Unit 1: Basics of Geometry

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

UNIT RATIONALE

In this unit, students will discover the meaning of basic geometric structures such as points, lines, and planes. Students will explore these structures and how they can be used to create more complicated figures like angles, intersecting lines, parallel lines, and perpendicular lines. Students will also discover how these more complicated structures relate to real life scenarios.

ESSENTIAL QUESTIONS

- What are the foundations of Geometry (lines, segments, rays, angles, etc.)? How are they useful in solving real world problems?

- How do we use coordinate plane geometry on maps?

- How are the relationships between lines, transversals, and angles used in architecture and in city planning?

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.C.9	Prove theorems about lines and angles.
MA.G-MG.A	Apply geometric concepts in modeling situations
MA.G-MG.A.3	Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).

New Jersey (NJSLS) - K-12 - Math Practice Standards (2020)

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-12.6	Attend to precision.
MA.K-12.8	Look for and express regularity in repeated reasoning.

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 create an egg drop apparatus collaboratively so that our egg will be protected from cracking.
Student Learning Strategies	Students will create an apparatus to protect an egg from cracking as it falls to the ground from the 3rd floor.
Success Criteria	- I can collaborate productively with peers to develop an apparatus - I can problem-solve to protect the egg from cracking - I can select and use strategies needed to be successful in this project
Formative Assessment (drives instructional decisions)	Students will be graded using a rubric
Activities and Resources	The egg drop project
Suggested Modifications	Students can be placed into groups and/or work with the teacher to complete the project.

MODULE 2

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will be learning how to find real life examples of basic geometric structures so that they can define each basic geometric structure.
Student Learning Strategies	- Class discussions about coordinate plane geometry - Desmos Activities - Whiteboard Activities - Projects
Success Criteria	- I can define each basic geometric structure
Formative Assessment (drives instructional decisions)	Project rubrics Class Discussion Desmos Deltamath

Activities and Resources	- Students write their own definition of points, lines, and planes - Students will take pictures of each basic geometric structure they find around the classroom/school - Students will present their findings -Interactive Notebook page
Suggested Modifications	Students can use playdough or clay to make models of the geometric structures.

MODULE 3

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will be learning about the coordinate plane so that they can find the distance and midpoint between two structures in the coordinate plane.
Student Learning Strategies	- Class discussions about coordinate plane geometry - Desmos Activities - Whiteboard Activities - Projects
Success Criteria	- I can find the midpoint of two points - I can find the distance between two points
Formative Assessment (drives instructional decisions)	Project rubrics Class Discussion Desmos Deltamath
Activities and Resources	Road trip activity (https://www.teacherspayteachers.com/Product/Road-Trip-Project-Distance-Midpoint-7221481?st=23911a161b40473dcdcb36b656900d0f)
Suggested Modifications	Students can use Desmos to check the distances on th map

MODULE 4

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are learning to make conjectures about geometric theorems so that we can prove theorems about angles.
Student Learning Strategies	- Class discussions about congruence - Desmos Activities - Whiteboard Activities - Projects
Success Criteria	- I can prove basic angle relationships - I can make a conjecture - I can make a counterargument - I can use vertical angle theorem - I can write a two column proof
Formative Assessment (drives instructional decisions)	Project rubrics Class Discussion Desmos Deltamath
Activities and Resources	- Debate project - Pool shots activity
Suggested Modifications	Students can use manipulatives to model angles as needed

MODULE 5

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will be learning about transversals so that they can identify relationships between lines and angles.
Student Learning Strategies	- Class discussions about types of lines and angles made by intersecting lines - Desmos Activities - Whiteboard Activities - Projects
Success Criteria	- I can identify a transversal - I can describe parallel, perpendicular, and skew lines - I can identify angle relationships made by lines and transversals

Formative Assessment (drives instructional decisions)	Project rubrics Class Discussion Desmos Deltamath
Activities and Resources	- Identify parallel and perpendicular lines on a road map activity (https://emergentmath.com/2020/01/04/transversals-lesson-street-views/) - Create your own city project (https://www.teacherspayteachers.com/Product/City-Designer-Geometry-Project-Parallel-lines-Transversals-Special-Angles-357722?st=dad10a593a3a3468daa7effcc59ae065) - Geometry and art of architecture project -Transversals, tape, and stickies activity (http://mr-stadel.blogspot.com/2012/10/transversals-tape-and-stickies.html)
Suggested Modifications	

MODULE 6

Student Learning Intentions (SLI) WALT: (We are learning to…)	We are learning to compare the slopes of lines so that we can determine if they are parallel. perpendicular, or neither.
Student Learning Strategies	Interactive Notebooks Parallel and Perpendicular line puzzle
Success Criteria	I can rearrange an equation into y = mx + b form I can determine the slope of a line I can determine if lines are parallel- same slope I can determine if lines are perpendicular - opposite sign reciprocal slopes
Formative Assessment (drives instructional decisions)	Daily student progress on the puzzle activity
Activities and Resources	Interactive Notebook Page Puzzle

Suggested Modifications	Students can work in pairs to complete the activity so that they can provide peer support

REFLECTIONS

Invest time setting up the INB.

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.W.9-10.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
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.