

Dover-Sherborn High School
Mathematics Curriculum
Algebra II Level 2/CP

A. DESCRIPTION

This course is designed for the college bound student. The course reviews and extends the major topics of Algebra I, and provides a thorough foundation in the concepts of Algebra II as preparation for the topics studied in Precalculus.

B. OBJECTIVES

The student should be able to:

1. demonstrate a thorough knowledge of Algebra I skills.
2. extend the knowledge of Algebra I by doing more difficult problems.
3. recognize the difference between a function and a relation and evaluate compositions of functions.
4. solve a system of equations by graphing and algebraic methods
5. perform all operations with complex numbers, including their use as solutions to quadratic equations.
6. solve a system of three equations in three variables.
7. derive and use the distance formula.
8. perform operations involving matrices
9. solve equations of degree higher than 2.
10. solve systems of quadratic equations.
11. solve simple exponential and logarithmic equations.
12. solve problems involving arithmetic and geometric sequences and series.

C. OUTLINE

1. Review and Extension of Algebra I Topics
 - a. Properties of the real number system [A.SSE.1]
 - b. First degree equations and inequalities [A.SSE.3]; [N.Q.1]; [N.Q.2]; [N.Q.3]; [A.CED.1]; [A.CED.3]; [A.CED.4]; [A.REI.1]; [A.REI.3]; [A.REI.4]; [G.MG.2]
 - i. solving
 - ii. graphing
 - iii. absolute value equations
 - iv. word problems
 - c. Systems of linear equations and inequalities [A.CED.2]; [A.CED.3]; [A.REI.5]; [A.REI.6]; [A.REI.8]; [A.REI.9]; [A.REI.11]; [A.REI.12]
 - i. graphing
 - ii. solving by substitution
 - iii. linear combination
 - iv. using inverse matrices
 - d. Writing the equation of a line [F.IF.6]; [G.GPE.5]
 - i. given the slope and y-intercept
 - ii. given two points
 - iii. given horizontal or vertical line and a point
 - iv. given slope and a point

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- v. given parallel or perpendicular line and a point
- 2. Quadratic Functions and Complex Numbers [N.CN.1]; [N.CN.2]; [N.CN.3]; [A.REI.4b]; [A.APR.3]; [N.CN.8]; [N.CN.9] [A.SSE.1a,b]; [A.SSE.2]; [A.SSE.3a]; [A.REI.4]; [A.REI.4b]; [F.IF.7a]
 - a. Factoring
 - b. Using Square Roots
 - c. Deriving and applying the quadratic formula
 - d. Performing operations
 - e. Solving quadratic equations with complex roots
 - a. Writing the quadratic equation given the roots
 - b. Analyzing the discriminant
- 3. Equations of Degree Higher Than Two [A.APR.2]; [A.APR.6]; [F.IF.7]; [F.IF.7c]
 - a. Finding possible roots
 - b. Solving by synthetic substitution
 - c. Remainder and factor theorems
 - d. Operations on Rational Expressions [A.APR.1]; [A.APR.7]; [A.REI.2];
 - i. factoring (including cubes)
 - ii. solving rational equations
 - iii. applying direct and inverse variation
 - iv. solving word problems
- 4. Powers, Roots and Radicals [F.IF.1]; [F.IF.2]; [F.IF.5]; [F.IF.9]; [A.REI.10]; [F.BF.1]; [F.BF.4a]; [F.BF.4b]; [N.RN.1]; [N.RN.2]; [N.RN.3]; [A.REI.2]
 - a. Functions and Relations
 - i. graphing functions
 - ii. finding the equation of an inverse
 - iii. composition of functions
 - b. Powers and Roots performing operations
 - i. simplifying and rationalizing
 - ii. solving radical equations
- 5. Series and Sequences [A.SSE.4]; [F.BF.1a]; [F.BF.2]; [F.LE.2]
 - a. Arithmetic and geometric sequences
 - b. Sum of arithmetic or geometric series
 - c. Permutations and combinations
 - d. Binomial Theorem
- 6. Trigonometry [G.SRT.6]; [G.SRT.7]; [G.SRT.8]
 - a. Trigonometry of the right triangle
 - b. Basic applications of sine, cosine and tangent
- 7. Logarithms and Exponents [F.BF.5]; [F.LE.1]; [F.LE.1a];
 - a. Solving logarithmic equations
 - b. Solving exponential equations
- 8. Probability and Statistics [S.ID.1]; [S.ID.2]; [S.ID.3]; [S.IC.1]; [S.IC.2]; [S.IC.6]; [S.CP.6]
 - a. Probability of events
 - b. Data visual representation and analysis

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C. TEXT

Algebra 2, Larson et al.; McDougal Littell 2001
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D. SUPPLEMENTARY MATERIALS

1. Graphical calculators
2. CBLs
3. Computer programs
4. Worksheets
5. SAT review sheets

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Algebra II Level 2/CP

Course Title: Algebra II Level 2/CP

Grade: 11

Unit: Review and extension of Algebra I Topics

Months Presented: Sept-Oct-Nov

Unit Length (in weeks): 12

Essential Question(s):

- Can I write linear equations given different points, intercepts, and/or slopes?
- Can I graph linear equations?
- Can I rearrange and solve for variables in different linear equations?
- Can I solve a system of equations in two or three variables?
- Can I solve an inequality or system of linear inequalities?

Learning Objectives:

- Write linear equations given different points, intercepts, and/or slopes.
- Graph linear equations
- Graph a system of linear equations
- Graph a system of linear inequalities
- Rearrange and solve for variables in different linear equations

Instructional Strategies & Activities:

- Note taking
- Guided exploration
- Cooperative learning/group work
- Competitive Review Games

Materials Utilized:

- Textbook
- Teacher generated notes and homework worksheets

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 Functions

Months Presented: Nov – Dec - Jan

Unit Length (in weeks): 5

Essential Question(s):

- Can I write quadratic equations given different points and/or intercepts?
- Can I rearrange and solve for variables in different quadratic equations?
- Can I graph quadratic equations?
- What is a complex number?
- How do I solve an equation with complex numbers?
- How do I simplify a statement with complex numbers?
- What is the discriminant and how is it useful?
- How do I solve an equation with roots?
- How do I simplify a statement with roots?
- What are the properties of roots?

Learning Objectives:

- Write quadratic equations given different points and/or intercepts.
- Graph quadratic equations
- Distinguish between real and complex numbers.
- Simplify, add, subtract, multiply and divide expressions with complex numbers.
- Solve equations containing complex numbers
- Use the discriminant to find the number and type of solutions to an equation.
- Simplify, add, subtract, multiply and divide expressions with roots.
- Solve equations containing roots.

Instructional Strategies & Activities:

- Note taking
- Guided exploration
- Cooperative learning/group work
- Competitive Review Games

Materials Utilized:

- Textbook
- Teacher generated notes and homework worksheets

Assessment Strategies:

- Discussion/Daily class performance
- Openers/Warm-Ups

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- Daily homework/Error analysis
- Tests and quizzes
- Reflection and Self-Assessment

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Unit: Equations of Degree Higher than Two

Months Presented: January- February

Unit Length (in weeks): 4

Essential Question(s):

- What is an equation of degree higher than two?
- How do I identify, evaluate, and graph polynomial functions?
- How do I factor and solve a polynomial equation?
- How do I simplify, add, subtract, multiply and divide polynomials?

Learning Objectives:

- Understand the properties of exponents.
- Know how to identify, evaluate, and graph polynomial functions.
- Simplify, add, subtract, multiply and divide polynomials.
- Factor and solve polynomial equations.

Instructional Strategies & Activities:

- Note taking
- Guided exploration
- Cooperative learning/group work
- Competitive Review Games

Materials Utilized:

- Textbook
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Assessment Strategies:

- Discussion/Daily class performance
- Openers/Warm-Ups
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Unit: Powers, Roots and Radicals

Months Presented: March

Unit Length (in weeks): 4

Essential Question(s):

- What is the n th root of a real number?
- How do I simplify expressions with rational exponents?
- How do I find the inverse of a function?
- How do I solve equations with radicals or rational exponents?

Learning Objectives:

- Evaluate n th roots of real numbers
- Use properties of rational exponents to evaluate and simplify expressions
- Find inverses of linear and nonlinear functions
- Solve equations that contain radicals or rational exponents

Instructional Strategies & Activities:

- Note taking
- Guided exploration
- Cooperative learning/group work
- Competitive Review Games

Materials Utilized:

- Textbook
- Teacher generated notes and homework worksheets

Assessment Strategies:

- Discussion/Daily class performance
- Openers/Warm-Ups
- Daily homework/Error analysis
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Unit: Sequences and Series

Month Presented: April

Unit Length (in weeks): 3

Essential Question(s):

- What are arithmetic and geometric sequences?
- How do I find the sum of arithmetic and geometric series?
- What are permutations and combinations and how do I use them?
- What is the binomial theorem and how do I use it?

Learning Objectives:

- Distinguish between arithmetic and geometric sequences.
- Find the sum of arithmetic and geometric series.
- Understand and use permutations and combinations.
- Understand and use the binomial theorem.

Instructional Strategies & Activities:

- Note taking
- Guided exploration
- Cooperative learning/group work
- Competitive Review Games

Materials Utilized:

- Textbook
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Assessment Strategies:

- Discussion/Daily class performance
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- Daily homework/Error analysis
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Unit: Trigonometry

Month Presented: April - May

Unit Length (in weeks): 3-4

Essential Question(s):

- How do I use trigonometric functions?
- How do I compute the side lengths using trigonometric functions?
- How do I compute angle measures using trigonometric functions?
- How do I find the area of a triangle?
- How do radians and degrees relate to each other?

Learning Objectives:

- Evaluate trigonometric functions and inverse trigonometric functions
- Find side lengths, angle measures, and areas of triangles
- Measure angles using degree measure and radian measure

Instructional Strategies & Activities:

- Note taking
- Guided exploration
- Cooperative learning/group work
- Competitive Review Games

Materials Utilized:

- Textbook
- Teacher generated notes and homework worksheets

Assessment Strategies:

- Discussion/Daily class performance
- Openers/Warm-Ups
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Unit: Logarithms and Exponents

Month Presented: May- June

Unit Length (in weeks): 3 - 4

Essential Question(s):

- What is exponential growth and decay?
- What is natural base e?
- How do I solve and graph exponential and logarithmic equations?
- What are the properties of logarithms?
- How do I model with exponential and power functions?
- What are logistic growth functions?

Learning Objectives:

- Understand exponential growth, exponential decay, and natural base e.
- Model with exponential and power functions.
- Understand and utilize logistic growth functions.
- Solve and graph exponential and logarithmic equations.
- Understand the properties of logarithms

Instructional Strategies & Activities:

- Note taking
- Guided exploration
- Cooperative learning/group work
- Competitive Review Games

Materials Utilized:

- Textbook
- Teacher generated notes and homework worksheets

Assessment Strategies:

- Discussion/Daily class performance
- Openers/Warm-Ups
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Unit: Probability & Statistics

Month Presented: June

Unit Length (in weeks): 1 - 2

Essential Question(s):

- What is probability?
- How do I use probability?
- How do I compute the probability of compound, dependent, and independent events?
- What are binomial distributions and how do I use them?
- What are normal distributions and how do I use them?

Learning Objectives:

- Compute the probability of compound, dependent, and independent events
- Understand how to use binomial distributions.
- Understand how to use normal distributions.

Instructional Strategies & Activities:

- Note taking
- Guided exploration
- Cooperative learning/group work
- Competitive Review Games

Materials Utilized:

- Textbook
- Teacher generated notes and homework worksheets

Assessment Strategies:

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