

Senior College Math Curriculum Guide

Number: 333
Level: College Prep B
Textbook: Mathematical Ideas, Miller, Heeren, Hornsby, Addison Wesley,
10th edition, 2004
Credits: 5
Written: July 2005
Revised August 2008

Midterm Exam revised: January 2008

Final Exam revised: June 2008

Prerequisite:

In order to take this course, students must have successfully completed Algebra 2 B with at least a “C” or successfully completed Algebra 2 A. Students must also have successfully completed Geometry A or Geometry B.

Course Description:

Senior College Math is the fourth year of college preparatory mathematics for students planning on non-scientific/non-technical majors. This course is intended to provide an alternative to Pre-Calculus for the liberal arts student. The course surveys several basic concepts of mathematics designed to give the liberal arts major an understanding of the breadth of mathematics in areas other than computational application.

Topics studied will include problem solving, the real number system, linear and quadratic equations, exponents and logarithms, graphs and functions, mathematical systems, trigonometric functions, right triangle trigonometry, graphing trigonometric functions and applications of trigonometric laws. All topics will include appropriate practical application of the concepts. A special review section for the SAT will also be included. The graphing calculator (TI-83, TI-83+, or TI-84+) will be used throughout the course to help students explore and visualize concepts.

District Policy: Academic Integrity

Pupils are expected to be honest in all of their academic work. This means that the students in this course 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.

Equity Statement:

High Point Regional High School's curriculum and instruction are aligned with New Jersey 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 socio-economic status.

New Jersey Core Curriculum Content Standards Addressed:

Standard 4.3 Patterns and Algebra

All students will represent and analyze relationships among variable quantities and solve problems involving patterns, functions and algebraic concepts and processes.

Standard 4.5 Mathematical Processes

All students will use the mathematical processes of problem solving, communication, connections, reasoning, representations and technology to solve problems and communicate mathematical ideas.

Course Objectives:

Students will be able to:

1. recognize and perform basic operations on the real numbers and the subsets of whole numbers, integers, rational numbers and irrational numbers.
2. develop a thorough understanding of algebraic concepts and their function in problem solving applications.
3. develop confidence and proficiency in using algebraic concepts.

Course Policies:

Throughout the year, 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 discussion.

Homework will be assigned almost every day and is an important part of the course, providing students with the opportunity to apply skills learned in class and strengthen conceptual understanding and identify areas of weakness. It is **imperative** that students do homework regularly and conscientiously. Some problems assigned will require students to extend the concepts learned in class to new situations. Assignments will be reviewed in class and it is the student's responsibility to ask questions about problems he/she may not understand, to identify specific mistakes and to take notes on any further explanations concerning these problems. It is the student's responsibility to obtain material (notes, homework, etc.) for any extended absence and meet with the teacher upon return to class. The teacher will be available to meet with students after school for extra help and to help students make up work from absences.

This class will use graphing calculators (TI-83, 83+, or TI-84+). Students who do not have a calculator will be issued one by the school. The student will sign that he/she has received the calculator and is expected to return the calculator in the condition they

received it or pay full purchase price for the calculator. Students may not substitute a calculator for a lost or damaged calculator.

Students are expected to bring the textbook, three-ring binder, homework, calculator and pen/pencil to class. They are expected to take notes during class, to keep these notes along with homework, quizzes, and tests, in an organized manner. **A three-ring binder is strongly recommended.**

Student Evaluation:

Quizzes, based on the course proficiencies, will be given about once a week, with a major test, based on the proficiencies, given at the end of each unit. An exam covering the semester's work will be given at the end of each semester.

Homework will be checked daily. **All work must be shown neatly to receive full credit.** Homework will usually not be graded, but will be considered satisfactory if the work shown indicates the student made a conscientious effort to complete the assignment. If a student is not able to complete an assignment because he/she does not understand the work, he/she may be asked to complete it after the assignment is reviewed in class and/or the student has come for extra help in order to receive credit for the assignment. Sometimes an assignment given for homework may be collected and graded as a quiz. This will only occur when the concepts have been thoroughly reviewed. Class work/group work may also be graded. Each teacher will explain his/her homework policy to the class.

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

- A. Marking Period Grade:
 - 1. Quizzes and Tests 70 – 80%
 - 2. Homework and Classwork 20 - 25%
 - 3. Class participation 0 - 5%
- B. Final Grade
 - 1. Each Marking Period 20%
 - 2. Midterm Exam 10%
 - 3. Final Exam 10%

Proficiencies

Unit 1 Review Basic Topics for the SAT

Time: 20 days

Goals: Review topics in preparation for the October SAT

Objectives:

Students will review concepts pertinent to:

1. numbers and operations including, properties of integers, word problems, elementary number theory, ratios, proportions and percents, sequences, sets and logical reasoning.
2. algebra and functions, including manipulating and solving equations, simplifying and evaluating expressions and using algebraic concepts in problem-solving situations.
3. geometry and measurement, including geometric notation, points, lines, angles, triangles, quadrilaterals, area and perimeter.
4. data analysis, statistics and probability, including interpreting information from graphs, tables or charts, comparing quantities, recognizing trends or performing calculations based on information found; computing simple probabilities.
5. test taking strategies

New Jersey Curriculum Content Standards (CCCS) Addressed:
(The CCCS are attached at the end of this curriculum guide.)

Standards 4.1, 4.2, 4.3, 4.4, 4.5

References:

1. The Official SAT Study Guide (For the New SAT) – College Board SAT copyright 2004
2. Teacher prepared handouts

Unit 2 Problem Solving

Time: 14 days

Goals: Students will develop and apply problem solving strategies appropriately in various situations.

Objectives:

Students will be able to:

1. solve problems by inductive reasoning.
2. recognize and define number patterns algebraically
3. develop and apply various strategies for problem solving.
4. calculate, estimate and read graphs

New Jersey Core Curriculum Content Standards (CCCS) Addressed:
(The CCCS are attached at the end of this curriculum guide.)

4.3.A .1 4.3.C.1 4.5.A. 1-5, F.1,4

References:

1. Textbook, Chapter 1
2. Teacher prepared handouts.

Unit 3 Basic Concepts of Set Theory

Time: 14 days

Goals: Students will understand and apply concepts of set theory to solve problems.

Objectives:

Students will be able to:

1. identify and use the notation and terminology associated with basic set theory.
2. identify a complement and/or subset of a set and use symbolic notation and Venn diagrams to define a set.
3. find set operations (intersection, union and difference) and cartesian products.
4. use the techniques of Venn diagrams, cardinal number formulas and tables to solve problems involving surveys.

CCCS Addressed: 4.4.D

References:

1. Textbook, Chapter 2
2. Teacher prepared handouts

Unit 4 Finite Mathematical Systems and Number Theory

Time: 12 Days

Goals: Students will examine the properties of single operation systems and identify mathematical groups. They will use modulo arithmetic and test a system for congruence, and investigate properties of the Fibonacci Sequence and Golden Ratio.

Objectives:

Students will be able to:

1. test a single-operation system for the commutative, closure, associative, identity and, inverse properties.
2. define the distributive property of multiplication over addition and subtraction.
3. decide whether a mathematical system is a group or not.
4. use clock arithmetic to add and subtract.
5. solve modular equations.
6. use modulo arithmetic to solve problems.
7. identify patterns in the Fibonacci Sequence and recognize these patterns in nature.
8. identify the Golden Ratio in architecture and nature.

CCCS Addressed: 4.1.A.3 4.4.C.4 4.5.A.1,2 4.5.B,C

References:

1. Textbook, Chapter 4.4, 4.5, 5.4, 5.4
2. Teacher prepared handouts

Unit 5 The Real Numbers

Time: 20 Days

Goals: Students will be able to perform operations and solve problems using real numbers.

Objectives:

Students will be able to:

1. identify rational and irrational numbers.
2. order real numbers.
3. find the absolute value of a number.
4. perform operations with integers.
5. use properties of real numbers to evaluate expressions.
6. solve problems involving real numbers, using operations and their properties.
7. represent numbers in both rational and decimal form.
8. represent irrational numbers in decimal form.
9. solve problems involving applications of decimals and percents.
10. (optional) simplify complex numbers.

CCCS Addressed: 4.1.A.1-3 4.1.B.1 4.2.D.1 4.3.C.1 4.3.D.1, 2

References:

1. Textbook, Chapter 6
2. Teacher prepared handouts

Unit 6 Basic Concepts of Algebra

Time: 26 Days

Goals: Students will be able to solve linear, quadratic, and exponential equations and inequalities, including those containing fractions, decimals, ratios, proportions and variation.

Objectives:

Students will be able to:

1. solve equations containing fractions and decimals by clearing fractions and by using the calculator.
2. solve problems that are applications of linear equations.
3. apply problem solving strategies to solve problems with ratios and proportions.
4. write equations for and solve problems involving direct and inverse variation.
5. solve linear inequalities in one variable and graph solutions on a number line.
6. apply properties of exponents to simplify expressions.
7. simplify expressions with negative exponents.
8. represent numbers in standard and scientific notation and use them to simplify expressions and solve equations.
9. add subtract, multiply and factor polynomials.
10. solve quadratic equations.
11. solve problems that involve quadratic equations.

CCCS Addressed: 4.3.B.1,4 4.3.C.1,2 4.3.D.1-3

References:

1. Textbook, Chapter 7
2. Teacher prepared handouts

Unit 7 **Graphs, Functions and Systems of Linear Equations and Inequalities** **Time: 30 Days**

Goals: Students will be able to graph relations and functions, write linear and quadratic equations and use these skills to solve problems.

Objectives:

Students will be able to:

1. use the distance formula to determine the distance between two points in the plane.
2. find the midpoint between two points in the plane.
3. understand the correlation between the distance formula and standard form of the equation of a line.
4. use the slope and y intercept to graph linear equations.
5. determine the equations of lines parallel or perpendicular to given lines.
6. apply the concept of slope to solve rate of change problems.
7. use point-slope form of an equation to write a linear model.
8. determine whether an equation represents a relation or a function and identify the dependent, independent variables and the domain.
9. graph relations and functions.
10. represent functions using function notation.
11. write a function that models a given situation.
12. define and transform graphs of quadratic functions of the form
$$y = a(x - h)^2 + k$$
13. use a quadratic model to optimize a quantity.
14. define and transform the graphs of exponential and logarithmic functions.
15. develop the concept of the limit of $\left(1 + \frac{1}{n}\right)^n$ as $n \rightarrow \infty$.
16. solve exponential and logarithmic equations.
17. solve problems involving compound and continuous compound interest.
18. solve linear systems in two and three variables by graphing, substitution, and elimination.
19. use matrices to solve systems of equations.
20. solve and graph linear inequalities in two variables.
21. solve linear programming problems.

CCCS Addressed: 4.3B.-4 4.3C.1-3 4.3D.1-2 4.5A-F

References:

1. Textbook, Chapter 8 (including extension)
2. Teacher prepared handouts

