Unit 04 Transformations

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 2**
Length: **3 weeks**
Status: **Published**

Brief Summary of Unit

Students will understand congruence and similarity in terms of transformations. Students will learn that rigid motions preserve distance and angle measure and nonrigid transformations may change the shape or size of the figure. This unit establishes the approach of using rigid motions to identify congruent figures.

Revision Date: July 2024

Standards

Students will analyze geometric designs which connects to various cultures. Embracing the diversity within society incorporates the following:

Amistad Commission

This unit also reflects the goals of the Department of Education and the Amistad Commission including the infusion of the history of Africans and African-Americans into the curriculum in order to provide an accurate, complete, and inclusive history regarding the importance of of African-Americans to the growth and development of American society in a global context.

Asian American and Pacific Islander History Law

This unit includes instructional materials that highlight the history and contributions of Asian Americans and Pacific Islanders in accordance with the New Jersey Student Learning Standards in Social Studies.

New Jersey Diversity and Inclusion Law

In accordance with New Jersey’s Chapter 32 Diversity and Inclusion Law, this unit includes instructional materials that highlight and promote diversity, including:

economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and

sexual orientation, race and ethnicity, disabilities, and religious tolerance.

1	Developing Responsibility for Learning: Cultivating independence, self-reflection, and responsibility for one's own learning.
2	Adapting Communication: Adapting communication in response to the varying demands of audience, task, purpose, and discipline.
3	Valuing Evidence in Argumentation: Constructing viable claims and evaluating, defending, challenging, and qualifying the arguments of others.
3.a	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
G.CO.A.2	Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).
3.b	Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
G.CO.A.3	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
G.CO.A.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
G.CO.A.5	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.
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.
G.SRT.A.1.a	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.
G.SRT.A.1.b	The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
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.
TEC.K-12.8.1	All students will use computer applications to gather and organize information and to solve problems.
TEC.K-12.8.2	All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world as they relate to the individual society, and the environment.
WORK.K-12.9.1	All students will develop career awareness and planning, employability skills and foundational knowledge necessary for success in the workplace.
WORK.K-12.9.2	All students will develop career awareness and planning, employability skills and foundational knowledge necessary for success in the workplace.

Essential Questions

- How can you change a figrue's size without changing its shape?

- How can you change a figures position without changing its size and shape?
- How can you represent a transformation in the coordinate plane?
- How do you recognize congruence and similarity in figures?

Enduring Understandings

- Rotations preserve distance, angles measures, and orientation of figures.
- When you reflect a figure across a line, each point of the figure maps to another point the same distance from the line but on the other side. The orientation of the figure reverses.
- You can change the position of a geometric figure so that the angle measures and the distance between any two points of a figure stay the same.
- You can use a scale factor to make a larger or smaller copy of a figure that is also similar to the original figure.

Students Will Know

- How to describe congruence and similarity transformations.
- How to draw and identify rotation images of figures.
- How to identify reflection images of figures.
- How to identify rigid motion using translation images of figures.

Students Will Be Skilled At

- Describing similarity transformations.
- Dilating figures and identifying scale factor.
- Identifying lines of symmetry in polygons.
- Identifying rigid motion through translations, reflections, and rotations.
- Identifying rotational symmetry in polygons.
- Performing a composition that include more than one of the following: translation, reflection or rotation of a figure.
- Understanding similarity between dilated images of the same figure.
- Writing a rule for a given translation.

Evidence/Performance Tasks

Assessments

- Formative: Daily assessments using examples from class notes, NJSLA test bank problems, and/or Albert/AP Classroom assessments
- Summative: Teacher-created assessments, NJSLA test bank problems, Big Ideas Math online platform

problems, Albert/AP Classroom and/or Big Ideas Math unit assessments

- Benchmark: IXL or teacher created diagnostic assessments in addition to unit assessments from Big Ideas Math
- Alternative Assessments: Student-centered activities such as scavenger hunts, various projects involving real world applications, and differentiated learning tasks in Khan Academy, DeltaMath, and IXL

- Answer essential questions
- Class discussion of daily topic
- Classwork and homework that assess the essential questions
- Provide alternative means of assessments for certain students
- Teacher Observation
- Tests and quizzes that assess the essential questions
- Written assignments that assess the essential questions that involves providing explanations

Learning Plan

Unit 4: Chapter 4, Transformations (1-2 days per topic, 2 days practice, 2 days review, 2 days assessment for 15 days)

- 4.1 Transformations
    - Translate figures using vector notation and using a rule
    - Given a translation, find the rule or vector notation
    - Define; image, preimage, vector, rigid transformation
    - Composition of translations
- 4.2 Reflections
    - Define Reflection, Line of Reflection, Glide reflections
    - Reflect over horizontal and vertical lines as well as $y = x$ and $y = -x$
    - Coordinate rules for reflections
    - Compositions of translation then reflection
    - Identify lines of Symmetry
- 4.3 Rotations
    - Define Rotation, Center of Rotation, Angle of Rotation, Rotational Symmetry, Center of Symmetry

    - Coordinate Rules for Rotations around the Origin
    - Composition of reflection then rotation
    - Identify Rotational Symmetry
- 4.4 Congruence
    - Identify Congruent Figures
    - Describe Congruent Multi-Step Transformation
- 4.5 Dilations
    - Define Dilation, Center of Dilation, Scale Factor
    - Discuss scale factor values for Enlargement or Reduction
    - Dilate figure in Coordinate Plane
    - Construct a Dilation**
    - Negative Scale Factors

Materials

Core instructional materials: Core Book List including Big Ideas Math Common Core Geometry

Supplemental materials: Khan Academy, Edia, DeltaMath

- District approved textbook and ancillary materials
- Online resources: Khan Academy, Delta Math, Edia, Geogebra
- Teacher created activiites
- Teacher created notes

Suggested Strategies for Modifications

Possible accommodations/modification for Geometry CP.