*Unit 1-2: Transformations & Dilation

Content Area: **Mathematics**
Course(s): **Math - Grade 8**
Time Period: **1 marking period**
Length: **5 weeks**
Status: **Published**

Unit Overview

Students will investigate transformation on a a plane and makes observations between the image and preimage.

Students will be able to determine figures as congruent and describe their transformation momements.

Students will be able to describe transfomations found in tessellations and in designs with rotational symmetry.

Students will follow up transformation with dilations and discuss how polygons/triangles are similar.

By the end of January, administer the Link It! G8 NJSLS math online Form B.

Transfer

Students will be able to independently use their learning to ...

- Describe

   o observations about scaled rectangles
   o observations about dilated points, circles, and polygons
   o sequences of transformations
   o observations about side lengths in similar triangles
   o movements of figures
   o observations about transforming parallel lines
   o transformations using corresponding points, line segments, and angles
   o observations about angle measurements
   o transformations found in tessellations and in designs with rotational symmetry

   Explain

   o how to apply dilations to find specific images
   o how to determine whether triangles are congruent, similar, or neither
   o strategies for finding missing side lengths
   o how to apply dilations to find specific images of points
   o reasoning for a conjecture

- o about categories for movement
- o about rotating line segments
- o about the relationship between vertical angles
- o about transformations and congruence
- o about corresponding segments and length
- o about alternate interior angles
- o about the sum of angles in a triangle

Represent

- o dilations using given scale factors and coordinates
- o figures using specific transformations
- o graphs of lines using equations
- o whether or not rigid transformations could produce an image
- o whether or not shapes are congruent
- o whether or not polygons are congruent
- o whether or not ovals are congruent
- o whether or not triangles can be created from given angle measurements

Meaning

Understandings

Students will understand that

- Transformations are moments that rotate,reflect or translate a figure without changing the size or change of the figture.
- the image and preimage are congruent
- the definition of congruent
- transformations are found in tessellations
- the definition of similar figures
- Dilated figures are similar figures and relate through a scale factor
- rigid transformations are considered rotations, reflections and/or translations
- tranformations rules for clockwise and counterclockwise around a coordinate graph

Essential Questions

Students will keep considering...

- How figures can be translated, rotated and or reflected on a coordinate graph?

- How can algebraic concepts be applied to geometry?
- How can we best show or describe the change in position of a figure?
- How can you determine congruence and similarity?
- How architects use and relate dilations to blueprint drawings?
- How similar figures relate and can be determined through proportions?

Application of Knowledge and Skill

Students will know...

Students will know...

- How to translate, rotate and reflect images on a coordinate graph.
- How to dilate polygons on a coordinate graph.
- How to use scale factor and proportions to determine similar figures.
- How to create a tessellation
- How to identify similar and congruent figures

Students will be skilled at...

Students will be skilled at...

- Rotating figures on a coordinate graph
- Reflecting figures on a coordinate graph
- translating figures on a coordinate graph
- Dilating figures on a coordinate graph
- Determining the scale factor of a figure that was dilated
- Writting congruency statements
- Identifying similar figures and their scale factor

Academic Vocabulary

plane, measure, vertex/vertices, direction, slide, turn, clockwise, counterclockwise, reflection, rotation, translation, opposite, image, angle of rotation, center (of rotation) line of reflection, sequence of transformation, distance, point, segment, coordinate, x-axis, y-axis, polygon, rigid transformation, corresponding, measurement, preserve, midpoint, vertical angles, parallel, intersect, congruent, perimeter, area, alternate interior angles, supplementary angles, transversal, straight angle, tessellation, symmetry.

Learning Goal 1

- Describe a sequence of transformations that exhibits the similarity between two similar two-dimensional figures (8.G.A.4)
- Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates (8.G.A.3)

CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP11	Use technology to enhance productivity.
CAEP.9.2.8.B.7	Evaluate the impact of online activities and social media on employer decisions.
TECH.8.1.8	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.

Target 1.1 --(Level of Difficulty: Comprehension(symbolizing), DOK: 2- Skill/Concept)

SWBAT: Graph translations on the coordinate plane. **(Chapter 1, Lesson 8)**

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-12.8	Look for and express regularity in repeated reasoning.
MA.8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations:
MA.8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

Target 1.2 -- (Level of Difficulty: Comprehension(symbolizing), DOK: 2- Skill/Concept)

SWBAT: Graph reflections on the coordinate plane. **(Chapter 1, Lesson 9)**

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.7	Look for and make use of structure.
MA.8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations:
MA.8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

Target 1.3 -- (Level of Difficulty: Retrieval (recognizing), DOK: 2- Skill/Concept)
INQUIRY LAB

SWBAT: Identify rotational symmetry. **(Chapter 1, Lesson 11)**

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations:

Target 1.4 -- (Level of Difficulty: Comprehension(symbolizing), DOK: 2- Skill/Concept)

SWBAT: Graph rotations on the coordinate plane. **(Chapter 1, Lesson 10)**

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.7	Look for and make use of structure.
MA.8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations:
MA.8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

Target 1.5 -- (Level of Difficulty: Comprehension(symbolizing), DOK: 2- Skill/Concept)

SWBAT: Draw compositions of translations, reflections, and rotations. **(Chapter 1, Lesson 11)**

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
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.

Target 1.6 -- (Level of Difficulty: Comprehension(symbolizing), DOK: 2- Skill/Concept)

SWBAT: Use a series of transformations to create congruent figures. **(Chapter 1, Lesson 11)**

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
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.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.

Target 1.7 --(Level of Difficulty: Comprehension, DOK: 2- Skill/Concept) INQUIRY LAB

SWBAT: Determine which three pairs of corresponding parts can be used to show that two triangles are congruent. **(Chapter 2, lesson 6-7)**

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
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.

Target 1.8 -- (Level of Difficulty: Comprehension, DOK: 2- Skill/Concept)

SWBAT: Write congruence statements for congruent figures. **(Chapter 2, Does not teach directly but discusses similarities)**

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.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.

Target 1.9 (Level of Difficulty: Retrieval (recognizing), DOK: 2- Skill/Concept) INQUIRY LAB

SWBAT: Identify dilations **(Chapter 2, Lesson 4)**

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

Target 1.11 -- (Level of Difficulty: Retrieval (recognizing), DOK: 2- Skill/Concept)

SWBAT: Use scale factors to graph dilations. **(Chapter 2, Lesson 4)**

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.

MA.K-12.4	Model with mathematics.
MA.8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

Target 1.12 -- (Level of difficulty: Knowledge Utilization, DOK: 3- Strategic Thinking) INQUIRY LAB

SWBAT: Investigate properties of similar triangles. **(Chapter 2, Lesson 5-8)**

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
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.

Target 1.14 -- (Level of Difficulty: Comprehension, DOK: 2- Skill/Concept)

SWBAT: Solve problems involving similar triangles. **(Chapater 2, Lesson 6)**

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.7	Look for and make use of structure.
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.

Target 1.15- (Level of Difficulty: Analysis(matching), DOK: 2- Skill/Concept)

SWBAT: Relate the slope of a line to similar triangles.**(Chapter 4, Lesson 1) Will also relate to chapter 2, Lesson 6**

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.8.EE.B.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.

Target 1.16 -- (Level of Difficulty: Analysis, DOK: 2- Skill/Concept)

SWBAT: Find the relationship between perimeters and areas of similar figures.**(Chapter 2, Lesson 7-8)**

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.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.

21st Century Life and Careers

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

Technology

TECH.8.1.8	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.
TECH.8.1.8.A.CS2	Select and use applications effectively and productively.
TECH.8.1.8.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.
TECH.8.1.8.C.CS1	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
TECH.8.1.8.E	Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
TECH.8.1.8.E.CS3	Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.

Formative Assessment and Performance Opportunities

Mid Chapter Checks

Are you ready assessments

Tests
Quizzes
Informal Assessments
Graded Classwork
Surveys
WhiteBoard Activities
Exit tickets
Group activities
Projects
Teacher Observations
Student Interviews
Aleks Assessments
Linkit Assessments

Summative Assessment

Unit Test-Found on Linkit
Aleks-based off percentage
Unit Project
Performance based assessment

Accommodations & Modifications

Please see Unit Resources below for specific targeted resources

- Aleks-Select tasks found in geometry

- Calculators

- Centers

- Coordinate Rule Cheat Sheet with each rotation

- Document Camera for visual demonstration

- Extra time on tasks

- Foldables-allow to help with procedures and vocabulary

- Geogebra for visual examples and task for review

- Graphing Calculator to help with volume and angle calculations

- interactive notebook pages for worked examples

- Manipulatives-Various shapes, nets to help visualize the transformations as well as volume formulas

- Modifications as per IEP/504

- Quizlet-Allow for practice as well as flashcards
- Review and Practice
- Small Group Instruction
- Translate the text

Unit Resources

Additional files located in Unit 2 folder

- www.achievethecore.org/coherence map
- Aleks online supplement
- ck12.org
- http://blog.mrmeyer.com/?p=17442
- http://illuminations.nctm.org/LessonsList.aspx?grade=3&standard=all
- http://insidemathematics.org/index.php/8th-grade
- http://learnzillion.com/
- http://www.illustrativemathematics.org/
- https://www.khanacademy.org/
- Inquiry labs
- Unit projects
- www.desmos.com
- www.geogebra.org
- www.quizlet.com

Interdisciplinary Connections

Create a room layout and discuss the perimeter and area when you dialate the room size. (MA.8.G.A.4)

| SCI.MS-ETS1-1 | Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. |