Unit 08: Polygonal Regions and the Areas

Content Area: **Mathematics**
Course(s): **Mathematics**
Time Period: **Week 20**
Length: **3 Weeks**
Status: **Published**

Unit Overview

In this unit, students will develop and use formulas for the area of various polygons including triangles, squares, rectangles, parallelograms, trapezoids, rhombi, and kites. They will use the Pythagorean Theorem to find missing sides of right triangles in order to solve complex problems. Students will explore special right angles and develop the formulas for 30°-60°-90° triangles and 45°-45°-90° triangles. Finally, they will apply all of these skills to find the area of both regular polygons and complex figures.

Standards

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.).
MA.G-SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
MA.G-GPE.B.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
MA.G-MG.A.1	Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

Essential Questions

1) Why is proof necessary?

2) How can right triangle theorems be applied to solve real-world problems?

3) How are we able to build upon previously learned concepts and apply them to geometry?

Application of Knowledge and Skills...

Students will know that...

- 1) the area of a closed region is the number of square units of space within the boundary.
- 2) formulas can be used to find the area of squares, rectangles, triangles, trapezoids, parallelograms, rhombi, kites, and regular polygons.
- 3) an irregular polygon can be divided into pieces so that the area can be found by finding the area of each individual piece and adding the areas together.

Students will be skilled at...

Students will be able to:

- a) find the area of polygons including squares, rectangles, triangles, right triangles, trapezoids, parallelograms, rhombi, and kites.
- b) find the area of irregular figures.

Assessments

- Daily Formative Assessments Formative: Other written assessments Formative assessments, such as Do-Now assignments, homework assignments, Tickets-to-Leave, and SmartPal response board practice problems, will provide daily data for teachers.
- Pre-Assessment Diagnostic: Other written assessments Students will be assessed on their prior knowledge of area and the Pythagorean Theorem.
- Unit Quiz Formative: Written Test Students will be assessed on finding the areas of regular and irregular figures.
- Unit Test Summative: Written Test Students will be assessed on finding the areas of polygons, applying the Pythagorean Theorem, and using special right triangles when finding missing measurements.

Activities

Communicator Practice

Students will complete differentiated practice problems on SmartPal response boards.

Cooperative Problem-Solving

Students will work cooperatively on challenge problems. This work may be presented by students, discussed as a class, or turned in for grading and comments.

Area of Regular Figures Investigation

Students will analyze regular polygons and discover the formula for the area of regular figures using a guided investigation.

Activities to Differentiate Instruction

Interactive Smartboard Activities will be utilized.

Students will work in mixed-level groups.

Students will be assigned optional and mandatory challenge problems on homework assignments.

Enrichment worksheets will be available for classwork and/or homework.

Guided notes and study guides will be provided accordingly.

Appropriately-leveled problems for students to complete. Proofs can range from having few steps to requiring multiple steps using multiple geometric figures.

Integrated/Cross-Disciplinary Instruction

- Students will build connections between geometry and art by knowing and applying properties of polygons into artwork.

Resources

McDougal Littell *Geometry for Enjoyment and Challenge* textbook and resources

Smartboard

Smart Exchange

McDougal Littell *Activity Generator* (Geometry 11.6 investigation)

Smart Exchange

21st Century Skills

CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.