**Marietta City Schools**

**2023–2024 District Unit Planner**

*Honors Geometry: Concepts & Connections*

| **Unit title** | Unit 3: Exploring Congruence | **MYP year** | *5* | **Unit duration (hrs)** | 17 hours |
|---|---|---|---|---|---|

**Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit):** ***What will students learn?***

**GA DoE Standards**

**Standards**

**G.GSR.3:** Experiment with transformations in the plane to develop precise definitions for translations, rotations, and reflections and use these to describe symmetries and congruence to model and explain real-life phenomena.

**G.GSR.3.1** Use geometric reasoning and symmetries of regular polygons to develop definitions of rotations, reflections, and translations.

**Fundamentals**

- Students should be able to define and identify figures as preimages and images.
- Students should be provided with multiple opportunities to identify lines of symmetry and angles of rotation to map a figure onto itself.
- Students should be provided with multiple opportunities to identify angles of rotation, lines of reflection, and directions of translations to map a preimage onto its image.
- Students should be provided opportunities to experiment with transformations represented on and off the coordinate plane.

**G.GSR.3.2** Verify experimentally the congruence properties of rotations, reflections, and translations: lines are taken to lines and line segments to line segments of the same length; angles are taken to angles of the same measure; parallel lines are taken to parallel lines.

**Fundamentals**

- Students should be able to determine that translations, reflections, and rotations produce images of the same size and shape as the preimage.
- Students should be able to determine congruency by identifying the rigid transformation(s) that produced the image of a figure.
- Opportunities should be provided for students to write statements of congruency.

**Terminology**

- A transformation that preserves size and shape is called a rigid transformation.

**Strategies and Methods**

- Students should have ample opportunities to use geometric tools and/or technology to explore figures created from translations, reflections, and rotations.

**G.GSR.3.3** Use geometric descriptions of rigid motions to draw the transformed figures and to predict the effect on a given figure. Describe a sequence of transformations from one figure to another and use transformation properties to determine congruence.

**Fundamentals**

- Students should be given multiple opportunities to identify resulting coordinates from translations, reflections, and rotations, and recognize the relationship between the coordinates and the transformation.

• Given two figures, students should be able to use the definition of congruence in terms of rigid motions to verify congruence if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
• Students should be able to use function notation to represent transformations in the coordinate plane.

**Strategies and Methods**

• Reflections should be limited to those over the x and y axes, horizontal and vertical lines, and the line y = x.
• Rotations should be limited to those centered about the origin and in increments of 90 degrees, clockwise and counterclockwise.

**Example**

• The function notation (x, y) --> (x-4, y+5) translates the point (x, y) four units to the left and five units up.

**G.GSR.3.4** Explain how the criteria for triangle congruence follow from the definition of congruence in terms of rigid motions. Use congruency criteria for triangles to solve problems and to prove relationships in geometric figures.

**Fundamentals**

• Students should be able to apply properties of congruence to solve problems with missing values involving corresponding parts.
• Students should be able to use the definition of congruence to prove relationships in geometric figures.

**Strategies and Methods**

• Students should be provided opportunities to use ASA, SAS, SSS, AAS, and HL congruence postulates/theorems to prove triangles are congruent.
• Students should have opportunities to prove triangle congruence using appropriate methods: logic statements, two-column proofs, paragraph proofs, and flow proofs.

**Terminology**

• Logic statements include conditional, converse, inverse, contrapositive, and conditional statements.

**G.MM.1:** Apply mathematics to real-life situations; model real-life phenomena using mathematics.

**G.MM.1.1** Explain mathematically applicable problems using a mathematical model.

**Fundamentals**

• Students should be provided with opportunities to learn mathematics through the exploration of real-life problems.
• Mathematically applicable problems are those presented in context where the context makes sense, realistically and mathematically, and allows for students to make decisions about how to solve the problem (model with mathematics).

**G.MM.1.2** Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities contexts.

**Fundamentals**

• Students should be able to use the content learned in this course to create a mathematical model to explain real-life phenomena.

**G.MM.1.3** Using abstract and quantitative reasoning, make decisions about information and data from a mathematically applicable situation.

**Fundamentals**

• Students should be able to connect learning of geometric shapes and their properties to describe objects.
• Students should be able to apply geometric methods and data to make decisions about structures and solve real-world problems.

**G.MM.1.4** Use various mathematical representations and structures with this information to represent and solve real-life problems.

**Fundamentals**

• Students should be able to construct a model by selecting and creating algebraic and geometric representations that describe relationships between variables in context.

**Concepts/Skills to support mastery of standards**

- Equivalence
- Transformations

- Graphing in the coordinate plane
- Identification/naming of angles and segments

**Vocabulary**

| | | | | | |
|---|---|---|---|---|---|
| Angle-Angle-Side (AAS) | Angle-Side-Angle (ASA) | Congruence | Hypotenuse-Leg (HL) | Isometry | Reflection |
| Rigid Motion | Rotation | Side-Angle-Side (SAS) | Side-Side-Side (SSS) | Similarity | Symmetry |
| Translation | | | | | |

**Notation**

$A \rightarrow A'$ $(x, y) \rightarrow (x+h, y+k)$ $\cong$

| Key concept | Related concept(s) | Global context |
|---|---|---|
| Form | Logic, Justification, Patterns | Personal and Cultural Expression - Artistry, craft, creation, beauty |

**Statement of inquiry**

Logic and justifications can be used as tools to form and craft geometric patterns and tessellations.

**Inquiry questions**

**Factual—**

- What is the transformation that maps the preimage to the image?

**Conceptual—**

- How can triangle congruence be used to prove rigid transformations?

**Debatable-**

- How can technology be used to explore figures created from transformations?

| MYP Objectives | Assessment Tasks |
|---|---|

| | | |
|---|---|---|
| *What specific MYP **objectives** will be addressed during this unit?* | ***Relationship** between summative assessment task(s) and statement of inquiry:* | *List of common formative and summative assessments.* |
| MYP C Communication | Students will be able to communicate their understanding of triangle congruence through content knowledge, tessellation creations, and argue the validity of proofs. | **Formative Assessment(s):**<br>CFA - Transformations & Triangle Congruence<br>MYP C - Triangle Congruence Proof<br>**Summative Assessment(s):**<br>Unit 3 Assessment |

| **Approaches to learning (ATL)** | |
|---|---|
| **Learning Activity: MYC C over Triangle Congruence Proofs**<br>**Category:** Communication Skills<br>**Cluster:** Communication<br>**Skill Indicator:** Use and interpret a range of discipline-specific terms and symbols | **Learning Activity: Reflection from Transformation Golf: Rigid Motion**<br>**Category:** Self-Management Skills<br>**Cluster:** Reflection<br>**Skill Indicator:** Consider content: What did I learn about today? What don't I understand yet? What questions do I have now? |

**Learning Experiences**

Add additional rows below as needed.

| Objective or Content | Learning Experiences | Personalized Learning and Differentiation |
|---|---|---|
| G.GSR.3.1<br>G.GSR.3.2<br>Using transformations to complete a round of transformation golf through Desmos. Students will use one or more transformations to transform the preimage to the image. | **Transformation Golf: Rigid Motions - Engage, Explore, Reflect (DOE)**<br>**Description:** In this learning plan, students use their existing understanding of translations, reflections, and rotations to complete a round of transformation golf. The task for each challenge is the same. Students will be required to use one or more transformations to transform the preimage into the image.<br>**Learning Goals:**<br>• I can describe a rigid motion sequence that maps a preimage to an image.<br>• I can describe a single rigid motion or sequences of rigid motions that have the same effect on the figure.<br>• I can use transformations to prove two congruent figures.<br>• I can use the triangle congruence criteria, rigid motions, and other properties of lines and angles to prove congruence between two figures**.** | - Graphic organizer for each of the transformations<br>- Build procedural fluency from conceptual understanding Supporting the Learning links within the DOE Task<br>- Use of Miras and Geo boards to help with reflections and rotations<br>- Challenge students to complete the Gold Transformations in as few of moves as possible |

| | | |
|---|---|---|
| G.GSR.3.4<br>Proving theorems for triangle congruence and showing these relationships through perseverance and patience in problem-solving | **Evaluating Conditions for Congruency - Engage and Explore (DOE)**<br>**Description:** In this learning plan, students will use the concepts of rigid motion and transformations to show congruency, including identifying corresponding sides and corresponding angles within and between triangles. Students will identify and understand the significance of a counterexample and use proofs in a geometric context. Students will explore definitions of congruence to formalize congruency criteria for triangles.<br><br>**Learning Goals**:<br>I can prove two triangles are congruent using HL, SSS, SAS, AAS, and ASA theorems. | - Provide scaffolded examples of starting points for the Card Set problems to get students thinking<br>- Provide multiple ways of students "drawing" their thoughts: pencil/paper, white boards, peg boards, technology<br>- Scaffold: Have students complete slides 1 and 2 of the Desmos matching activity<br>- Extension: Encourage students to complete all 4 slides of the Desmos matching activity |

**Content Resources**

**Textbook Correlation: enVision A|G|A - Geometry**

**G.GSR.3.1** - Lesson 3-1, 3-2, 3-3, 3-4, 3-5, Topic 3 - Mathematical Modeling in 3 Acts
**G.GSR.3.2** - Lesson 3-1, 3-2, 3-3, 3-4, 3-5, Topic 3 - Mathematical Modeling in 3 Acts
**G.GSR.3.3** - Lesson 3-1, 3-2, 3-3, 3-4, 3-5, Topic 3 - Mathematical Modeling in 3 Acts, 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, Topic 4 - Mathematical Modeling in 3 Acts
**G.GSR.3.4** - Lesson 4-3, 4-4, 4-5, 4-6, Topic 4 - Mathematical Modeling in 3 Acts; 6-2, 6-3, 6-4, 6-5, 6-6