

02 Congruence

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **7 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

[NJSLs Geometry curriculum overview](#)

In this unit, students begin by reasoning about the relationships between congruent parts of figures, and congruent figures. They use transformations as tools for reasoning and generalizing. Students use transformations to prove three theorems about triangle congruence: Side-Angle-Side Triangle Congruence, Angle-Side-Angle Triangle Congruence, and Side-Side-Side Triangle Congruence. As students prove new theorems, they apply those theorems to prove results about quadrilaterals, isosceles triangles, and other figures. Finally, students have a chance to apply their skills to conjecture and explore congruences and properties of quadrilaterals. (IM)

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives:

In this unit, students begin by reasoning about the relationships between congruent parts of figures, and congruent figures. They use transformations as tools for reasoning and generalizing. Students use transformations to prove three theorems about triangle congruence: Side-Angle-Side Triangle Congruence, Angle-Side-Angle Triangle Congruence, and Side-Side-Side Triangle Congruence. As students prove new theorems, they apply those theorems to prove results about quadrilaterals, isosceles triangles, and other figures. Finally, students have a chance to apply their skills to conjecture and explore congruences and properties of quadrilaterals. (IM)

Essential Questions:

- What is necessary to prove that two figures are congruent?
- If two figures are congruent, what other relationships are consequences of their congruence?
- In what ways can congruent figures be used to solve modeling and application problems?

Enduring Understandings:

- The congruence criteria established through rigid motions is used to establish methods for proving congruent triangles, these are then used in turn to prove other relationships including congruence relationships in other figures.

- Properties of quadrilaterals are based on properties and relationships of triangles.

CONTENT AREA STANDARDS

G.C

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

G.CO

- A. Experiment with transformations in the plane**
- B. Understand Congruence in terms of rigid motions**
- C. Prove geometric theorems**
- D. Make geometric constructions**

G.GMD

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

G.GPE

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

G.MG

- A. Apply geometric concepts in modeling situations**

G.SRT

- A. Understand similarity in terms of similarity transformations**
- B. Prove theorems involving similarity**

C. Define trigonometric ratios and solve problems involving right triangles

D. Apply trigonometry to general triangles

MA.G-CO.A.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
MA.G-CO.B.6	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.
MA.G-CO.B.7	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
MA.G-CO.B.8	Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.
MA.G-CO.C.9	Prove theorems about lines and angles.
MA.G-CO.C.10	Prove theorems about triangles.
MA.G-CO.C.11	Prove theorems about parallelograms.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.6	Attend to precision.
MA.K-12.8	Look for and express regularity in repeated reasoning.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

9.1.12.PB.1: Explain the difference between saving and investing

CS.K-12.1.a	Include the unique perspectives of others and reflect on one's own perspectives when designing and developing computational products.
CS.K-12.2.b	Create team norms, expectations, and equitable workloads to increase efficiency and effectiveness.
CS.K-12.2.c	Solicit and incorporate feedback from, and provide constructive feedback to, team members and other stakeholders.
CS.K-12.2.d	Evaluate and select technological tools that can be used to collaborate on a project.
CS.K-12.3.a	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
CS.K-12.3.b	Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
CS.K-12.3.c	Evaluate whether it is appropriate and feasible to solve a problem computationally.
LA.RH.9-10.4	Determine the meaning of words and phrases as they are used in a text, including vocabulary describing political, social, or economic aspects of history and the social sciences; analyze the cumulative impact of specific word choices on meaning and tone.
LA.RH.9-10.5	Analyze how a text uses structure to emphasize key points or advance an explanation or analysis.
LA.RH.9-10.7	Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative

	analysis in print or digital text, to analyze information presented via different mediums.
LA.RST.9-10.2	Determine the central ideas, themes, or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
LA.RST.9-10.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LA.RST.9-10.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
LA.RST.9-10.5	Analyze the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).
LA.RST.9-10.6	Determine the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.

EVIDENCE OF LEARNING

Benchmark Assessments

Benchmark Assessments conducted three times per year, using Pear Assessment (Standards Based Assessments)

Alternate Assessments

- Portfolios
- Verbal Assessment (instead of written)
- Multiple choice
- Modified Rubrics
- Performance Based Assessments

Formative Assessments

- Student feedback/questioning/observation
- Exit Ticket
- Error analysis
- Specific skill assessment/questions
- Survey/polling
- Reflection questions
- Scored/evaluated class work or homework
- Task completion

Summative Assessments

Lesson Quizzes

Unit Test

Performance Tasks

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- Triangles can be proven congruent by: SSS, SAS, ASA, AAS, and HL
- Corresponding parts of congruent triangles are congruent
- Properties of quadrilaterals are proven based on properties of (congruent) triangles

Procedural Knowledge

Students will be able to:

- Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions. *Comprehension*
- Given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. *Comprehension*
- Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are

congruent. *Comprehension*

- Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure. *Analysis*
- Prove theorems about lines and angles. *Knowledge Utilization*
- Prove theorems about parallelograms. *Knowledge Utilization*
- Prove theorems about triangles. *Knowledge Utilization*

RESOURCES (Instructional, Supplemental, Intervention Materials)

Core Instructional Materials

Envisions Geometry

Kuta Software

Supplemental Materials

NJ DOE Model Curriculum unit: [Congruence, Proof & Constructions](#)

Illustrative Mathematics unit: [Congruence](#)

Khan Academy unit: [Congruence](#)

NJCTL unit: [Congruent Triangles](#)

INTERDISCIPLINARY CONNECTIONS

Interdisciplinary connections are frequently addressed through modeling and application problems whereby students solve and analyze situations taken from business, physics, engineering, biology, statistics, geography, and numerous other fields. Examples can be found in topic specific textbook problems and digital resources.

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.

