



**MIDDLE SCHOOL COURSE OUTLINE**

<b>Course Code</b>	3010			<b>Department</b>	Mathematics		
<b>Course Title</b>	Algebra CD			<b>Abbreviation</b>	Alg CD		
<b>Grade Level</b>	8	<b>Course Length</b>	1 year	<b>Required</b>		<b>Elective</b>	
<b>Required for HS Graduation</b>	Yes		<b>Meets UC "a-g Requirement"</b>			Yes (c)	

*\*Two years of the sequence (Algebra AB and Algebra CD) must be completed to fulfill the Algebra graduation requirement and the "a-g" requirement.*

**COURSE DESCRIPTION:**

This year-long course is the second half of the Algebra 1-2 course. It continues instruction in the language and applications of algebra, including development of the real number system, variables, mathematical expressions, linear equations, problem solving, inequalities, polynomials, special products and factoring, and introduces graphs, relations and functions, quadratic equations, rational and radical expressions, and basic statistics and probability. Students must have taken Algebra AB in sequence with this course. Algebra is required for graduation from high school.

**GOALS:** (Student needs the course is intended to meet)

Standards will complete all of the California State Standards for Algebra. Symbolic reasoning and calculations with symbols are central in algebra. Through the study of algebra, the student will develop an understanding of the symbolic language of mathematics and the sciences. In addition, algebraic skills and concepts are developed and used in a wide variety of problem-solving situations.

Students communicate precisely about quantities, logical relationships, and unknown values through the use of signs, symbols, models, graphs, and mathematical vocabulary. Regular opportunities are provided for students to communicate through oral and written explanations of math concepts.

Students learn to apply mathematics to everyday life and develop an interest in pursuing advance studies in mathematics and in a wide array of mathematically related career choices.

## CONTENT STANDARDS

- 1.0 Students identify and use the arithmetic properties of subsets of integers and rational, irrational, and real numbers, including closure properties for the four basic arithmetic operations where applicable: (CST, PSAT)
- 2.0\* Students understand and use such operations as taking the opposite, finding the reciprocal, taking a root, and raising to a fractional power. They understand and use the rules of exponents. (CAHSEE, CST, PSAT)
- 3.0 Students solve equations and inequalities involving absolute values. (CAHSEE, CST)
- 4.0\* Students simplify expressions before solving linear equations and inequalities in one variable, such as  $3(2x-5) + 4(x-2) = 12$ . (CAHSEE, CST, PSAT)
- 5.0\* Students solve multistep problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step. (CAHSEE, CST, PSAT)
- 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  $2x + 6y < 4$ ). (CAHSEE, CST)
- 7.0\* Students verify that a point lies on a line, given an equation of the line. Students are able to derive linear equations by using the point-slope formula. (CAHSEE, CST, PSAT)
- 8.0 Students understand the concepts of parallel lines and perpendicular lines and how those slopes are related. Students are able to find the equation of a line perpendicular to a given line that passes through a given point. (CAHSEE, CST, PSAT)
- 9.0\* Students solve a system of two linear equations in two variables algebraically and 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. (CAHSEE, CST, PSAT)
- 10.0\* Students add, subtract, multiply, and divide monomials and polynomials. Students solve multistep problems, including word problems, by using these techniques. (CAHSEE, CST, PSAT)
- 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 difference of two squares, and recognizing perfect squares of binomials. (CST, PSAT)
- 12.0\* Students simplify fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms. (CST)
- 13.0\* Students add, subtract, multiply, and divide rational expressions and functions. Students solve both computationally and conceptually challenging problems by using these techniques. (CST)
- 14.0\* Students solve a quadratic equation by factoring or completing the square. (CST, PSAT)
- 15.0\* Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems. (CAHSEE, CST, PSAT)
- 16.0 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 functions. (CST, PSAT)
- 17.0 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. (CST)
- 18.0 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. (CST)
- 19.0\* Students know the quadratic formula and are familiar with its proof by completing the square. (CST)
- 20.0\* Students use the quadratic formula to find the roots of a second-degree polynomial and to solve quadratic equations. (CST)
- 21.0\* Students graph quadratic functions and know that their roots are the x-intercepts. (CST)
- 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. (CST)
- 23.0\* Students apply quadratic equations to physical problems, such as the motion of an object under the force of gravity. (CST)
- 24.0 Students use and know simple aspects of a logical argument: (CST, PSAT)
- 25.0 Students use properties of the number system to judge the validity of results, to justify each step of a procedure, and to prove or disprove statements: (CST, PSAT)

The \* designates the key standards that comprise a minimum of 70% of the Content Standards Test.  
 CST – Standard assessed on the California Standards Test  
 CAHSEE – Standard assessed on the California High School Exit Exam  
 PSAT – Preliminary Scholastic Achievement Test

## STATE PERFORMANCE STANDARDS

The California State Board of Education has identified the following performance levels for the California Content Standards Test in Algebra. The objective of Long Beach Unified School District is to have all students achieve at or above the Proficient Performance Standard (Level). The table indicates the Scaled Score (SS) and estimated percent correct on the Content Standards Test.

	Far Below Basic	Below Basic	Basic	Proficient	Advanced Proficient
%	0% - 27%	28% - 41%	42% - 56%	57% - 78%	79% - 100%
# Correct	Less than 17	18 – 25	26 – 35	36 – 49	50 – 65

## DISTRICT PERFORMANCE STANDARDS

The Long Beach Unified School District has common assessments and key assignments that are required for Algebra. The Performance Standard Criteria is shown in the table below. The goal is to have all students achieve at or above the Proficient Level and receive a C or better in the course.

### Mathematics Performance Standard Criteria

Assignments	Far Below Basic (FBB)	Below Basic (BB)	Basic (B)	Proficient (P)	Advanced Proficient (AP)
Key Assignments: LBUSD practice exams for Quarter 1, Quarter 2, Quarter 3, and EOC	The student completes at least 25%; not all work is shown.	The student completes at least 50%; not all work is shown.	The student completes 65% - 79% showing all work.	The student completes 80% - 89% showing all work.	The student completes at least 90% showing all work.
Assessments	FBB	BB	B	P	AP
Standards Based Assessments	0% - 27%	28% - 41%	42% - 56%	57% - 78%	79% - 100%
LBUSD Quarter 1, Quarter 2, and Quarter 3 Exams					
End-Of-Course Exam					

Assessment	Not Proficient 1	Partial Proficient 2	Proficient 3	Advanced Proficient 4
Integer Tests	Less than 80%	80% - 92% 56 of 70 Correct Completed in $\leq$ 15 mins.	93% - 96% 65 of 70 Correct Completed in $\leq$ 10 mins.	97% - 100% 68 of 70 Correct Completed in $\leq$ 5 mins.

**OUTLINE OF CONTENT AND RECOMMENDED TIME ALLOTMENT:**

Content sequencing and time allocations are only suggestions and may be adjusted to suit school site curriculum plans and student needs.

**Approximately five weeks should be allotted at the beginning of the course to review key standards from the Algebra AB Course Outline covering chapters 1 through 7-5.**

Symbols used in this document:

- # - # Refers to the Chapter and Section in the text: Burger, Edward B., et al. Holt California Algebra 1. Texas: Holt, Rinehart and Winston, 2008.
- ( ) Indicates the number on the California Mathematics Content Standards for Algebra

***Perform Basic Operations on Polynomials***

	California Content Standards	Adopted Textbook Correlation	Assessments <u>Algebra Assessment Portfolio Workbook</u>	Key Vocabulary and Recommended Aids	Time
Add, subtract, and multiply polynomials	Classify polynomials	7 – 6		<b>Key Vocabulary:</b> Binomial Constants Cubic Degree Difference of squares FOIL Leading coefficient Monomial Polynomial Power of a monomial Power of power Product of powers Quadratic Square a binomial Square of a sum Trinomial <b>Visuals &amp; Demos:</b> Algebra Tiles Algeblocks	3 weeks
	Add and subtract polynomials by combining similar terms (10.0)	7 – 6, 7 – 7	1, 9, 91		
	Multiply polynomials (10.0)	7 – 8, 7 – 9	Pages 1, 2, 3, 12, 36, 37, 53		
	Special Products of Binomials (10.0)	7 – 9			

***Factor Polynomials***

	California Content Standards	Adopted Textbook Correlation	Assessments <u>Algebra Assessment Portfolio Workbook</u>	Key Vocabulary And Recommended Aids	Time
Factor trinomials completely using the greatest common factor and other factoring patterns	Factor using the greatest common factor (11.0)	8 – 1, 8 - 2	Pages 1, 9, 93	<b>Key Vocabulary:</b> Composite Distributive property Factor Greatest common factor Difference of squares Perfect square Prime Quadratic equation Zero product property <b>Visuals &amp; Demos:</b> Factor Puzzles Factor Trees Color Tiles	4 Weeks
	Factor trinomials (11.0)	8 – 3, 8 - 4	Pages 3, 12, 93		
	Factor completely by applying several different factor patterns (11.0)	8 – 5, 8 - 6	Pages 58, 93		

## Solve and Graph Quadratics

California Content Standards		Adopted Textbook Correlation	Assessments Algebra Assessment Portfolio Workbook	Key Vocabulary And Recommended Aids	Time
Solve quadratic equations by factoring and using the quadratic formula. Graph quadratic expressions by point plotting, recognize the graph as a parabola, and recognize the x-intercepts as roots; apply the quadratic formula to physical problems; solve quadratic equations by completing the square; use the discriminant to determine the number of x-intercepts and solutions of a quadratic equation.	Solve quadratic equations by factoring (14.0)	9 - 5	Page 3 - 5, 13, 112, 113	<b>Key Vocabulary:</b> Axis of symmetry Axis of symmetry Factoring Hypotenuse Leg Maximum Maximum Minimum Minimum Parabola Parabola Pythagorean theorem Quadratic equation Standard form of a quadratic equation Vertex Zero product property	10 weeks
	Graph quadratic expressions by point plotting, recognize the graph as a parabola and the x-intercepts as roots (20.0), (21.0), (22.0)	9 – 2 to 9 - 4	Pages 2, 112 -114		
	Apply quadratic solutions to maximum, minimum problems	9 – 1 to 9 - 5			
	Apply the quadratic formula to physical problems(19.0), (23.0)	9 – 1 to 9 - 5	Pages 112, 113		
	Apply the Pythagorean Theorem And use the distance formula. (23.0)	9 - 6	Pages 4, 9, 13, 116	<b>Visuals &amp; Demos:</b> Graph Aerobics Graph Paper	
	Solve quadratic equations by completing the square (14.0)	9 - 7	Page 59		
	Solve quadratic equations by using the quadratic formula (20.0)	9 - 8	Pages 13, 112, 113		
	Determine the number of x-intercepts, roots or solutions by using the discriminant of the quadratic equation	9 - 9			

## Perform the Basic Operations on Algebraic Fractions

California Content Standards		Adopted Textbook Correlation	Assessments <u>Algebra</u> <u>Assessment</u> <u>Portfolio</u> <u>Workbook</u>	Key Vocabulary And Recommended Aids	Time
Add, subtract, multiply and divide algebraic expressions and simplify them in lowest form	Add, subtract, multiply and divide algebraic expressions and simplify complex fractions (13.0)	10 - 3 to 10 - 5	Pages 5, 6, 38	<b>Key Vocabulary:</b> Common denominator Common factors Denominator Dividend Divisor Excluded values Fraction bar GCF LCM (least common multiple) Least common denominator Means Numerator Product Proportions Quotient Rational equations Extremes Rational expression Simplest form Unlike denominator  <b>Visuals &amp; Demos:</b> Algebra Tiles Coins Dice Spinners	8 Weeks
	Divide polynomials	10 - 6			
Solve rational equations	Solve rational equations (including proportions) (15.0)	10 - 7	Pages 4, 9, 40, 96		
	Apply algebra techniques to solve rate, work and mixture problems	10 - 8			

## Perform Basic Operations with Radicals and Solve Equations

California Content Standards		Adopted Textbook Correlation	Assessments <u>Algebra</u> <u>Assessment</u> <u>Portfolio</u> <u>Workbook</u>	Key Vocabulary And Recommended Aids	Time
Work with algebraic expressions containing real numbers. Find square roots of real numbers; simplify, multiply, divide, add, and subtract radicals and solve equations containing radicals. apply the	Find the square root of a real number (2.0)	11 - 1	Page 8	<b>Key Vocabulary:</b> Square root Perfect square Radical sign Principal square root Negative square root Irrational number Radicand Simplest radical form  <b>Visuals &amp; Demos</b> Product property Quotient property Like radicals Radical expression Radical equation Extraneous roots  <b>Visuals &amp; Demos:</b> Graph Paper	4 Weeks
	Simplify, multiply, divide, add, and subtract radicals (1.0) (2.0)	11 - 2 to 11 - 4	Pages 3, 6, 8, 41-44		
	Solve equations containing radicals	11 - 1, 11 - 5	Pages 6, 109 - 111		

## APPLICATION OF COURSE CONTENT

### **Career Connection:**

**Related Major Skills & Characteristics** - Problem Solving , Organizational Skills, Numerical Computation, Ability to Analyze & Interpret Data, Critical Thinking, Computer Literacy, Logical Thinking, Team Skills Efficient, Systemizing Skills, Advanced Quantitative Skills, Testing Skills

**Related Career Titles** – Students who major in mathematics will be prepared for any of the following careers.

\*Accountant \*Contract Administrator \*Information Scientist \*Actuary \*Cost Estimator/Analyst \*Inventory Control Specialist \*Aerospace Engineer \*Cryptographer/Cryptologist \*Investment Banker \*Air Traffic Controller \*Data Control Administrator \*ISO 2000 Specialist \*Applications Programmer \*Data Processing Manager \*Market Research Analyst \*Applied Science Technologist \*Database Manager  
\*Mathematician \*Artificial Intelligence Programmer \*Demographer \*Media Buyer \*Astronomer  
\*Econometrician \*Meteorologist \*Banking/Credit/ Investment Mgr \*Economist \*Mortgage Researcher  
\*Biometrician/ Biostatistician \*EDP Auditor \*Network Programmer \*Commodity Manager \*Employee Relations Specialist \*Numerical Analyst \*Compensation/Benefits Administrator \*Engineer \*Operations Research Analyst \*Computer Consultant \*Engineering Lab Technician \*Physicist \*Computer Engineer  
\*Environmental Technologist \*Pollution Meteorologist \*Computer Facilities Mgr \*Estate Planner  
\*Production Manager \*Computer Installation \*External Auditor \*Production Support Specialist \*Computer Marketing/Sales Rep \*Financial Auditor \*Psychometrician \*Computer Programmer \*Financial Consultant  
\*Public Health Statistician \*Computer Scientist \*Financial Manager \*Purchasing/Contract Agent \*Computer-Aided Design Tech. \*Hydro Geologist \*Quality Assurance Analyst \*Consumer Loan/Credit Officer  
\*Hydrologist \*Rate Analyst \*Cartographer \*Software Engineer \*Teacher: Science/Math/Computers \*Research Analyst \*Software Support Specialist \*Technical Support Rep. \*Risk & Insurance Specialist \*Statistician  
\*Technical Writer \*Risk Analyst \*Systems Analyst \*Transportation Planner \*Robotics Programmer \*Systems Engineer \*Treasury Management Specialist \*Satellite Communications Specialist \*Systems Programmer  
\*Underwriter \*Software Development Specialist \*Urban Planner \*Value Engineer \*Weight Analyst

**Service Learning** – Students who are Advanced Proficient on the Content Standards Tests or those who are earning an A in the course, can participate in after school tutoring programs to assist other students in learning mathematics. All hours can be credited towards the Service Learning requirement.

**METHODS:** A variety of instructional strategies will be utilized to accommodate all learning styles including, but not limited to:

**Lesson Design & Delivery:** Teachers will incorporate these components of lesson design during direct instruction and inquiry activities. The order of components is flexible, depending on the teacher's vision for the individual lesson. For instance, the objective and purpose, while present in the teacher's lesson plan, are not made known to the students at the beginning of an inquiry lesson.

<p><b>Essential Elements of Effective Instruction Model for Lesson Design Using Task Analysis</b></p>	<p>Anticipatory Set Objective Standard Reference Purpose Input Modeling Check for Understanding Guided Practice Closure Independent Practice</p>
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Some components may occur once in a lesson, but others will recur many times. Checking for understanding occurs continually; input, modeling, guided practice and closure may occur several times. There may even be more than one anticipatory set when more than one content piece is introduced.

**Active Participation:** Teachers will incorporate the principles of active participation and specific strategies to ensure consistent, simultaneous involvement of the minds of all learners in the classroom. Teachers should include both covert and overt active participation strategies, incorporating cooperative learning structures and brain research. Some of the possible active participation strategies include:

<b>COVERT</b>	<b>OVERT (Oral)</b>	<b>OVERT (Written)</b>	<b>OVERT (Gestures)</b>
• Recall	• Pair/Share	• Restate in Journals / Notes	• Hand Signals
• Imagine	• Idea Wave	• Response Boards	• Model with Manipulatives
• Observe	• Choral Response	• Graphic Organizers	• Stand up/ Sit down
• Consider	• Give One, Get One	• Folded Paper	• Point to Examples
	• "Foggiest" point	• Ticket Out of Class	
	• Socratic Seminar		
	• Cooperative Discussion Groups (i.e. Talking Chips, Gambit Chips)		

### **Literacy and Differentiation Strategies**

Learning styles and learning challenges of your students may be addressed by implementing combinations of the following:

<b><u>Reading Strategies in Mathematics</u></b>	<b><u>SDAIE Strategies for English Learners</u></b>	<b><u>Differentiation for Advanced Learners</u></b>
<ul style="list-style-type: none"> <li>▪ Learning Logs</li> <li>▪ Pre-teaching</li> <li>▪ Vocabulary</li> <li>▪ Pre-reading</li> <li>▪ Text Structures</li> <li>▪ Trail Markers</li> <li>▪ Reciprocal Teaching</li> <li>▪ Functional Text</li> <li>▪ Anticipation Guide</li> </ul>	<ul style="list-style-type: none"> <li>▪ Tapping/Building Prior Knowledge (Graphic Organizers, Schema)</li> <li>▪ Grouping Strategies</li> <li>▪ Multiple Intelligences</li> <li>▪ Adapt the Text</li> <li>▪ Interactive Learning (Manipulatives, Visuals)</li> <li>▪ Acquisition Levels</li> <li>▪ Language Sensitivity</li> <li>▪ Lower the Affective Filter (including Processing Time)</li> <li>▪ Home/School Connection (including Cultural Aspects)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Curriculum Compacting</li> <li>▪ Tiered Assignments</li> <li>▪ Flexible Grouping</li> <li>▪ Acceleration</li> <li>▪ Depth and Complexity</li> <li>▪ Independent Study</li> </ul>

**MATERIALS USED IN TEACHING THE COURSE:** In addition to the basic text (***mandatory information – Title, Author, Copyright Date and Publisher***), a variety of instructional tools will be used to meet the needs of all students

**Basic Text:**

Holt California Algebra 1, Burger, Edward B., et. Al, 2008; Holt, Rinehart and Winston

**Related Career Resources**

- There are many web sites that will help with career selection such as Eguidance.com, BRIDGES.com, and icouldbe.org. The software package COIN JR also has career information. Video tapes such as the Futures with Jamie Escalante - School to Career shows how math is used in various careers (FASE productions 800-404-FASE). Other videos are Career Futures. Call the Career/Tech Ed Office (562-989-7872 x 291) for more information on careers.

**EVALUATION:** Student achievement in this course will be measured using multiple assessment tools including but not limited to chapter tests, cumulative tests (quarter tests, semester 1 test, and End-Of-Course Exam), quizzes, homework, classwork, notebooks, and projects.

Textbook	Diagnose	Monitor	Evaluate
District Developed Assessments	Practice EOC Exam from previous math course	Practice Exams for Quarter 1, Quarter 2, Quarter 3, and End-of-Course	Quarter 1, 2, and 3 test End-Of-Course Exam
Holt Algebra 1	Are You Ready? Strategies for Success	Warm Up Questioning Strategies Check It Out Think and Discuss Write About It Journal Spiral Standards Review College Entrance Exam Practice	Lesson Quiz Alternative Assessment Ready To Go On? Chapter Test Mastering the Standards Cumulative Assessment Concept Connection

**Scoring Guide for Written Response/Projects**

Score	Description
4	The student response thoroughly accomplishes the task. <ul style="list-style-type: none"> <li>• Shows thorough understanding and use of the central mathematical ideas(s)</li> <li>• Includes appropriate and accurate mathematical computations</li> <li>• Presents mathematical knowledge and ideas clearly and skillfully, using combinations of mathematical symbols and/or visual means as supporting evidence</li> </ul>
3	The student response substantially accomplishes the task. <ul style="list-style-type: none"> <li>• Shows an essential grasp of the central mathematical idea(s)</li> <li>• Includes appropriate and generally correct mathematical computations</li> <li>• Presents mathematical knowledge and ideas clearly with supporting evidence</li> </ul>
2	The student response partially accomplishes the task. <ul style="list-style-type: none"> <li>• Shows a limited grasp of the central mathematical ideas(s)</li> <li>• May include incomplete and/or misdirected mathematical computations</li> <li>• Presents mathematical knowledge and ideas in an unclear manner or without supporting evidence</li> </ul>
1	The student response makes little or no progress toward accomplishing the task. <ul style="list-style-type: none"> <li>• Shows little or no grasp of the central mathematical idea(s)</li> <li>• Includes mathematical computations that are incorrect or inappropriate</li> <li>• Presents mathematical knowledge and ideas in a barely (if at all) comprehensible manner</li> </ul>

**Grading Policy:** A common grading policy ensures consistency between schools and classrooms across the district.

**Suggested Percent of Grade**

Classwork/Homework (10%)	15% - 20%
Notes/Projects	5%
Chapter Tests	35% - 40%
Quizzes	25% - 30%
Cumulative Tests/End-Of-Course Exam	10% - 15%

**Standard Grading Scale**

- A =** 90% - 100%
- B =** 80% - 89%
- C =** 70% - 79%
- D =** 60% - 69%
- F =** Below 60%

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School/Office: Math Office

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