

03 Similarity

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **3-4 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

[NJSL Geometry Overview](#)

In this unit, students use dilations and rigid transformations to justify triangle similarity theorems including the Angle-Angle Triangle Similarity Theorem. Students explicitly build on their work with congruence and rigid motions, establishing that triangles are similar by dilating them strategically. The unit balances a focus on proof with a focus on using similar triangles to find unknown side lengths and angle measurements. (IM)

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives:

Throughout this unit students will need to blend computational skills, Algebraic techniques, and Geometric relationships to determine and analyze the similarity of figures.

Essential Questions:

- What conditions need to exist for two figures to be similar?
- What conclusions can be drawn from determining that two figures are similar?
- How can similarity be used to help model and solve problems?

Enduring Understandings:

- Dilations create similar figures
- Triangles can be proven similar through: AAA, AA, SAS, SSS, and HL
- Corresponding lengths in similar polygons are proportional
- Similarity preserves the congruence of angles
- All circles are similar

CONTENT AREA STANDARDS

MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.G-SRT.A.1	Verify experimentally the properties of dilations given by a center and a scale factor:
MA.G-SRT.A.2	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
MA.G-SRT.A.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
MA.G-SRT.A.1a	A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.
MA.G-SRT.A.1b	The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
MA.G-SRT.B	Prove theorems involving similarity
MA.G-SRT.B.4	Prove theorems about triangles.
MA.G-SRT.B.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

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

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.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.9-10.7	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.K-12.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.
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.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- Two figures are similar if one figure is dilated by using a scale factor and is then either translated, reflected or rotated.
- If two figures are similar then the lengths of all corresponding sides are in an equal ratio and all corresponding angles are congruent.
- This equal ratio is called the scale factor.
- Pairs of congruent angles are determined by the order of the letters in which the similarity statement has been given. For example, the angle named by the first letter from the similarity statement in one figure will be congruent to the angle named by the first letter from the other figure in the similarity statement.

Procedural Knowledge

Students will be able to:

- Prove theorems about triangles. Write a two column proof to show that two triangles are similar using the AA, SSS or SAS similarity postulate. Each angle and or side must be written in the proof with a valid reason. *Knowledge Utilization*
- Perform a dilation of a figure where a side of the figure intersects the center of the dilation. Verify that the side intersecting the center of the dilation will remain in the same location.
- Perform a dilation of a figure when a side of the figure does not intersect the center of the dilation. Verify the each corresponding side will become parallel to the corresponding side of the original figure. *Analysis*
- Verify that when a line segment is dilated by a scale factor greater than 1, the length will increase. *Analysis*
- Verify that when a line segment is dilated by a scale factor less than 1, the length will

decrease. *Analysis*

- Given two figures, determine if the length of each corresponding side is multiplied by the same number to determine if the two figures are similar. *Comprehension*
- Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. *Comprehension*
- Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar. *Comprehension*

EVIDENCE OF LEARNING

Formative Assessments

- Student feedback/questioning/observation
- Error analysis
- Specific skill assessment/questions
- Survey/polling
- Task completion and review of quizzes and material presented in the Geometry class

Summative Assessments

There will be no formal assessments in this course.

RESOURCES (Instructional, Supplemental, Intervention Materials)

NJ DOE Model Curriculum unit: [Similarity and Proof](#)

Illustrative Mathematics unit: [Similarity](#)

Khan Academy unit: [Similarity](#)

NJCTL unit: [Similar Triangles and Trigonometry](#)

Desmos Activities: [Similarity Card Sort](#), [Introduction to similarity and congruence](#), [Triangle Similarity](#)

Course approved textbook

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.