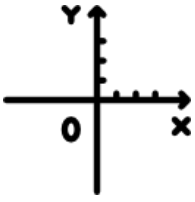


Discrete Mathematics



Unit 1: Problem Solving and Critical Thinking

Suggested Pacing: 9 days

This chapter explores key concepts such as inductive and deductive reasoning, emphasizing the differences and applications of each in logical arguments and proofs. It covers estimation techniques for problem-solving, alongside the creation and interpretation of graphs to represent data effectively. Additionally, students will learn about mathematical models, including their formulation and analysis in real-world contexts.



Unit 2: Set Theory

Suggested Pacing: 10 days

This unit explores the fundamental concepts of set theory, including set notation, operations like union and intersection, subsets, power sets, and the use of Venn diagrams to visualize relationships. Students will engage in practical activities such as creating sets from real data and solving problems to deepen their understanding of how sets work and relate to each other. This knowledge is important because it develops critical reasoning skills that underpin logic, probability, computer science, and many real-world problem-solving scenarios.



Unit 3: Graph Theory

Suggested Pacing: 7 days

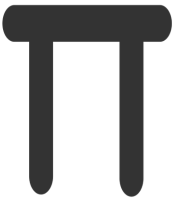
In this unit, students will learn to identify and explain the components of graphs and digraphs, as well as find paths in both directed and undirected graphs. They will apply algorithms to determine the presence of Eulerian and Hamiltonian circuits. Throughout the unit, students will connect graph theory concepts to real-world problems like network design and optimization to strengthen their problem-solving skills.



Unit 4: Number Representation and Calculation

Suggested Pacing: 8 days

This unit explores the four basic arithmetic operations—addition, subtraction, multiplication, and division—and their key properties in different bases and numeration systems to help students calculate efficiently. It also introduces modular arithmetic, where numbers wrap around after reaching a certain value, showing real-world applications like clocks and codes.



Unit 5: Matrices

Suggested Pacing: 8 days

This unit teaches students what matrices are and how to write and use 3×3 matrices. They will learn to add, subtract, multiply, and find inverses of matrices using real-world examples like encryption, economics, circuits, and systems of equations, with help from calculators or technology. Students will also learn important vocabulary and practice solving problems to understand how matrices help in everyday situations.



Unit 6: Number Theory and the Real Number System

Suggested Pacing: 7 days

This unit covers key ideas in number theory and the real number system, focusing on integers, divisibility, prime numbers, and the classification of real numbers. Students will learn how to compute GCDs, understand rational versus irrational numbers, and apply the principle of mathematical induction to prove statements. These concepts build important skills for problem-solving and proofs used in discrete mathematics and computer science.



Unit 7: Logic

Suggested Pacing: 11 days

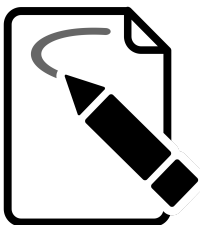
This unit explores key concepts in logic including expressing both statements and conditional statements and their negatives, using logical connectives, analyzing arguments, and avoiding common logical fallacies.



Unit 8: Counting Methods and Probability Theory

Suggested Pacing: 10 days

In this unit, students will explore methods to efficiently count possible outcomes in various situations. They will learn to apply the Fundamental Counting Principle to determine the total number of outcomes in multi-step processes. The unit will cover permutations and combinations. Students will develop problem-solving skills by applying these counting techniques to real-world scenarios and probability questions.



Unit 9: Voting and Apportionment

Suggested Pacing: 10 days

This unit focuses on comparing different voting methods and their impact on the fairness of election outcomes and representation. Students will explore and analyze possible voting scenarios and arrangements. The unit highlights fairness by examining paradoxes such as the Voting Paradox and Apportionment Paradoxes, which show how some methods can produce unexpected or unfair results. Through comparing voting systems and understanding these paradoxes, students develop critical thinking skills to evaluate fair decision-making.

Honors Framework

Honors courses taught in Greenville County Schools should align with the South Carolina Honors Framework. Key components of honors courses include:

- Alignment with South Carolina standards and indicators.
- Alignment with Profile of the South Carolina graduate.
- Learning and enrichment opportunities that extend beyond the standard coursework in CP level courses.
- An expectation of quality work the advanced learner is equipped to produce.
- Instruction of material in greater complexity, novelty, and acceleration.
- Diverse learning strategies such as:
 - Student-initiated research
 - Student engagement and collaboration
 - Project-based learning
 - Problem-solving and critical thinking
 - Creativity and innovation (eg. student portfolios and performance tasks)