalities, or relations.
 - iv. Write equivalent forms of equations, inequalities, and systems of equations and solve them.
 - v. Use symbolic algebra to represent and explain mathematical relationships.
 - vi. Judge the meaning, utility, and reasonableness of results of symbolic manipulations.
 - vii. Use symbolic expressions to represent relationships arising from various contexts.
 - viii. Approximate and interpret rates of change from graphic and numeric data.

III. – IV. Course Outline and Key Assignments

Intensive Algebra 1-2 follows the same standards as Algebra 1-2 but is front-loaded with basic conceptual and skills review.

In the left-hand column is the course outline for the IA class, broken into its respective instructional periods. These are essentially the Algebra 1 standards of which the students in the IA class will need to show competency. The right-hand column lists the IA key assignments.

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III. – IV. Course Outline and Key Assignments

IA 1 Course Outline	IA 1 Key Assignments
<p>Academic Identity and Team Building</p>	<ul style="list-style-type: none"> • Mathematical Identity assignments that may contain but are not limited to: Mathography, Identity Posters, Mathematics from Different Cultures lessons, ‘How am I thinking?’ • Team Building assignments that may contain but are not limited to: Flux, Human Knot, Human Graph Theory, Prisoner’s Dilemma, For more ideas see the math forum website.¹
<p>Algebra Readiness Skills, Conceptual Mathematics and Academic Language Building</p> <p>California Algebra Readiness Standards</p> <p>A. Operations on Rational Numbers (Grade 7 NS: 1.2, 1.3, 1.5, 2.1, AF 2.1) Use positive and negative integers, decimals, fractions in arithmetic operations and understand why algorithms work.</p> <p>B. Equations and Functions (Grade 7 AF: 1.1, 1.3, 4.1, 4.2) Identify the context of a word problem, pick a strategy for solving and express the solution symbolically. Solve two-step linear equations and inequalities.</p> <p>C. The Coordinate Plane (Grade 7 MG: 3.3) Graph and interpret situations on the x-y plane and understand that a graph is a collection of all ordered pairs that satisfy a condition.</p> <p>D. Graphing Proportional Relationships (Grade 7 AF: 3.3,3.4, MG: 1.3) Graph linear functions understanding slope for</p>	<p>Textbook/Workbook assignments plus:</p> <p>A. Rational Numbers assignments that may contain but are not limited to: POM ‘Part and Whole’, Sequences, diamond problems, Patterns, Number Lines, For more ideas see the math forum website¹.</p> <p>B. Word Problem assignments that may contain but are not limited to: Guess and Check, POM ‘The WheelShop’,...For more ideas see website that refer to MARS tasks such as Inside Mathematics³.</p> <p>C. Coordinate Plane activities that may contain but are not limited to: Coordinate Worksheet Pictures or Puzzles, On-line Graphing Games, For more ideas see math game websites such as hotmath².</p> <p>D. Graphing activities that may contain but are not limited to: On-line Graphing Games, Slope Jeopardy, For more ideas math game websites</p>

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direct relationships ($y = mx$)	such as hotmath ² .
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IA 1 Course Outline	IA 1 Key Assignments
<p>Algebra Skills, Conceptual Mathematics and Academic Language Building</p> <p>A. Algebra I Standard 4.0 Students simplify expressions prior to solving linear equations and inequalities in one variable, such as: $3(2x-5) + 4(x-2) = 12$.</p> <p>B. Algebra I Standard 5.0 Students solve multi-step problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.</p> <p>C. Algebra I Standard 6.0 Students graph a linear equation and compute the x- and y- intercepts (e.g., graph $2x + 6y = 4$). They are also able to sketch the region defined by linear inequality, e.g., they sketch the region defined by $2x + 6y < 4$</p> <p>D. Algebra I Standard 9.0 Students ... are able to interpret the answer graphically. Students are able to solve a system of two linear inequalities in two variables and to sketch the solution sets.</p> <p>E. Algebra I Standard 3.0 Students solve equations ... involving absolute values.</p>	<p>A. Textbook/Workbook assignments plus: Simplifying Expressions assignments that may contain but are not limited to: Algebra Tiles, On-line Algebra Tiles...</p> <p>B. Textbook/Workbook assignments plus: Solving equations in one variable problems that may contain but are not limited to: Algebra Tiles, On-line Algebra Tiles, Guess and Check, Area and Perimeter,</p> <p>C. Textbook/Workbook assignments plus: Linear graphing activities that may contain but are not limited to: Exploring graphing calculators, on-line graphing games, human graphing, For more ideas see math game websites such as hotmath².</p> <p>D. Textbook/Workbook assignments plus: Linear systems graphing activities that may contain but are not limited to: Comparing Rate Plans, Exploring graphing calculators, on-line graphing games, human graphing, For more ideas see math game websites such as hotmath².</p> <p>E. Textbook/Workbook assignments plus: Solving absolute value equations activities that may contain but are not limited to: 'Tolerance' in science, Distance problems,</p>

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IA 2 Course Outline	IA 2 Key Assignments
<p>Academic Identity and Team Building</p>	<p>Continue mathematical identity and team building efforts. For more ideas see the math forum website¹.</p>
<p>Algebra Skills, Conceptual Mathematics and Academic Language Building</p> <p>A. Algebra I Standard 7.0 Students verify that a point lies on a line, given an equation of the line. Students are able to derive linear equations using the point-slope formula.</p> <p>B. Algebra I Standard 9.0 Students solve a system of two linear equations in two variables algebraically ...</p> <p>C. Algebra I Standard 2.0 Students understand and use such operations as taking the opposite; finding the reciprocal, taking a root ... They understand and use the rules of exponents.</p> <p>D. Algebra I Standard 10.0 Students add, subtract, multiply, and divide monomials and polynomials. Students solve multi-step problems, including word problems, by using these techniques.</p> <p>E. Algebra I Standard 11.0 Students apply basic factoring techniques to second- and simple third-degree polynomials. These techniques include finding a common factor for all terms in a polynomial, recognizing the</p>	<p>A. Textbook/Workbook assignments + Writing Linear Equations activities that may contain but are not limited to: Exploring graphing calculators, on-line graphing games, ... For more ideas see math game websites such as hotmath².</p> <p>B. Textbook/Workbook assignments + Solving Systems of Linear Equations activities that may contain but are not limited to: Comparing Rate Plans (or Wii games,...), Road Rage,... For more ideas see NCTM website.</p> <p>C. Textbook/Workbook assignments + Exponents/Square roots activities that may contain but are not limited to: Investment Plans, Pythagorean Theorem, Distance problems, ...</p> <p>D. Textbook/Workbook assignments + Operations on polynomials activities that may contain but are not limited to: Algebra tiles, area problems, ...</p> <p>E. Textbook/Workbook assignments plus: Factoring activities that may contain but are not limited to: Algebra tiles, diamond problems, ...</p>

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<p>difference of two squares, and recognizing perfect squares of binomials.</p> <p>F. Algebra I Standard 14.0 Students solve a quadratic equation by factoring or completing the square.</p> <p>G. Algebra I Standard 20.0 Students use the quadratic formula to find the roots of a second-degree polynomial and to solve quadratic equations.</p> <p>H. Algebra I Standard 21.0 Students graph quadratic functions and know that their roots are the x-intercepts.</p> <p>I. Algebra I Standard 22.0 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.</p> <p>J. Algebra I Standard 13.0 Students add, subtract, multiply, and divide rational expressions and functions. Students solve both computationally and conceptually challenging problems by using these techniques.</p>	<p>F. - I. Textbook/Workbook assignments</p> <p>Solving Quadratics activities that may contain but are not limited to: Path of a flying object, Equation of a hanging string, Motion, Area, Maximum, Minimum ...</p> <p>J. Textbook/Workbook assignments plus: Rational Expressions activities that may contain but are not limited to: Geometric Areas, ...</p>
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V. Instructional Methods and/or Strategies that may be included but are not limited to:

1. Universal Methods and Strategies
 - a. Scaffold and differentiate
 - Customization of instruction to address different learning modalities
 - Use of formative assessments to drive instruction
 - Use of scaffolding of essential ideas to increase access, encourage incremental learning, and diminish the reinforcement of wrong ideas.
 - Use of multiple representations of math ideas and asking students to provide multiple responses to deepen mathematical understanding.
 - b. Re-teach/Re-engage
 - Large group/ Small group instruction
 - Direct instruction of individuals
 - Error analysis
 - Learning centers
 - c. Technology such as
 - Individual student response systems (clickers)
 - Graphing calculators
 - Smartboards
 - Individualized online or computer-based programs
 - 1) Individually paced learning/assessment program
 - 2) Class assessment and reporting program with drill-down capability
 - d. Relevance and application of mathematics
 - Practical application problems
 - Real world application problems
2. Student Engagement
 - a. Whole class
 - b. Group work
 - c. Student teams
 - d. Pair work
 - e. Student demonstrations
 - f. Tutor: one-on-one, pairs, or triads
 - g. Differentiated work groups

VI. Assessment Methods and/or Tools

1. Formative Assessment
 - a. Checks for understanding in the classroom
 - b. Weekly quizzes
 - c. Group tests
 - d. Performance tasks similar to those on common core assessments
 - e. Problems of the Month (POM's)
 - f. Warm ups
 - g. District common assessments
 - h. Homework assignments

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2. Summative Assessments
 - a) Class quizzes and tests
 - b) Performance tasks similar to those on common core assessments
 - c) District common assessments

VII. Texts and Supplemental Materials

1. Text: CK-12 On-line Textbook
CK-12 Algebra 1 and CK-12 Flexbook. Creative Commons Attribution-NonCommercial-ShareAlike 3.0, 2nd Edition
<http://www.ck12.org/flexbook/>
2. Supplemental Materials:
 - a) Online resources such as Compass Learning (grades 7,8 and Honors Algebra), 'Get the Math', and others
 - b) Workbooks- district generated from online and other resources
 - c) Worksheets – teacher developed and from other sources
 - d) Individual whiteboards and large pair whiteboards
 - e) Chartpad posters

Footnotes of math websites

¹ <http://mathforum.org/alejandre/cooperate.html>

² <http://hotmath.com/games.html>

³ <http://www.insidemathematics.org/>

⁴ <http://illuminations.nctm.org/LessonDetail.aspx?ID=L770>

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Appendix A

SAN MATEO UNION HIGH SCHOOL DISTRICT
Intensive Algebra Class Placement Criteria – Fall 2011

- Below 276 on the 7th grade mathematics CST and
- Below 17 on the MDTP Test OR 1 on the Curriculum Associates benchmark test