Unit 4: Transformations

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **Full Year**
Status: **Published**

UNIT RATIONALE

A variety of transformations exist which can change the location and/or shape of an object. Proofs are used to develop the use of sequential thinking and supportive statements which can also be used in supporting a side or argument. Math tools like other tools need to be used precisely in order to be effective. Precise definitions of angle, circle, perpendicular line, parallel line, line segments, and distance play an important role in understanding basic terminology.

ESSENTIAL QUESTIONS

How can you change a figure's position without changing its size and shape?

How can you change a figures size without changing its shape?

How do you recognize symmetry in a shape?

STANDARDS

NEW JERSEY STUDENT LEARNING STANDARDS: CONTENT AREA

New Jersey (NJSLS) - High School - Mathematics (2020)

MA.G-CO.A.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
MA.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).
MA.G-CO.A.3	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.
MA.G-CO.A.4	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.
MA.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.
MA.G-CO.B.7	Use the definition of congruence in terms of rigid motions to show that two triangles are

	congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
MA.G-CO.D.12	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.).

NEW JERSEY STUDENT LEARNING STANDARDS: CAREER READINESS, LIFE LITERACIES AND KEY SKILLS

12.9.3.ST-SM.1	Apply science and mathematics to provide results, answers and algorithms for engineering and technological activities.
12.9.3.ST-SM.2	Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
WRK.9.2.12.CAP.6	Identify transferable skills in career choices and design alternative career plans based on those skills.
TECH.9.4.12.CI.1	Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
TECH.9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).

NEW JERSEY STUDENT LEARNING STANDARDS: COMPUTER SCIENCE AND DESIGN THINKING

CS.9-12.8.1.12.AP.5	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
CS.9-12.8.1.12.DA.2	Describe the trade-offs in how and where data is organized and stored.
CS.9-12.8.1.12.DA.5	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

PRE-ASSESSMENTS

Non-curricular tasks to identify student readiness in respect to problem solving.

Students will collaboratively solve real world tasks.

INSTRUCTIONAL PLAN

MODULE 1

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are learning to use reflections and angles to create miniature golf holes
Student Learning Strategies	Students will investigate how to achieve a hole in one on various mini-golf holes.
Success Criteria	I can reflect a point I can use similar triangles I can construct perpendicular lines
Formative Assessment (drives instructional decisions)	Formative assessment will be determined by studen responses to the questions in the activity.
Activities and Resources	Putt-Putt handout, ruler, pencil, compass
Suggested Modifications	Students can work in pairs.

GeometryPuttPuttProject-1.pdf

MODULE 2

Student Learning Intentions (SLI) WALT: (We are learning to…)	Today we are using fractals to build a Sierpinski Triangle model
Student Learning Strategies	Students will use fractals to create a three dimensional fractal
Success Criteria	I can identify patterns in fractals I can use prior knowledge of similarity to transform shapes
Formative Assessment (drives instructional decisions)	Formative assessment will be determined by student responses to the questions in the activity.
Activities and Resources	https://sites.google.com/site/stemsos2016sierpinskitriangle/my

	pbl-project Intro to fractals Envelopes, scissors, rulers, glue guns
Suggested Modifications	Students can complete a two dimensional model instead

MODULE 3

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are learning to use transformations to translate, reflect, rotate and dilate shapes in the coordinate plane.
Student Learning Strategies	Students will complete the INB pages and examples
Success Criteria	I can translate a point or shape I can reflect a point or shape I can rotate a point or shape I can dilate a shape I can determine what transformation was used to bring a shape from one location to another.
Formative Assessment (drives instructional decisions)	Formative assessment will be determined by studen responses to the questions in the activity.
Activities and Resources	INB pages and examples
Suggested Modifications	Students complete the examples at their own pace.

GeometryGuidedInteractiveMathNotebookPageRigidTransformations.pdf

MODULE 4

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are learning to use transformations to create a flipbook.
Student Learning Strategies	Students will use ppt to create slides that will show the movement of an object
Success Criteria	I can translate a point or shape I can reflect a point or shape I can rotate a point or shape I can determine what transformation was used to bring a shape from one location to another.
Formative Assessment (drives instructional decisions)	Formative assessment will be determined by studen responses to the questions in the activity.
Activities and Resources	TPT flipbook slides
Suggested Modifications	Students can make more that 10 slides to show additional movement.

FlipBookTransformationProject-1.pptx
Flip_Book_Project.pdf

MODULE 5

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are learning to identify transformations using Braille
Student Learning Strategies	Students will use the braille alphabet to identify symmetry of shapes and transformations.
Success Criteria	I can determine if a shape has symmetry I can identify a rotation I can identify a reflection
Formative Assessment (drives instructional decisions)	Formative assessment will be determined by studen responses to the questions in the activity.
Activities and Resources	Braille activity document

Suggested Modifications	Students can work independently or in pairs depending on the level of support that is needed.

Braille_Activity.docx

MODULE 6

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are learning to transform shapes to create a quil pattern.
Student Learning Strategies	Students will design their own fabric pattern by usinç transformations and lines of reflection.
Success Criteria	I can translate a point or shape I can reflect a point or shape I can rotate a point or shape I can determine what transformation was used to bring a shape from one location to another.
Formative Assessment (drives instructional decisions)	Formative assessment will be determined by studen responses to the questions in the activity.
Activities and Resources	Quilt Activity handout, rulers, colored pencils
Suggested Modifications	Students who want to investigate this topic further can research fabric design methods and share their findings with the class.

Quilt_Activity.docx

MODULE 7

Student Learning Intentions (SLI) WALT: (We	We are learning to transform shapes so that they map onto themselves.

are learning to…)	
Student Learning Strategies	Students will play a game that applies their knowledge of congruent transformations.
Success Criteria	I can use reflections to map a shape onto itself. I can use translations to map a shape onto itself. I can use compositions of transformations to map a shape onto itself
Formative Assessment (drives instructional decisions)	Formative assessment will be determined by studen responses to the questions in the activity.
Activities and Resources	Copy game boards
Suggested Modifications	Modify the game to a certain number of overlapping shapes instead of all shapes.

Game_Finders_Keepers.doc

REFLECTIONS

Transformations are easily connected to art. The students enjoyed the projects that contained an artistic element.

INTERDISCIPLINARY CONNECTIONS: NEW JERSEY STUDENT LEARNING STANDARDS FOR ELA, SOCIAL STUDIES, SCIENCE AND/OR MATHEMATICS

LA.K-12.NJSLSA.W2	Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
LA.K-12.NJSLSA.W4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LA.K-12.NJSLSA.W6	Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.
LA.K-12.NJSLSA.W8	Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.

LA.W.9-10.1.A	Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence.
LA.K-12.NJSLSA.SL2	Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
LA.K-12.NJSLSA.SL4	Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
LA.W.9-10.2.D	Use precise language and domain-specific vocabulary to manage the complexity of the topic.
LA.W.9-10.3.C	Use a variety of techniques to sequence events so that they build on one another to create a coherent whole.
LA.SL.9-10.5	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance findings, reasoning, and evidence and to add interest.