

# 10 - Transformations, Congruence, and Similarity

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

## **General Overview, Course Description or Course Philosophy**

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Pre-Algebra 7A units were created and organized in line with the areas of focus as identified by the New Jersey Student Learning Standards. Each unit consists of standards that are considered major content along with standards that are supporting and/or additional content. The expectation is that students will have many opportunities to develop fluency with rational number arithmetic and solving multi-step problems (including those involving positive and negative rational numbers and word problems leading to one variable equations) throughout the school year. This course prepares students to take Algebra 1 in Grade 8 by addressing a combination of Grade 7 and Grade 8 standards in one school year.

In this module, students will draw on their knowledge of graphing in the coordinate plane to develop understanding of transformations. They will use their understanding to build fluency with graphing and describing translations, reflections, rotations, and dilations using coordinates. They will develop understanding that two figures are congruent or similar if the second figure can be obtained from the first by a series of transformations. They will apply their understanding to solve real-world indirect measurement problems.

## **OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS**

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### **Objectives:**

#### Similarity and Transformations:

- Compare similar figures with non similar figures
- Distinguish algebraic rules that produce similar figures from those that produce non similar figures
- Use algebraic rules to produce similar figures
- Recognize when a rule shrinks or enlarges a figure
- Explore the effect on the image of a figure if a number is added to the x- or y-coordinates of the figure's vertices

## Similarity and Indirect Measurement:

- Develop strategies for using similar figures to solve problems
- Use the properties of similarity to find distances and heights that cannot be measured directly
- Predict the ways that stretching or shrinking a figure will affect side lengths, angle measures, perimeters, and areas
- Use similarity to solve real-world problems

## **Essential Questions:**

- What does it mean to perform a transformation on a figure?
- What does it mean for two figures to be similar?
- How can you decide whether or not two figures are similar?
- How can you use similar triangles to find a distance that is difficult to measure directly?
- How can you use similar triangles to estimate the heights of tall objects?

## **Enduring Understandings:**

- Similar figures have congruent corresponding angles and corresponding sides lengths are in a proportional relationship.

## **CONTENT AREA STANDARDS**

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### **7.G**

**A. Draw, construct, and describe geometrical figures and describe the relationships between them**

**B. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume**

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| MA.K-12.1   | Make sense of problems and persevere in solving them.   |
| MA.K-12.2   | Reason abstractly and quantitatively.   |
| MA.K-12.3   | Construct viable arguments and critique the reasoning of others.                                  |
| MA.K-12.4   | Model with mathematics.   |
| MA.K-12.5   | Use appropriate tools strategically.  |
| MA.K-12.6   | Attend to precision.  |
| MA.K-12.7   | Look for and make use of structure.   |
| MA.K-12.8   | Look for and express regularity in repeated reasoning.  |
| MA.8.G.A    | Understand congruence and similarity using physical models, transparencies, or geometry software. |
| MA.8.G.A.1  | Verify experimentally the properties of rotations, reflections, and translations:                 |
| MA.8.G.A.1a | Lines are transformed to lines, and line segments to line segments of the same length.            |

|             |   |
|-------------|---|
| MA.8.G.A.1b | Angles are transformed to angles of the same measure.   |
| MA.8.G.A.1c | Parallel lines are transformed to parallel lines.   |
| MA.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.                        |
| MA.8.G.A.3  | Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.  |
| MA.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. |
| MA.8.G.A.5  | Use informal arguments to establish facts about the angle sum and 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.  |

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

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|--------------|--|
| 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**

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### **Declarative Knowledge**

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Students will understand that:

- Know what rules and properties create similar and non similar images.

### **Procedural Knowledge**

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Students will be able to:

- Translate figures
- Describe translations on the coordinate plane.
- Reflect figures.
- Describe reflections on the coordinate plane.
- Rotate figures.
- Describe rotations on the coordinate plane.

- Dilate figures.
- Describe dilations on the coordinate plane.
- Use a sequence of transformations to describe congruency between figures.
- Use a sequence of transformations to describe similarity between figures.
- Identify similar figures by comparing corresponding sides and angles.
- Write and solve proportions to find missing lengths of similar figures.
- Use similar triangles to estimate the height of tall objects.
- Solve problems involving similar triangles.

## **EVIDENCE OF LEARNING**

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### **Benchmark Assessments**

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- BOY Diagnostic Snapshot Assessment
- MP1 Quarterly Assessment
- MP2 Quarterly Assessment
- MP3 Quarterly Assessment
- MP4 Quarterly Assessment
- EOY Diagnostic Snapshot Assessment

### **Formative Assessments**

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- Delta Math Assignments
- Do Now Check ins
- Formative Assessments - exit tickets, student-friendly proficiency scales, skill checklists

### **Summative Assessments**

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- Summative Assessment
- OnCourse Assessments
- Teacher created assessments (both test generator and teacher generated questions)
- Delta Math - Teacher generated assessments

## **RESOURCES (Instructional, Supplemental, Intervention Materials)**

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### **Instructional Materials:**

- Reveal Math Accelerated - Transformations, Congruence, and Similarity (Module 13) ([Online link](#) - teacher and student resources)

### **Supplemental/Intervention Materials:**

- [Delta Math](#)
- [Khan Academy](#)
- [NCTM Illuminations](#)
- [Illustrative Math](#)
- [Illustrative Math Tasks](#)

## **INTERDISCIPLINARY CONNECTIONS**

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- Environmental Engineering (determining lengths of various situations)
- Architecture and construction
- Computer and information systems
- Agriculture
- Art

## **ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS**

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See link to Accommodations & Modifications document in course folder.