This course supports the assessments for QPT2. The course covers 6 competencies and represents 2 competency units.

Introduction

Overview
The College Geometry course is one of the culminating assessments for the middle grades mathematics endorsement studies, and provides a transition to the upper-level material of the high school mathematics endorsement studies. As such, it has a substantial focus on proofs and somewhat more abstract ideas than earlier courses; namely, the exploration of non-Euclidean geometries. Be prepared to develop yourself as a proof writer and abstract thinker.

The knowledge you develop will not only be useful for teaching mathematics, but will also be valuable as you prepare for the Praxis II exam and any additional state-mandated mathematics content exams. You have already studied Euclidean geometry in high school, and you will review some of that material here. You will extend your exploration of geometric concepts to include non-Euclidean geometry (e.g., spherical and hyperbolic). This knowledge will prove invaluable as you prepare to teach geometry in the future.

Watch the following video for an introduction to this course:

Note: To download this video, right-click the following link and choose "Save as...": download video.

Competencies
This course provides guidance to help you demonstrate the following 6 competencies:

- **Competency 209.4.1: Problem Solving in Geometry**
  The graduate applies geometry definitions, relationships, and theorems to solve problems.

- **Competency 209.4.2: Spatial Visualization and Geometric Modeling**
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.

- **Competency 209.4.3: Geometric Axioms, Theorems, and Proofs**
  The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.

- **Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry**
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.

- **Competency 209.4.5: Measurement Techniques, Concepts, and Tools**
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.

- **Competency 209.4.6: Non-Euclidean Geometry**
The graduate demonstrates knowledge of core concepts and principles of non-Euclidean geometries in two and three dimensions from both formal and informal perspectives.

Teaching Dispositions Statement
Please review the Statement of Teaching Dispositions.

Course Mentor Assistance
As you prepare to successfully demonstrate competency in this subject, remember that course mentors stand ready to help you reach your educational goals. As subject matter experts, mentors enjoy and take pride in helping students become reflective learners, problem solvers, and critical thinkers. Course mentors are excited to hear from you and eager to work with you.

Successful students report that working with a course mentor is the key to their success. Course mentors are able to share tips on approaches, tools, and skills that can help you apply the content you’re studying. They also provide guidance in assessment preparation strategies and troubleshoot areas of deficiency. Even if things don't work out on your first try, course mentors act as a support system to guide you through the revision process. You should expect to work with course mentors for the duration of your coursework, so you are welcome to contact them as soon as you begin. Course mentors are fully committed to your success!

Preparing for Success

The information in this section is provided to detail the resources available for you to use as you complete this course.

Learning Resources
The learning resources listed in this section are required to complete the activities in this course. For many resources, WGU has provided automatic access through the course. However, you may need to manually enroll in or independently acquire other resources. Read the full instructions provided to ensure that you have access to all of your resources in a timely manner.

Manually Enrolled Resources

Take a moment to enroll in the learning resources listed in this section. To enroll, navigate to the “Learning Resources” tab, click the “Sections” button, and then click the “Enroll Now” button for each resource. Once your mentor approves your enrollment in the resource, you will receive an e-mail with further access instructions. Contact your mentor if you have questions.

Geometer’s Sketchpad
Geometer’s Sketchpad is interactive geometry software that you will learn and utilize throughout this course. Geometer's Sketchpad is used in many geometry classrooms throughout the United States, so becoming familiar with this important resource now will also prepare you to teach geometry in the future.

Automatically Enrolled Resources

You can access the learning resources listed in this section by clicking on the links provided throughout the course. You may be prompted to log in to the WGU student portal to access the
resources.

**VitalSource E-Texts**
The following textbooks are available to you as an e-text within this course. You will be directly linked to the specific readings required within the activities that follow.


This resource is accompanied by video lectures that will be used throughout this course. You will be directly linked to the video lectures required within the activities that follow.

*Note: These e-texts are available to you as part of your program tuition and fees, but you may purchase hard copies at your own expense through a retailer of your choice. If you choose to do so, please use the ISBN listed to ensure that you receive the correct edition.*

**Thinkwell**
You will access the materials in the following Thinkwell courses at the activity level within this course. These web-based resources include multimedia video lectures, review notes, interactive animations, and sample exercises:

- Thinkwell Calculus, ONLINE
- Thinkwell Geometry, ONLINE

**Other Learning Resources**

You will use the following learning resources for this course.

**Purchase a Graphing Calculator**
Acquire a graphing calculator and familiarize yourself with how to use it. Refer to the [Calculator Guidelines](#) in the WGU Student Handbook for details regarding calculators that are acceptable on WGU exams.

If you are in a secondary mathematics program, refer to the [WGU Calculator Recommendations](#) for calculator suggestions for your degree program. If you are not in a secondary mathematics program, contact your mentor to discuss calculators appropriate to your degree program.

If you are not in a secondary mathematics program, contact your mentor to discuss calculators appropriate to your degree program.

**Lynda.com**
WGU students have open access to the complete Lynda.com library of training videos. This resource can be used to help you become more comfortable with technology, such as Microsoft Office applications, software programs, and e-mail, in order to provide supplemental learning tools for your WGU courses. To access the main search page, click the link below.
Before starting into the formalities of geometry, you will begin this course with a familiar topic of measurement. You will investigate this topic, along with some of its associated topics, such as precision, accuracy, estimation, and error.

**Measurement**
Measurement, by its very nature, is always an estimate. This can be a bit uncomfortable for mathematicians since they are more familiar with working with exact numbers. However, applied mathematics is based on measurements, which are estimations that need significant figures.

When you have completed the following activities you should be able to:

- recognize measurement attributes,
- identify appropriate measurement units,
- identify appropriate measurement tools,
- convert between metric and traditional systems, and
- estimate a given measurement.

This topic addresses the following competency:

- Competency 209.4.5: Measurement Techniques, Concepts, and Tools
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.

**What Does It Mean To Measure?**
Review the following web page:

- [What Does It Mean To Measure?](#)

This is a short module that includes text, video, interactive activities, and homework questions. Please advance through the module all the way to the homework tab and complete the exercises there.

**Fundamentals of Measurement**
Review the following web page:

- [Fundamentals of Measurement](#)

This is a short module that includes text, video, interactive activities, and homework questions.
Please advance through the module all the way to the homework tab and complete the exercises there. Please note that what is covered in regards to “relative error” in this activity is not the same form of “relative error” that you will use in Part C of Task 4. See the next activity for the type of “relative error” you will be using in the task.

**Error in Measurement**

Review the following web page:

- [Error in Measurement](#)

This has some helpful information about error in measurement. Particularly focus on “3. Absolute Error and Relative Error” from this website to help you in completion of Part C of Task 4. Please note that this form of “relative error” is the only form you can use in your task. Can you see why that is?

**OPTIONAL: The Metric System**

Review the following web page if you need a review of the metric system:

- [The Metric System](#)

This is a short module that includes text, video, interactive activities, and homework questions. Please advance through the module all the way to the homework tab and complete the exercises there.

**Task 4**

You now have the competency necessary to complete RQPT Task 4.

**Complete: Task 4 Performance Task**

Complete the following task in TaskStream:

- QPT1 College Geometry: RQPT Task 4

For details about this performance assessment, see the "Assessment" tab in this course.

Upon completing this, you should submit this task for evaluation. Check your submission against the scoring rubric before submitting.

**Geometry Foundations**

A geometry course may be the first time you have undertaken proof writing in earnest. In this way, geometry is more than just the study of the relationships of lines and angles; it is also the study of how to write proofs. These first topics will build the foundation both of the attributes of shapes as well as the reasoning and method of writing geometry proofs.

**Line and Angle Relationships**

This introductory topic lays the foundation for the rest of geometry by laying out the tools used
to study geometric relationships as well as building skills in writing proofs.

This topic addresses the following competencies:

- **Competency 209.4.1: Problem Solving in Geometry**
  The graduate applies geometry definitions, relationships, and theorems to solve problems.

- **Competency 209.4.2: Spatial Visualization and Geometric Modeling**
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.

- **Competency 209.4.3: Geometric Axioms, Theorems, and Proofs**
  The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.

- **Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry**
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.

### Sets, Statements, and Reasoning

Watch the following video lecture:

- **1.1 Sets, Statements, and Reasoning**

OR

Read the following pages in *Elementary Geometry for College Students*:

- **pages 1–8 of section 1.1 ("Sets, Statements, and Reasoning")**

After watching the video or reading the selection, complete the following exercises from section 1.1:

- 11, 13, 25, 27, 29, 37, 39, 41, 43, 45

*Note: The answers to odd-numbered exercises appear in the back of the text. A best practice is to look at the answers after you believe you have correctly solved each problem.*

### Informal Geometry and Measurement

Watch the following video lecture:

- **1.2 Informal Geometry and Measurement**

OR

Read the following pages in *Elementary Geometry for College Students*:

- **pages 10–17 of section 1.2 ("Informal Geometry and Measurement")**
After watching the video or reading the selection, complete the following exercises from section 1.2:

- 5, 7, 9, 19, 24, 27, 29, 37, 39, 43, 46, 47

**Task 5 Part A**
You now have the competency necessary to complete Part A of QPT Task 5.

**Complete: Task 5, Part A Performance Task**

OPTIONAL: Watch the following recording as an overview and clarification of this part of task 5.

*Note: To download this video, right-click the following link and choose "Save as...": [download video]*

Complete the following task subsection in TaskStream:

- QPT2 College Geometry: QPT Task 5, Part A

For details about this performance assessment, see the "Assessment" tab in this course.

Do not submit your work on this task yet. You will be directed to completing the other parts of this task as you progress through this course, and you will submit your work on this task when you have completed all parts of it.

**Line and Angle Relationships (continued)**
This introductory topic lays the foundation for the rest of geometry by laying out the tools used to study geometric relationships as well as building skills in writing proofs.

This topic addresses the following competencies:

- Competency 209.4.1: Problem Solving in Geometry
  The graduate applies geometry definitions, relationships, and theorems to solve problems.
- Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.
- Competency 209.4.3: Geometric Axioms, Theorems, and Proofs
  The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.
- Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.

**Early Definitions and Postulates**

Watch the following video lecture:
• 1.3 Early Definitions and Postulates

OR

Read the following pages in *Elementary Geometry for College Students*:

• pages 21–28 of section 1.3 ("Early Definitions and Postulates")

After watching the video or reading the selection, complete the following exercises from section 1.3:

• 9, 11, 13, 14, 15, 19, 21, 23, 25, 32, 33, 35, 37

**Angles and Their Relationships**

Watch the following video lecture:

• 1.4 Angles and Their Relationships

OR

Read the following pages in *Elementary Geometry for College Students*:

• pages 30–36 of section 1.4 ("Angles and Their Relationships")

After watching the video or reading the selection, complete the following exercises from section 1.4:

• 5, 7, 9, 11, 13, 19, 27, 31, 32, 33, 34, 35, 36, 37, 41, 43

Also, using Geometer’s Sketchpad, complete the Technology Exploration on page 32 of *Elementary Geometry for College Students*. Atomic Learning has several video tutorials for Geometer’s Sketchpad.

**Introduction to Geometric Proof**

Watch the following video lecture:

• 1.5 Introduction to Geometric Proof

OR

Read the following pages in *Elementary Geometry for College Students*:

• pages 39–43 of section 1.5 ("Introduction to Geometric Proof")

After watching the video or reading the selection, complete the following exercises in section 1.5:
• 1, 3, 5, 7, 9, 11, 13, 15, 27, 29, 31, 37

Relationships: Perpendicular Lines

Watch the following video lecture:

• 1.6 Relationships: Perpendicular Lines

OR

Read the following pages in Elementary Geometry for College Students:

• pages 46–50 of section 1.6 ("Relationships: Perpendicular Lines")

After watching the video or reading the selection, complete the following exercises in section 1.6:

• 1, 3, 5, 7, 9, 11, 13, 15, 19, 21, 23, 25, 27

The Formal Proof of a Theorem

Watch the following video lecture:

• 1.7 The Formal Proof of a Theorem

OR

Read the following pages in Elementary Geometry for College Students:

pages 53–58 of section 1.7 ("The Formal Proof of a Theorem")

After watching the video or reading the selection, complete the following exercises from section 1.7:

• 1–33, odd numbers only

Parallel Lines

Geometric proof is further investigated in this topic, with special focus on parallel lines. Knowing the Euclidean definition of parallel lines, as well as when lines are or are not parallel, can be crucial in proving geometric properties.

This topic addresses the following competencies:

• Competency 209.4.1: Problem Solving in Geometry
  The graduate applies geometry definitions, relationships, and theorems to solve problems.
• Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze
geometric shapes and structures, and their properties.

- Competency 209.4.3: Geometric Axioms, Theorems, and Proofs
  The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.

- Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.

**The Parallel Postulate and Special Angles**

Watch the following video lecture:

- [2.1 The Parallel Postulate and Special Angles](#)

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 72–78 of section 2.1 (“The Parallel Postulate and Special Angles”)

After watching the video or reading the selection, complete the following exercises from section 2.1:

- 1, 3, 5, 7, 9, 11, 13, 19, 21, 23, 25, 27, 29, 31, 33

**Indirect Proof**

Watch the following video lecture:

- [2.2 Indirect Proof](#)

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 80–84 of section 2.2 (“Indirect Proof”)

After watching the video or reading the selection, complete the following exercises from section 2.2:

- 1, 3, 5, 7, 8, 9, 15, 16, 19

**Proving Lines Parallel**

Watch the following video lecture:

- [2.3 Proving Lines Parallel](#)

OR
Read the following pages in *Elementary Geometry for College Students*:

- pages 86–90 of section 2.3 ("Proving Lines Parallel")

After watching the video or reading the selection, complete the following exercises from section 2.3:

- 1–21, odd numbers only

**The Angles of a Triangle**

Watch the following video lecture:

- 2.4 The Angles of a Triangle

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 92–96 of section 2.4 ("The Angles of a Triangle")

After watching the video or reading the selection, complete the following exercises from section 2.4:

- 1, 3, 7, 9, 11, 13, 15, 17, 19, 21, 23, 31, 33, 35, 47

Also, using Geometer’s SketchPad, complete the technology exploration on page 94.  

**Task 3 Part C2**

You now have the competency necessary to complete Part C2 of RQPT Task 3. 

**Complete: Task 3, Part C2 Performance Task**

Complete the following task subsection in TaskStream:

- QPT2 College Geometry: RQPT Task 3, Part C2

For details about this performance assessment, see the "Assessment" tab in this course.

Do not submit your work on this task yet. You will be directed to completing the other parts of this task as you progress through this course of study, and you will submit your work on this task when you have completed all parts of it.

**Polygons with Many Sides**

The properties previously discussed about triangles and quadrilaterals can be generalized to even larger polygons. When you have completed the following activities, you should be able to

- classify polygons based on their measurements and/or properties, and
- determine relationships between certain attributes of a polygon and the number of sides
Convex Polygons

Watch the following video lecture:

• 2.5 Convex Polygons

OR

Read the following pages in Elementary Geometry for College Students:

• pages 99–105 of section 2.5 ("Convex Polygons")

After watching the video or reading the selection, complete the following exercises from section 2.5:

• 1–27, odd numbers only; 31, 35, 37, 43

Transformations

After completing the following activities, you should be able to mentally visualize and graphically show the effect of the following geometric transformations:

• translation
• reflection
• rotation
• dilation

This topic addresses the following competencies:

• Competency 209.4.1: Problem Solving in Geometry
  The graduate applies geometry definitions, relationships, and theorems to solve problems.
• Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.
• Competency 209.4.3: Geometric Axioms, Theorems, and Proofs
  The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.
• Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.
problems.

- Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.

- Competency 209.4.3: Geometric Axioms, Theorems, and Proofs
  The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.

- Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.

**Symmetry and Transformations**

Watch the following video lecture:

- [2.6 Symmetry and Transformations](#)

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 107–115 of section 2.6 ("Symmetry and Transformations")

After watching the video or reading the selection, complete the following exercises from section 2.6:

- 1–31 odd

Also watch the following video lecture from Thinkwell Geometry:

- [13.1.6 Dilations](#)

And complete the associated exercises for 13.1.6.

**Triangles**

Triangles and their attributes were introduced in section 2.4 of *Elementary Geometry for College Students*. Proving that two triangles are congruent is a technique often used in geometric proof, even when the theorem is not directly related to triangles. Be aware of the classifications of triangles, as well as their attributes: vertex, side, angle, median, midpoint, and altitude.

This topic addresses the following competencies:

- Competency 209.4.1: Problem Solving in Geometry
  The graduate applies geometry definitions, relationships, and theorems to solve problems.

- Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze
geometric shapes and structures, and their properties.

- Competency 209.4.3: Geometric Axioms, Theorems, and Proofs
  The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.
- Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.

**Congruent Triangles**

Watch the following video lecture:

- 3.1 Congruent Triangles

OR

Read the following pages in *Elementary Geometry for College Students*:

pages 128–134 of section 3.1 ("Congruent Triangles")

After watching the video or reading the selection, complete the following exercises from section 3.1:

- 1–31, odd numbers only; 41

**Corresponding Parts of Congruent Triangles**

Watch the following video lecture:

- 3.2 Corresponding Parts of Congruent Triangles

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 138–142 of section 3.2 ("Corresponding Parts of Congruent Triangles")

After watching the video or reading the selection, complete the following exercises from section 3.2:

- 1, 5, 9, 11, 15, 17, 19, 21, 23, 33

**Isosceles Triangles**

Watch the following video lecture:

- 3.3 Isosceles Triangles

OR
Read the following pages in *Elementary Geometry for College Students*:

- pages 145–151 of *section 3.3 ("Isosceles Triangles")*

After watching the video or reading the selection, complete the following exercises from section 3.3:

- 1, 3, 5, 7, 9, 11, 19, 21, 23, 25, 27, 31, 33, 39, 41, 43

**Quadrilaterals**

Quadrilaterals were briefly touched on in section 2.5 of *Elementary Geometry for College Students*. Quadrilaterals are now discussed more specifically: the square, rectangle, parallelogram, rhombus, and trapezoid. When you have completed the following activities, you should be able to

- classify quadrilaterals based on their measurements and/or properties, and
- determine relationships between different classifications of quadrilaterals.

This topic addresses the following competencies:

- Competency 209.4.1: Problem Solving in Geometry
  The graduate applies geometry definitions, relationships, and theorems to solve problems.
- Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.
- Competency 209.4.3: Geometric Axioms, Theorems, and Proofs
  The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.
- Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.

**Properties of a Parallelogram**

Watch the following video lecture:

- 4.1 Properties of a Parallelogram

OR

Read the following pages in *Elementary Geometry for College Students*:

pages 178–183 of *section 4.1 ("Properties of a Parallelogram")*

After watching the video or reading the selection, complete the following exercises from section 4.1:
• 3, 5, 11, 13, 15, 17, 19, 21, 23, 27

The Parallelogram and the Kite

Watch the following video lecture:

• 4.2 The Parallelogram and the Kite

OR

Read the following pages in Elementary Geometry for College Students:

• pages 187–192 of section 4.2 ("The Parallelogram and the Kite")

After watching the video or reading the selection, complete the following exercises from section 4.2:

• 1–21, odd numbers only

Task 5 Part B

You now have the competency necessary to complete Part B of QPT Task 5.

Complete: Task 5, Part B Performance Task

OPTIONAL: Watch the following recording as an overview and clarification of this part of task 5.

Note: To download this video, right-click the following link and choose “Save as...”: download video.

Complete the following task subsection in TaskStream:

• QPT2 College Geometry: QPT Task 5, Part B

For details about this performance assessment, see the "Assessment" tab in this course.

Do not submit your work on this task yet. You will be directed to completing the other parts of this task as you progress through this course of study, and you will submit your work on this task when you have completed all parts of it.

Quadrilaterals (continued)

Quadrilaterals were briefly touched on in section 2.5 of Elementary Geometry for College Students. Quadrilaterals are now discussed more specifically: the square, rectangle, parallelogram, rhombus, and trapezoid. When you have completed the following activities, you should be able to
classify quadrilaterals based on their measurements and/or properties, and
determine relationships between different classifications of quadrilaterals.

This topic addresses the following competencies:

- Competency 209.4.1: Problem Solving in Geometry
  The graduate applies geometry definitions, relationships, and theorems to solve
  problems.
- Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze
  geometric shapes and structures, and their properties.
- Competency 209.4.3: Geometric Axioms, Theorems, and Proofs
  The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves
  geometric theorems.
- Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to
  solve geometric problems.

The Rectangle, Square, and Rhombus

Watch the following video lecture:

- 4.3 The Rectangle, Square, and Rhombus

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 195–201 of section 4.3 ("The Rectangle, Square, and Rhombus")

After watching the video or reading the selection, complete the following exercises from section
4.3:

- 1–23, odd numbers only; 29, 31, 33

The Trapezoid

Watch the following video lecture:

- 4.4 The Trapezoid

OR
Read the following pages in *Elementary Geometry for College Students*:

- pages 204–208 of section 4.4 ("The Trapezoid")

After watching the video or reading the selection, complete the following exercises:

- 1–13, odd numbers only; 17, 19, 21, 23, 27

**Geometric Properties**

Basic proof writing and an introduction to the properties of basic shapes lead into the following topics, which cover similarity, the Pythagorean Theorem, and other more complex geometric relationships. These topics also cover the attributes of more complex shapes: circles.

Additional measures of the attributes of a variety of shapes are discussed:

- perimeter
- area
- surface area
- volume

**Similarity and Congruence**

Congruence of triangles was discussed in sections 3.1 and 3.2 of *Elementary Geometry for College Students*. Similarity is another relationship between polygons that can be useful as you explore geometric topics. Two polygons that look exactly the same, except that one is a different size than another, are called *similar*. A more mathematical definition is given in the reading.

This topic addresses the following competencies:

- Competency 209.4.1: Problem Solving in Geometry
  The graduate applies geometry definitions, relationships, and theorems to solve problems.
- Competency 209.4.3: Geometric Axioms, Theorems, and Proofs
  The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.
- Competency 209.4.5: Measurement Techniques, Concepts, and Tools
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.

**Similar Polygons**

Watch the following video lecture:

- 5.2 Similar Polygons
Read the following pages in *Elementary Geometry for College Students*:

- pages 227–232 of section 5.2 ("Similar Polygons")

After watching the video or reading the selection, complete the following exercises from section 5.2:

- 1–15, odd numbers only; 21, 23, 25

**Pythagorean Theorem**

You previously touched on the Pythagorean Theorem in sections 3.2 and 4.4 in *Elementary Geometry for College Students*. You will now get a thorough treatment of this important theorem. When you have completed the following activities, you should be able to

- recite the Pythagorean Theorem from memory, and
- apply the Pythagorean theorem to situations involving right triangles.

This topic addresses the following competencies:

- Competency 209.4.1: Problem Solving in Geometry
  The graduate applies geometry definitions, relationships, and theorems to solve problems.
- Competency 209.4.3: Geometric Axioms, Theorems, and Proofs
  The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.
- Competency 209.4.5: Measurement Techniques, Concepts, and Tools
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.

**The Pythagorean Theorem**

Watch the following video lecture:

- 5.4 The Pythagorean Theorem

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 244–250 of section 5.4 ("The Pythagorean Theorem")

After watching the video or reading the selection, complete the following exercises from section 5.4:

- 7, 13, 15, 17, 25, 27, 29, 31, 33

**Special Triangles**

Certain classifications of triangles have nice properties, and are therefore considered special
triangles. These classifications include equilateral and isosceles triangles from sections 2.4 and 3.3 of *Elementary Geometry for College Students*, as well as right triangles, discussed in this section.

This topic addresses the following competencies:

- Competency 209.4.1: Problem Solving in Geometry
  The graduate applies geometry definitions, relationships, and theorems to solve problems.
- Competency 209.4.3: Geometric Axioms, Theorems, and Proofs
  The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.
- Competency 209.4.5: Measurement Techniques, Concepts, and Tools
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.

**Special Right Triangles**

Watch the following video lecture:

- [5.5 Special Right Triangles](#)

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 252–256 of section 5.5 (“Special Right Triangles”)

After watching the video or reading the selection, complete the following exercises from section 5.5:

- 1–25, odd numbers only

**Circle Properties**

Learn the definition of the parts of circles, and keep track of the relationships among them. When you have completed the following activities, you should be able to

- recite the definitions of center, radius, inscribed angle, central angle, tangent, arc, and sector and draw the corresponding diagrams; and
- compute measurements of different attributes of the circle.

This topic addresses the following competencies:

- Competency 209.4.1: Problem Solving in Geometry
  The graduate applies geometry definitions, relationships, and theorems to solve problems.
- Competency 209.4.3: Geometric Axioms, Theorems, and Proofs
The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.

- **Competency 209.4.5: Measurement Techniques, Concepts, and Tools**
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.

**Circles and Related Segments and Angles**

Watch the following video lecture:

- **6.1 Circles and Related Segments and Angles**

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 278–285 of *section 6.1* ("Circles and Related Segments and Angles")

After watching the video or reading the selection, complete the following exercises from section 6.1:

- 1–31, odd numbers only

**More Measure Angles in the Circle**

Watch the following video lecture:

- **6.2 More Measure Angles in the Circle**

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 288–296 of *section 6.2* ("More Measure Angles in the Circle")

After watching the video or reading the selection, complete the following exercises from section 6.2:

- 1–23, odd numbers only; 29, 33

**Perimeter and Area**

The perimeter and area of a figure give information about the length of the exterior and the coverage of the interior. The formulas for finding the perimeter and area need not simply be memorized; they are based on the mathematical principles of addition and multiplication, and can be deduced.

This topic addresses the following competencies:
Competency 209.4.1: Problem Solving in Geometry
The graduate applies geometry definitions, relationships, and theorems to solve problems.

Competency 209.4.3: Geometric Axioms, Theorems, and Proofs
The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.

Competency 209.4.5: Measurement Techniques, Concepts, and Tools
The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.

Area and Initial Postulates

Watch the following video lecture:

- 8.1 Area and Initial Postulates

OR

Read the following pages in Elementary Geometry for College Students:

- pages 352–358 of section 8.1 ("Area and Initial Postulates")

After watching the video or reading the selection, complete the following exercises from section 8.1:

- 1–29, odd numbers only

Perimeter and Area of Polygons

Watch the following video lecture:

- 8.2 Perimeter and Area of Polygons

OR

Read the following pages in Elementary Geometry for College Students:

- pages 363–370 of section 8.2 ("Perimeter and Area of Polygons")

After watching the video or reading the selection, complete the following exercises from section 8.2:

- 1, 3, 5, 7, 13, 15, 17, 19, 21, 29, 31, 33, 35, 37, 39

Circumference and Area of a Circle

Watch the following video lecture:

- 8.4 Circumference and Area of a Circle
Read the following pages in *Elementary Geometry for College Students*:

- pages 379–384 of section 8.4 ("Circumference and Area of a Circle")

After watching the video or reading the selection, complete the following exercises from section 8.4:

- 1, 3, 5, 7, 9, 11, 13, 15, 21, 23, 25, 27, 31, 33

**Surface Area and Volume**

Perimeter and area of two-dimensional figures can be expanded to surface area and volume of three-dimensional figures. As with perimeter and area, surface area and volume formulas need not simply be memorized. These formulas are also based on the mathematical principles of addition and multiplication, and can be deduced.

This topic addresses the following competencies:

- Competency 209.4.1: Problem Solving in Geometry
  The graduate applies geometry definitions, relationships, and theorems to solve problems.
- Competency 209.4.3: Geometric Axioms, Theorems, and Proofs
  The graduate demonstrates a firm grasp of the axiomatic nature of geometry and proves geometric theorems.
- Competency 209.4.5: Measurement Techniques, Concepts, and Tools
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.

**Prisms, Area, and Volume**

Watch the following video lecture:

- [9.1 Prisms, Area, and Volume](#)

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 404–410 of section 9.1 ("Prisms, Area, and Volume")

After watching the video or reading the selection, complete the following exercises from section 9.1:

- 1–31, odd numbers only

**Cylinders and Cones**
Watch the following video lecture:

- **9.3 Cylinders and Cones**

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 424–431 of *section 9.3 ("Cylinders and Cones")*

After watching the video or reading the selection, complete the following exercises from section 9.3:

- 1–31, odd numbers only

**Polyhedrons and Spheres**

Watch the following video lecture:

- **9.4 Polyhedrons and Spheres**

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 433–439 of *section 9.4 ("Polyhedrons and Spheres")*

After watching the video or reading the selection, complete the following exercises from section 9.4:

- 13, 23, 25, 27, 29, 31, 33, 35

**Geometric Perspectives**

The previous focus on synthetic geometry is expanded to include analytic and vector geometry. Also, the parallel postulate is investigated and discarded with an introduction to non-Euclidean geometry.

**Coordinate Geometry**

Using coordinates—the $(x, y)$ ordered pairs of the Cartesian approach—is one way to represent spatial relationships and to specify locations. Formulas in arithmetic and algebra become relevant to describing geometric situations.

This topic addresses the following competencies:

- Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.
Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.

Competency 209.4.5: Measurement Techniques, Concepts, and Tools
The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.

Competency 209.4.6: Non-Euclidean Geometry
The graduate demonstrates knowledge of core concepts and principles of non-Euclidean geometries in two and three dimensions from both formal and informal perspectives.

The Rectangular Coordinate System

Watch the following video lecture:

- 10.1 The Rectangular Coordinate System

OR

Read the following pages in Elementary Geometry for College Students:

- pages 450–455 of section 10.1 ("The Rectangular Coordinate System")

After watching the video or reading the selection, complete the following exercises from section 10.1:

- 1–41, odd numbers only; 45, 47

Task 1 Part A
You now have the competency necessary to complete Part A of RQPT Task 1.

Complete: Task 1, Part A Performance Task

Complete the following task subsection in TaskStream:

- QPT1 College Geometry: RQPT Task 1, Part A

For details about this performance assessment, see the "Assessment" tab in this course.

Do not submit your work on this task yet. You will be directed to completing the other parts of this task as you progress through this course, and you will submit your work on this task when you have completed all parts of it.

3D Coordinate System
The idea of Cartesian coordinates can be generalized to \((x, y, z)\) ordered triples to represent location in space. When you have completed the following activities, you should be able to

- find the length of a segment in three dimensions, and
- find the midpoint of a segment in three dimensions.
This topic addresses the following competencies:

- **Competency 209.4.2: Spatial Visualization and Geometric Modeling**
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.

- **Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry**
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.

- **Competency 209.4.5: Measurement Techniques, Concepts, and Tools**
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.

- **Competency 209.4.6: Non-Euclidean Geometry**
  The graduate demonstrates knowledge of core concepts and principles of non-Euclidean geometries in two and three dimensions from both formal and informal perspectives.

### A Three-Dimensional Coordinate System

Watch the videos in “Example 2, 4, and 5” in the following link from Thinkwell Geometry:

- **12.1.8 Formulas in Three Dimensions**

Watch the following YouTube video on additional explanation on the three-dimensional coordinate system:

It is also acceptable to view the 3D coordinate system with the axes set up as in the image below. Use the version that makes the most sense to you: the ones shown in the videos or the one below in the image.

- **3D Coordinate System**

### Task 1 Part B

You now have the competency necessary to complete Part B of RQPT Task 1.

**Complete: Task 1, Part B Performance Task**

Complete the following task subsection in **TaskStream**:

- QPT1 College Geometry: RQPT Task 1, Part B

For details about this performance assessment, see the "Assessment" tab in this course.

Do not submit your work on this task yet. You will be directed to completing the other parts of this task as you progress through this course, and you will submit your work on this task when you have completed all parts of it.

### Dynamic Geometry Software

Dynamic geometry software, such as Geometer’s Sketchpad, greatly enhances the depth with
which geometry can be studied. The tutorials in Atomic Learning and the Technology Explorations in above activities have given you a taste of what this powerful software can do. When you have completed the following activities, you should be able to

- see how dynamic geometry can help visualize mathematical properties, and
- complete more difficult dynamic geometry activities.

This topic addresses the following competencies:

- Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.
- Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.
- Competency 209.4.5: Measurement Techniques, Concepts, and Tools
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.
- Competency 209.4.6: Non-Euclidean Geometry
  The graduate demonstrates knowledge of core concepts and principles of non-Euclidean geometries in two and three dimensions from both formal and informal perspectives.

**Dynamic Geometry Software**

Open your Geometer’s Sketchpad program to start learning some of the basics in how to use the software. Access the following link from Geometer’s Sketchpad Learning Center to investigate the construction of triangles and for learning some basic features of the software. It is recommended that you complete up through step 24. You can either read how to complete these constructions, or watch the videos of how to complete these constructions by clicking on the “film” icon.

- **Constructing Triangles**

Now access the following link from Geometer’s Sketchpad Learning Center to investigate more constructions and other useful functions with the software. It is recommended that you complete up through step 22. Again, you can either read how to complete these constructions, or watch the videos for them by clicking on the “film” icon.

- **Properties of Shapes**

Now access the following link from Geometer’s Sketchpad Learning Center to investigate more useful functions with the software. It is recommended that you complete up through step 25. Again, you can either read how to complete these constructions, or watch the videos for them by clicking on the “film” icon.

- **Angles in a Triangle**
And finally, if you would like additional instruction on the features and functionality of Geometer’s Sketchpad, you can investigate all that the Learning Center offers for using Sketchpad from the link below. You can also access the Learning Center from the “Help” menu in your Sketchpad program, and then “Using Sketchpad.”

- **Using Sketchpad**

**Constructing a Rectangle with Geometer’s Sketchpad**

Watch one or more of the following videos to learn techniques for constructing a rectangle with Geometer’s Sketchpad:

*Note: To download this video, right-click the following link and choose "Save as...": [download video].*

*Note: To download this video, right-click the following link and choose "Save as...": [download video].*

*Note: To download this video, right-click the following link and choose "Save as...": [download video].*

**Task 1 Part C**

You now have the competency necessary to complete Part C of RQPT Task 1.

**Complete: Task 1, Part C Performance Task**

Complete the following task in **TaskStream**:

- QPT1 College Geometry: RQPT Task 1, Part C

For details about this performance assessment, see the "Assessment" tab in this course.

Upon completing Part C, you should now submit Task 1 for evaluation. Check your submission against the scoring rubric before submitting.

**Analytic and Synthetic Proofs**

Synthetic geometry is another name for the rigorous deductive approach to geometry that uses axioms and undefined terms that match Euclid’s. You have seen and used this approach thus far in this course of study. You will now learn about analytic proofs.

This method is an algebraic approach to geometry that puts all figures on a Cartesian plane and focuses on doing proofs by reducing them to algebra and thus leaning on the axioms and undefined terms of algebra and arithmetic. When you have completed the following activities, you should be able to

- compare and contrast synthetic and analytic proof methods
complete proofs of geometric theorems using analytic methods

This topic addresses the following competencies:

- Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.
- Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.
- Competency 209.4.5: Measurement Techniques, Concepts, and Tools
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.
- Competency 209.4.6: Non-Euclidean Geometry
  The graduate demonstrates knowledge of core concepts and principles of non-Euclidean geometries in two and three dimensions from both formal and informal perspectives.

Preparing to Do Analytic Proofs

Watch the following video lecture:

- 10.3 Preparing to Do Analytic Proofs

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 466–472 of section 10.3 ("Preparing to Do Analytic Proofs")

After watching the video or reading the selection, complete the following exercises from section 10.3:

- 1–35, odd numbers only

Analytic Proofs

Watch the following video lecture:

- 10.4 Analytic Proofs

OR

Read the following pages in *Elementary Geometry for College Students*:

- pages 475–479 of section 10.4 ("Analytic Proofs")

After watching the video or reading the selection, complete the following exercises from section...
10.4:

- 1, 5, 9, 13, 19, 25

**Task 5 Parts C and D**

You now have the competency necessary to complete Parts C and D of QPT Task 5.

**Complete: Task 5, Parts C and D Performance Task**

OPTIONAL: Watch the following recording as an overview and clarification for these parts of Task 5.

*Note: To download this video, right-click the following link and choose "Save as...": [download video]*

Complete the following task in [TaskStream]:

- QPT1 College Geometry: QPT Task 5, Parts C and D

For details about this performance assessment, see the "Assessment" tab in this course.

Upon completing Parts C and D, you should now submit Task 5 for evaluation. Check your submission against the scoring rubric before submitting.

**Vectors**

The vector approach to geometry evolved in cooperation with the way vectors are used in basic physics. To understand this approach, think of shapes in space as a collection of forces, each having direction and magnitude but not coordinates. When you have completed the following activities, you should be able to

- perform basic vector operations, and
- prove geometric theorems using vector techniques.

This topic addresses the following competencies:

- Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.
- Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.
- Competency 209.4.5: Measurement Techniques, Concepts, and Tools
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.
- Competency 209.4.6: Non-Euclidean Geometry
  The graduate demonstrates knowledge of core concepts and principles of non-Euclidean geometries in two and three dimensions from both formal and informal
Introduction to Vectors

Watch the following video lecture in Thinkwell Calculus:

- 22.1.2 Introduction to Vectors

After watching the video, complete the associated exercises from 22.1.2.

Coordinate Geometry and Vectors

Read the following example in College Geometry: A Discovery Approach:

- Example 2 on pages 310–311 of section 4.7 ("Coordinate Geometry and Vectors")

OPTIONAL: After reading the example, you can watch an explanation of this example from the following video:

Note: To download this video, right-click the following link and choose "Save as...": download video.

OPTIONAL: The following video is another version of the previous proof, but uses an arbitrary point O:

OPTIONAL: Additional help with vectors.

Watch the videos in each site below, as well as read through the examples in the last site below:

Note: To download this video, right-click the following link and choose "Save as...": download video.

- Introduction to Vectors
- Vector Geometry

Task 2

You now have the competency necessary to complete RQPT Task 2.

Complete: Task 2 Performance Task

OPTIONAL: Watch the following recording as an overview and clarification of Task 2:

Note: To download this video, right-click the following link and choose "Save as...": download video.
Complete the following task in TaskStream:

- QPT1 College Geometry: RQPT Task 2

For details about this performance assessment, see the "Assessment" tab in this course.

Upon completing this, you should submit this task for evaluation. Check your submission against the scoring rubric before submitting.

**Euclidean and Non-Euclidean Geometry**

When you have completed the following activities, you should have a rigorous mathematical understanding of non-Euclidean geometries, as well as some understanding of how they apply to the real world. When you have completed the following activities, you should be able to

- identify statements that are true in Euclidean geometry but not in non-Euclidean, and vice-versa; and
- recognize real-world applications of non-Euclidean geometry.

This topic addresses the following competencies:

- Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.
- Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.
- Competency 209.4.5: Measurement Techniques, Concepts, and Tools
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.
- Competency 209.4.6: Non-Euclidean Geometry
  The graduate demonstrates knowledge of core concepts and principles of non-Euclidean geometries in two and three dimensions from both formal and informal perspectives.

**Neutral Geometry**

Begin by reading the definition of absolute geometry. Note that absolute geometry is also called neutral geometry.

Read through the first 6 pages of the following PDF document, until reaching the heading of “Incidence”, for further understanding of neutral geometry.

- **Neutral Geometry**

Read the following pages in *College Geometry: A Discovery Approach*:

- pages 211–214 of section 4.1 ("Euclidean Parallelism, Existence of Rectangles")
Task 3 Part A
You now have the competency necessary to complete Part A of RQPT Task 3.
Complete: Task 3, Part A Performance Task

Complete the following task subsection in TaskStream:

- QPT1 College Geometry: RQPT Task 3, Part A

For details about this performance assessment, see the "Assessment" tab in this course.

Do not submit your work on this task yet. You will be directed to completing the other parts of this task as you progress through this course, and you will submit your work on this task when you have completed all parts of it.

History of Non-Euclidean Geometry
Non-Euclidean geometry typically references both spherical and hyperbolic geometries. The history of non-Euclidean geometry spans hundreds of years before the concepts for them were fully understood. In the activity for this topic, you will overview the history of non-Euclidean geometry.

This topic addresses the following competencies:

- Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.
- Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.
- Competency 209.4.5: Measurement Techniques, Concepts, and Tools
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.
- Competency 209.4.6: Non-Euclidean Geometry
  The graduate demonstrates knowledge of core concepts and principles of non-Euclidean geometries in two and three dimensions from both formal and informal perspectives.

History of Non-Euclidean Geometry

Read the following pages in College Geometry: A Discovery Approach:

- pages 421–428 of sections 6.1 and 6.2 ("Historical Background of Non-Euclidean Geometry" and “An Improbable Logical Case”)

Read the first 3 pages of the following PDF document for an overview of the history of non-Euclidean geometries, which is especially helpful for the upcoming completion of Part B of Task 3.
Task 3 Part B
You now have the competency necessary to complete Part B of RQPT Task 3.
Complete: Task 3, Part B Performance Task

Complete the following task subsection in TaskStream:

- QPT1 College Geometry: RQPT Task 3, Part B

For details about this performance assessment, see the "Assessment" tab in this course.

Do not submit your work on this task yet. You will be directed to completing the other parts of this task as you progress through this course, and you will submit your work on this task when you have completed all parts of it.

Hyperbolic Geometry
Hyperbolic geometry is one of two non-Euclidean geometries, and in the activity for this topic you will learn just a few basics involved in this geometry. A significant and in-depth coverage of hyperbolic geometry will not be covered in this course.

This topic addresses the following competencies:

- Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.
- Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.
- Competency 209.4.5: Measurement Techniques, Concepts, and Tools
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.
- Competency 209.4.6: Non-Euclidean Geometry
  The graduate demonstrates knowledge of core concepts and principles of non-Euclidean geometries in two and three dimensions from both formal and informal perspectives.

Hyperbolic Geometry: Angle Sum Theorem

Read the following pages in College Geometry: A Discovery Approach:

- pages 436–437 of section 6.3 (“Hyperbolic Geometry: Angle Sum Theorem”)

Review of Proof by Contradiction (i.e. Indirect Proof)

Review the following pages in Elementary Geometry for College Students:

- pages 82–83 up to Example 4 of section 2.2 (“Indirect Proof”)
You now have the competency necessary to complete Part C3 of RQPT Task 3.
Complete: Task 3, Part C3 Performance Task

Complete the following task subsection in TaskStream:

- QPT1 College Geometry: RQPT Task 3, Part C3

For details about this performance assessment, see the "Assessment" tab in this course.

Do not submit your work on this task yet. You will be directed to completing the other parts of this task as you progress through this course, and you will submit your work on this task when you have completed all parts of it.

**Spherical Geometry and Non-Euclidean Summary**

Spherical geometry is the other non-Euclidean geometry, and you will begin by learning just a few of the basics for this geometry. A significant and in-depth coverage of spherical geometry will not be covered in this course. You will then finish with a summary of the two non-Euclidean geometries to better visualize them and their properties.

This topic addresses the following competencies:

- Competency 209.4.2: Spatial Visualization and Geometric Modeling
  The graduate uses spatial visualization and geometric modeling to explore and analyze geometric shapes and structures, and their properties.
- Competency 209.4.4: Synthetic, Analytic, and Transformational Geometry
  The graduate applies synthetic, analytic, and transformational geometry techniques to solve geometric problems.
- Competency 209.4.5: Measurement Techniques, Concepts, and Tools
  The graduate uses appropriate measurement techniques to determine quantities and applies measurement concepts and tools to solve problems.
- Competency 209.4.6: Non-Euclidean Geometry
  The graduate demonstrates knowledge of core concepts and principles of non-Euclidean geometries in two and three dimensions from both formal and informal perspectives.

**Spherical Geometry**

Read the following pages in *College Geometry: A Discovery Approach*:

- pages 545–547 of *section 7.6 ("Spherical Geometry")*

OPTIONAL: Access the following applet to interact with spherical geometry. It is recommended that you at least attempt the first suggested activity under the applet in drawing a triangle and rotating the sphere, but you are welcome to try all activities:

- [Spherical Geometry Demo](#)

**Non-Euclidean Geometry Video**
Watch the following video. Pay special attention to how properties, such as the sum of the angles of a triangle, change in the different types of geometry:

**Non-Euclidean Geometry Summary**

Read through the first four pages of the following website (ending on the Hyperbolic Models) to summarize important facts about spherical and hyperbolic geometry:

- [Spherical Geometry](#)

OPTIONAL:

Access the following applets to interact with spherical geometry:

- [Spherical Geometry](#)
- [Lunes and Triangles in Spherical Geometry](#)

Access the following applet to interact with hyperbolic geometry with the Poincare disc model:

- [Hyperbolic Geometry](#)
- [Hyperbolic Triangles](#)

**Task 3 Part C1**

You now have the competency necessary to complete part C1 RQPT Task 3.

**Complete: Task 3, Part C1 Performance Task**

Complete the following task in TaskStream:

- QPT1 College Geometry: RQPT Task 3, Part C1

For details about this performance assessment, see the "Assessment" tab in this course.

Upon completing Part C1, you should now submit Task 3 for evaluation. Check your submission against the scoring rubric before submitting.

**Final Steps**

Congratulations on completing the activities in this course! This course has prepared you to complete the assessments associated with this course. If you have not already been directed to complete the assessments, schedule and complete your assessments now.

**The WGU Library**

The WGU Library is available online to WGU students 24 hours a day.
For more information about using the WGU Library, view the following videos on The WGU Channel:

Introducing the WGU library

*Note: To download this video, right-click the following link and choose "Save as...":* [download video](#).

Searching the WGU library

*Note: To download this video, right-click the following link and choose "Save as...":* [download video](#).

**Center for Writing Excellence: The WGU Writing Center**

If you need help with any part of the writing or revision process, contact the Center for Writing Excellence (CWE). Whatever your needs—writing anxiety, grammar, general college writing concerns, or even ESL language-related writing issues—the CWE is available to help you. The CWE offers personalized individual sessions and weekly group webinars. For an appointment, please e-mail [writingcenter@wgu.edu](mailto:writingcenter@wgu.edu).

**Feedback**

WGU values your input! If you have comments, concerns, or suggestions for improvement of this course, please submit your feedback using the following form:

- [Course Feedback](#)

**Accessibility Policy**

Western Governors University recognizes and fulfills its obligations under the Americans with Disabilities Act of 1990 (ADA), the Rehabilitation Act of 1973 and similar state laws. Western Governors University is committed to provide reasonable accommodation(s) to qualified disabled learners in University programs and activities as is required by applicable law(s). The Office of Student Accessibility serves as the principal point of contact for students seeking accommodations and can be contacted at [ADASupport@wgu.edu](mailto:ADASupport@wgu.edu). Further information on WGU’s Accessibility policy and process can be viewed in the student handbook at the following link:

- [Policies and Procedures for Students with Disabilities](#)