

Reading Public Schools

Instilling a joy of learning and inspiring the innovative leaders of tomorrow



Mathematics Curriculum Guide

Honors Geometry

Course Description

Students will begin by learning the building blocks of geometric shapes so that they have a common vocabulary for the rest of the year. Other topics, including the concepts of symmetry, congruence, similarity, coordinate geometry, constructions, perpendicularity, parallelism, transformations, polygons, circles, solids, area, and volume, will be studied throughout the year. Trigonometry and the unit circle are introduced. Coordinate proofs of geometric relationships are emphasized, and logical proofs using direct and indirect reasoning are also studied. Students are expected to be able to solve equations and graph linear and quadratic functions from their study of Algebra 1.

Content Standards

Number and Quantity Content Standards

Quantities

- Reason quantitatively and use units to solve problems.

Algebra Content Standards

Seeing Structure in Expressions

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

Creating Equations

- Create equations that describe numbers or relationships.

Geometry Content Standards

Congruence

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

Similarity, Right Triangle Triangles, and Trigonometry

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

Geometry Content Standards (continued)

Circles

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

Expressing Geometric Properties with Equations

- Use coordinates to prove simple geometric theorems algebraically.

Geometric Measurement & 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.

Trigonometric Functions

- Extend the domain of trigonometric functions using the unit circle.
- Model periodic phenomena with trigonometric functions.

Statistics and Probability Content Standards

Interpreting Categorical and Quantitative Data

- Interpret linear models.

Mathematical Practice Standards

- Making sense of problems and persevering in solving them
- Reasoning abstractly and quantitatively
- Constructing viable arguments and critiquing the reasoning of others
- Modeling with mathematics
- Using appropriate tools strategically
- Attending to precision
- Looking for and making use of structure
- Looking for and expressing regularity in repeated reasoning

Units	Essential Questions
Tools of Geometry	<ul style="list-style-type: none"> • How can you represent a three-dimensional figure with a two-dimensional drawing? • What are the building blocks of geometry?
Reasoning and Proof	<ul style="list-style-type: none"> • How are inductive and deductive reasoning different? • Why is formal proof important? • Why is deductive reasoning used in geometric proof?
Parallel and Perpendicular Lines	<ul style="list-style-type: none"> • What algebraic and geometric conditions are sufficient and necessary to prove lines parallel or perpendicular? • How do the equations of lines utilize properties of lines in the coordinate plane?
Congruent Triangles	<ul style="list-style-type: none"> • What is congruency? How is it different than equivalency? • What information is needed to prove that two triangles are congruent? • How do you identify corresponding parts of congruent triangles? • What real world problems can be solved using congruent triangles?
Relationships Within Triangles	<ul style="list-style-type: none"> • How do you use coordinate geometry to find relationships within triangles? • How do you solve problems that involve measurements of triangles?
Polygons and Quadrilaterals	<ul style="list-style-type: none"> • How is the number of sides in a polygon related to the measures of its interior and exterior angles? • How can you classify quadrilaterals? • How can you use coordinate geometry to prove general relationships?
Similarity	<ul style="list-style-type: none"> • How do you use proportions to find side lengths in similar polygons? • How do you show two triangles are similar? • How do you identify corresponding parts of similar triangles?
Right Triangles and Trigonometry	<ul style="list-style-type: none"> • How do you find a side length or angle measure in a right triangle? • How do trigonometric ratios relate to similar right triangles?
Transformations	<ul style="list-style-type: none"> • How can you change a figure's position without changing its size and shape? • How can you change a figure's size without changing its shape? • How can you represent a transformation in the coordinate plane?
Area & Volume	<ul style="list-style-type: none"> • How do perimeter and area of similar figures compare? • How do the surface areas and volumes of similar solids compare?
Circles	<ul style="list-style-type: none"> • When lines intersect a circle or within a circle, how do you find the measure of the resulting arcs, angles, and segments? • How do you find the equations of a circle in the coordinate plane?
Analytical Trigonometry	<ul style="list-style-type: none"> • How are positive and negative angles of all sizes represented on a unit circle? • How are the x and y coordinates of a point related to the angles and their trigonometric functions? • How is a reference angle used to find trigonometric functions in all quadrants? • What is a radian? • What do the key features (max, min, increasing, decreasing, etc.) tell us about trigonometric graphs and what do they represent in real-world situations modeled by trigonometric functions? • How does changing the parameters of an equation affect the graphs of trigonometric functions?

Classroom Structures & Key Learning Routines

Whole class instruction, small group instruction, formative assessments, summative assessments, performance tasks, group projects, explorations with technology, real-world application problems

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Curriculum Guide Overview

Honors Geometry

Curriculum Guide

Curriculum guides are public documents aligned with the Massachusetts Department of Education Curriculum Frameworks. They focus on the set of standards that students will learn within certain disciplines at appropriate grade levels. Each area of the curriculum is divided into general strands (broad categories) under which the standards fall. When we discuss “standards-based education” we mean that students are measured against their proficiency and growth towards meeting these standards. Curriculum guides are intended for teachers, parents, and the wider school community as an overview document of the course of study for the year.

Curriculum Map

Curriculum maps are internal documents utilized as planning tools for teachers. Curriculum maps keep a focus on the end-of-year standards and chart a course for the teaching and learning over the year. They are typically organized in a grade-level overview organized by month or marking period. Curriculum maps typically include: standards and expectations for the grade/content, essential skills/concepts, methods of assessment, and major content resources. Maps are never “done” as ongoing work of educators include revisions, additions, and revisits to the maps. They provide an overview for the year while also allowing educators to see a vertical picture of how the content develops as students progress through each grade.

Content Standards

The standards used as the foundation of our curriculum come directly from the Massachusetts Department of Education Curriculum Frameworks. State standards may be viewed here: <http://www.doe.mass.edu/frameworks/>

Mathematical Practice Standards

Mathematical Practice Standards are a set of skills/behaviors that are replicated in grades preK-12. These standards describe ways in which students engage with the mathematical content and the level of application grows increasingly complex as students progress vertically throughout their education.

Units

Units are the learning themes for the course. They are generally cumulative in nature, meaning that new units are based upon knowledge from previous units.

Essential Questions

Essential questions are questions that are not answerable with an easy answer or a simple instruction. The purpose of essential questions is to provide opportunities for inquiry into the learning and act as an umbrella to anchor the unit/lesson.

Activities

Activities identified in Curriculum Guides are not intended to be exhaustive, nor are they intended to be prescriptive. The activities identified may function as a menu of curriculum resources from which educators identify the most appropriate tools to utilize in their classrooms.