Orange Public Schools

Office of Curriculum & Instruction

2019-2020 Mathematics Curriculum Guide

7th Grade Mathematics (Accelerated)

Illustrative Mathematics - Unit 7: Rigid Transformations & Congruence

February 13, 2020 – March 11, 2020

Board Approved: 1.14.2020

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From the New Jersey State Learning Standards:

Traditional Pathway Accelerated 7th Grade

In **Accelerated 7th Grade,** instructional time should focus on four critical areas: (1) Rational Numbers and Exponents; (2) Proportionality and Linear Relationships; (3) Introduction to Sampling Inference; (4) Creating, Comparing, and Analyzing Geometric Figures

1. Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems. They extend their mastery of the properties of operations to develop an understanding of integer exponents, and to work with numbers written in scientific notation.

2. Students use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions ($y/x = m$ or $y = mx$) as special linear equations ($y= mx + b$), understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount $m \times A$. Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation.

3. Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences

4. Students continue their work with area from Grade 6, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity, they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross sections. They solve real- world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms. Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

Yearlong Pacing Guide
Accelerated 7

<table>
<tr><th>Grade</th><th colspan="2">SEP</th><th colspan="2">OCT</th><th colspan="2">NOV</th><th colspan="2">DEC</th><th colspan="2">JAN</th><th colspan="2">FEB</th><th colspan="2">MAR</th><th colspan="2">APR</th><th colspan="2">MAY</th><th colspan="2">JUN</th></tr>
<tr><td>6</td><td colspan="3">Unit 1
6.G</td><td colspan="2">Unit 2
6.RP</td><td colspan="2">Unit 3
6.RP</td><td colspan="3">Unit 4
6.NS</td><td colspan="3">Unit 5
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6.EE</td><td colspan="2">Unit 7
6.NS</td><td colspan="3">Unit 8
6.SP</td></tr>
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7.RP</td><td>Unit 2
7.G</td><td colspan="2">Unit 3
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8.G</td><td>Unit 9
8.EE</td><td>Unit 10
8.EE</td><td colspan="2">Unit 11
7.SP</td><td colspan="3"></td></tr>
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Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
7.RP: Scale Drawings & Proportional Relationships	**7.G:** Measuring Circles	**7.RP:** Proportional Relationships & Percentages	**7.NS:** Rational Number Arithmetic	**7.EE:** Expressions, Equations, & Inequalities

Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11
7.G: Angles, Triangles and Prisms	**8.G:** Rigid Transformations & Congruence	**8.G.** Dilations, Similarity, and Introducing Slope	**8.EE:** Linear Relationships	**8.EE:** Exponents and Scientific Notation	**7.SP:** Probability & Sampling

2019-2020 Accelerated Grade 7 (iM)										
Quarter 1			**Quarter 2**			**Quarter 3**			**Quarter 4**	
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11
iM 7.1 iM 7.2	iM 7.3	iM 7.4	iM 7.5	iM 7.6	iM 7.7	iM 8.1	iM 8.2	iM 8.3	iM 8.7	iM 7.8
7.G.1(A) 7.RP.2a(M) 7.RP.2b(M) 7.RP.2c(M) 7.RP.2d(M)	7.G.4(A)	7.RP.1(M) 7.RP.3(M)	7.NS.1(M) 7.NS.2(M) 7.NS.3(M)	7.EE.3(M) 7.EE.4(M) 7.EE.2(M) 7.EE.1(M)	7.G.5(A) 7.G.2(A) 7.G.3(A) 7.G.6(A)	8.G.1(M) 8.G.2(M) 8.G.5(M)	8.G.4(M) 8.G.3(M) 8.EE.6(M)	8.EE.5(M) 8.F.4(S) 8.EE.8(M)	8.EE.1(M) 8.EE.3(M) 8.EE.4(M)	7.SP.6(S) 7.SP.5(S) 7.SP.7(S) 7.SP.8(S) 7.SP.1(S) 7.SP.2(S) 7.SP.3(S) 7.SP.4(S)
20 Days	8 Days	11 Days	14 Days	18 Days	12 Days	13 Days	12 Days	12 Days	11 Days	15 Days
Oct. 9	Oct. 24	Nov. 15	Dec. 12	Jan. 22	Feb. 12	Mar. 11	Apr. 1	Apr. 29	May. 18	June 11

Major Work Supporting Content Additional Content

Table of Contents

References

"Illustrative Mathematics" *Open Up Resources.* 2018
<https://auth.openupresources.org/register/complete>

I. Unit Overview

In this unit, students extend their reasoning to plane figures with different rotation and mirror orientations.

Through activities designed and sequenced to allow students to make sense of problems and persevere in solving them (MP1), students use and extend their knowledge of geometry and geometric measurement. They begin the unit by looking at pairs of cartoons, each of which illustrates a translation, rotation, or reflection. Students describe in their own words how to move one cartoon figure onto another. As the unit progresses, they solidify their understanding of these transformations, increase the precision of their descriptions (MP6), and begin to use associated terminology, recognizing what determines each type of transformation, e.g., two points determine a translation. They identify and describe translations, rotations, and reflections, and sequences of these. In describing images of figures under rigid transformations on and off square grids and the coordinate plane, students use the terms "corresponding points," "corresponding sides," and "image." Students learn that angles and distances are preserved by any sequence of translations, rotations, and reflections, and that such a sequence is called a "rigid transformation." They learn the definition of "congruent": two figures are said to be congruent if there is a rigid transformation that takes one figure to the other. Students experimentally verify the properties of translations, rotations, and reflections, and use these properties to reason about plane figures, understanding informal arguments showing that the alternate interior angles cut by a transversal have the same measure and that the sum of the angles in a triangle is 180∘. The latter will be used in a subsequent grade 8 unit on similarity and dilations. Throughout the unit, students discuss their mathematical ideas and respond to the ideas of others (MP3, MP6).

Many of the lessons in this unit ask students to work on geometric figures that are not set in a real-world context. This design choice respects the significant intellectual work of reasoning about area. Tasks set in real-world contexts are sometimes contrived and hinder rather than help understanding. Moreover, mathematical contexts are legitimate contexts that are worthy of study. Students do have opportunities in the unit to tackle real-world applications. In the culminating activity of the unit, students examine and create different patterns formed by plane figures. This is an opportunity for them to apply what they have learned in the unit (MP4).

Essential Questions

- Why does one need to perform transformations on figures?
- How does knowing two figures are congruent or similar help one to solve problems?
- How can you use models of one and two-dimensional figures to show congruent figures?
- How can you use models of one and two-dimensional figures to show similar figures?

Enduring Understanding

- Congruent figures can be formed by a series of transformations.
- Similar figures can be formed by a series of transformations.
- Understand angle relationships in one and two-dimensional figures.
- Rotations, reflections, and translations take: -lines to lines -line segments to line segments of the same length -angles to angles of the same measure -parallel lines to parallel lines.
- 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.
- 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.
- There are relationships between the interior and exterior angles of a triangle.
- When two angles of one triangle are congruent to two angles of another triangle, the third angles are also congruent.

II. Pacing Guide

Activity	New Jersey State Learning Standards (NJSLS)	Estimated Time (Blocks)
Unit 7 Pre-Unit Assessment *Optional*	8.G.A.1, 4.G.A.1, 5.G.A.1, 6.G.A.3, 7.G.B.5, 7.G.A.2, 6.G.A.1, 8.G.A.2	½
Lesson 1: Moving in the Plane	8.G.A.1	1
Lesson 2: Making Grid Moves	8.G.A.1	1
Lesson 3: Making Coordinate Moves	8.G.A.1, 8.G.A.3	1
Lesson 4: No Bending or Stretching	8.G.A.1.a, 8.G.A.1.b	1
Lesson 5: Moves in Parallel and Composing Figures	8.G.A.1.a, 8.G.A.1.b, 8.G.A.1.c	1
Lesson 6: What is the Same?	8.G.A.1, 8.G.A.2	1
Lesson 7: Congruent Polygons	8.G.A.2	1
Lesson 8: Congruence	8.G.A.1.a, 8.G.A.2	1
Lesson 9: Alternate Interior Angles	8.G.A.1, 8.G.A.5	1
Lesson 10: Adding the Angles in a Triangle	8.G.A.2, 8.G.A.5.	1
Lesson 11: Parallel Lines and the Angles in a Triangle	8.G.A.5	1
Performance Task *(Project Based Learning)*	8.G.A.1	½
Unit 7 End of Unit Assessment *Optional*	8.G.A.1, 8.G.A.2, 8.G.A.1.a, 8.G.A.5	**1**
Total Time		**13 Blocks**

Major Work Supporting Content Additional Content

III. Scope & Sequence

Accelerated Unit Lesson	Accelerated Lesson Name	Original Unit Lesson	Activity Name
7.1	Moving in the Plane	8.1.1	Triangle Square Dance
		8.1.2	A Pair of Quadrilaterals
		8.1.2	How Did You Make That Move?
		8.1.2	Move Card Sort
		8.1.2	Is It a Reflection?
7.2	Making Grid Moves	8.1.3	Notice and Wonder: Isometric Grid
		8.1.3	Transformation Information
		8.1.4	Reflection Quick Image
		8.1.4	Make That Move
		8.1.3	Some are Translations and Some Aren't
7.3	Making Coordinate Moves	8.1.4	A to B to C
		8.1.5	Translating Coordinates
		8.1.5	Reflecting Points on the Coordinate Plane
		8.1.5	Transformations of a Segment
		8.1.5	Rotation or Reflection
7.4	No Bending or Stretching	8.1.6	Info Gap: Transformation Information
		8.1.7	Sides and Angles
		8.1.7	Translated Trapezoid
		8.1.8	Rotating a Segment
		8.1.8	A Pattern Of Four Triangles
7.5	Moves in Parallel and Composing Figures	8.1.9	Line Moves
		8.1.9	Parallel Lines
		8.1.9	Let's Do Some 180's
		8.1.9	Finding Missing Measurements
		8.1.10	Angles of An Isosceles Triangle
		8.1.10	Triangle Plus One
7.6	What is the Same?	8.1.10	Triangle Plus Two
		8.1.10	Identifying Side Lengths and Angle Measures
		8.1.11	Are They the Same?
		8.1.11	Area, Perimeter, and Congruence
		8.1.11	Mirror Images
7.7	Congruent Polygons	8.1.12	Translated Images
		8.1.12	Congruent Pairs (Part 1)
		8.1.12	Congruent Pairs (Part 2)
		8.1.12	Building Quadrilaterals
		8.1.12	Moving to Congruence
7.8	Congruence	8.1.13	Not Just the Vertices
		8.1.13	Congruent Ovals
		8.1.13	Corresponding Points in Congruent Figures
		8.1.13	Explaining Congruence
7.9	Alternate Interior Angles	8.1.14	Angle Pairs
		8.1.14	Cutting Parallel Lines With a Transversal
		8.1.14	Alternate Interior Angles are Congruent
		8.1.14	All The Rest

7.10	Adding the Angles in a Triangle	8.1.15	Can You Draw It?
		8.1.15	Find All Three
		8.1.15	Tear It Up
		8.1.15	Missing Angle Measures
7.11	Parallel Lines and the Angles in a Triangle	8.1.16	Angle Plus Two
		8.1.16	Every Triangle In The World
		8.1.16	Four Triangles Revisited
		8.1.17	Tesselate This
		8.1.17	Rotate That

IV. Pacing Calendar

Please complete the pacing calendar based on the suggested pacing (*see Pacing Guide on page 3)*.

FEBRUARY

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	**3**	**4**	**5**	**6**	**7**	**8**
9	**10**	**11**	**12**	**13**	**14**	**15**
16	**17**	**18**	**19**	**20**	**21**	**22**
23	**24**	**25**	**26**	**27**	**28**	**29**

Please complete the pacing calendar based on the suggested pacing (*see Pacing Guide on page 3)*.

MARCH

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	**2**	**3**	**4**	**5**	**6**	**7**
8	**9**	**10**	**11**	**12**	**13**	**14**
15	**16**	**17**	**18**	**19**	**20**	**21**
22	**23**	**24**	**25**	**26**	**27**	**28**
29	**30**	**31**				

V. NJSLA Assessment Evidence Statements

Type I Type II Type III

NJSLS	Evidence Statement	Clarification	Math Practices	Calculator ?
8.G.1.a	Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length.	i) Tasks may or may not have context	MP. 3 MP. 5 MP. 8	No
8.G.1.b	Verify experimentally the properties of rotations, reflections, and translations: b. Angles are taken to angles of the same measure.	i) Tasks may or may not have context	MP. 3 MP. 5 MP. 8	No
8.G.1.c	Verify experimentally the properties of rotations, reflections, and translations: c. Parallel lines are taken to parallel lines.	i) Tasks may or may not have context	MP. 3 MP. 5 MP. 8	No
8.G.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.	i) Tasks do not have a context. ii) Figures may be drawn in the coordinate plane, but do not include the use of coordinates. iii) Tasks require students to make connections between congruence and transformations.	MP. 2 MP. 7	No
8.G.3	Describe the effect of dilations, translations, rotations, and reflections on two dimensional figures using coordinates.	i) Tasks have “thin context” to no context. ii) Tasks require the use of coordinates in the coordinate plane. iii) For items involving dilations, tasks must state center of dilation. iv) Centers of dilation can be the origin, the center of the original shape or the vertices of the original shape.	MP. 2 MP. 3 MP. 5	No

8.C.3.2	Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. Content Scope: Knowledge and skills articulated in 8.G.2, 8.G.4	-	MP.3 MP.5 MP.6	Yes
8.C.3.3	Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures. Content Scope: Knowledge and skills articulated in 8.G.5	-	MP.3 MP.5 MP.6	Yes
8.C.5.2	Apply geometric reasoning in a coordinate setting, and/or use coordinates to draw geometric conclusions. Content Scope: Knowledge and skills articulated in 8.G.2, 8.G.4	-	MP.2 MP.3 MP.5	Yes

VI. Differentiated Instruction

Supporting English Language Learners

The purpose of this document is to nudge the field forward by offering support to the next generation of mathematics learners and by challenging persistent assumptions about how to support and develop students' disciplinary language. The goal is to provide guidance to mathematics teachers for recognizing and supporting students' language development processes in the context of mathematical sense making. UL/SCALE provides a framework for organizing strategies and special considerations to support students in learning mathematics practices, content, and language. The framework is intended to help teachers address the specialized academic language demands in math when planning and delivering lessons, including the demands of reading, writing, speaking, listening, conversing, and representing in math (Aguirre & Bunch, 2012). Therefore, while the framework can and should be used to support all students learning mathematics, it is particularly well-suited to meet the needs of linguistically and culturally diverse students who are simultaneously learning mathematics while acquiring English.

For more information, click the link below:

Supporting ELL Learners

Supporting Students with Disabilities

The philosophical stance that guided the creation of these materials is the belief that with proper structures, accommodations, and supports, all children can learn mathematics. Lessons are designed to maximize access for all students and include additional suggested supports to meet the varying needs of individual students. While the suggested supports are designed for students with disabilities, they are also appropriate for many children who struggle to access rigorous, grade-level content. Teachers should use their professional judgment about which supports to use and when, based on their knowledge of the individual needs of students in their classroom.

For more information, click the link below:

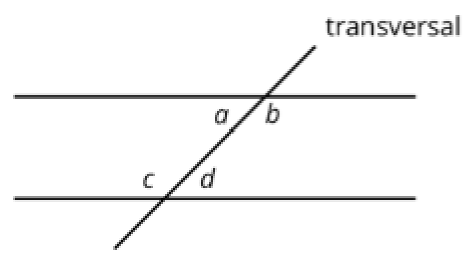
Supporting Students with Disabilities

VII. Vocabulary

Alternate Interior Angles: Interior angles are angles that are made by a transversal crossing two parallel lines. They are the angles that lie between the parallel lines, not outside them.

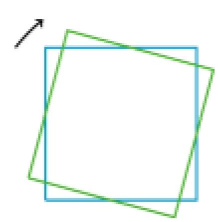
If two interior angles lie on opposite sides of the transversal they are called alternate interior angles.

In the figure, *a* and *d* are alternate interior angles, and *b* and *c* are also alternate interior angles.



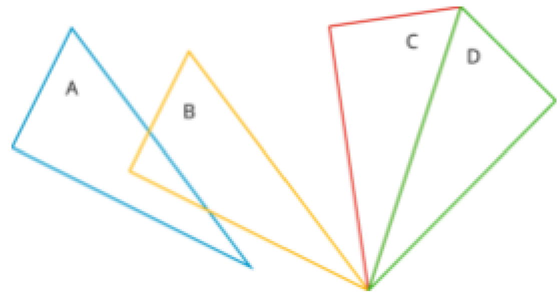
Clockwise: An object is rotating clockwise if it is turning in the same way that the hour or minute hand goes around a clock.

The tilted square is rotated 15∘ clockwise from the square sitting horizontally on its base.



Congruent: One figure is congruent to another if there is a rigid transformation (a sequence of translations, rotations, and reflections) that moves the first figure so that it fits exactly over the second. The second figure is called the image of the rigid transformation.

Triangle A is congruent to triangle D. A translation takes triangle A to triangle B, a rotation takes triangle B to triangle C, and a reflection takes triangle C to triangle D.

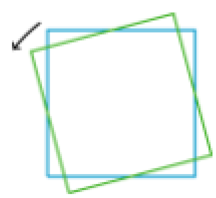


<u>Corresponding:</u> If a part of the original figure matches up with a part of the copy, we call them corresponding parts. The part could be an angle, point, or side, and you can have corresponding angles, corresponding points, or corresponding sides.

If you have a distance between two points in the original figure, then the distance between the corresponding points in the copy is called the corresponding distance.

<u>Counterclockwise:</u> An object is rotating counterclockwise if it is turning in the opposite way to the way that the hour or minute hand goes around a clock.

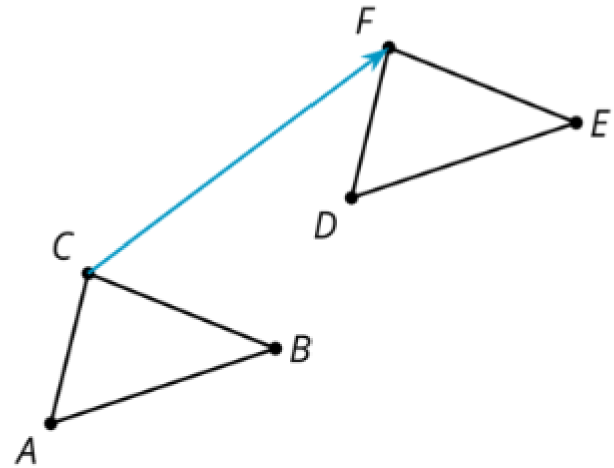
The tilted square is rotated 15∘ counterclockwise from the square with a horizontal base.



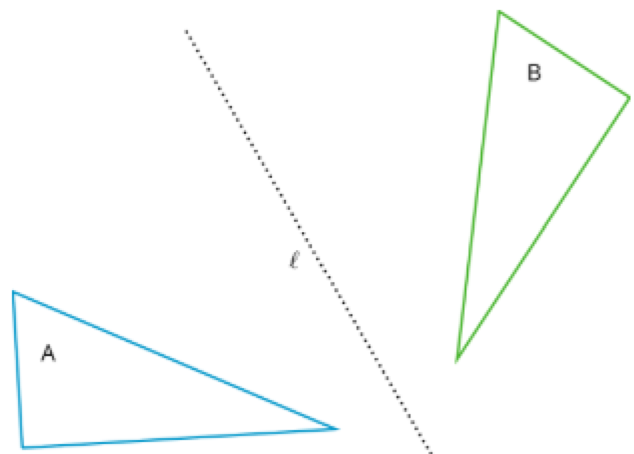
<u>Image:</u> Translations, rotations, and reflections move objects in the plane. Points, segments, and other parts of the original all have corresponding parts on the "moved object." The moved object is called the image.

For example, here is triangle ***ABC*** and a translation to the right and up which is labeled ***DEF***.

Point ***F*** in the image corresponds to point ***C***, segment ***EF*** in the image corresponds to segment ***BD***, and angle ***DEF*** corresponds to angle ***ABC***.

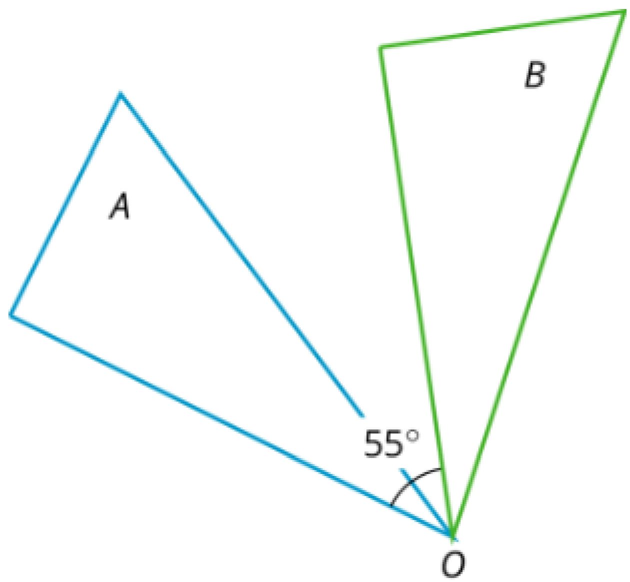


Reflection: The reflection of a figure across a line takes every point of the figure to a point directly opposite to it on the other side of the line and the same distance from the line. In the figure, the triangle B is the reflection of the triangle A across the line ℓ.



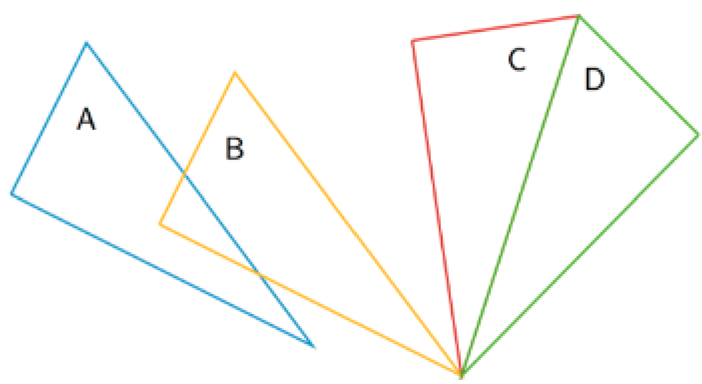
Rigid Transformation: A rigid transformation is a sequence of translations, rotations, and reflections. If a rigid transformation is applied to a geometric figure, the resulting figure is called the image of the original figure under the transformation.

Rotation: A rotation has a center, an angle, and a direction. It moves every point of a figure in a circle around the center, in the direction specified (clockwise or counterclockwise), and for a distance specified by the angle. For example, in the figure, triangle A is rotated 55∘ clockwise about center O to get triangle B.



<u>Sequence of Transformations:</u> A sequence of transformations is a set of translations, rotations, reflections, and dilations performed in a particular order on a geometric figure, resulting in a final figure.

The diagram shows a sequence of transformations consisting of a translation (from A to B) followed by a rotation (from B to C) followed by a reflection (from C to D). The last triangle is the final figure resulting from the sequence.

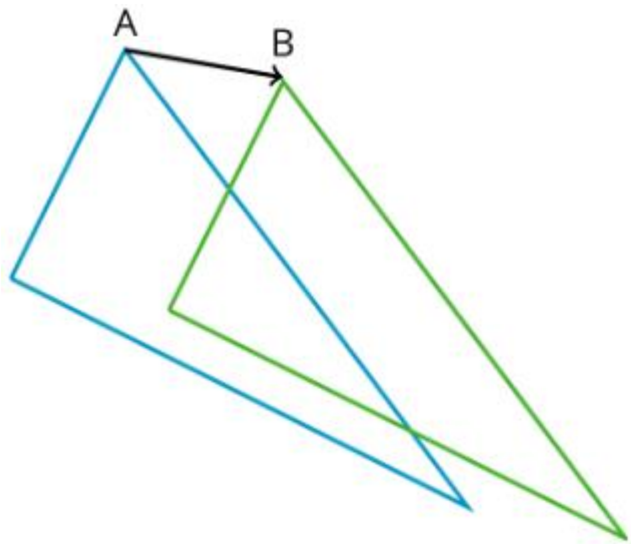


<u>Straight Angle:</u> If the two rays that make an angle form a straight line, we call the angle a straight angle.

Transformation: A transformation is a translation, rotation, reflection, or dilation, or combination of these. There is also a more general concept of a transformation of the plane that is not discussed in grade 8.

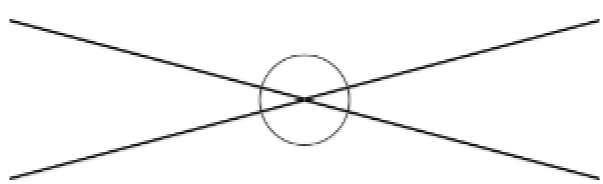
Translation: A translation has a distance and a direction. It moves every point in a figure the given distance in the given direction.

The figure on the left is translated to the figure on the right in the direction from A to B, using the distance from A to B.



Transversal: A transversal to two parallel lines is a line that cuts across them, intersecting each one.

Vertical Angles: A pair of vertical angles is a pair of angles that are across from each other at the point where two lines intersect. There are two pairs of vertical angles.



VIII. Assessment Framework

Unit 7 Assessment Framework				
Assessment	**NJSLS**	**Estimated Time**	**Format**	**Graded ?**
Pre-Unit Diagnostic Assessment (Beginning of Unit – Optional) *Illustrative Mathematics*	8.G.A.1, 4.G.A.1, 5.G.A.1, 6.G.A.3, 7.G.B.5, 7.G.A.2, 6.G.A.1, 8.G.A.2	½ Block	Individual	Yes (No Weight)
Mid-Unit Assessment (After Lesson 10 - Optional) *Illustrative Mathematics*	8.G.A.1, 8.G.A.1.a, 8.G.A.1.b, 8.G.A.3	1 Block	Individual	Yes
End-of-Unit Assessment (End of Unit – Optional) *Illustrative Mathematics*	8.G.A.1, 8.G.A.1.a, 8.G.A.2, 8.G.A.5	1 Block	Individual	Yes

Unit 7 Performance Assessment Framework				
Assessment	**NJSLS**	**Estimated Time**	**Format**	**Graded ?**
Unit 7 Performance Task 1 (Early October) *Triangle Congruence with Congruence*	8.G.A.2, 8.G.A.3	½ Block	Individual	Yes; Rubric
Unit 7 Performance Task Option 1 (Optional) *Reflecting a Rectangle Over a Diagonal*	8.G.A.1	Teacher Discretion	Teacher Discretion	Yes, if administered
Extended Constructed Response (ECR)* (click here for access)	Dependent on unit of study & month of administration	Up to 30 minutes	Individual	Yes; Rubric

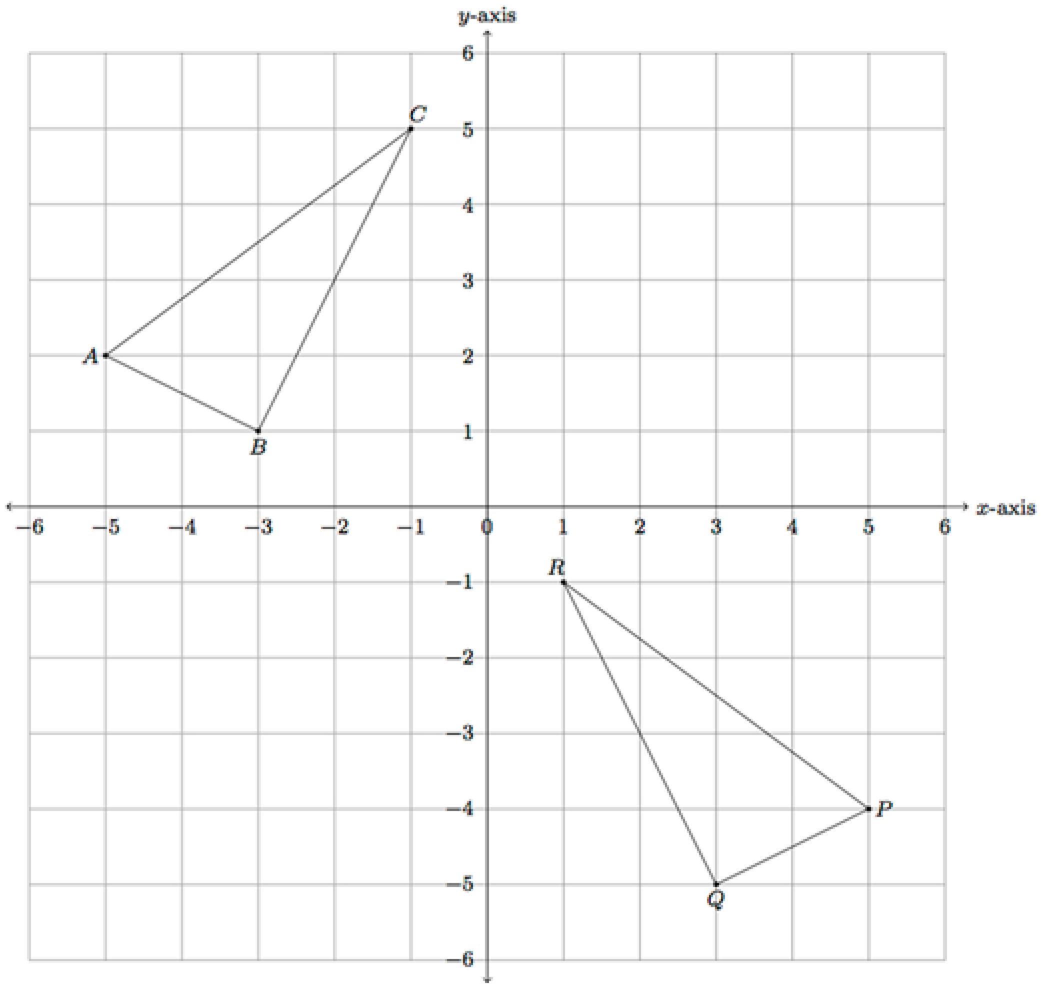
* Use the following links to access ECR protocol and district assessment scoring documents:

- *Assessment & Data in Mathematics Bulletin*
- *Extended Constructed Response Protocol*

Name ________________________ Block ______ Date __________

Triangle Congruence with Coordinates (8.G.A.2, 8.G.A.3)

Triangles ABC and PQR are shown below in the coordinate plane:



a. Show that △ABC is congruent to △PQR with a reflection followed by a translation.

b. If you reverse the order of your reflection and translation in part (a) does it still map △ABC to △PQR?

c. Find a second way, different from your work in part (a), to map △ABC to △PQR using translations, rotations, and/or reflections.

Accelerated 7th Grade Triangle Congruence with Coordinates Name:_______________ Date: _________

NJSLS: 8.G.A.2, 8.G.A.3 Type:________________ Teacher: __________

SOLUTION

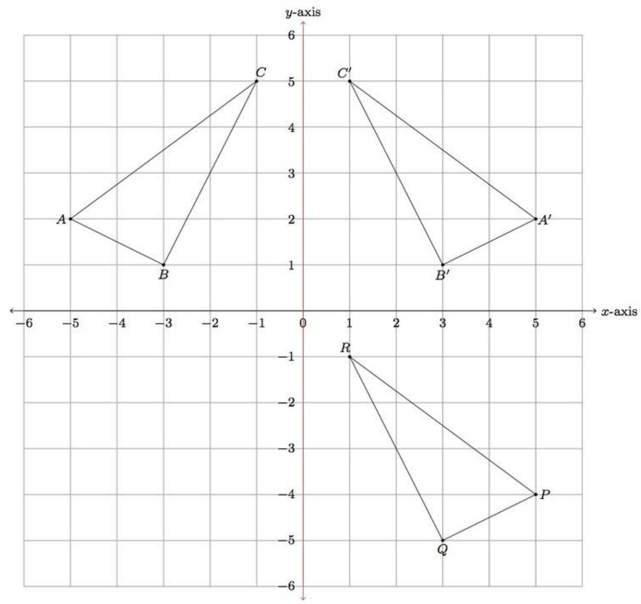
a. Student proves the two triangles are congruent with a sequence of reflections and translations.
b. Student accurately justifies their reason for yes or no based on the reverse sequence from part (a).
c. Student finds a different sequence of transformations than the sequence used in part (a) to prove the two triangles are congruent.

Level 5: Distinguished Command	**Level 4: Strong Command**	**Level 3: Moderate Command**	**Level 2: Partial Command**	**Level 1: No Command**
Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including: • a logical approach based on a conjecture and/or stated assumptions • a logical and complete progression of steps • complete justification of a conclusion with minor computational error	Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including: • a logical approach based on a conjecture and/or stated assumptions • a logical and complete progression of steps • complete justification of a conclusion with minor conceptual error	Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams, including: • a logical, but incomplete, progression of steps • minor calculation errors • partial justification of a conclusion • a logical, but incomplete, progression of steps	Constructs and communicates an incomplete response based on concrete referents provided in the prompt such as: diagrams, number line diagrams or coordinate plane diagrams, which may include: • a faulty approach based on a conjecture and/or stated assumptions • An illogical and Incomplete progression of steps • major calculation errors • partial justification of a conclusion	The student shows no work or justification.

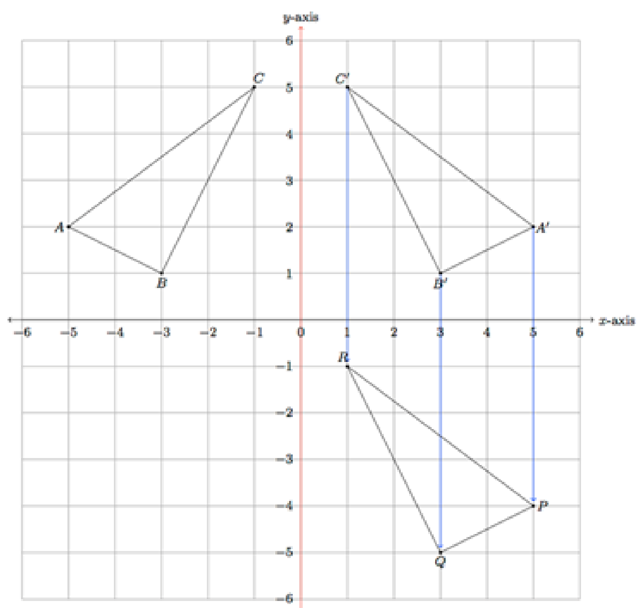
Accelerated 7th Grade Triangle Congruence with Coordinates – Scoring Guide

<table>
<tr><th>#</th><th>Answer</th></tr>
<tr><td>Part A</td><td>

Below the y-axis is shaded red and triangle ABC is reflected over the y-axis. The image of this reflection is triangle A’B’C’. Reflecting about the y-axis leaves the y-coordinate of each point the same and switches the sign of the x-coordinate.



So, for example, *A* = (−5,2) so *A’* = (5,2). We can now see that translating triangle *A’B’C’* down by 6 units puts it on top of triangle *PQR*:

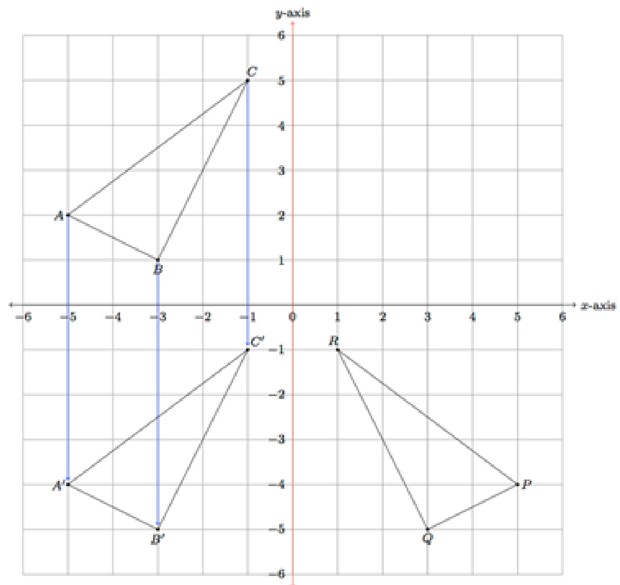


To find the coordinates after applying this translation, the x-coordinate stays the same and we subtract 6 from the y-coordinate of each point.

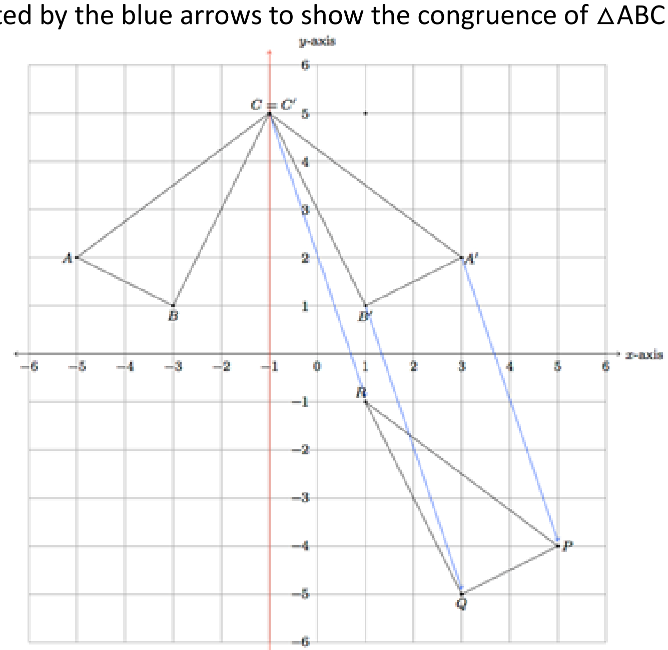
</td></tr>
</table>

Part B

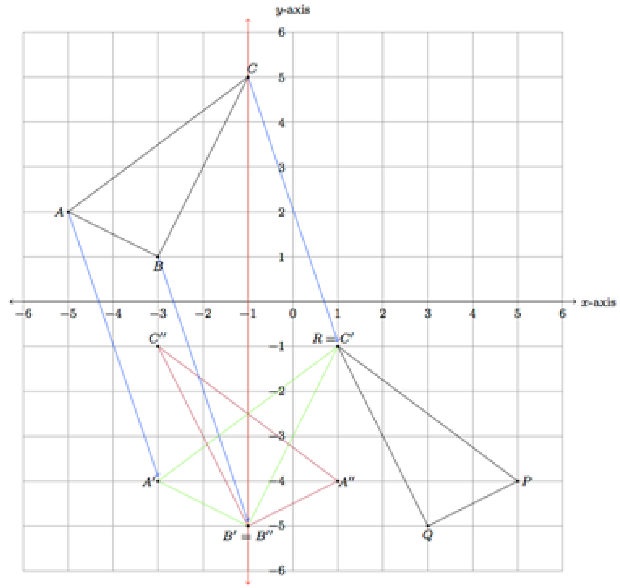
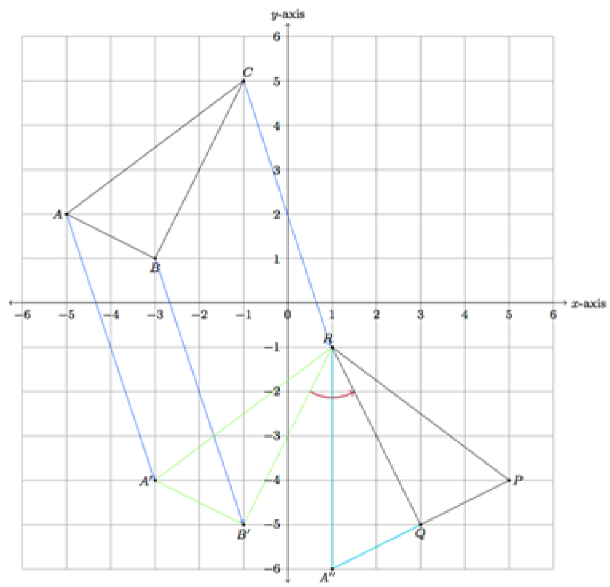
The answer here will depend on which reflection and translation have been chosen in part (a). For the reflection and translation chosen above, we reverse the order by first translating △ABC by 6 units downward and then reflecting over the y-axis. Below, the translated triangle is triangle A’B’C’ and its reflection over the y-axis is △PQR:



Below is a different reflection through the vertical line through vertex A, which can be followed by the translation indicated by the blue arrows to show the congruence of △ABC with △PQR:



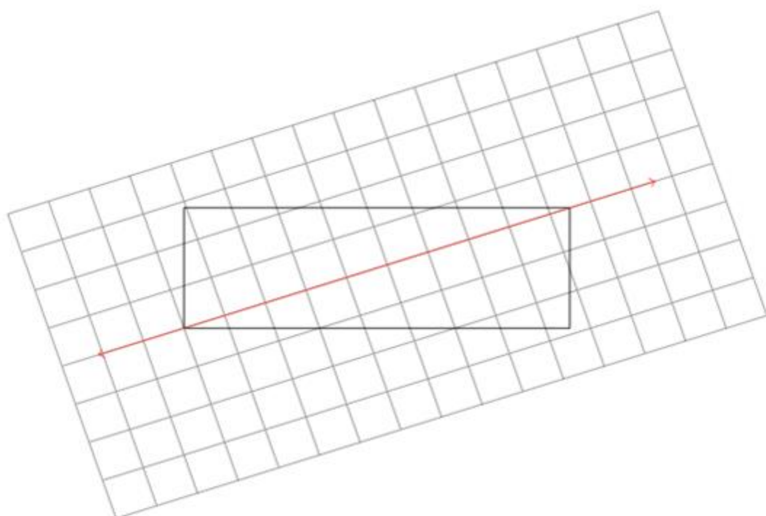
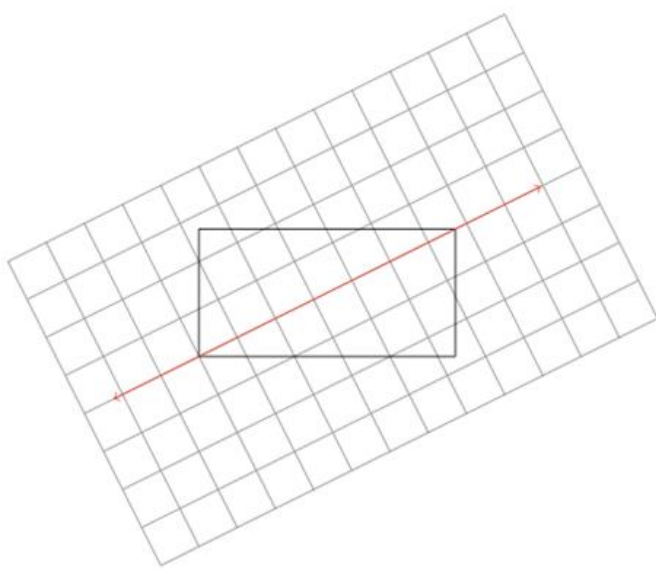
Unlike in the previous case, if we perform the translation first, giving the green triangle A’B’C’, and then the reflection, giving the purple triangle A’’B’’C’’, this does not produce the triangle PQR. So in this case, performing the translation and reflection in a different order produces a different outcome.

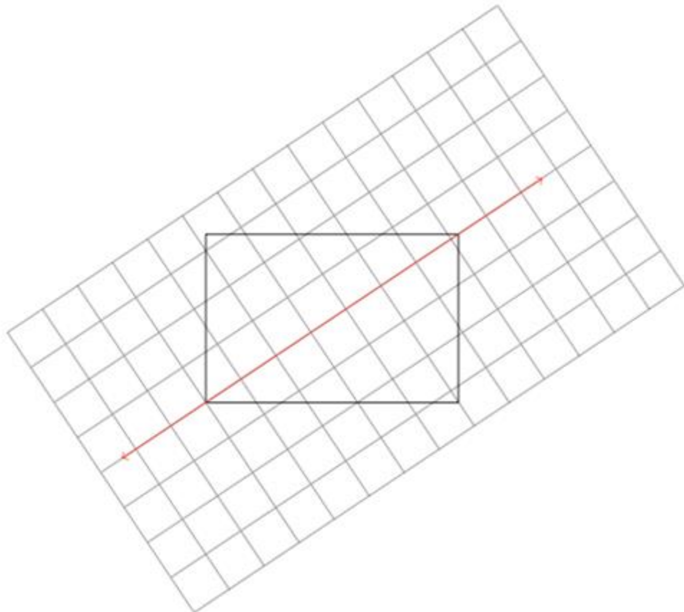
	
Part C	One way to show the triangle congruence would be to align one vertex at a time. Graphically this is shown below:  First a translation is used to move C to R with the new triangle shown in green. If B′ is the image of B under this translation, then a rotation, by the directed angle indicated in purple, moves B′ to Q: the triangle after this transformation is indicated in blue, sharing one side with triangle PQR. If A″ is the image of A after the translation and rotation, then a reflection across $\overline{QR}$ moves A″ to P.

Name ________________________ Block ______ Date __________

Reflecting a Rectangle Over a Diagonal (8.G.A.1)

a. Each picture below shows a rectangle with a line through a diagonal. For each picture, use the grid in the background to help draw the reflection of the rectangle over the line.

1.	
2.	

3.	

b. Suppose you have a rectangle where the line through the diagonal is a line of symmetry. Using what you know about reflections, explain why the rectangle must be a square.

X. Modifications

Special Education/ 504:	**English Language Learners:**
-Adhere to all modifications and health concerns stated in each IEP. -Give students a MENU options, allowing students to pick assignments from different levels based on difficulty. -Accommodate Instructional Strategies: reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), handouts, definition list with visuals, extended time -Allow students to demonstrate understanding of a problem by drawing the picture of the answer and then explaining the reasoning orally and/or writing , such as Read-Draw-Write -Provide breaks between tasks, use positive reinforcement, use proximity -Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum by using manipulatives -Implement supports for students with disabilities (click here) - Make use of strategies imbedded within lessons -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 17-18) - Strategies for students with 504 plans	- Use manipulatives to promote conceptual understanding and enhance vocabulary usage - Provide graphic representations, gestures, drawings, equations, realia, and pictures during all segments of instruction - During i-Ready lessons, click on “Español” to hear specific words in Spanish - Utilize graphic organizers which are concrete, pictorial ways of constructing knowledge and organizing information - Use sentence frames and questioning strategies so that students will explain their thinking/ process of how to solve word problems - Utilize program translations (if available) for L1/ L2 students - Reword questions in simpler language - Make use of the ELL Mathematical Language Routines (click here for additional information) -Scaffolding instruction for ELL Learners -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 16-17)
Gifted and Talented:	**Students at Risk for Failure:**
- Elevated contextual complexity - Inquiry based or open ended assignments and projects - More time to study concepts with greater depth - Promote the synthesis of concepts and making real world connections - Provide students with enrichment practice that are imbedded in the curriculum such as: ● Application / Conceptual Development ● Are you ready for more? - Provide opportunities for math competitions - Alternative instruction pathways available - Common Core Approach to Differentiate Instruction: Students with Disabilities (pg. 20)	- Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum - Modify Instructional Strategies, reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), inclusion of more visuals and manipulatives, Peer Support - Constant parental/ guardian contact - Provide academic contracts to students & guardians - Create an interactive notebook with samples, key vocabulary words, student goals/ objectives. - Plan to address students at risk in your learning tasks, instructions, and directions. Anticipate where the needs will be, then address them prior to lessons. -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 19)

21st Century Life and Career Skills: Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study. https://www.state.nj.us/education/cccs/2014/career/9.pdf	
• **CRP1**. Act as a responsible and contributing citizen and employee. • **CRP2**. Apply appropriate academic and technical skills. • **CRP3**. Attend to personal health and financial well-being. • **CRP4**. Communicate clearly and effectively and with reason. • **CRP5**. Consider the environmental, social and economic impacts of decisions. • **CRP6**. Demonstrate creativity and innovation.	• **CRP7**. Employ valid and reliable research strategies. • **CRP8**. Utilize critical thinking to make sense of problems and persevere in solving them. • **CRP9**. Model integrity, ethical leadership and effective management. • **CRP10**. Plan education and career paths aligned to personal goals. • **CRP11**. Use technology to enhance productivity. • **CRP12**. Work productively in teams while using cultural global competence.
Students are given an opportunity to communicate with peers effectively, clearly, and with the use of technical language. They are encouraged to reason through experiences that promote critical thinking and emphasize the importance of perseverance. Students are exposed to various mediums of technology, such as digital learning, calculators, and educational websites.	

<table>
<tr><th colspan="2">Technology Standards:
All students will be prepared to meet the challenge of a dynamic global society in which they participate, contribute, achieve, and flourish through universal access to people, information, and ideas.
https://www.state.nj.us/education/cccs/2014/tech/</th></tr>
<tr><td>8.1 Educational Technology:

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
B. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
C. Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
D. Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
E. Research and Information Fluency: Students apply digital tools to gather, evaluate, and use of information.
F. Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.</td>
<td>8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:

All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

A. The Nature of Technology: Creativity and Innovation- Technology systems impact every aspect of the world in which we live.
B. Technology and Society: Knowledge and understanding of human, cultural, and societal values are fundamental when designing technological systems and products in the global society.
C. Design: The design process is a systematic approach to solving problems.
D. Abilities in a Technological World: The designed world in a product of a design process that provides the means to convert resources into products and systems.
E. Computational Thinking: Programming- Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.</td></tr>
</table>

Interdisciplinary Connections:	
English Language Arts:	
L.7.3	Use knowledge of language and its conventions when writing, speaking, reading, or listening.
SL.7.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 7 topics and texts*, building on others' ideas and expressing their own clearly.
W.7.1	Write opinion pieces on topics or texts, supporting a point of view with reasons and information.

XI. Core Instruction & Supplemental Resources

Core Instruction

ILLUSTRATIVE MATHEMATICS V. 2019
(OPEN UP RESOURCES)

GRADE	TEACHER RESOURCES	STUDENT RESOURCES
6	• **Teacher Edition: Unit 1-9** • Online Course Guide	• Student Workbook Set: Unit 1-9 • Online Student Access (Digital Applets)
7	• **Teacher Edition: Unit 1-9** • Online Course Guide	• Student Workbook Set: Unit 1-9 • Online Student Access (Digital Applets)
8	• **Teacher Edition: Unit 1-9** • Online Course Guide	• Student Workbook Set: Unit 1-9 • Online Student Access (Digital Applets)

5 Practices for Orchestrating Productive Mathematics Discussions

Anticipate

Consider how students might mathematically interpret a problem, the array of strategies—both correct and incorrect—that they might use to tackle it, and how those strategies and interpretations might relate to the mathematical concepts, representations, procedures, and practices that you would like the students to learn.

- Solve the problem yourself first. If possible work with colleagues.
- Ask yourself the following questions:
  - What strategies have students used in the past?
  - What representations are students most likely to use?
  - What incorrect or unproductive strategies are students likely to try?
  - What things might get in the way of students being able to engage with the problem? How can you remove those barriers?
  - What questions will you ask those who struggle?

Monitor

Pay close attention to students' mathematical thinking and solution strategies as they work on the task.

- Create a list of strategies the students may produce.
- Circulate the room. Watch and listen to students as they work.
- If any students use strategies you anticipated, write their name or group number on your list.
- Ask questions that will help students make their thinking visible.
- Ask questions that will help students clarify their thinking.
- Press students to consider aspects of the task to which they need to attend.

Select

Select particular students to share their work with the rest of the class to get specific mathematics into the open for discussion. The selection of particular students and their solutions is guided by the previously anticipated strategies and your assessment of how each approach will contribute to that goal.

- Based on the previously anticipated strategies and the mathematical goal of the activity, decide which student strategies to highlight.
- Select students who will share their work with the class.

Sequence

Make purposeful choices about the order in which students' work is shared to maximize the chances of achieving the mathematical goals for the discussion.

- Based on the mathematical goal, decide on the purpose for the sequence of work. For example: least efficient to most efficient, concrete to abstract, misconceptions to conceptions, or building representations.
- Decide in which order students will present their work.

Connect

Help students draw connections between their solutions and other students' solutions as well as the key mathematical ideas in the lesson. Help students to make judgments about the consequences of different approaches for the range of problems that can be solved, one's likely accuracy and efficiency in solving them, and the kinds of mathematical patterns that can be most easily discerned. Know where you want the discussion to "land" and make choices that are likely to get you there. If necessary, you may have to demonstrate an approach that students didn't come up with themselves.

- As students share, ask questions to elicit and clarify student thinking.
- After each student shares, ask questions to connect it to previously shared work or ask a student to summarize what another student said in their own words.
- Ask students to compare and contrast strategies or representations during the discussion.
- If students did not come up with an approach that you need them to see in order for the discussion to "land," demonstrate this approach and connect it to the work that students did.

IDEAL MATH BLOCK

Whole Group Instruction	55min	INSTRUCTION (Grades 3 – 8) Daily Routine: Mathematical Content or Language Routine (7 – 10 min) Anchor Task: Anticipate, Monitor, Select, Sequence, Connect Tech Integration: Digital applets embedded within lessons designed to enhance student learning Collaborative Work* Guided Learning/Guided Practice Independent Work (Demonstration of Student Thinking) Additional Activities / Let's Practice		
Rotation Stations (Student Notebooks & Chromebooks Needed)	1-2X 30 min	STATION 1: Focus on current Grade Level Content STUDENT EXPLORATION* Independent or groups of 2-3 Emphasis on MP's 3, 6 (Reasoning and Precision) And MP's 1 & 4 (Problem Solving and Application) TOOLS/RESOURCES Practice Problems Extra Practice/Enrichment Are you ready for more? Put Your Thinking Cap On	STATION 2: Focus on Student Needs TECH STATION Independent TECH INTEGRATION iReady - *i-Ready* delivers online lessons driven by student data to provide tailored instruction that meets students where they are in their learning trajectory. Dreambox (ELL) – Adaptive online learning platform.	TEACHER STATION: Focus on Grade Level Content; heavily scaffolded to connect deficiencies TARGETED INSTRUCTION 4 – 5 Students TOOLS/ RESOURCES Homework Manipulatives Reteach Workbook Transition Guide *all students seen in 2 weeks
Closure	5 min	INSTRUCTION Exit Ticket (Demonstration of Student Thinking) TOOLS/RESOURCES Notebooks or Exit Ticket Slips		

* Promotes discourse and collaboration

Supplemental Resources

Achieve the Core

Tasks - https://achievethecore.org/category/416/mathematics-tasks

Coherence Map - https://achievethecore.org/page/1118/coherence-map

Embarc

https://embarc.online/

Engage NY

https://www.engageny.org/ccss-library/?f%5B0%5D=field_subject%253Aparents_all%3A13601

iReady Digital Platform

https://login.i-ready.com/

Illustrative Mathematics

Content Standard Tasks - https://tasks.illustrativemathematics.org/content-standards

Practice Standard Tasks - https://tasks.illustrativemathematics.org/practice-standards

Open Up Resources - https://access.openupresources.org/sign_in

iM Additional Resources - https://bit.ly/imshare

Khan Academy

https://www.khanacademy.org/math/illustrative-math

NJDOE Digital Item Library

https://nj.digitalitemlibrary.com/home?subject=Math

Ready Teacher Toolbox

https://teacher-toolbox.com/