Hoboken Public Schools

Geometry Honors Curriculum

Geometry Honors HOBOKEN PUBLIC SCHOOLS

Course Description

Geometry Honors is for our accelerated Math students. It stresses the ability to reason logically and to think critically, using spatial sense. Students will engage in activities that allow them to create geometric understanding. These courses will formalize and extend students' geometric experiences from the middle grades. The courses are driven by the Common Core State Standards and apply the eight Mathematical Practices. Students will explore more complex geometric situations and deepen their explanations of geometric relationships moving toward formal mathematical arguments. The courses guide students to experience mathematics as a coherent, useful, and logical subject that makes use of their ability to exercise problem-solving skills in authentic situations. The curriculum includes the topics of transformations, congruence, similarity, trigonometry, two- and three-dimensional figures, circles, and probability.

Course Resources

OnCore Mathematics Geometry workbook
Khan Academy
Kuta Software
Edmentum Assessment

References & Suggested Instructional Websites
http://illuminations.nctm.org/Lessons-Activities.aspx (choose grade level and connect to search lessons)
http://www.yummymath.com/birds-eye-of-activities/
http://map.mathshell.org/tasks.php?collection=9&unit=HE06
http://www.shmoop.com/common-core-standards/math.html
http://www.njcore.org/standards?processing=true#
https://hcpss.instructure.com/courses/99
https://www.desmos.com/
http://www.geogebra.org/
http://www.cpalms.org/Public/ToolkitGradeLevelGroup/Toolkit?id=14

Pacing Guide

Unit Titles	Time Frame
Unit One: Congruence and Constructions	**6-8 Weeks**
Unit Two: Congruence, Similarity, and Proof	**8-10 Weeks**
Unit Three: Trigonometry Ratios & Geometric Equations	**6-8 Weeks**
Unit Four: Geometric Modeling	**6-8 Weeks**

Unit 1 – Congruence and Constructions
Six to Eight Weeks

Overview

In this unit, students will demonstrate the ability to use fundamental concepts of geometry, including definitions, basic constructions, and tools of geometry. They will also demonstrate the ability to analyze the effects of transformations

Essential Questions
- How are the undefined terms in geometry outlined and why are they undefined?
- How does the use of congruency and similarity concepts allow us to model relationships between geometric figures?
- How is the relationship of the criteria for triangle congruence to congruence in terms of rigid motion defined?
- How can I use constructions to show congruence in geometric figures?

Essential Learning Outcomes
- The student will demonstrate the ability to use fundamental concepts of geometry, including definitions, basic constructions, and tools of geometry.
- The student will demonstrate the ability to analyze the effects of transformations.

Technology Infusion
- 8.1.12.E.1-Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.
- 8.1.12.F.1-Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

Standards Addressed

G.SRT.A.1, G.SRT.A.2, G.SRT.A.3, G.CO.C.9, G.CO.C.10, G.CO.C.11, G.SRT.B.4, G.SRT.B.5

Differentiation
- Pre-teach vocabulary using visual and verbal models that are connected to real life situations.
- Encourage students to maintain a reference notebook for Geometry by providing them with notes or guiding them in note-taking.
- Provide students with hands on opportunities to explore and extend their understanding of transformations by using transparencies, graph paper, dry erase markers, cut out shapes.
- Link concepts to everyday examples so that students can visualize the transformations and internalize their distinguishing characteristics.
- Review the meaning of symmetry and use visual and verbal models to demonstrate how to identify lines of symmetry in different figures.
- Model the thinking and processes necessary to determine a series of transformations that end up with the figure superimposing on top of itself.

- ➢ Provide students with clues to remember the definitions and know the differences between the terms/concepts. i.e. translation - slide
- ➢ Encourage students to verbalize their thinking while working in small groups by asking assessing and advancing questions. Use this information to tailor instruction to student needs.
- ➢ Review the concept of congruence with respect to triangles and then model how to use rigid transformations to prove or disprove congruence.
- ➢ Encourage students to add this concept to their reference notebook by providing notes or guiding note-taking.
- ➢ Provide students with hands on opportunities to explore and extend their understanding.
- ➢ Provide students with hands on opportunities to explore and extend their understanding of constructions using tools such as compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.
- ➢ Model the thinking behind the constructions stressing the definitions of the figures and the necessary characteristics to adhere to those definitions.
- ➢ Connect the importance of this practice to real life careers such as engineering, graphic design, manufacturing etc.

Assessments
- ➢ Describe Learning Vertically
- ➢ Identify Key Building Blocks
- ➢ Make Connections (between and among key building blocks)
- ➢ Short/Extended Constructed Response Items
- ➢ Multiple-Choice Items (where multiple answer choices may be correct)
- ➢ Drag and Drop Items
- ➢ Use of Equation Editor
- ➢ Quizzes/Tests
- ➢ Journal Entries/Reflections/Quick-Writes
- ➢ Accountable talk
- ➢ Projects
- ➢ Portfolio
- ➢ Observation
- ➢ Graphic Organizers/ Concept Mapping
- ➢ Presentations
- ➢ Role Playing
- ➢ Teacher-Student and Student-Student Conferencing
- ➢ Homework

21st Century Learning Connection
- ➢ 9.1.12.A.1 Apply critical thinking and problem-solving strategies during structured learning experiences.
- ➢ 9.4.12A.16 Employ critical thinking skills independently and in teams to solve problems and make decisions, (e.g., analyze, synthesize, and evaluate).

Unit 2 – Congruence, Similarity, and Proof
Eight to Ten Weeks

Overview

In this unit, students will demonstrate the ability to identify similar triangles and solve problems using ratios and proportions. To continue, students will explore how dilations affect various parts of a figure and thus their relationship with each other.

Essential Questions

➢ How do dilations affect the various parts of a figure and their relationship to each other?
➢ How are the concepts of similarity and congruence related to each other?
➢ Why is it important to include every logical step in a proof?

Essential Learning Outcomes
➢ Students will demonstrate the ability to identify similar triangles and solve problems using ratios and proportions.
➢ Students will explore how dilations affect various parts of a figure and thus their relationship with each other.

Technology Infusion
➢ 8.1.12.E.1-Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.
➢ 8.1.12.F.1-Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

Standards Addressed

G.SRT.A.1, G.SRT.A.2, G.SRT.A.3, G.CO.C.9, G.CO.C.10, G.CO.C.11, G.SRT.B.4, G.SRT.B.5

Differentiation
➢ Pre-teach vocabulary using visual and verbal models that are connected to real life situations.
➢ Encourage students to maintain a reference notebook for Geometry by providing them with notes or guiding them in note-taking.
➢ Provide students with hands on opportunities to explore and extend their understanding of transformations by using transparencies, graph paper, dry erase markers, cut out shapes.
➢ Link concepts to everyday examples so that students can visualize the transformations and internalize their distinguishing characteristics.
➢ Review the meaning of symmetry and use visual and verbal models to demonstrate how to identify lines of symmetry in different figures.
➢ Model the thinking and processes necessary to determine a series of transformations that end up with the figure superimposing on top of itself.
➢ Provide students with clues to remember the definitions and know the differences between the terms/concepts. i.e. translation - slide
➢ Encourage students to verbalize their thinking while working in small groups by asking assessing and advancing questions. Use this information to tailor instruction to student needs.
➢ Review the concept of congruence with respect to triangles and then model how to use rigid transformations to prove or disprove congruence.
➢ Encourage students to add this concept to their reference notebook by providing notes or guiding note-taking.
➢ Provide students with hands on opportunities to explore and extend their understanding.

- ➢ Provide students with hands on opportunities to explore and extend their understanding of constructions using tools such as compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.
- ➢ Model the thinking behind the constructions stressing the definitions of the figures and the necessary characteristics to adhere to those definitions.
- ➢ Connect the importance of this practice to real life careers such as engineering, graphic design, manufacturing etc.

Assessments
- ➢ Describe Learning Vertically
- ➢ Identify Key Building Blocks
- ➢ Make Connections (between and among key building blocks)
- ➢ Short/Extended Constructed Response Items
- ➢ Multiple-Choice Items (where multiple answer choices may be correct)
- ➢ Drag and Drop Items
- ➢ Use of Equation Editor
- ➢ Quizzes/Tests
- ➢ Journal Entries/Reflections/Quick-Writes
- ➢ Accountable talk
- ➢ Projects
- ➢ Portfolio
- ➢ Observation
- ➢ Graphic Organizers/ Concept Mapping
- ➢ Presentations
- ➢ Role Playing
- ➢ Teacher-Student and Student-Student Conferencing
- ➢ Homework

21st Century Learning Connection
- ➢ 9.1.12.A.1 Apply critical thinking and problem-solving strategies during structured learning experiences.
- ➢ 9.4.12A.16 Employ critical thinking skills independently and in teams to solve problems and make decisions, (e.g., analyze, synthesize, and evaluate).

Unit 3 – Trigonometry Ratios & Geometric Equations
Six to Eight Weeks

Overview

In this unit, students will demonstrate the ability to solve problems using properties of right triangles, including trigonometric ratios. Furthermore, students will demonstrate the ability to apply definitions and theorems of triangles.

Essential Questions

- ➢ How can theorems be proven using coordinate geometry?
- ➢ How is the relationship between slopes of perpendicular and parallel lines explained?
- ➢ How can a segment be partitioned in a given ratio?
- ➢ How can I use the similarity of right triangles to derive trigonometric ratios?
- ➢ How can right triangles be used to solve real world problems?
- ➢ How are all circles similar? Under what circumstances?

Essential Learning Outcomes

- ➢ Student will demonstrate the ability to use fundamental concepts of geometry, including definitions, basic constructions, and tools of geometry.
- ➢ Student will demonstrate the ability to analyze the effects of transformations.

Technology Infusion

- ➢ 8.1.12.E.1-Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.
- ➢ 8.1.12.F.1-Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.

Differentiation

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- ➢ Provide students with hands on opportunities to explore and extend their understanding of transformations by using transparencies, graph paper, dry erase markers, cut out shapes.
- ➢ Link concepts to everyday examples so that students can visualize the transformations and internalize their distinguishing characteristics.
- ➢ Review the meaning of symmetry and use visual and verbal models to demonstrate how to identify lines of symmetry in different figures.
- ➢ Model the thinking and processes necessary to determine a series of transformations that end up with the figure superimposing on top of itself.
- ➢ Provide students with clues to remember the definitions and know the differences between the terms/concepts. i.e. translation - slide
- ➢ Encourage students to verbalize their thinking while working in small groups by asking assessing and advancing questions. Use this information to tailor instruction to student needs.
- ➢ Review the concept of congruence with respect to triangles and then model how to use rigid transformations to prove or disprove congruence.
- ➢ Encourage students to add this concept to their reference notebook by providing notes or guiding note-taking.
- ➢ Provide students with hands on opportunities to explore and extend their understanding.
- ➢ Provide students with hands on opportunities to explore and extend their understanding of constructions using tools such as compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.
- ➢ Model the thinking behind the constructions stressing the definitions of the figures and the necessary characteristics to adhere to those definitions.
- ➢ Connect the importance of this practice to real life careers such as engineering, graphic design, manufacturing etc.

Assessments

- ➢ Describe Learning Vertically

- ➢ Identify Key Building Blocks
- ➢ Make Connections (between and among key building blocks)
- ➢ Short/Extended Constructed Response Items
- ➢ Multiple-Choice Items (where multiple answer choices may be correct)
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- ➢ 9.1.12.A.1 Apply critical thinking and problem-solving strategies during structured learning experiences.
- ➢ 9.4.12A.16 Employ critical thinking skills independently and in teams to solve problems and make decisions, (e.g., analyze, synthesize, and evaluate).

Geometric Modeling

Six to Eight Weeks

Overview

In this unit, Students will demonstrate the ability to find one- and two- dimensional measurements relating to circles and polygons. Students will explore the ability to apply the properties of angles, parallel and perpendicular lines. Students will understand how to find two- and three- dimensional measurements related to geometric solids.

Essential Questions

- ➢ How are some of the ways you can model real-world objects with geometric shapes?
- ➢ How is density related to area and volume?
- ➢ How can geometry be applied to design an object or structure to solve real world problems?
- ➢ How can I apply Cavalieri's principle to solve problems?

Essential Learning Outcomes

- ➢ Students will demonstrate the ability to find one- and two- dimensional measurements relating to circles and polygons.
- ➢ Students will explore the ability to apply the properties of angles, parallel and perpendicular lines.
- ➢ Students will understand how to find two- and three- dimensional measurements related to geometric solids..

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- ➢ 8.1.12.E.1-Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.
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Standards Addressed

G.MG.A.1, G.GMD.A.3, G.GMD.B.4., G.MG.A.2., G.MG.A.3., G.GMD.A.1

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