Englewood Public School District
Mathematics
Grade 8
Third Marking Period

Unit - Geometry

Overview: The Pythagorean Theorem, geometric transformations and congruence and similarity.

Time Frame: Chapter 7 – 10 days, Chapter 8 - 18 days, Chapter 9 – 14 days
(Chapters 8 and 9 require Online Common Core Additional Resources)

Enduring Understandings:
The Pythagorean Theorem describes the relationship among the three sides of a right triangle.
Geometric transformations move figures on a plane. Each transformation changes some properties of a figure, but leaves other unchanged.
Both congruent figures and similar figures can be related by geometric transformations.

Essential Questions:
How can the Pythagorean Theorem and its converse be modeled?
How is the Pythagorean Theorem used to determine unknown side length is right triangles?
How is the Pythagorean Theorem used to find the distance between two points in a coordinate system?
How can the formulas for the volume of cones, cylinders, and spheres be derived?
How can these formulas be used to solve mathematical and real-world problems?
What are the properties of rotations, reflections and translations?
How can congruency between two figures be described by a series of rotations, reflections, and/or translations?
How can similarity between two figures be described by a series of rotations, reflections, dilations and/or translations?
How can exploration be used to determine the relationships that exist between interior and exterior sums of triangles?
How can exploration be used to determine the relationships that exist between angles created when parallel lines are cut by a transversal?
How can explorations be used to determine the relationships that exist between the angle-angle criterion for similarity of triangles?

Standards	Topics and Objectives	Activities	Resources	Assessments
Chapter 7				
8.G.B.6. **Explain a proof of the Pythagorean Theorem and its converse.** 8.G.B.7. **Apply the Pythagorean Theorem to**	**Topics** Understanding the Pythagorean Theorem and plane figures, understanding distance formula,	8.G.B.6 Converse of the Pythagorean Theorem 8.G.B.7 Running on the Football Field	**SE-8B:** 2-47 **My HRW** - Online access to all Math in Focus materials listed above and Virtual Manipulatives	**Unit 3 Benchmark Assessments:** Common Formative Assessment Exact Path

determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

8.G.B.8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

8.G.C.9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Mathematical Practices
MP.1, MP.2, MP.3, MP.4, MP.6, MP.7, MP.8

understanding the Pythagorean Theorem and solids and identifying volumes of composite solids.

Twenty-First Century Themes and Skills include:
- Creativity and Innovation
- Critical Thinking and Problem Solving
- Communication and Collaboration

Objectives

The students will be able to:
- Use the Pythagorean Theorem to find unknown side lengths.
- Use the converse of the Pythagorean Theorem.
- Solve real-world problems involving the Pythagorean Theorem.
- Use the Pythagorean Theorem to find the distance between two points on a coordinate plane.
- Understand the distance formula.
- Use the Pythagorean Theorem to solve problems involving solids.
- Use the Pythagorean Theorem to find volumes of composite solids.

8.G.B.8 Finding isosceles triangles

8.G.B.8 Finding the distance between points

Math Playground
http://www.mathplayground.com/

Math Fact Practice
http://www.playkidsgames.com/games/mathfact/mathFact.htm

Grades 6-8 Math Fluency Support
https://www.engageny.org/resource/mathematics-fluency-support-grades-6-8

Brain Genie
http://braingenie.ck12.org/

Math Game Time
http://www.mathgametime.com/

Everything you need to know about math journals:
https://thecornerstoneforteachers.com/math-journals/
(NJSLSA.R1, NJSLSA.W2, NJSLSA.L1)

Technology Resources
- Math in Focus eBooks
- Math in Focus Teacher Resources CD
- Interactive Whiteboard lessons
- Virtual Manipulatives
- Online Professional Development Videos

North Carolina Dept of Ed. Wikispaces:
http://maccss.ncdpi.wikispaces.net/Middle+School

Math Goodies – Math Lessons
http://www.mathgoodies.com/

Standards Solution Lessons:
CCSS Prescriptive Lesson Plan: Applying the Pythagorean Theorem

Worksheets for every topic:
http://kutasoftware.com/freeipa.html
(CRP2, CRP4, CRP8)

8th grade assessments, interactive, videos, games, lessons, homework:
https://www.opened.com/search?area=mathematics&grad

Summative Assessments:

Math in Focus Assessments

SE/TE: pp. 44, 45–47

Assessments Course 3: Chapter 7
Test A pp. 123–127;
Test B pp. 128–132

ExamView Assessment Suite – Test and Practice Generator

Formative Assessments:
Math journal (NJSLSA.R1, NJSLSA.W2, NJSLSA.L1)

Multiple choice / short answer assessments (CRP8)

Mini quizzes – assess just one topic, or what was done within 1 or 2 days (CRP8)

Alternative Assessments:
Learning centers: each learning center focuses on a different type of problem (CRP8) (9.2.8.B.3)

	• Reinforce, consolidate, and extend chapter skills and concepts.	**Pythagorean theorem word problems practice:** https://www.khanacademy.org/math/basic-geo/basic-geometry-pythagorean-theorem/pythagorean-theorem-app/e/pythagorean-theorem-word-problems--basic (NJSLSA.R1) **Pythagorean theorem challenge:** https://www.khanacademy.org/math/basic-geo/basic-geometry-pythagorean-theorem/pythagorean-theorem-app/e/pythagorean-theorem-word-problems (CRP8) **Pythagorean theorem video classroom activity:** https://www.youtube.com/watch?time_continue=1&v=DQk_VrWdCr0 (RH.6-8.7) **Pythagorean theorem activity:** http://www.shodor.org/interactivate/lessons/PythagoreanTheorem/ (CRP8)	e=8&offset=0&resource_type=interactive-assessment (CRP2, CRP4, CRP8, 8.1.8.A.1) **8th grade common core worksheets:** https://www.ixl.com/math/grade-8 (CRP2, CRP4, CRP8) **Khan Academy – videos, lessons, assessments www.khanacademy.org** (8.1.8.A.1)	Create posters illustrating the main objectives of the unit (RH.6-8.7) Create a dictionary defining and illustrating vocabulary terms (RH.6-8.7)

Distance and the Pythagorean theorem worksheets:
http://www.math-aids.com/Pythagorean_Theorem/
(CRP8)

Distance between two points game:
https://www.mathgames.com/skill/8.47-find-the-distance-between-two-points
(8.1.8.A.1 CRP8)

Additional texts:
www.newsela.com
www.readworks.org
www.commonlit.org

Chapter 8

Note:	**Topics**	8.G.A.1 Reflections, Rotations, and Translations	**SE-8B:** 48-111	**Summative Assessments:**
It is recommended that additional lessons be taught for the following standards. The lessons are listed in the Resources column and are located in the Online Common Core Additional Resources.	Complementary, supplementary, adjacent angles, angles that share a vertex, alternate interior, alternate exterior, corresponding angles, and interior and exterior angles.	8.G.A.3 Effects of Dilations on Length, Area, and Angles	*Online Common Core Additional Resources for Course 3:* 6.3 Alternate Interior, Alternate Exterior, and Corresponding Angles	**Math in Focus Assessments** **SE/TE**: pp. 107–108, 109–111
		8.G.A.5 Street Intersections		**Assessments Course 3: Chapter 8**
8.G.A.5. Use informal arguments to establish facts about the angle sum and exterior angle of triangles,	Translations, reflections, rotations, dilations, and comparing transformations.	8.G.A.5 Similar Triangles II	*Online Common Core Additional Resources for Course 3:*	Test A pp. 135–139; Test B pp. 140–144 ExamView Assessment

about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*

<mark>8.G.A.1</mark>**. Verify experimentally the properties of rotations, reflections, and translations:**

a. Lines are taken to lines, and line segments to line segments of the same length.
b. Angles are taken to angles of the same measure.
c. Parallel lines are taken to parallel lines.

<mark>8.G.A.3</mark>**. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates**

Mathematical Practices
MP.2, MP.3, MP.4, MP.5, MP.7

Objectives

The students will be able to:
- Identify type of angles formed by parallel lines and a transversal.
- Write and solve equations to find unknown angle measures in figures.
- Explore and apply the properties of the interior angles of a triangle.
- Explore and apply the properties of the exterior angles of a triangle
- Understand the concept of a translation.
- Draw images after translations.
- Find the coordinates of points after translations.
- Understand the concept of a reflection.
- Draw images after reflections.
- Find the coordinates of points after reflections.
- Understand the concept of a rotation.

8.G.A.5 Triangle's Interior Angles

Math Playground
http://www.mathplayground.com/

Math Fact Practice
http://www.playkidsgames.com/games/mathfact/mathFact.htm

Grades 6-8 Math Fluency Support
https://www.engageny.org/resource/mathematics-fluency-support-grades-6-8

Brain Genie
http://braingenie.ck12.org/

Math Game Time
http://www.mathgametime.com/

Everything you need to know about math journals:
https://thecornerstoneforteachers.com/math-journals/
(NJSLSA.R1, NJSLSA.W2, NJSLSA.L1)

Special angle pairs discovery activity:
http://www.cpalms.org/Pu

6.4 Interior and Exterior Angles

SE-8B: 48-111

My HRW - Online access to all Math in Focus materials listed above and Virtual Manipulatives

Technology Resources
- Math in Focus eBooks
- Math in Focus Teacher Resources CD
- Interactive Whiteboard lessons
- Virtual Manipulatives
- Online Professional Development Videos

North Carolina Dept of Ed. Wikispaces:
http://maccss.ncdpi.wikispaces.net/Middle+School

Math Goodies – Math Lessons
http://www.mathgoodies.com/

Standards Solution Lessons:
- **CCSS Lesson Plan:** Transformations: Rotations, Translations and Reflections
- **CCSS Prescriptive Lesson Plan:** Verifying

Suite – Test and Practice Generator

Online Common Core Additional Resources for Course 3:
Chapter 6 Angle Properties and Straight Lines,

Review/Test: Items: 20–28

Online Common Core Additional Resources for Course 3:
Assessments Chapter 6
Test A, Items: 10, 13–16;
Test B, Items: 10, 13–16

Formative Assessments:
Math journal (NJSLSA.R1, NJSLSA.W2, NJSLSA.L1)

Multiple choice / short answer assessments (CRP8)

Alternative Assessments:
Learning centers: each learning center focuses on a different type of problem (CRP8)

- Draw images after rotations.
- Find the coordinates of points after rotations.
- Understand the concept of dilation.
- Find the dimensions of figures after dilations.
- Draw images after dilations.
- Find the center of dilation.
- Compare translations, reflections, rotations and dilations.
- Reinforce, consolidate, and extend chapter skills and concepts.

blic/PreviewResourceLesson/Preview/26664
(CRP8)

12 activities for making parallel lines cut by a transversal memorable:
https://ideagalaxyteacher.com/12-activities-making-parallel-lines-cut-transversal-memorable/
(CRP2)

11 easy activities for teaching effects of transformations:
https://ideagalaxyteacher.com/11-easy-activities-teaching-effects-transformations/
(8.1.8.A.1, CRP8)

Hands-on transformation activities:
https://www.tes.com/articles/secondary-maths-collection-6-transformations
(8.1.8.A.1, CRP8, CRP2)

Additional texts:
www.newsela.com
www.readworks.org
www.commonlit.org

Properties of Transformations
- **CCSS Prescriptive Lesson Plan:** Describing Transformations using Coordinates

Worksheets for every topic:
http://kutasoftware.com/freeipa.html
(CRP2, CRP4, CRP8)

8th grade assessments, interactive, videos, games, lessons, homework:
https://www.opened.com/search?area=mathematics&grade=8&offset=0&resource_type=interactive-assessment
(CRP2, CRP4, CRP8, 8.1.8.A.1)

8th grade common core worksheets:
https://www.ixl.com/math/grade-8
(CRP2, CRP4, CRP8, 8.1.8.A.1)

Khan Academy – videos, lessons, assessments
www.khanacademy.org
(8.1.8.A.1)

(9.2.8.B.3)

Create posters illustrating the main objectives of the unit
(RH.6-8.7)

Chapter 9

Note: It is recommended that additional lessons be taught for the following standards. The lessons are listed in the Resources column and are located in the Online Common Core Additional Resources. **8.G.A.2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.** **8.G.A.4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.** **8.G.A.5. Use informal arguments to establish facts about the angle sum and**	**Topics** Understanding and applying congruent and similar figures and relating congruent and similar figures to geometric transformations. Volume and surface area of cylinders and spheres. Volume of pyramids and cones. Twenty-First Century Themes and Skills include: • Creativity and Innovation • Critical Thinking and Problem Solving • Communication and Collaboration **Objectives** The students will be able to: • Understand and apply the concept of congruence. • Use tests for congruent triangles. • Understand and apply the concept of similarity. • Use tests for similar triangles. • Relate congruent or similar figures using geometric transformations. • Perform and identify a sequence of transformations.	8.G.A.2 Congruent Triangles 8.G.A.4 Are They Similar 8.G.C.9 A Canister of Tennis Balls **Math Playground** http://www.mathplayground.com/ **Math Fact Practice** **http://www.playkidsgames.com/games/mathfact/mathFact.htm** **Grades 6-8 Math Fluency Support** https://www.engageny.org/resource/mathematics-fluency-support-grades-6-8 **Brain Genie** http://braingenie.ck12.org/ **Math Game Time** http://www.mathgametime.com/ **Everything you need to know about math journals:** https://thecornerstoneforteachers.com/math-journals/ (NJSLSA.R1,	**SE-8B:** 112-171 *Online Common Core Additional Resources for Course 3:* 8.2 Finding Volume and Surface Area of Cylinders *Online Common Core Additional Resources for Course 3:* 8.3 Finding Volume and Surface Area of Pyramids and Cones *Online Common Core Additional Resources for Course 3:* 8.4 Finding Volume and Surface Area of Spheres *Online Common Core Additional Resources for Course 3:* 8.5 Real-World Problems: Composite Solids **My HRW** - Online access to all Math in Focus materials listed above and Virtual Manipulatives **Technology Resources** • Math in Focus eBooks	**Summative Assessments:** **Math in Focus Assessments** **SE/TE:** pp. 159, 160–165, 166–171 **Assessments Course 3: Chapter 9** Test A pp. 147–150; Test B pp. 151–155 **Assessments Course 3: Benchmark Test A** pp. 156–161; Benchmark Test B pp. 162–168 *Online Common Core Additional Resources for Course 3:* Chapter 8 Volume and Surface Area of Solids, Review/Test: Items: 1–15 *Online Common Core Additional Resources for Course 3:* Assessments Chapter 8 Test A, Items: 1–12; Test B, Items: 1–12 ExamView Assessment Suite – Test and Practice

exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*

==8.G.C.9.== **Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.**

Mathematical Practices
MP.1, **MP.2**, MP.3, **MP.4**, MP.5, **MP.7**

- Find volume and surface area of cylinders and spheres.
- Find volume of pyramids and cones.
- Solve real-world problems involving cylinders, pyramids, cones and spheres.
- Reinforce, consolidate and extend chapter skills and concepts.

NJSLSA.W2, NJSLSA.L1)

Similar and congruent figures game:
https://www.mathgames.com/skill/8.75-similar-and-congruent-figures
(8.1.8.A.1)

Congruent triangles sss,sas and asa game:
https://www.mathgames.com/skill/8.90-congruent-triangles-sss-sas-and-asa
(8.1.8.A.1)

Connect four: area, volume and surface area activity:
https://www.teacherspayteachers.com/Product/Connect-Four-Area-Volume-and-Surface-Area-8th-Grade-Math-2744312
(CRP2, 8.1.8.A.1)

Surface area and volume worksheets:
http://www.math-aids.com/Geometry/Volume/
(CRP2, 8.1.8.A.1)

Additional texts:
www.newsela.com
www.readworks.org
www.commonlit.org

- Math in Focus Teacher Resources CD
- Interactive Whiteboard lessons
- Virtual Manipulatives
- Online Professional Development Videos

Standards Solution Lessons:
- **PARCC Lesson 14:** Performance Based Assessment – 8.G.2
- **PARCC Lesson 17:** Performance Based Assessment – 8.G.2, 3 & 4
- **PARCC Lesson 17:** Practice Type I items – Geometry domain
- **CCSS Prescriptive Lesson Plan:** Describing Transformations
- **CCSS Prescriptive Lesson Plan:** Volume of Real World Cones, Cylinders and Spheres

Worksheets for every topic:
http://kutasoftware.com/freeipa.html
(CRP2, CRP4, CRP8, 8.1.8.A.1)

8ᵗʰ grade assessments, interactive, videos, games,

Generator

Formative Assessments:
Math journal
(NJSLSA.R1, NJSLSA.W2, NJSLSA.L1)

Multiple choice / short answer assessments
(CRP2, CRP4, CRP6)

Alternative Assessments:
Learning centers: each learning center focuses on a different type of problem (CRP2, CRP4, CRP6)(9.2.8.B.3)

Create posters illustrating the main objectives of the unit
(RH.6-8.7)

lessons, homework:
https://www.opened.com/search?area=mathematics&grade=8&offset=0&resource_type=interactive-assessment
(CRP2, CRP4, CRP8, 8.1.8.A.1)

8th grade common core worksheets:
https://www.ixl.com/math/grade-8
(CRP2, CRP4, CRP8, 8.1.8.A.1)

Khan Academy – videos, lessons, assessments
www.khanacademy.org
(8.1.8.A.1)

Key Vocabulary:
Chapter 7:
Pythagorean Theorem, hypotenuse, leg

Chapter 8:
translation, map, image, transformation, invariant point, reflection, line of reflection, rotation, center of rotation, clockwise, counterclockwise, angle of rotation, half turn, dilation, scale factor, center of dilation, isometry

Chapter 9 :
Congruence, corresponding angles, corresponding sides, statement of congruence, similarity

NJ Learning Standards Vocabulary:
8.G.A.1, 2, 3, 4, & 5
Understand congruence and similarity using physical models, transparencies, or geometry software.

translations, rotations, reflections, line of reflection, center of rotation, clockwise, counterclockwise, parallel lines, congruence, ≅, reading A' as "A prime", similarity, dilations, pre-image, image, rigid transformations, exterior angles, interior angles, alternate interior angles, angle-angle criterion, deductive reasoning, vertical angles, adjacent, supplementary, complementary, corresponding, scale factor, transversal, parallel

8.G.B.6, 7, & 8
Understand and apply the Pythagorean Theorem.
right triangle, hypotenuse, legs, Pythagorean Theorem, Pythagorean triple

8.G.C.9
Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.
cones, cylinders, spheres, radius, volume, height, Pi

Accommodations and Modifications:

Students with special needs: Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered. Additional staff should be included so all students can fully participate in the standards associated with this curriculum.

ELL/ESL students: Students will be supported according to the recommendations for "can do's" as outlined by WIDA - https://www.wida.us/standards/CAN_DOs/

Students at risk of school failure: Formative and summative data will be used to monitor student success at first signs of failure. Student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time will be made available with a certified instructor to aid students in reaching the standards.

Gifted and Talented Students: Students excelling in mastery of standards will be challenged with complex, high level challenges.

English Language Learners:	Special Education:	At-Risk:	Gifted and Talented:
- Use 3-D manipulatives when learning about surface area and volume - Teaching modeling - Peer modeling - Word walls - Give directions in small steps and in as few words as	- Use 3-D manipulatives when learning about surface area and volume - Utilize modifications & accommodations delineated in the students' IEP - Work with paraprofessional - Work with a partner	- Use 3-D manipulatives when learning about surface area and volume - Use visual demonstrations, illustrations and models - Give directions / instructions verbally and in simple written format	- Inquiry based instruction - Independent study - Higher order thinking skills - Adjusting the pace of the lessons - Real world scenarios

possible • Provide visual aids • Group similar problems together • Repeat directions when necessary • Provide a vocabulary list with definitions • Use of alge-tiles when needed • Use of number line when needed	• Shorten assignments to focus on mastery or key concepts • Maintain adequate space between desks • Keep workspaces clear of unrelated materials • Provide fewer problems to attain passing grades • Tape a number line to the student's desk • Create a math journal that they can use during class, on assignments and (if teacher allows) on assessments • Provide extra time to complete a task when needed • Provide definitions of different graphs / charts with illustrations • Allow tests to be taken in a separate room • Allow students to use a calculator when appropriate • Divide test into small sections of similar questions or problems • Use of alge-tiles when needed • Use of number line when needed	• Peer support • Increased one – on – one time • Teachers may modify instructions by modeling what the student is expected to do • Instructions may be printed out in large print and hung up for the students to see during the time of the lesson • Review behavior expectations and make adjustments • Create a math journal that they can use during class, on assignments and (if teacher allows) on assessments • Allow students to complete an independent project as an alternative test • Use of alge-tiles when needed • Use of number line when needed	• Student driven instruction • Allow students to complete an independent project as an alternative test

Interdisciplinary Connections: ELA

NJSLSA.R1. Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

NJSLSA.W2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content

W.8.1: Write arguments to support claims with clear reasons and relevant evidence.

W.8.10: Write routinely over extended time frames (time for research, reflection, metacognition/self correction, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

NJSLSA.L1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking

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Integration of Technology Standards NJSLS:

8.1.8.A.1: Demonstrate knowledge of a real world problem using digital tools.

21st Century Standards

9.2.8.B.3: Evaluate communication, collaboration and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

Career Ready Practices:

CRP2: Apply appropriate academic and technical skills
CRP4: Communicate clearly and effectively and with reason
CRP6: Demonstrate creativity and innovation
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them

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History / Social Studies:

RH.6-8.7 Integrate visual information (e.g., in charts, graphs, photographs, videos or maps) with other information in print and digital texts

Major Supporting Additional (Identified by PARCC Model Content Frameworks)