



OFFICE OF CURRICULUM, INSTRUCTION & PROFESSIONAL DEVELOPMENT

HIGH SCHOOL COURSE OUTLINE

(Revised October 2010)

| | | | | | | | | | |
|-----------------------------------|-------------|-----------------------------|---|-------------------------------|----|-------------------------|-----|-----------------|-----|
| Department | Mathematics | Course Title | | Algebra 1-2 | | Course Code | | 3004 | |
| Grade Level | 9 -12 | Short Title | | ALGEBRA 1-2 | | Grad Requirement | | | Yes |
| Course Length | 2 semesters | Credits per Semester | 5 | Approved for Honors | No | Required | Yes | Elective | No |
| Prerequisites | None | | | | | | | | |
| Co-requisites | None | | | | | | | | |
| Articulated with LBCC | | No | | Articulated with CSULB | | | | No | |
| Meets UC "a-g" Requirement | | Yes (c) | | Meets NCAA Requirement | | | | Yes | |

COURSE DESCRIPTION:

This course is an introduction to 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, graphs, relations and functions, quadratic equations, rational and radical expressions, and basic statistics and probability. This course includes an emphasis on modeling algebra concepts used in real world applications. Successful completion of Algebra 1-2, or an equivalent sequence, is a graduation requirement.

COURSE PURPOSE: GOALS

- CONTENT** • Students will master the fundamental concepts of algebra, and attain proficiency in the California state standards for algebra.
- SKILLS** • Through the study of algebra, the student will develop an understanding of the symbolic language of mathematics and the sciences. Students will represent relationships between two quantities numerically, algebraically, and graphically. In addition, algebraic skills and concepts will be developed and used in a wide variety of problem-solving situations.
- In addition to algebra skills and concepts, students are expected to apply the following common skills that are relevant across all curriculum areas and career pathways: students will use technology, apply problem-solving and critical thinking skills, adapt to varied roles and responsibilities while working together in teams, understand and apply ethical behavior in the classroom and workplace, and understand and apply the characteristics of teamwork, leadership and citizenship in the school, community and workplace.
- LITERACY** • Students communicate precisely about quantities, logical relationships, and unknown values through the use of signs, symbols, models, graphs, and mathematical vocabulary.
- Students are expected to produce legible work, using correct spelling and grammar, and will formulate judgments about ideas and support those judgments with evidence.
- Students will use visual aids, including graphs and step-by-step solutions, in oral explanations and presentations.
- APPLICATIONS** • Students learn to apply mathematics to everyday life, develop an interest in pursuing advanced studies in mathematics, and learn how math is applied in a wide array of career choices.

COURSE PURPOSE: EXPECTED OUTCOMES

Students are expected to perform at a proficient level on a variety of tasks and assessments addressing both the content and skill standards for Algebra 1-2. Levels of proficiency are defined near the end of this course outline under Performance Criteria.

- 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)

- * Key standards that comprise a minimum of 70% of the Algebra I Content Standards Test
- CST Standard assessed on the Algebra I California Standards Test
- CAHSEE Standard assessed on the California High School Exit Exam
- PSAT Preliminary Scholastic Achievement Test

COURSE PURPOSE: EXPECTED INTEGRATED OUTCOMES

Students are also expected to proficiently apply common skills that are relevant across curriculum areas and career pathways. The following are those skills most applicable to Algebra 1-2.

CTE Foundation Standards: from the California Career Technical Education Model Curriculum Standards, adopted by the California State Board of Education in May, 2005.

Foundation Standard 2: CommunicationsWritten and Oral English Language Conventions (Grades 9 and 10)

- 1.4 Produce legible work that shows accurate spelling and correct use of the conventions of punctuation and capitalization.
- 1.1 Formulate judgments about the ideas under discussion and support those judgments with convincing evidence.
- 1.7 Use props, visual aids, graphs, and electronic media to enhance the appeal and accuracy of presentations.
- 1.12 Evaluate the clarity, quality, effectiveness, and general coherence of a speaker's important points, arguments, evidence, organization of ideas, delivery, diction, and syntax.

Foundation Standard 3: Career Planning and Management

- 3.5 Understand the past, present, and future trends that affect careers, such as technological developments and societal trends, and the resulting need for lifelong learning.
- 3.6 *Know important strategies for self-promotion in the hiring process, such as job applications, resume writing, interviewing skills, and preparation of a portfolio.*

Foundation Standard 4: Technology

- 4.2 Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.

Foundation Standard 5: Problem Solving and Critical Thinking

- 5.1 Apply appropriate problem-solving strategies and critical thinking skills to work-related issues and tasks.
- 5.3 *Use critical thinking skills to make informed decisions and solve problems.*

Foundation Standard 7: Responsibility and Flexibility

- 7.1 Understand the qualities and behaviors that constitute a positive and professional work demeanor.
- 7.2 *Understand the importance of accountability and responsibility in fulfilling personal, community, and workplace roles.*
- 7.3 Understand the need to adapt to varied roles and responsibilities.
- 7.4 Understand that individual actions can affect the larger community.

Foundation Standard 8: Ethics and Legal Responsibilities

- 8.2 Understand the concept and application of ethical and legal behavior consistent with workplace standards.
- 8.3 *Understand the role of personal integrity and ethical behavior in the workplace.*

Foundation Standard 9: Leadership and Teamwork

- 9.1 Understand the characteristics and benefits of teamwork, leadership, and citizenship in the school, community, and workplace setting.
- 9.3 *Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals.*
- 9.4 Know multiple approaches to conflict resolution and their appropriateness for a variety of situations in the workplace.
- 9.5 Understand how to interact with others in ways that demonstrate respect for individual and cultural differences and for the attitudes and feelings of others.

The italicized standards are the CTE "Power" Standards addressed across the content areas.

OUTLINE OF CONTENT AND SUGGESTED TIME ALLOTMENT:

The Task Analysis and Key Vocabulary presented here are drawn from the Mathematics Framework for California Public Schools, which defines the intent and scope of the Mathematics Content Standards. For additional information on the context and the benchmark standards to assess, refer to the Blueprints for the Algebra I Content Standards Test (CST). Content sequencing, activities, and time allocations are only suggestions and may be adjusted to suit school site curriculum plans, available materials, and student needs.

A refers to the Algebra I standards of the CA Mathematics Content Standards

FS refers to the Foundation Standards of the CA CTE Pathway Standards

| Foundations of Algebra | | 12 Days (6 Blocks) | | | | | | | | | | | | | | | |
|---|---|---|---|----------------------|-------|------|----------|------------|----------|----------|------------|----------|-----|------------------|----------|---------|-------------------|
| <i>Sample Essential Question: How are integers used in the real world?</i> | | | | | | | | | | | | | | | | | |
| Content Standards | | Performance Standard Measures <i>(Reflects rigor and integration of CTE Foundation Standards and may vary by SLC)</i> | Instructional Support | | | | | | | | | | | | | | |
| Students Know... (Content) | Students are Able to... (Skill) | Students Demonstrate Knowledge and Skill | | | | | | | | | | | | | | | |
| ... the language and tools of algebra including variables and expressions, operations on real numbers, powers, exponents and roots, and simplifying expressions. (A2.0) | Translate verbal phrases and sentences to algebraic expressions and equations, and evaluate expressions. (A2.0) | <p>Key Assignment:</p> <ul style="list-style-type: none"> Lesson 1-1 Challenge – Comparing Phone Plans (Described in Key Assignments following the Outline of Content) <p>Suggested Activity:</p> <ul style="list-style-type: none"> Collaborative Study Group – Chapter 1 (Available on LBUUSD Math Intranet/ Instructional Tools) | <p>BASIC TEXTBOOK CORRELATION: 1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 1-7</p> <p>KEY VOCABULARY:</p> <table> <tr> <td>Algebraic expression</td> <td>Power</td> </tr> <tr> <td>Base</td> <td>Quotient</td> </tr> <tr> <td>Difference</td> <td>Rational</td> </tr> <tr> <td>Evaluate</td> <td>Substitute</td> </tr> <tr> <td>Exponent</td> <td>Sum</td> </tr> <tr> <td>Grouping symbols</td> <td>Variable</td> </tr> <tr> <td>Product</td> <td>Verbal expression</td> </tr> </table> <p>SUPPLEMENTAL MATERIALS CORRELATION: Algebra Tiles Holt Chapter 1 Resource File Holt Online Projects</p> | Algebraic expression | Power | Base | Quotient | Difference | Rational | Evaluate | Substitute | Exponent | Sum | Grouping symbols | Variable | Product | Verbal expression |
| | Algebraic expression | | | Power | | | | | | | | | | | | | |
| | Base | | | Quotient | | | | | | | | | | | | | |
| | Difference | | | Rational | | | | | | | | | | | | | |
| | Evaluate | | | Substitute | | | | | | | | | | | | | |
| | Exponent | | | Sum | | | | | | | | | | | | | |
| | Grouping symbols | | | Variable | | | | | | | | | | | | | |
| Product | Verbal expression | | | | | | | | | | | | | | | | |
| Add, subtract, multiply and divide rational numbers. (A2.0) | | | | | | | | | | | | | | | | | |
| Take rational numbers to whole-number powers, and take roots of rational numbers. Classify real numbers. (A2.0) | | | | | | | | | | | | | | | | | |
| Identify and use arithmetic properties, and use counter-examples to disprove statements. (A2.0, A24.3) | | | | | | | | | | | | | | | | | |
| Use order of operations to simplify expressions. (A1.1) | | | | | | | | | | | | | | | | | |
| Use critical thinking skills to make informed decisions and solve problems. (FS5.3) | | | | | | | | | | | | | | | | | |
| Understand how to interact with others in ways that demonstrate respect for individual and cultural differences and for the attitudes and feelings of others. (FS9.5) | | | | | | | | | | | | | | | | | |

| Equations and Inequalities | | | 22 Days (11 Blocks) |
|--|---|--|---|
| <i>Sample Essential Question:</i> What are the similarities and differences between solving equations and inequalities? | | | |
| Content Standards | | Performance Standard Measures <i>(Reflects rigor and integration of CTE Foundation Standards and may vary by SLC)</i> | Instructional Support |
| Students Know... (Content) | Students are Able to... (Skill) | Students Demonstrate Knowledge and Skill | |
| ... that equations and inequalities can be used to model and solve real-world problems. (A3.0, A4.0, A5.0, A15.0) | Solve two-step, and multi-step equations, and equations and inequalities with variables on both sides of the equal sign. (A4.0, A5.0) | Suggested Activities: <ul style="list-style-type: none"> Algebra Tiles to Solve Equations Solving Inequalities Investigation (Available on LBUUSD Math Intranet/ Instructional Tools) | BASIC TEXTBOOK CORRELATION: 2-2, 2-3, 2-4, 2-5, 2-6, 2-7, 3-4, 3-5, 3-6, 3-7 KEY VOCABULARY: Compound inequality Percent Cross products Proportion Deductive reasoning Rate Equation Ratio Formula Scale Inequality Solution Intersection Union Literal equation Unit rate SUPPLEMENTAL MATERIALS CORRELATION: Algebra Tiles Holt Chapter 2 Resource File |
| | Apply algebraic techniques to solve rate, proportion and percent problems. (A15.0) | | |
| | Solve literal equations for one variable. (A5.0) | | |
| | Solve absolute-value equations and inequalities. (A3.0) | | |
| | Solve compound inequalities. (A5.0) | | |

| Functions and Linear Equations | | | 22 Days (11 Blocks) |
|---|--|--|---|
| <i>Sample Essential Question:</i> How are the graphs of equations and inequalities similar and different? | | | |
| Content Standards | | Performance Standard Measures <i>(Reflects rigor and integration of CTE Foundation Standards and may vary by SLC)</i> | Instructional Support |
| Students Know... (Content) | Students are Able to... (Skill) | Students Demonstrate Knowledge and Skill | |
| ... the concepts of a relation and a function. Students know the characteristics of linear functions and their graphs, such as the x-intercept, y-intercept, and slope. (A6.0, A7.0, A8.0, A16.0) | Determine if a relation is a function, and find the domain and range. (A16.0) | Assessment: District Algebra I Quarter 1 Exam Suggested Activities: <ul style="list-style-type: none"> Interpreting x- and y-Intercepts Activity Families of Lines Activity Parallel and Perpendicular Lines Investigation (Available on LBUUSD Math Intranet/ Instructional Tools) | BASIC TEXTBOOK CORRELATION: 4-2 5-1, 5-2, 5-3, 5-5, 5-6, 5-7 KEY VOCABULARY: Domain Rate of change Function Relation Linear equation Rise Linear function Run Parallel lines Slope Perpendicular lines x-intercept Range y-intercept SUPPLEMENTAL MATERIALS CORRELATION: Graph paper Graphing calculator Holt Chapter 5 Resource File |
| | Graph linear equations using a table of values, and using intercepts. (A6.0) | | |
| | Find the slope of a line from a graph, two points, and equations. (A6.0, A7.0) | | |
| | Graph and write equations of lines using slope-intercept, point-slope, and standard forms of equations. (A6.0, A7.0) | | |
| | Understand the concepts of parallel and perpendicular lines and how the slopes are related. (A8.0) | | |

Systems of Equations and Inequalities**15 Days (7 Blocks)***Sample Essential Question:**How can systems of equations and inequalities be used to model and solve real-world situations?*

| Content Standards | | Performance Standard Measures <i>(Reflects rigor and integration of CTE Foundation Standards and may vary by SLC)</i> | Instructional Support |
|--|---|--|---|
| Students Know... (Content) | Students are Able to... (Skill) | Students Demonstrate Knowledge and Skill | |
| ...that systems of equations and inequalities can be used to model and solve real-world situations. (A6.0, A9.0, A15.0) | Solve systems of equations by graphing, substitution and elimination, including special systems. (A9.0) | Key Assignment: <ul style="list-style-type: none"> Systems of Equations Project (Described in Key Assignments following the Outline of Content) Suggested Activities: <ul style="list-style-type: none"> Partner Coach (2)– Solve Systems by Substitution, Graphing Systems of Inequalities Comparing Graphs Activity (Available on LBUSD Math Intranet/ Instructional tools) | BASIC TEXTBOOK CORRELATION: 6-1, 6-2, 6-3, 6-4, 6-5, 6-6, 6-7 KEY VOCABULARY: Consistent system solution Dependent system system of linear Inconsistent system equations Independent system system of linear linear inequality inequalities SUPPLEMENTAL MATERIALS CORRELATION: Graph paper Graphing calculator |
| | Use systems of equations to solve rate and percent mixture problems. (A15.0) | | |
| | Graph the region defined by linear inequalities and systems of linear inequalities. (A6.0, A9.0) | | |
| | Understand the use of technological resources to gain access to, manipulate, and produce information, products, and services. (FS4.2) | | |
| | Use critical thinking skills to make informed decisions and solve problems. (FS5.3) | | |
| Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals. (FS9.3) | | | |

Exponents and Polynomials**11 Days (5 Blocks)***Sample Essential Question:**How are operations performed on polynomials similar and different from operations performed on rational numbers?*

| Content Standards | | Performance Standard Measures <i>(Reflects rigor and integration of CTE Foundation Standards and may vary by SLC)</i> | Instructional Support |
|--|--|--|--|
| Students Know... (Content) | Students are Able to... (Skill) | Students Demonstrate Knowledge and Skill | |
| ...properties of exponents and fractional exponents, and how they apply to simplifying polynomial expressions. (A2.0, A10.0) | Evaluate and simplify expressions containing integer and fractional exponents. (A2.0) | Assessment: District Algebra I Quarter 2 Exam (Middle School) or Semester Exam (High School) Suggested Activities: <ul style="list-style-type: none"> Classifying Polynomials Activity Partner Coach – Multiplying Monomials & Binomials (Available on LBUSD Math Intranet/ Instructional tools) | BASIC TEXTBOOK CORRELATION: 7-1, 7-3, 7-4, 7-5, 7-6, 7-7 KEY VOCABULARY: Binomial Leading Cubic coefficient Degree of a monomial Monomial Degree of a polynomial Perfect- square trinomial Difference of two squares Polynomial Quadratic Index Standard form of a polyn'l Trinomial SUPPLEMENTAL MATERIALS CORRELATION: Algebra Tiles Holt Chapter 7 Resource File |
| | Simplify exponential expressions using the product, quotient and power properties of exponents. (A2.0) | | |
| | Classify polynomials and find the degree. (A10.0) | | |
| | Add, subtract and multiply polynomials. (A10.0) | | |
| | Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals. (FS9.3) | | |

Factoring Polynomials**14 Days (7 Blocks)**

Sample Essential Question:

How is the process of factoring a polynomial similar and different from the process for factoring rational numbers?

| Content Standards | | Performance Standard Measures <i>(Reflects rigor and integration of CTE Foundation Standards and may vary by SLC)</i> | Instructional Support |
|--|---|---|--|
| Students Know... (Content) | Students are Able to... (Skill) | Students Demonstrate Knowledge and Skill | |
| ... the different methods for factoring polynomials. (A11.0) | Find the greatest common factor (GCF) of monomials and factor polynomials using the GCF. (A11.0) | Key Assignment: <ul style="list-style-type: none"> Holt Algebra I Textbook, Concept Connection, p. 528 (Described in Key Assignments following the Outline of Content) Suggested Activities: <ul style="list-style-type: none"> Partner Coach – Mixed Factoring Carousel – Factoring (Available on LBUSD Math Intranet/ Instructional tools) | BASIC TEXTBOOK CORRELATION: 8-1, 8-2, 8-3, 8-4, 8-5, 8-6 KEY VOCABULARY: Greatest common factor Prime factorization SUPPLEMENTAL MATERIALS CORRELATION: Algebra Tiles Holt Chapter 8 Resource File |
| | Factor trinomials. (A11.0) | | |
| | Factor special products. (A11.0) | | |
| | Identify and use the appropriate method to factor polynomials. (A11.0) | | |
| | Understand the qualities and behaviors that constitute a positive and professional work demeanor. (FS7.1) | | |
| Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals. (FS9.3) | | | |

Quadratic Functions and Equations**20 Days (10 Blocks)**

Sample Essential Question:

How can quadratic functions and equations be used to model and solve real-world situations?

| Content Standards | | Performance Standard Measures <i>(Reflects rigor and integration of CTE Foundation Standards and may vary by SLC)</i> | Instructional Support |
|--|--|--|---|
| Students Know... (Content) | Students are Able to... (Skill) | Students Demonstrate Knowledge and Skill | |
| ... the properties of quadratic functions, and how they can be used to model and solve real-world problems. (A14.0, A19.0, A21.0, A22.0) | Determine whether a point is on a graph, and graph a parabola using ordered pairs. (A21.0) | Key Assignment: <ul style="list-style-type: none"> Problem Solving: Maximum Area Problem (Described in Key Assignments following the Outline of Content) Assessment: District Algebra I Quarter 3 Exam Suggested Activities: <ul style="list-style-type: none"> Partner Coach (2) – Graphing Quadratic Equations, Solving Quadratic Equations with Square Roots Quadratics Review Poster (Available on LBUSD Math Intranet/ Instructional tools) | BASIC TEXTBOOK CORRELATION: 9-1, 9-2, 9-3, 9-4, 9-5 11-2 9-6, 9-7, 9-8, 9-9 KEY VOCABULARY: Axis of symmetry Parabola Completing the square Quadratic equation Discriminant Quadratic function Maximum value Vertex Minimum value Zero of a function SUPPLEMENTAL MATERIALS CORRELATION: Algebra Tiles Holt Chapter 9 Resource File |
| | Find the zeros of a quadratic function, the axis of symmetry, the vertex, and the maximum or minimum from the equation or graph. (A21.0) | | |
| | Solve quadratic equations by factoring, using square roots, completing the square, and the quadratic formula. (A14.0, A19.0) | | |
| | Determine the number of real solutions by using the discriminant. (A22.0) | | |
| | Use critical thinking skills to make informed decisions and solve problems. (FS5.3) | | |
| | Understand the need to adapt to varied roles and responsibilities. (FS7.3) | | |
| | Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals. (FS9.3) | | |

Rational Functions and Equations**20 Days (10 Blocks)***Sample Essential Question:**How are operations performed with fractions similar and different from operations performed on rational algebraic expressions?*

| Content Standards | | Performance Standard Measures <i>(Reflects rigor and integration of CTE Foundation Standards and may vary by SLC)</i> | Instructional Support |
|---|--|---|---|
| Students Know... (Content) | Students are Able to... (Skill) | Students Demonstrate Knowledge and Skill | |
| ...how to simplify and perform operations on rational expressions and use rational equations to model and solve real-world problems. (A12.0, A13.0, A15.0) | Simplify fractions with polynomials in the numerator and denominator by factoring both and reducing them to the lowest terms. (A12.0) | <u>Suggested Activities:</u> <ul style="list-style-type: none"> Partner Coach (2) – Simplifying Rational Expressions, Dividing Polynomials Collaborative Study Group – Mixed Operation (Available on LBUSD Math Intranet/ Instructional tools) | BASIC TEXTBOOK CORRELATION: 10-3, 10-4, 10-5, 10-7, 10-8 <i>(revisit 6-5 and 2-5)</i> KEY VOCABULARY: Cross products Rational equation Excluded values Rational expression Extraneous solution Rational function Factor Reciprocal |
| | Add, subtract, multiply and divide rational expressions. (A13.0) | | |
| | Solve rational equations including those used in rate problems, area problems, transportation problems, work problems, and percent mixture problems. (A15.0) | | |
| | Understand the need to adapt to varied roles and responsibilities. (FS7.3) | | |
| Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals. (FS9.3) | | | SUPPLEMENTAL MATERIALS CORRELATION: Algebra Tiles Graph paper Graphing calculator |

Radical Functions and Equations**21 Days (6 Blocks)***Sample Essential Question:**How are the properties used to perform operations on radical expressions similar and different from the properties used to perform operations on rational numbers?*

| Content Standards | | Performance Standard Measures <i>(Reflects rigor and integration of CTE Foundation Standards and may vary by SLC)</i> | Instructional Support |
|--|---|---|---|
| Students Know... (Content) | Students are Able to... (Skill) | Students Demonstrate Knowledge and Skill | |
| ...how to simplify and perform operations on radical expressions and solve radical equations. (Preparation for Geometry) | Simplify radical expressions. | <u>Assessment:</u> District Algebra I End-of-Course Exam | BASIC TEXTBOOK CORRELATION: 11-2, 11-3, 11-4, 11-5 |
| | Add, subtract, multiply and divide radical expressions. | | |
| | Solve radical equations. | | |
| Understand how to organize and structure work individually and in teams for effective performance and the attainment of goals. (FS9.3) | | <u>Suggested Activities:</u> <ul style="list-style-type: none"> Partner Coach – Adding/Subtracting Radical Expressions Collaborative Study Group – Mixed Operation Radical Expressions (Available on LBUSD Math Intranet/ Instructional tools) | KEY VOCABULARY: Like radicals Radical expression Radicand Radical equation |
| | | | SUPPLEMENTAL MATERIALS CORRELATION: Holt Chapter 11 Resource File |

KEY ASSIGNMENTS/ASSESSMENTS:

| | |
|---|---|
| Daily Homework and In-class Assignments | Throughout the course, students will complete daily homework and in-class assignments from the math textbook and supplemental materials that will be used to assess their knowledge of the information learned during class time. |
| Content-Based Activities | Students will participate in a variety of in-class rigorous and relevant standards-based activities which may include investigations, discovery activities, cooperative group activities, and creative ways to summarize concepts learned. |
| Unit Tests | Common unit tests are developed by a team of Algebra teachers at each high school site and administered to each student enrolled in the course. Tests include a variety of free-response and multiple choice items. Free-response items may be graded allowing an opportunity for students to receive partial credit if they demonstrate conceptual understanding, but make arithmetic errors. Tests include a variety of objective questions that assess basic knowledge of content, vocabulary, procedures, skills, conceptual understanding, or problem-solving ability. |
| Quarter Exams | Students taking Algebra 1-2 in LBUSD take a district-developed 20-item multiple-choice quarter 1 and quarter 3 exam assessing proficiency in the state standards taught in the given quarter. |
| Comprehensive Semester Exam | Students taking Algebra 1-2 in LBUSD take a district-developed 50-item multiple-choice exam assessing proficiency in the state standards taught in the first semester. |
| Comprehensive End of Course Exam | Students taking Algebra 1-2 in LBUSD take a district-developed 50-item multiple-choice exam assessing proficiency in all of the state standards for Algebra I. |
| Performance-Based Projects – especially Quad D and Service Learning | Students may complete rigorous and relevant standards-based projects which may integrate more than one subject area, relate to real-life or a career application, and may include service learning. The projects can be completed individually or in a small group, and can be completed during class time and/or at home. The projects can include a presentation to a small or group or the whole class. Service Learning activities involve research, preparation, action/demonstration, and reflection of experiential applications of the content and will be credited toward the district's high school Service Learning requirement. Students are expected to complete a Service Learning activity with a minimum of 5 hours, prior to the completion of this course. The learning (any products developed, reflection on the service) will be graded by the instructor as one of the performance based assessments; the service itself will not be graded or judged. |

Key Assignments (Performance-Based Projects)**Quarter 1****Comparing Phone Plans** (Holt Algebra I Textbook, Chapter 1 Resource File, Lesson 1-1 Challenge)

Students are given two cell phone plans, each with a start-up fee and a per-minute charge. Students write a variable expression to represent the monthly cost for each phone plan. Students complete a table of values to find the cost for each phone plan for several given numbers of minutes called per month. Students analyze the data to determine the least and most expensive plan for a given number of minutes called, and write a letter to a friend to explain under what conditions each plan would be the best option.

Quarter 2**Systems of Equations Project** (LBUSD Math Intranet)

Students will be able to solve a word problem using systems of equations and interpret the solution in the context of the problem. Given an application problem, students work in pairs to represent both missing quantities as variables, write two equations, solve the system of equations using one of the following methods: substitution, elimination, or graphing, and interpret the solution in the context of the problem. Students will create a poster or PowerPoint presentation illustrating their work, which will be used as a visual aid as they present the solution to the class.

Quarter 3

Shaping the Environment (Holt Algebra I Textbook, Concept Connection, page 528)

Students are given 2 trinomial expressions, one represents the area of a rectangular garden, and the other represents the area of a square garden. Students must factor both trinomials to give expressions that represent the length and width of each garden. Students are given the length of one side of each garden, and then must multiply binomials, and add polynomials to find the area and perimeter of both gardens. Finally, students analyze which garden has the greater area, and which garden has the shortest perimeter. A written explanation of each part of the problem is required, including visual aids to represent each step of the solution.

Quarter 4

Building Fences: Maximizing Area with Quadratic Modeling (LBUSD Math Intranet)

Given a fixed amount of fence, students create a table of values of possible dimensions of the rectangle that will enclose a maximum area of a garden. Students graph the length vs area, resulting in a parabola. Students will interpret the meaning of the maximum and the vertex in the context of the garden. Students then work cooperatively in small groups to complete a similar problem, with a different amount of fencing. The whole class combines their results, and students make conjectures about how to find the dimensions of the rectangle with maximum area given a fixed amount of fencing.

INSTRUCTIONAL METHOD AND/OR STRATEGIES:

A variety of instructional strategies will be utilized to accommodate all learning styles:

Math-specific Methods: .

1. lectures, structured note-taking, justification of reasoning
2. cooperative problem-solving, pair-teaching
3. activities, projects
4. manipulatives, drawing visual representations

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>Essential Elements of Effective Instruction Model for Lesson Design Using Task Analysis</p> | <p>Anticipatory Set Objective Standard Reference Purpose Input Modeling Check for Understanding Guided Practice Closure Independent Practice</p> |
|---|--|

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:

| COVERT | OVERT (Oral) | OVERT (Written) | OVERT (Gestures) |
|------------|---------------------------------|-----------------------|---------------------------|
| • Recall | • Think (Write)/Pair/Share | • Restate in Notes | • Hand Signals |
| • Imagine | • Idea Wave | • Response Boards | • Model with Hand Motions |
| • Observe | • Choral Response | • Graphic Organizers | • Stand up/ Sit down |
| • Consider | • Give One, Get One | • Folded Paper | • Point to Examples |
| | • Socratic Seminar | • Ticket Out of Class | |
| | • Cooperative Discussion Groups | | |

Baldrige Quality Tools: Students can become more positively involved in their education through goal setting, self-assessment, and data tracking and analysis by making use of the following strategies:

| BALDRIGE TOOL | PURPOSES |
|----------------------------|---|
| Affinity Diagram | – finding consensus, organizing complex information |
| Flowchart | – describing a process, planning a project, identifying problem steps in a process |
| Force Field Diagram | – identifying obstacles, finding causes and solutions to problems |
| Issues / Ideas Bin | – handling individual questions/requests without stopping a group activity, providing anonymous input, obtaining diverse input in specific areas. |
| Data Folder | – tracking goals and actual results |
| Plus / Delta | – tracking improvement efforts, identifying opportunities for change, finding out what's working and what's not working in a process, procedure, activity, etc. |
| Class Data Graphs | – displaying trends for goal setting |

Diverse learning styles may be addressed by implementing combinations of the following:

Significant, Proven Strategies for ALL Algebra Students

- Cooperative Problem-solving
- Student Presentations
- Short/Long-term projects
- Peer Teaching
- Manipulatives
- Drawing visual representations
- Structured Note-taking

| Reading Strategies in Algebra | |
|--|--|
| <input type="checkbox"/> Vocabulary Development (including conceptual and non-linguistic components) | |
| <input type="checkbox"/> Anticipation Guides | <input type="checkbox"/> Text Structures |
| <input type="checkbox"/> Pre-teaching | <input type="checkbox"/> Reciprocal Teaching |
| <input type="checkbox"/> Pre-reading | <input type="checkbox"/> Functional Text |

| Strategies for Students with Disabilities |
|---|
| <input type="checkbox"/> IEP Accommodations (refer to student's IEP document or IEP summary sheet) |
| <input type="checkbox"/> Curricular Adaptations (e.g., quantity, input, participation, time, level of difficulty, level of support, output, substitute curriculum, alternate goals) |
| <input type="checkbox"/> Think Alouds |
| <input type="checkbox"/> Small Group Instruction / Learning Centers |
| <input type="checkbox"/> Manipulatives & Visuals |
| <input type="checkbox"/> Peer Assisted Learning |

| SDAIE Strategies for English Learners | |
|--|--|
| <input type="checkbox"/> Lower the Affective Filter (including Processing Time) | |
| <input type="checkbox"/> Tapping/Building Prior Knowledge (Graphic Organizers, Schema) | |
| <input type="checkbox"/> Acquisition Levels | <input type="checkbox"/> Multiple Intelligences |
| <input type="checkbox"/> Language Sensitivity | <input type="checkbox"/> Adapt the Text |
| <input type="checkbox"/> Grouping Strategies | <input type="checkbox"/> Manipulatives & Visuals |
| <input type="checkbox"/> Home/School Connection (including Cultural Aspects) | |

| Differentiation for Advanced Learners | |
|--|---|
| <input type="checkbox"/> Curriculum Compacting | <input type="checkbox"/> Acceleration |
| <input type="checkbox"/> Depth and Complexity | <input type="checkbox"/> Tiered Assignments |
| <input type="checkbox"/> Flexible Grouping | <input type="checkbox"/> Independent Study |

Please note that these strategies often overlap and should not be limited to specifically defined courses or student populations.

TEXTBOOKS:

Basic Textbook: Read in entirety Excerpts used Holt California Algebra 1, Burger, Edward B., et. al.; Holt, Rinehart and Winston, © 2008

SUPPLEMENTAL INSTRUCTIONAL MATERIALS:

In addition to the basic text, a variety of instructional tools will be used to meet the needs of all students.

RESOURCES:

Documents

- LBUSD Pacing LBUSD Mathematics Curriculum Internet
- Algebra 1-2 Supplemental Resources LBUSD Mathematics Curriculum Intranet
- STAR Testing Blueprints.....<http://www.cde.ca.gov/ta/tg/sr/blueprints.asp>
- CST Released Items<http://www.cde.ca.gov/ta/tg/sr/css05rtq.asp>

ASSESSMENT METHODS AND/OR TOOLS:

Student achievement in this course will be measured using multiple assessment tools including but not limited to:

Suggested Evaluation tools:

| Source | Diagnostic (Diagnose) | Formative (Monitor) | Summative (Evaluate) |
|--|---|---|--|
| District Developed Assessments | Practice EOC Exam from previous math course | Practice Exams for Quarter 1, Quarter 2 or Semester 1, Quarter 3, and End-of-Course | Quarter 1 and 3 exam Semester 1 exam End-Of-Course Exam |
| Holt: <u>California Algebra 1</u> | 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 |
| Teacher Developed Assessments | Warm Up Quizzes Homework Checking for Understanding using Active Participation Cooperative Learning | Warm Up Quizzes Homework Checking for Understanding using Active Participation Cooperative Learning | Quizzes Chapter Tests |

PERFORMANCE STANDARDS CRITERIA:

Defines how good is good enough on which measures to demonstrate achievement of content standards.

State Performance Standards:

The California State Board of Education has identified the following performance levels for the California Standards Test (CST) in Algebra I. The objective of Long Beach Unified School District is to have all students achieve at or above the Proficient Performance Standard (Level). The table below indicates the number correct, the estimated percent correct and the Reported Scaled Score (SS) on the Content Standards Test (based on **2009** data).

| Far Below Basic | Below Basic | Basic | Proficient | Advanced Proficient |
|------------------------|--------------------|-----------------|-------------------|----------------------------|
| 0 – 18 Correct | 19 – 27 Correct | 28 – 37 Correct | 38 – 51 Correct | 52 – 65 Correct |
| 0% – 28% | 29% – 42% | 43% – 57% | 58% – 79% | 80% – 100% |
| SS 150 – 252 | SS 253 – 299 | SS 300 – 349 | SS 350 – 427 | SS 428 – 600 |

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 tables below. The goal is to have all students achieve at or above the Proficient Level and receive a C or better in the course.

Assessments

| | Far Below Basic (FBB) | Below Basic (BB) | Basic (B) | Proficient (P) | Advanced Proficient (AP) |
|--|-----------------------|------------------|-----------|----------------|--------------------------|
| District Assessments: <ul style="list-style-type: none"> • Quarter 1 • Semester 1 • Quarter 3 • End-of-Course | 0% – 28% | 29% – 42% | 43% – 57% | 58% – 79% | 80% – 100% |

Key Assignments/Performance-Based Projects

| F | D | C | B | A |
|--|---|---|---|---|
| Not Proficient 0 – 59% | Partial Proficient 60% – 69 % | Proficient 70% – 84% | Advanced Proficient 85% – 100% | |
| The student response makes little or no progress toward accomplishing the task. <ul style="list-style-type: none"> • Shows little or no grasp of the central mathematical idea(s) • Includes mathematical computations that are incorrect or inappropriate • Presents mathematical knowledge and ideas in a barely (if at all) comprehensible manner | The student response partially accomplishes the task. <ul style="list-style-type: none"> • Shows a limited grasp of the central mathematical ideas(s) • May include incomplete and/or misdirected mathematical computations • Presents mathematical knowledge and ideas in an unclear manner or without supporting evidence | The student response substantially accomplishes the task. <ul style="list-style-type: none"> • Shows an essential grasp of the central mathematical idea(s) • Includes appropriate and generally correct mathematical computations • Presents mathematical knowledge and ideas clearly with supporting evidence | The student response thoroughly accomplishes the task. <ul style="list-style-type: none"> • Shows thorough understanding and use of the central mathematical ideas(s) • Includes appropriate and accurate mathematical computations • Presents mathematical knowledge and ideas clearly and skillfully, using combinations of mathematical symbols and/or visual means as supporting evidence | |

Classroom Performance Standards

The objective of instruction is to help all students achieve at or above the Proficient Level and receive a C or better in the course.

| | F | D | C | B | A |
|---------------------------------------|----------------|--------------------|------------|---------------------|---|
| | Not Proficient | Partial Proficient | Proficient | Advanced Proficient | |
| Assessment Tests and Quizzes | Less than 60% | 60% - 69% | 70% - 84% | 85% - 100% | |
| Classwork/Activities | Less than 60% | 60% - 69% | 70% - 84% | 85% - 100% | |
| Activities/Performance-Based Projects | Less than 60% | 60% - 69% | 70% - 84% | 85% - 100% | |
| Homework | Less than 60% | 60% - 69% | 70% - 84% | 85% - 100% | |

Standard Grading Scale:

| | | |
|---------------------|----------|-----------|
| Advanced Proficient | A | 90 – 100% |
| | B | 80 – 89% |
| Proficient | C | 70 – 79% |
| Partial Proficient | D | 60 – 69% |
| Not Proficient | F | 0 – 59% |

Suggested Grade Weighting:

| | |
|--|----------|
| 1. Assessment | 60% |
| ○ Tests (including quarter exam) | 35 – 60% |
| ○ Quizzes | 0 – 25% |
| 2. Semester Final Exam | 10% |
| ○ First semester final exam in the first semester | |
| ○ End-of-course exam in the second semester | |
| 3. Classwork/Activities | 10 – 20% |
| ○ Notes | |
| ○ In-class assignments and activities | |
| 4. Activities/Performance-Based Projects | 5 – 10% |
| ○ Activities are standards-based and may include: | |
| • Investigations | |
| • discovery activities | |
| • cooperative group activities | |
| • creative ways to summarize concepts learned | |
| ○ Performance-Based Projects | |
| • Rigorous, standards-based activities | |
| • may integrate | |
| ◆ more than one subject area | |
| ◆ real-life or a career application | |
| ◆ service learning | |
| • can be completed individually or in a small group | |
| • can be completed during class time and/or at home | |
| • can include a presentation to a small group or the whole class | |
| 5. Homework | 5 – 10% |

| | |
|----------------------------------|---|
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| Submission Date: | October 2010 |
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| Original Board Approval Date: | |
| Revised Board Approval Date: | 2/15/11 |