Unit 6: Polygons and Quadrilaterals
Geometry

15 Class Meetings
Revised May 2023

Essential Questions

- How can you classify polygons?
- How can you use area formulas to find different dimensions?

Enduring Understandings with Unit Goals

EU 1: Using the relationships between the sides, angles, and diagonals of a polygon, you can classify quadrilaterals and other polygons.
- Identify specific properties of each type of polygon.

EU 2: Using measurements of polygons, it is possible to find the perimeter and area.
- Utilize the area formulas to find missing dimensions.

EU 3: You can use ratios to compare the perimeters and areas of similar figures.
- Create ratios that compare perimeter and area.

Standards

Common Core State Standards:

- **HSG.CO.C.11:** Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals*.
- **HSG.MG.A.1:** Use geometric shapes, their measures, and their properties to describe objects
- **HSG.GPE.B.7:** Use coordinates to compute perimeters of polygons and areas of triangles and rectangles.
- **HSG.SRT.C.8:** Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

ISAAC Vision of the Graduate Competencies

Competency 1: Write effectively for a variety of purposes.
Competency 2: Speak to diverse audiences in an accountable manner.
Competency 3: Develop the behaviors needed to interact and contribute with others on a team.
Competency 4: Analyze and solve problems independently and collaboratively.
Competency 5: Be responsible, creative, and empathetic members of the community.

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Unit Content Overview

1. **The Polygon-Angle Sum Theorem**
   - Classifying a polygon
   - Finding and using the polygon angle sum
   - Finding an exterior angle measure

2. **Properties of Parallelograms**
   - Identify the 5 properties of parallelograms
   - Solve equations using the properties
   - Find area of a parallelogram
   - Find a missing dimension

3. **Properties of Rhombuses, Rectangles, and Squares (Special Parallelograms)**
   - Classifying special parallelograms
   - Solve equations using properties of special parallelograms
   - Find area of special parallelograms
   - Find a missing dimension

4. **Trapezoids and Kites**
   - Classifying trapezoids and kites
   - Finding angle measures of trapezoids and kites
   - Using the mid-segment of a trapezoid
   - Find area of trapezoids and kites
   - Find a missing dimension

5. **Polygons in the Coordinate Plane**
   - Classifying a triangle
   - Classifying polygons
   - Classifying the figures created by the midpoints

6. **Areas of Regular Polygons and Composite Figures**
   - Finding area of a regular polygon
   - Using special triangles and trigonometry to find area of a regular polygon
   - Finding area of composite figures

7. **Perimeters and Areas of Similar Figures**
   - Finding and applying similarity and perimeter ratios
   - Finding and applying area ratios

Interdisciplinary Connection:
- Language Arts - Word Problems
- Science – Word Problems

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Daily Learning Objectives with *TWPS Activities*

Students will be able to…

- Calculate the sum of the measures of the interior and exterior angles of a polygon
- Solve problems involving relationships among sides and angles and diagonals of parallelograms
- Distinguish whether a quadrilateral is a parallelogram
    - *Is a quadrilateral always a parallelogram, why or why not?*
- Calculate the area of parallelograms
- Define and classify special types of parallelograms
- Solve problems using properties of diagonals of rhombuses and rectangles
- Calculate the area of special parallelograms
- Verify and use properties of trapezoids and kites
- Calculate the area of trapezoids and kites
- Identify polygons in the coordinate plane
- Evaluate the area of a regular polygon
- Evaluate the area of composite figures
    - *When finding a composite area, what strategy do you use to divide the shape?*
- Solve proportions to determine perimeters and areas of similar polygons
    - *Why do we need proportions to solve for unknown perimeters and areas?*

Instructional Strategies/Differentiated Instruction

- **HLP:** Academically Productive Talk
- **HLP:** Writing to Learn (TWPS)
- **HLP:** Effective Feedback
- Whole-group instruction
- Creating authentic connections for students
- Rephrasing and restatement of information and concepts
- Guided notes
- Student-led instruction
- Independent problem-solving
- Collaborative problem-solving
- Cross-curricular problem solving (independent and collaborative)
- Accountable Talk
- Manipulatives
- Cumulative Homework
- Visuals to support instruction
- Small group instruction
- Pre-teaching and reteaching

EL DIFFERENTIATED INSTRUCTION:

- Word Walls with visuals
- TWPS (Think, Write, Pair, Share)
- Pre-reading strategies
- Culturally responsive teaching
- Explicit Modeling
- Key Vocabulary
- Graphic Organizers
- Strategic Grouping
- Non-verbal Assessments

Assessments

FORMATIVE ASSESSMENTS:

- Accountable Talk Discussions
- Daily Think-Write-Pair Share (TWPS)
- Daily Do Now
- Whiteboards
- Mid-class check-ins
- Exit Slips
- Cumulative Homework
- Performance Task – Mapping the Course
    - Problem Solving Rubric

SUMMATIVE ASSESSMENTS:

- Edulastic Quiz 1 – EU 1
- Edulastic Quiz 2 – EU 2
- Unit 6 Test – EU 1, EU 2, EU 3
- Performance Task – Mapping the Course

Unit Task

Unit Task Name: Mapping the Course

Description: Students will use information learned in this unit about how polygons can be classified according to specific properties (EU 1), how there are formulas to determine area of polygons (EU 2), and how proportions can be used to find perimeter and area of similar polygons (EU 3), in order to map a course of a student's afternoon run. Students will be given instructions and directions of a path for an afternoon jog. They will need to map the jog and place important landmarks on a coordinate plane. After they have mapped out the run, students will need to analyze the map for different shapes and distances. They will classify the shapes based on the categories learned in this unit and explain in a well-developed paragraph how they have come to their conclusions. Students will then use formulas learned in the unit to determine how far the person ran.

Evaluation: Problem Solving Rubric

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Unit Resources
● Worksheets ● Calculator ● Laptops ● SBAC Prep Online ● Edulastic ● Kahn Academy ● Gimkit ● Quizizz ● Individual Whiteboards ● 2 Truths & One Lie ● State Common Core Standards Transition Tasks ● Online resources