# Advanced Mathematical Decision Making (AMDM) Mathematics

Key Instructional Activities

Advanced Mathematical Topics will look at mathematics in three areas: pure mathematics, applied mathematics, and application-oriented courses. There will be a strong focus on the presentation of mathematical ideas through both written and oral communication. is an introduction to Advanced Mathematical Topics. Students continue to build upon the K–8, algebra, and geometry foundations as they expand their understanding through further mathematical experiences. Advanced Mathematical Decision Making includes the analysis of information using statistical methods and probability, modeling change and mathematical relationships, and spatial and geometric modeling for mathematical reasoning. Students learn to become critical consumers of real-world quantitative data, knowledgeable problem solvers who use logical reasoning, and mathematical thinkers who can use their quantitative skills to solve authentic problems. Students develop critical skills for success in college and careers, including investigation, research, collaboration, and both written and oral communication of their work, as they solve problems in many types of applied situations.

Here's a brief snapshot of some of the work students will be doing in these areas:

- They apply methods from logic and set theory to solve real-world problems.
- Students will utilize combinatorics to study how combinations of objects belonging to a finite set in accordance with certain constraints, such as those of graph theory, behave.
- Students will learn about risk and reward in the financial world, and apply mathematical modeling to stock markets and investing.
- Students will analyze data and survey design to investigate research, bias, and variability.
- Students will utilize functions, linear regression equations, cyclical functions, and piecewise functions to make decisions.

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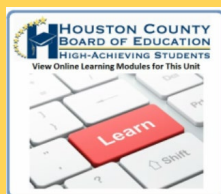
What is the Learn Button on the Weebly Site? *Link to Georgia Virtual School Modules for instructional videos, examples, and practice by unit.*

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What resources are available for students and parents?

https://hcbemath.weebly.com/

- ✓ Online Math Textbook
- ✓ Parent Portal
- ✓ Overview of Units and Pacing
- ✓ The Learn Button!
- ✓ While AMDM materials, which are copyrighted by the Charles A. Dana Center, are not posted to Weebly, you can find content help for other courses listed there.

AMDM Course Overview

Unit 1: Analyzing Numerical Data
Expected Dates: Beginning of School Year to end of August

The Analyzing Numerical Data unit requires approximately four weeks of instructional time. It focuses on deepening students' understanding of proportional reasoning and basic numerical calculations—such as ratios, rates, and percents—by applying them to settings in business, media, consumer, and other areas. Working with familiar mathematical tools and learning some new ones, students improve their ability to solve problems by applying appropriate strategies.The Analyzing Numerical Data unit builds upon students' prior knowledge of ratio and focuses on helping students learn how to make decisions in everyday situations after analyzing information. Using contextual situations, students develop skills that they can apply outside the classroom. Students begin the development of critical college and career readiness skills as they research and answer questions, present their solutions to the class, and provide feedback to others.

Unit 2: Probability
Expected Dates: Late August to Mid-October

The Probability unit requires approximately five weeks of instructional time. It focuses on the analysis of information using probability to make decisions about everyday situations. After determining the probability of various events, students expand their knowledge toward making decisions about the risks and mathematical fairness of these events. The Probability unit builds upon students' prior knowledge of probability and focuses on how to make decisions in everyday situations after analyzing information. By using contextual situations, students develop skills that they can apply outside the classroom. In particular, students extend the range of situations they deal with to include those in which not all outcomes are equally likely, and they learn tools to account for weighting different possible outcomes in such situations.

Unit 3: Statistical Studies
Expected Dates: Mid-October to End of Semester

The Statistical Studies unit requires approximately seven weeks of instructional time. It focuses on developing background statistical knowledge through the use of existing case studies and introducing students to the basic components of the design and implementation of statistical studies. After collecting and displaying data, students explore introductory techniques of statistical analysis. Students build the skills and vocabulary necessary to analyze and critique reported statistical

Unit 6: Decision Making in Finance
Expected Dates: January 1 to Mid-February

The Decision Making in Finance unit requires five to six weeks of instructional time. It focuses on the financial decisions that surround borrowing, loaning, and investing money and how the time value of money affects such decisions. While some of these topics may be familiar to teachers and students, the mathematics behind them can be challenging. Thus, these contexts provide rich opportunities for critical thinking and problem solving. This unit goes well beyond typical "consumer math" skills that might be addressed in middle school or high school. It asks students to use sophisticated mathematical models to deal with problems in these familiar situations.

Unit 7: Networks and Graphs
Expected Dates: Mid-February to Mid-March

The Networks and Graphs unit requires approximately four weeks of instructional time. It focuses on the creation of models that represent real-world contexts involving networks and graphs and the use of these networks and graphs to investigate real-world scheduling problems. In this unit, students extend their ability to solve abstract and concrete problems. Although networks and graphs have geometrical connections (in that they are drawn in two dimensions with points, lines, and curves), the mathematical reasoning required to create, understand, and use them is new to most students.

Unit 5: Functions
Expected Dates: Mid-March to Mid-April

The Using Functions in Models and Decision Making unit requires four weeks of instructional time. It focuses on analyzing data and finding mathematical functions (rules) to model real-world data and contexts with functions. Here students expand their set of tools for data analysis, building on their previous work with continuous and piecewise-defined functions. They also build on their work in Unit IV, "Using Recursion in Models and Decision Making," connecting recursive rules and explicit function rules.

Unit 4: Using Recursion in Models and Decision Making
Expected Dates: Mid-April to End of School Year

The Using Recursion in Models and Decision Making unit requires approximately four weeks of instructional time. It focuses on analyzing data and finding rules to model the data. By looking at recursive models for bivariate data and relationships, students expand their set of tools for data analysis. While teachers (and some students) might

information, summaries, and graphical displays; they prepare oral and written reports of these analyses. They also develop skills to prepare them for the further use of statistics and statistical studies in their major field of study at the university level or in the workplace.

associate the term bivariate with statistical analysis, in reality this term can refer to any relationship between two variables or quantities. Thus, nearly all high school work with algebraic modeling involves bivariate relationships.

Helpful Tips for Parents and Guardians

Believe that every child can be successful in math. It takes good teaching, coaching, encouragement and practice.

Partnering with your child's teacher

• Get to know your child's math teacher! Your child will thank you (someday) for being involved in his or her learning. Also – know about the online resources that are available!

• Don't be afraid to reach out to your child's teacher—you are an important part of your child's education. Ask to see a sample of your child's work or bring a sample with you.

• Talk with your child's teacher about difficulties he/she may be experiencing. When teachers and parents work together, children benefit.

• Ask the teacher questions like:

• Where is my child excelling? How can I support this success?

• What do you think is giving my child the most trouble? How can I help my child improve in this area?

• What can I do to help my child with upcoming work?

Helping your child learn outside of school

• Talk about math in a positive way. A positive attitude about math is infectious. Encourage your child to stick with it whenever a problem seems difficult. This will help your child see that everyone can learn math.

• Encourage persistence. Some problems take time to solve. Praise your child when he or she makes an effort, and share in the excitement when he or she solves a problem or understands something for the first time

• Encourage your child to experiment with different approaches to mathematics. There is often more than one way to solve a math problem.

• Encourage your child to talk about and show a math problem in a way that makes sense

• When your child is solving math problems ask questions such as: Why did you...? What can you do next? Do you see any patterns? Does the answer make sense? How do you know? This helps to encourage thinking about mathematics.

• Connect math to everyday life and help your child understand how math influences them

• Play family math games together that add excitement such as checkers, junior monopoly, math bingo and uno.

• Computers + math = fun! There are great computer math games available on the internet that you can discover with your child.