Dover-Sherborn High School
Mathematics Curriculum
Algebra I Level 1 CP/Honors

A. DESCRIPTION

This two semester course is designed to develop a thorough understanding of the framework of algebra, the real number system and related operations and methods of problem solving.

B. OBJECTIVES

The students will be able to:

1. represent situations using variables, expressions, equations and inequalities.
2. use tables and understand information given in tables.
3. graph linear equations.
4. develop an understanding of functions and demonstrate this understanding through problem solving.
5. solve linear equations.
6. solve linear inequalities.
7. solve word problems using equations and inequalities.
8. solve a system of equations.
9. use systems of equations to solve word problems.
10. multiply and factor polynomials.
11. solve equations by factoring.
12. simplify and manipulate radical expressions.
13. solve a simple quadratic equation using the quadratic formula.
14. solve word problems using quadratic equations.

C. OUTLINE

1. Equations and Applications
    a. Uses of algebra [AI.N.2]; [AI.P.2]
        1) Variables and applications
            a) algebraic expressions
            b) evaluating expressions
            c) formulas and replacement sets
            d) using formulas
            e) sentences and solution sets
        2) Introduction to real numbers
            a) rational expressions
            b) real numbers
            c) postulates for real numbers
    b. Operations with real numbers [AI.N.1]; [AI.N.2]; [AI.P.2]
        1) Properties of addition and subtraction
            a) positive and negative numbers
            b) absolute value
            c) addition and subtraction
            d) combining like terms

2) Properties of multiplication and division

c. Solving equations and inequalities [AI.N.4]; [AI.P.2]; [AI.P.10]
   1) Addition property for equations
   2) Multiplication property for equations
   3) Using inequalities
   4) Solving absolute value equations
   5) Graphing solutions on a number line
   6) Solving word problems

2. Graphing and Applications [AI.P.2]; [AI.P.4]; [AI.P.5]
   a. Graphing ordered pairs [AI.P.3]; [AI.D.1]
   b. Graphing relations and functions [AI.P.3]
   c. Graphing linear functions [AI.P.1]; [AI.D.1]; [AI.D.2]
   d. Slope of a line
   e. Slope intercept form of a line
   f. Systems of Equations [AI.N.4]; [AI.P.6]
      1) Graphing
      2) Addition method of solution
      3) Using multiplication with addition
      4) Substitution method
      5) Matrices
      6) Word problems using systems [AI.P.11]
   g. Systems of Inequalities [AI.P.12]
      1) Graphing linear inequalities
      2) Graphing systems of inequalities

3. Polynomials and Applications [AI.P.2]; [AI.P.4]
   a. Operations with polynomials [AI.P.7]; [AI.P.8]
      1) Multiplying and dividing monomials
      2) Addition and subtraction of monomials
      3) Products of monomials
      4) Addition and subtraction of polynomials
      5) Multiplication and division of polynomials
      6) Multiplying binomials
      7) Squaring binomials
   b. Factoring polynomials [AI.P.8]
      1) Common factors
      2) Difference of two squares
      3) Perfect square trinomials
      4) Factoring trinomials completely
      5) Solving equations by factoring
      6) Using factoring to solve word problems [AI.P.11]

c. Rational expressions [AI.P.1]; [AI.P.7]; [AI.P.8]; [AI.P.11]; [AI.P.12]
   1) Ratio and proportion
   2) Simplifying rational expressions
   3) Addition and subtraction of rational expressions
   4) Multiplication and division of rational expressions
   5) Solving equations with rational expressions
   6) Solving word problems with rational expressions
   7) Joint variation and inverse variation

4. Quadratic Equations
   a. Radicals [AI.N.1]; [AI.N.3]; [AI.N.4]; [AI.P.1]; [AI.P.2]; [AI.P.4]; [AI.P.9]; [AI.P.11]; [AI.P.12]
      1) Roots of numbers
      2) Simplifying radicals
      3) Multiplication and division of radicals
      4) Addition and subtraction of radicals
      5) Completing the square
      6) The quadratic formula
      7) Solving equations using the quadratic formula

D. HONORS/OPTIONAL TOPICS [AI.P.11]; [AI.P.12]

1. Linear programming applications
2. Matrices and determinants
3. Cramer's Rule

E. TEXT

Algebra 1, Larson, et. Al., McDougal Littell, 2001
ISBN 0-395-93776-0

F. RESOURCE MATERIALS

1. Algebra with Pizzazz, Marcy & Marcy, Creative Publishers, 1983
2. Worksheets prepared by teachers
3. Graphical Calculators
4. CBLs
5. Sites selected by teacher
6. Selected software

Dover-Sherborn High School
Mathematics Curriculum Maps
Algebra I Level 1 CP/Honors

Course Title: Algebra I Level 1 CP/Honors Grade: 9

Unit: Equations and Applications

Month Presented: Sept-Jan Unit Length: 20

Essential Question(s):

- What are functions?
- Can I obtain information from a graph? Table of data? An equation?
- Can I identify each function given its graph, table of data or equation?
- What are the rates of change of each type of function?
- Which functions model different real-life situations?
- What does it mean to solve an equation?
- What does x represent?
- What is a domain? Why do different situations require different domains?
- What are the properties of real numbers?
- What is a system of equations?
- What are the methods for solving systems of equations and which one is most efficient?
- How can I use systems of equations to model and solve real-life problems?
- Why is it useful to graph the solutions to inequalities?
- What types of inequalities have no solution? Infinitely many solutions?
- When and why do I switch the inequality symbol when solving algebraically?
- How does absolute value change the solutions to inequalities?

Learning Objectives:

- Identify function (linear and non-linear) types given a graph, table of data or equation.
- Generate a table of data given a real-life situation or word problem.
- Use graph, table of data and/or equation to predict or obtain information given a real-life situation or word-problem.
- Use order of operations.
- Simplify and evaluate expressions involving grouping symbols and absolute value.
- Solve equations given a domain.
- Translate word phrases, sentences, and problems into algebraic expressions and equations.
- Interpret and use the number line, and the ideas of opposites and absolute value.
- Solve basic through multi-step equations, including absolute value.
- Solve word problems by writing and solving algebraic equations.
- Identify equations which have “no solution” or “infinitely many solutions.”
- Solve two-variable and three-variable systems.
- Solve word problems using systems of equations.

- Solve and graph basic multi-step inequalities.
- Solve and graph combined inequalities (conjunctions and disjunctions).
- Solve and graph inequalities involving absolute value.

Instructional Strategies & Activities:

- Note taking.
- Calculator Based Laboratories.
- Guided exploration.
- Competitive Review Games.
- Cooperative learning/group work.

Materials Utilized:

- Textbook.
- Teacher generated notes and homework worksheets.
- Calculator
- Rulers/Graph paper.
- Microsoft Excel
- Geometer's Sketchpad

Assessment Strategies:

- Discussion/Daily class performance.
- Openers/Warm-Ups.
- Daily homework/Error analysis.
- Tests and quizzes.
- Reflection and Self-Assessment

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Course Title: Algebra I Level 1 CP/Honors Grade: 9

Unit: Graphing and Applications

Month Presented: Feb-Mar Unit Length: 8

Essential Question(s):

- What is slope?
- What are other terms which describe slope?
- Can I apply and use slope?
- How can I recognize a linear equation?
- What are the different forms of linear equations?
- When is each most useful?
- Why is it useful to graph the solutions to inequalities?
- How do I graph the solutions to inequalities?

Learning Objectives:

- Graph linear equations by plotting points and applying slope-intercept method.
- Calculate slope of a line give a graph, data points, or an equation.
- Distinguish between linear and non-linear equations.
- Write equations of lines given various data.
- Determine algebraically whether pairs of lines are parallel or perpendicular.
- Identify and analyze horizontal and vertical lines in terms of equation and slope.
- Graph, analyze and interpret word problems with respect to slope and y-intercept.
- Solve and graph basic through multi-step inequalities.
- Solve and graph combined inequalities (conjunctions and disjunctions).
- Solve and graph inequalities involving absolute value.

Instructional Strategies & Activities:

- Note taking.
- Calculator Based Laboratories.
- Guided exploration.
- Competitive Review Games.
- Cooperative learning/group work.

Materials Utilized:

- Textbook.
- Teacher generated notes and homework worksheets.
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Assessment Strategies:

- Discussion/Daily class performance.
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Unit: Polynomials and Applications

Month Presented: Apr-May Unit Length: 6

Essential Question(s):

- What are the properties of exponential expressions?
- What does x represent?
- When is solving a formula more efficient in solving a real-life problem?
- When is it more efficient to use an equation to model and solve a real-life problem?
- Can I re-organize the given information in a problem in order to solve it? (draw a diagram, organize a chart, list the "knowns" and "unknowns", define a variable or write a "let"statement)
- How can I use factoring to solve rational equations?
- Is a proportion an equation?
- Why is division by zero undefined?
- Am I comfortable manipulating equations algebraically?
- What is the difference between a real-life solution and an algebraic solution?

Learning Objectives:

- Simplify and evaluate expressions with exponents.
- Simplify, add, subtract and multiply polynomials.
- Solve word problems involving exponential expressions.
- Write, simplify and apply ratios.
- Solve equations with fractional coefficients.
- Solve proportions.
- Identify the least common multiple of rational expressions.
- Solve rational equations.
- Use and apply scientific notation.
- Solve word problems which use rational equations.
- Use and apply percentages.

Instructional Strategies & Activities:

- Note taking.
- Calculator Based Laboratories.
- Guided exploration.
- Competitive Review Games.
- Cooperative learning/group work.

Materials Utilized:

- Textbook.
- Teacher generated notes and homework worksheets.
- Calculator
- Rulers/Graph paper.
- Microsoft Excel
- Geometer's Sketchpad

Assessment Strategies:

- Discussion/Daily class performance.
- Openers/Warm-Ups.
- Daily homework/Error analysis.
- Tests and quizzes.
- Reflection and Self-Assessment

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Unit: Quadratic Equations

Month Presented: May-June Unit Length: 6

Essential Question(s):

- What are the different methods of solving quadratic equations?
- How do I choose the most efficient method of solution?
- Why are there usually two solutions to a quadratic equation?
- What is the graphical interpretation of the solutions to quadratics?
- Where does the quadratic formula come from?

Learning Objectives:

- Solve quadratic equations by taking the square root of both sides of an equation, by factoring, by completing the square and by using the quadratic formula.
- Solve word problems which use quadratic equations.

Instructional Strategies & Activities:

- Note taking.
- Calculator Based Laboratories.
- Guided exploration.
- Competitive Review Games.
- Cooperative learning/group work.

Materials Utilized:

- Textbook.
- Teacher generated notes and homework worksheets.
- Calculator
- Rulers/Graph paper.
- Microsoft Excel
- Geometer's Sketchpad

Assessment Strategies:

- Discussion/Daily class performance.
- Openers/Warm-Ups.
- Daily homework/Error analysis.
- Tests and quizzes.
- Reflection and Self-Assessment