

CP ALGEBRA 1 A CURRICULUM GUIDE

Course Number: MATHEMATICS 302

Level: Academic

Textbook: Algebra 1. Burger, Chard, Hall, et al. (2007). Holt, Rinehart, and Winston.

Number of Credits: 5 Credits

Date Revised: August 2008

Midterm Exam Revised: January 2008

Final Exam Revised: June 2008

Grade Levels: Entering freshmen are scheduled for this course based on the results of standardized tests and teacher recommendations. Upperclassmen may schedule this course with teacher recommendation.

Prerequisites: There are no prerequisite courses for CP Algebra 1 A.

Course Description: This course is designed to meet the needs of the college preparatory student. However, due to the increasing technological nature of our society, any student who has demonstrated the ability to do mathematics at the College Prep A level, even though he or she may not be planning to go to college at this time, would benefit from this course and is strongly encouraged to enroll in it. Teacher recommendations and standardized test scores are used to determine whether students should enroll in the academic level. Students who complete this program are prepared to succeed in any regular mathematics program in college, up to and including the study of Calculus. It should be noted that many college programs now require the study of Calculus, as an entry-level course.

Topics covered in this course are operations on real numbers, solutions of linear equations and inequalities, graphing linear equations and inequalities, systems of equations and inequalities, exponents, polynomials, factoring, algebraic functions, radical functions, and data analysis. Problem solving and real-life situations which apply the concepts are stressed throughout the course. HSPA review problems will also be integrated in the course.

Scientific calculators will be used throughout the course. Students are required to supply their own scientific calculator and have it with them everyday. The school recommends the Texas Instruments TI-30XII Scientific Calculator. The use of a calculator allows students to concentrate on problem solving strategies and enables the use of the types of numbers which may occur in real-life situations. Estimation and reasonableness of answers will be stressed so that students can recognize calculator errors. Graphing calculators will also be used occasionally both as an aid to exploration and discovery and to help students visualize algebraic concepts. Students will be supplied graphing calculators by their teacher on days when they are being used.

Course Objectives: Students are expected to be active participants in the learning process. The teacher will involve them in the introduction and development of material through questioning and class discussions. Understanding of concepts is stressed rather than the memorization of skills. When appropriate, students are guided in discovering the concepts themselves through a

study of patterns and by relating the new work to their prior knowledge. Critical thinking is emphasized and students will be asked to draw, label, explain, justify, verify and interpret as they apply the concepts they learn to new situations.

Cooperative learning activities will be used throughout the course, providing students the opportunity to apply skills learned in class, strengthen their understanding of concepts, and identify areas they do not understand. It is imperative that students do their homework regularly and conscientiously. Homework will be reviewed in class and it is the **student's responsibility** during that time to ask questions about problems that they do not understand to identify specific mistakes. The student is expected to take notes on any further explanations concerning these problems and to schedule time for extra help with their teacher if needed. The student is expected to be prepared for class **everyday** with a 3-ring binder containing lined paper, a scientific calculator, a pencil, their homework, and their covered textbook.

CCCS Addressed: 4.1.A-C, 4.3.A-D, 4.4.A-D, and 4.5.A-F

Student Evaluation: One to three quizzes, based on course proficiencies, will be given during each unit and a test will be given at the end of each unit. Each test and quiz is designed to be completed in a specific amount of time. Students will not be allowed extra time to complete tests or quizzes, unless previous arrangements have been made through guidance. An exam will be given at the end of each semester, covering all of the work of that semester.

Homework will be checked daily. It will usually not be graded, but will be considered satisfactory if the **work shown** indicates that the students made a conscientious effort to complete the assignment. Sometimes an assignment given for homework may be collected and graded as a quiz. This will only be done when concepts have been thoroughly reviewed.

Extra credit assignments are not available to students on an individual basis. Extra credit assignments may be assigned to the entire class several times throughout the year. Additionally, extra credit questions may occasionally appear on tests and quizzes.

Grades will be calculated according to the school grading policy and the following guidelines:

Marking Period:		Final Grade:	
Tests and Quizzes	90%	Each Marking Period	20%
Homework	10%	Midterm Exam	10%
		Final Exam	10%

District Policy: ACADEMIC INTEGRITY

Pupils are expected to be honest in all of their academic work. This means that they will not engage in any of the following acts:

- Cheating on examinations or other school assignments, including but not limited to, the non-authorized use of books or notes, the use of crib sheets, copying from other students' papers, exchanging information with other students orally, in writing, or by signals, obtaining copies of the examination illegally and other similar activities. Cheating through the use of technology to exchange information on any school assignment, examination, etc. is prohibited. Technology is defined as, but not limited to, computers, telephones, text messaging, palm pilots, calculators, cameras or any other hand held device.
- Plagiarism is not permitted in term papers, themes, essays, reports, images, take-home examinations, and other academic work. Plagiarism is defined as stealing or use without acknowledgment of the ideas, words, formulas, textual materials, on-line services, computer programs, etc. of another person, or in any way presenting the work of another person as one's own.
- Falsifications, including forging signatures, altering answers after they have been graded, inserting answers after the fact, erasing of grader's markings, and other acts that allow for falsely taking credit.

A pupil found guilty of academic dishonesty may be subjected to a full range of penalties including, but not limited to reprimand and loss of credit for all of the work that is plagiarized. Disciplinary action may also be a consequence of such behavior. Additional consequences may apply as defined in specific department policies and guidelines.

A teacher who believes that a pupil has been academically dishonest in his/her class should resolve the matter in the following manner:

- Reprimand the student orally and/or in writing. The teacher is also authorized to withhold credit in the work due to academic dishonesty.
- If warranted, the teacher shall file a written complaint against the student with the Administration, requesting a more stringent form of discipline. The complaint must describe in detail the academic dishonesty that is alleged to have taken place, and must request that the matter be reviewed by the Administration.
- The Administration will determine if further discipline of the pupil is appropriate, and will determine the nature of the discipline on a case-by-case basis.
- If the pupil is not in agreement with the disciplinary action of the Administration, he/she may appeal the action first to the Principal and secondly to the Superintendent. If the pupil is dissatisfied with the Superintendent's disposition of the case, he/she may grieve the action in

accordance with Policy No. 5710, Pupil Grievance.

District Policy: Discrimination

High Point Regional High School's curriculum and instruction are aligned to the State's Core Curriculum Content Standards and address the elimination of discrimination by narrowing the achievement gap, by providing equity in educational programs and by providing opportunities for students to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

Note to Teachers: The proficiencies, not the textbook, are to be used as a guide for this course. At the end of each unit a list of resources and activities is given. The textbook is the major resource and will be listed first. Specific activities from alternate sources are listed next and most are attached behind each unit. All activities related to the HSPA must be done. Other activities are to be used at the teacher's discretion.

Teachers may use "Problems of the Day" or "Do Now" problems at their discretion. As students are doing these problems, specific problem solving strategies should be discussed. At the end of every other chapter in the textbook problem solving strategies are applied to real-world scenarios. There is also a Problem Solving Handbook located in the Student Handbook section of the textbook. This section also includes extra practice problems for each chapter, a skills bank, selected answers to homework problems, a glossary, an index, and a reference of symbols and formulas.

The textbook provides a variety of activities that are found in each chapter. These activities include labs, graphing calculator activities, and connecting algebra to other subject areas. Each chapter highlights Tools for Success, which includes Reading and Writing Math, Study Skills, and Test Prep. At the conclusion of each chapter there is a study guide and practice chapter test.

HSPA problems and review worksheets listed in the Resources and Activities must be included in the course. Similar problems should appear on quizzes and/or tests.

Quizzes and tests should contain problem solving situations, open-ended questions, sample HSPA problems, and require students to show work and give written explanations. The resource books that accompany the text provide a source of problems.

Students should be permitted to use scientific calculators throughout the course. Correct methods of using calculators should be discussed. The teacher needs to stress number sense, estimation and reasonable answers so that students can recognize calculator errors. Although students may use calculators, the emphasis remains on the process, not the answer. The students should be required to **show all work**, indicating the operations that they did with their calculators.

Student Proficiencies:

Unit 1: Foundations for Algebra

14 Days

Unit Goal: This unit provides students with skills that can be used to form a solid foundation for the rest of this algebra course. Students will study how to evaluate and simplify expressions, properties of the real number system, the order of operations, and patterns formed by points plotted in the coordinate plane in order to

Unit Objectives: Students will be able to:

1. Model relationships with variables.
2. Evaluate algebraic expressions.
3. Use and understand the concepts of variable, constant, numerical expression, algebraic expression, and evaluate.
4. Add and subtract real numbers.
5. Use and understand the concepts of absolute value, opposites, and additive inverse.
6. Multiply and divide real numbers.
7. Use and understand the concepts of reciprocal and multiplicative inverse.
8. Evaluate expressions containing exponents.
9. Use and understand the concepts of base, power, and exponent.
10. Evaluate expressions containing square roots.
11. Classify numbers within the real number system.
12. Use and understand the concept of rational, irrational, and real numbers.
13. Use the order of operations to simplify expressions.
14. Use the Commutative, Associative, and Distributive Properties to simplify expressions.
15. Use and understand the concepts of term, like terms, and coefficient.
16. Identify the Reflexive, Symmetric, and Transitive Properties of Equality.
17. Use and understand the concepts of the coordinate plane.
18. Graph functions from ordered pairs.
19. Use and understand the concepts of input and output.
20. Use problem solving strategies.

Resources and Activities:

1. Textbook:
Chapter 1, pages 3-71
Problem Solving Handbook, pages S40-S49
Activities, pages 5, 12
2. HSPA Worksheets and Supplementary Materials:
Evaluating Expressions
Combining Like-Terms
Properties of Equality and Arithmetic Operations
Real Numbers
Problem Solving Strategies
3. HSPA Practice Questions

Unit 2: Equations

16 Days

Unit Goal: This unit provides students with skills that can be used to solve problems in science courses and all future math courses. Students will study how to use inverse operations to solve equations containing variables, writing equations to represent situations, and simplifying equations before solving.

Unit Objectives: Students will be able to:

1. Use and understand the concepts of equation and solution of an equation.
2. Solve one-step equations with one variable by using addition or subtraction.
3. Solve one-step equations with one variable by using multiplication or division.
4. Solve equations with one variable that contain more than one operation.
5. Solve equations with one variable that contain variable terms on both sides.
6. Use and understand the concepts of identity (infinitely many solutions) and contradiction (no solution).
7. Students will be able to solve equations that contain absolute value expressions.
8. Solve a formula or equation with two or more variables for a given variable.
9. Use and understand the concepts of formula and literal equation.
10. Write and use ratios, rates, and unit rates.
11. Write and solve proportions.
12. Use and understand the concepts of cross products, conversion factors, and scale.
13. Use proportions to solve problems involving geometric figures.
14. Use proportions to solve problems involving percents.
15. Use common applications of percents.
16. Use and understand the concepts of commission, tip, sales tax, principal, and interest.
17. Find the percent of increase or decrease.
18. Use and understand the concepts of percent of change, discount, and markup.

Resources and Activities:

1. Textbook:
Chapter 2, pages 72-161
Activities, pages 76, 83, 91, 99, 144
Problem Solving, page 162
2. HSPA Worksheets and Supplementary Materials:
Solving Equations
Word Problems
3. HSPA Practice Questions

Unit 3: Inequalities

12 Days

Unit Goal: This unit provides students with skills that can be used for future math classes, including Geometry. Students will study the properties of inequality, how to solve inequalities by using inverse operations, how to solve inequalities with variables on both sides, and how to solve compound inequalities.

Unit Objectives: Students will be able to:

1. Identify solutions of inequalities with one variable.
2. Write and graph inequalities with one variable.
3. Solve one-step inequalities by using addition or subtraction.
4. Solve one-step inequalities by using multiplication or division.
5. Solve inequalities that contain more than one operation.
6. Solve inequalities that contain variable term on both sides.
7. Solve and graph solution sets of compound inequalities with one variable.
8. Use and understand the concepts of union and intersection.
9. Solve inequalities with one variable involving absolute value expressions.

Resources and Activities:

1. Textbook:
Chapter 3, pages 164-225
Activities, pages 201, 209
2. Supplementary Materials:
Multi-Step Inequalities
Compound and Absolute Value Inequalities
3. Practice HSPA Questions

Unit 4: Functions

12 Days

Unit Goal: This unit provides students with skills that can be used to analyze data and make predictions in other courses, such as Chemistry. Students will study relationships between variables and determine whether a relation is a function, relationships in function notation, and how trend lines on scatter plots help you make predictions.

Unit Objectives: Students will be able to:

1. Match simple graphs with situations.
2. Graph a relationship.
3. Use and understand the concepts of continuous and discrete graphs.
4. Identify functions from a relation, table of values, or a graph.
5. Find the domain and range of relations and functions.
6. Identify dependent and independent variables.
7. Write an equation or function rule in function notation.
8. Evaluate a function for given input values.
9. Graph functions given a limited domain or a domain of all real numbers.
10. Use and make connections between a function rule, a table of values, and a graph.
11. Create and interpret scatter plots.
12. Use trend lines to make predictions.
13. Use and understand the concepts of correlation and correlation coefficient.
14. Recognize and extend an arithmetic sequence.
15. Find a given term of an arithmetic sequence.
16. Use and understand the concepts of sequence, term, common difference, and limits.
17. Apply concepts with and without technology to real-world situations.

Resources and Activities:

1. Textbook:
Chapter 4, pages 226-289
Activities, pages 243, 244, 259, 270, 271
Problem Solving, page 290
2. HSPA Worksheets and Supplementary Materials:
Quantitative Graphs
Correlation and Correlation Coefficient
Functions
Sequences and Limits
Blank Graphs
3. HSPA Practice Questions
4. Computer Activity:
Understanding Math - Understanding Graphing: "Relations, Equations, and Functions"

Unit 5: Linear Functions

20 Days

Unit Goal: This unit provides students with skills that can be used to identify rates of change in linear data, make calculations and comparisons in their personal finances, and solve systems of equations in the next unit. Students will study writing and graphing linear functions, identifying and interpreting the components of linear graphs, and graphing and analyzing families of functions.

Unit Objectives: Students will be able to:

1. Identify linear functions and linear equations.
2. Graph linear functions and give their domain and range.
3. Model and write an equation for a situation in standard form, $Ax + By = C$.
4. Find the x- and y-intercepts of a linear equation and use them to graph lines.
5. Find rates of change and slope.
6. Relate a constant rate of change to the slope of a line.
7. Use coordinates to find the slope by using the slope formula.
8. Use a table to determine the rate of change.
9. Identify and use the concepts of direct variation and constant of variation.
10. Write a linear equation in slope-intercept form, $y = mx + b$.
11. Graph a line using slope-intercept form.
12. Identify and graph parallel and perpendicular lines.
13. Write equations to describe lines parallel or perpendicular to a given line.
14. Use and understand the concepts of family of functions and parent function.
15. Use and understand the concepts of transformations, translations, rotations, and reflections.
16. Identify characteristics of absolute value functions and their graphs.
17. Graph absolute value functions and give their domain and range.
18. Use and understand the concept of vertex and axis of symmetry.
19. Apply concepts with and without technology to real-world situations.

Resources and Activities:

1. Textbook:
Chapter 5, pages 292-377 - **OMIT** 5-7, 5-9
Activities, pages 309, 318, 348, 356
2. Supplementary Materials:
Families of Functions
Direct Variation
Blank Graphs
3. Graphing Calculator Activities:
Parallel and Perpendicular Lines
Absolute Value Functions
4. HSPA Practice Questions

Unit 6: Systems of Equations and Inequalities

14 Days

Unit Goal: This unit provides students with skills that can be used in other classes such as Chemistry and Economics, to determine which purchases are better deals, and in future math classes to solve linear equations containing three or more variables. Students will study how to find a solution that satisfies two linear equations and how to graph one or more linear inequalities on a coordinate plane.

Unit Objectives: Students will be able to:

1. Identify solutions of systems of linear equations with two variables.
2. Solve systems of linear equations by graphing, substitution, and elimination.
3. Compare and choose an appropriate method for solving systems of linear equations.
4. Understand and solve special systems of linear equations by all three methods.
5. Write and solve a system of linear equations to represent a situation.
6. Graph and solve a linear inequality and understand what it means to be a solution of a linear inequality.
7. Solve systems of linear inequalities by graphing.
8. Understand what it means to be a solution of a system of linear inequalities.
9. Apply all concepts with or without technology to real-world situations.

Resources and Activities:

1. Textbook:
Chapter 6, pages 378-439
Activities, pages 382, 389, 404, 427
Problem Solving, page 440
2. PowerPoint Presentation: Systems of Linear Equations
3. SMART Board Activity: Systems of Linear Inequalities

Unit 7: Exponents and Polynomials

14 Days

Unit Goal: This unit provides students with skills that can be used to model area, perimeter, and volume in Geometry and to express very small or vary large quantities in classes such as Chemistry, Physics, and Biology. Students will study properties of exponents, scientific notation, and how to perform operations with polynomials.

Unit Objectives: Students will be able to:

1. Evaluate and simplify expressions containing zero and negative exponents.
2. Convert numbers between standard notation and scientific notation.
3. Perform operations with numbers in scientific notation.
4. Simplify and evaluate expressions using the multiplication and division properties of exponents.
5. Write polynomials in standard form.
6. Classify polynomials by its degree and number of terms.
7. Evaluate polynomial expressions.
8. Add and subtract polynomials.
9. Multiply polynomials using the Distributive Property or FOIL Method.
10. Find special products of binomials.
11. Use and understand the concepts of difference of two squares and perfect square trinomial.

Resources and Activities:

1. Textbook:
Chapter 7, pages 442-519
Activities, pages 458, 482, 490, 500
2. HSPA Practice Questions

Unit 8: Factoring Polynomials

12 Days

Unit Goal: This unit provides students with skills that can be used to solve area problems such as calculating dimensions in landscaping, construction or design work. Students will study greatest common factors (GCF), how to factor polynomials and special products, and how to choose a factoring method.

Unit Objectives: Students will be able to:

1. Write the prime factorization of numbers and find the GCF of monomials.
2. Factor polynomials by using the GCF.
3. Factor quadratic trinomials in the form $x^2 + bx + c$ and $ax^2 + bx + c$.
4. Factor perfect square trinomials and the difference of two squares.
5. Choose an appropriate method or combine methods to factor a polynomial.
6. Apply skills with or without technology to real world situations.

Resources and Activities:

1. Textbook:
Chapter 8, pages 520-583
Activities, pages 530, 538, 555, 565
Problem Solving, page 584
2. Supplementary Materials:
Factoring Trinomials

Unit 9: Quadratic Functions and Equations

10 Days

Unit Goal: This unit provides students with skills that can be used to solve problems about the height of launched or thrown objects in Physics. Students will study identifying and graphing quadratic functions, transforming quadratic equations, solving quadratic equations, and using factoring to solve quadratic equations.

Unit Objectives: Students will be able to:

1. Identify quadratic functions, or parabolas, and determine whether their vertex is a maximum or minimum and give the domain and range.
2. Graph and transform quadratic functions with and without technology.
3. Solve quadratic equations by factoring.
4. Solve quadratic equations by using square roots.

If time permits:

5. Solve quadratic equations by completing the square (9-8).
6. Solve quadratic equations by using the Quadratic Formula (9-9).
7. Use the discriminant to determine the number of solutions of a quadratic equation (9-9).

Resources and Activities:

1. Textbook:
Chapter 9, pages 586-671 - **OMIT** 9-2, 9-3, 9-5; **If time permits do** 9-8, 9-9
Activities, pages 598, 612, 642, 644
2. Graphing Calculator Activities:
Quadratic Functions
3. Computer Activity:
Understanding Math – Understanding Graphing: “Quadratic Functions”

Unit 10: Exponential and Radical Functions (Chapter 11)

12 Days

Unit Goal: This unit provides students with skills that can be used to explore exponential growth and decay models that are used in science and to make informed decisions about finances. Students will study geometric sequences, exponential and square root functions, and radical equations.

Unit Objectives: Students will be able to:

1. Recognize and extend geometric sequences and determine their limits.
2. Find the common ratio and n^{th} term of a geometric sequence.
3. Evaluate, identify, and graph exponential functions.
4. Solve problems involving exponential growth (compound interest) and decay (half-life).
5. Compare linear, quadratic, and exponential models and write an equation to describe the function modeled.
6. Identify and graph square root functions and give their domain and range.
7. Simplify radical expressions by factoring the radicand using perfect squares.
8. Understand and use the concept of like radicals to add and subtract radical expressions.
9. Multiply and divide radical expressions.
10. Rationalize denominators.
11. Solve radical equations and be able to identify and explain extraneous solutions.
12. Apply concepts to real world situations with and without technology.

Resources and Activities:

1. Textbook:
Chapter 11, pages 762-845
Activities, pages 779, 780, 804
2. HSPA Worksheets and Supplementary Materials:
Sequences and Limits
Simplifying Radical Expressions
3. Graphing Calculator Activities
Exponential Functions
Radical Functions

Unit 11: Rational Functions and Equations (Chapter 12)

12 Days

Unit Goal: This unit provides students with skills that can be used to calculate costs when working with a fixed budget and solve problems involving inverse variation in classes such as Physics and Chemistry. Students will study inverse variations, rational expressions, and solving rational equations.

Unit Objectives: Students will be able to:

1. Identify, write, and graph inverse variations using the constant of variation.
2. Compare inverse and direct variations.
3. Simplify rational expressions.
4. Identify excluded values of rational expressions.
5. Multiply and divide rational expressions.
6. Add and subtract rational expressions with like and unlike denominators by finding the LCD.
7. Solve rational equations and be able to identify and explain extraneous solutions.

If time permits:

8. Divide a polynomial by a monomial or binomial (12-6).

Resources and Activities:

1. Textbook:
Chapter 12, pages 846-919 **OMIT** 12-2 and EXT; **If time permits do** 12-6
Activities, pages 850, 873, 874, 892
Problem Solving, page 920

Unit 12: Data Analysis and Probability (Chapter 10)

18 Days

Unit Goal: This unit provides students with skills that can be used to be more informed about statistical information in the news and to not be misled by how it is presented and to be able to determine the chances of an event occurring. Students will study how to organize data, how to find the central tendency of a set of data, writing experimental and theoretical probability, and combinations, permutations, and factorials.

Unit Objectives: Students will be able to:

1. Organize data in tables and graphs.
2. Create stem-and-leaf plots, box-and-whisker plots, frequency tables, and histograms.
3. Describe the central tendency of a data set including the mean, median, mode, range, and outlier.
4. Recognize misleading graphs and statistics.
5. Use and understand the concepts of matrices to organize data.
6. Add and subtract matrices and multiply a matrix by a scalar.
7. Construct and use basic network representations with matrices.
8. Use and understand the concepts of impossible and certain events, the complement of an event, sample space, tree diagrams, simulations, and the law of large numbers.
9. Determine the experimental probability of an event and use it to make predictions.
10. Determine the theoretical probability of an event.
11. Convert between probabilities and odds.
12. Understand use the concepts of replacement and independent and dependent events.
13. Solve problems involving combinations and permutations.
14. Use and understand the concepts of compound events, the Fundamental Counting Principle, and factorial.

If time permits:

15. Recognize and continue patterns involving iterations, recursions, and fractals.

Resources and Activities:

1. Textbook, Chapter 10, pages 672-759
Activities, pages 700, 712, 719, 734
Problem Solving, page 760
2. HSPA Worksheets and Supplementary Materials:
Measures of Central Tendency
Stem-and-Leaf and Box-and-Whisker Plots
Matrices
Directed Graphs
Probability Labs
Factorial, Counting Principle, Combinations, and Permutations
Fractals (**if time permits**)
3. HSPA Practice Questions