

High School Mathematics

Grades 9-12

Greetings High School Parents!

In Harford County Public Schools (HCPS), we are committed to ensuring that every child graduates having received an outstanding education. We know that you as parents are integral to this process and want you to know the role that the Maryland College and Career-Ready Standards (MCCRS) serve in the implementation of our curriculum.

What does it mean to be College and Career-Ready in Mathematics?

The Harford County Public Schools mathematics curriculum, which is based on the MCCRS, is comprised of a set of mathematical objectives that sequentially prepare students to successfully gain admission to college and engage in the challenges of higher education and the workplace.

The MCCRS provide clear direction for the implementation of a focused, coherent, and rigorous curriculum, which results in college and career readiness for all students. To ensure success for all students, the Mathematical Practices are integrated into all mathematics curricula, grades kindergarten through grade 12. Students with exceptional mathematical knowledge and skill will have opportunities to be accelerated in the HCPS curriculum.



What will lessons look like in the classroom?

Teachers are encouraged to create engaging and interactive lessons, integrating technology when appropriate. Our teachers provide the best environment for learning so that our children grow as learners and mathematical thinkers but also gain the content and skills necessary to become productive members of our workforce and society.

How can you support your child at home?

As you review this brochure, think about ways you can support your child's learning at home. Over the course of child's high school career, he or she will need to take a minimum of four credits of coursework in mathematics. We need your help as we implement our curriculum and hold students to the highest standards of academic performance. Through a strong partnership with you, we will ensure that your child is fully prepared for success in school, work, and life.

Mathematical Practices

Mathematically proficient students ...

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Mathematics CCSS

A Sample of What Your Child May Learn

High School Mathematics

NUMBER AND QUANTITY

The Real Number System

- Extend the properties of exponents to rational exponents.
- Classify numbers as rational or irrational.

Quantities *

- Reason quantitatively and use units to solve problems.

The Complex Number System

- Perform arithmetic operations with complex numbers.
- Represent complex numbers and their operations on the complex plane.
- Use complex numbers in polynomial identities and equations.

Vector and Matrix Quantities

- Represent and model with vector quantities.
- Perform operations on vectors.
- Perform operations on matrices and use matrices in applications.

ALGEBRA OVERVIEW

Seeing Structure in Expressions

- Interpret the structure of expressions.
- Write expressions in equivalent forms to solve problems.

Arithmetic with Polynomials and Rational Functions

- Perform arithmetic operations on polynomials.
- Understand the relationship between zeroes and factors of polynomials.
- Use polynomial identities to solve problems.
- Rewrite rational functions.

Creating Equations *

- Create equations that describe numbers or relationships.

Reasoning with Equations and Inequalities

- Understand solving equations as a process of reasoning and explain the reasoning.
- Solve equations and inequalities in one variable.
- Solve systems of equations.
- Represent and solve equations and inequalities graphically.

MODELING

Modeling links classroom mathematics and statistics to everyday life, work, and decision-making. Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions. Quantities and their relationships in physical, economic, public policy, social, and everyday situations can be modeled using mathematical and statistical methods. When making mathematical models, technology is valuable for varying assumptions, exploring consequences, and comparing predictions with data.

Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★).

A Sample of What Your Child May Learn

High School Mathematics

GEOMETRY OVERVIEW

Congruence

- Experiment with transformations in the plane.
- Understand congruence in terms of rigid motions.
- Prove geometric theorems.
- Make geometric constructions.

Similarity, Right Triangles, and Trigonometry

- Understand similarity in terms of similarity transformations.
- Prove theorems involving similarity.
- Define trigonometric ratios and solve problems involving right triangles.
- Apply trigonometry to general triangles.

Circles

- Understand and apply theorems about circles.
- Find arc lengths and areas of sectors of circles.

Expressing Geometric Properties with Equations

- Translate between the geometric description and the equation for a conic section.
- Use coordinates to prove simple geometric theorems algebraically.

Geometric Measurement and Dimension

- Explain volume formulas and use them to solve problems.
- Visualize relationships between two-dimensional and three-dimensional objects.

Modeling with Geometry

- Apply geometric concepts in modeling situations.



FUNCTIONS OVERVIEW

Interpreting Functions

- Understand the concept of a function and use function notation.
- Interpret functions that arise in applications in terms of the context.
- Analyze functions using different representations.

Building Functions

- Build a function that models a relationship between two quantities.
- Build new functions from existing functions.

Linear, Quadratic, and Exponential Models *

- Construct and compare linear and exponential models and solve problems.
- Interpret expressions for functions in terms of the situation they model.

Trigonometric Functions

- Extend the domain of trigonometric functions using the unit circle.
- Model periodic phenomena with trigonometric functions.
- Prove and apply trigonometric identities.



A Sample of What Your Child May Learn

STATISTICS AND PROBABILITY OVERVIEW

Interpreting Categorical and Quantitative Data

- Summarize, represent, and interpret data on a single count or measurement variable.
- Summarize, represent, and interpret data on two categorical and quantitative variables.
- Interpret linear models.

Making Inferences and Justifying Conclusions

- Understand and evaluate random processes underlying statistical experiments.
- Make inferences and justify conclusions from sample surveys, experiments and studies.

Conditional Probability and the Rules of Probability

- Understand independence and conditional probability and use them to interpret data.
- Use the rules of probability to compute probabilities of compound events in a uniform probability model.

Using Probability to Make Decisions

- Calculate expected values and use them to solve problems.
- Use probability to evaluate decisions.
- Prove and apply trigonometric identities.

What mathematics assessments and advanced courses might my child take during the 2014-15 school year?

Algebra I	High School Assessment (Graduation Requirement)
PARCC	Algebra I – <i>for those students enrolled in Algebra I for the first time.</i> (Graduation Requirement)
Grades 10-11	PSAT
Grades 10-12	SAT
AP Courses	AP Calculus, AP Statistics, AP Computer Science

Parent Checklist for Supporting Mathematics Learning in High School

- Have a positive attitude toward mathematics.
- Set high expectations.
- Discuss the mathematics being learned in class.
- Find opportunities to do mathematics every day.
- Be open to a variety of ways to solve a problem.
- Work on puzzles and other engaging mathematics problems.
- Discuss the mathematics found in sports statistics and other real-world applications of mathematics.
- Use computers and calculators, as well as pencil and paper, to solve problems.
- Discuss why (or why not) an answer to a mathematics problem is reasonable.
- Monitor homework.
- Practice and support principles of responsible finance by showing how you think about money.
- Encourage enrollment in challenging courses.



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