Unit 10: Areas of Plane Figures

Content Area: **Mathematics**
Course(s): **English I, Geometry, Honors Geometry**
Time Period: **March**
Length: **2 weeks**
Status: **Published**

Unit Overview

- Know and use the formulas for areas of rectangles, parallelograms, triangles, rhombuses, trapezoids, and regular polygons.
- Know and use the formulas for the circumference, area, arc length, and areas of sectors of a circle.
- The area of a polygon is really the area of the region shaped like the polygon.
- Understand and apply the relationships between scale factors, perimeters, and areas of similar figures.
- Use lengths and areas to solve problems involving geometric probability.

Enduring Understandings

- Algebra is used with geometric formulas and properties to find unknown values.
- Geometric figures can be described and compared through measurement.
- Geometric relationships can be used to describe and measure a variety of phenomena in non-mathematical fields.

Essential Questions

- How are plane figures measured and compared?
- How can an unknown length or angle measurement be found?
- Identify objects in the real world that are measured using geometric formulas, how is the formula used?
- What is a non-mathematical area where geometry is utilized?
- Where do equations occur in geometry?
- Where is geometric terminology used in real world situations?

Lesson Titles/Objectives

- To find the ratio of the areas of two triangles
- To know and us the formulas for arc lengths and the areas of sectors of a circle
- To know and use the formulas for circumferences and areas of circles
- To know and use the formulas for the areas of rectangles, parallelograms, triangles, rhombuses, trapezoids, and regular polygons
- To understand and apply the relationships between scale factors, perimeters, and areas of similar figures

- To understand the area postulates
- To understand what is meant by the area of a polygon
- To use lengths and areas to solve problems involving geometric probability

Standards

	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
MA.S-MD	Using Probability to Make Decisions
MA.G-C.A	Understand and apply theorems about circles
	Connections to Equations.
	Geometry

Indicators

MA.G-C.B.5	Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
MA.S-MD.B.5	Weigh the possible outcomes of a decision by assigning probabilities to payoff values and finding expected values.
MA.S-MD.B.5b	Evaluate and compare strategies on the basis of expected values.
MA.S-MD.B.6	Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).
MA.S-MD.B.7	Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).
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.2	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).
	Analytic geometry connects algebra and geometry, resulting in powerful methods of

analysis and problem solving. Just as the number line associates numbers with locations in one dimension, a pair of perpendicular axes associates pairs of numbers with locations in two dimensions. This correspondence between numerical coordinates and geometric points allows methods from algebra to be applied to geometry and vice versa. The solution set of an equation becomes a geometric curve, making visualization a tool for doing and understanding algebra. Geometric shapes can be described by equations, making algebraic manipulation into a tool for geometric understanding, modeling, and proof. Geometric transformations of the graphs of equations correspond to algebraic changes in their equations.

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21st Century Skills and Career Ready Practices

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.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
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.

Inter-Disciplinary Connections

LA.RI.11-12.7	Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.
LA.L.11-12.6	Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.
STEM.9-12.9.4.12.O.(1).12	Model technical competence by developing and applying processes and concepts in the design process.

Instructional Strategies. Learning Activities. and Levels of Blooms/DOK:

- Intro. apothems
- Intro. applications of area and circumference of circles
- Intro. applying arc length to find area of a sector
- Intro. applying area of quadrilaterals and triangles
- Intro. area addition postulate
- Intro. area congruence postulate
- Intro. area of circles
- Intro. area of parallograms
- Intro. Area of rectangles
- Intro. area of rhombuses
- Intro. area of trapezoids
- Intro. Area of triangles
- Intro. circumference of circles
- Intro. finding area of regular polygons
- Intro. geometric probability
- Intro. ratio of areas
- Intro. relationship of scale factor and ratio of perimeters
- Intro. sector of a circle
- Intro. the relationship between scale factor and ratio of areas
- Review anticipatory Set
- Review Homework
- Review HSPA warmup
- Review Quiz
- students will take a chapter 11 test
- students will take a quiz on 11.1-11.4
- students will take a quiz on 11.5-11.8

Closure

Modifications:

ELLs Modifications

- Offer alternate/or modify assessments
- 1:1 testing

- Tap prior knowledge
- Utilize explicit learning strategies that are well planned in advance (intentional planning)

IEP & 504 Modifications

- providing study guides that don't lead the student to study too much extraneous information (less unnecessary details)/scaffolded study guides
- students could use calculator and/or other math tools (x grids, chips, etc)
- teaching the main ideas/concepts (limiting not needed details)to be taught and repeating them in several different ways over several different days (goal is 7 different ways same concept for students with learning disabilities)

G&T Modifications

- CTE - Additional reinforcement activities soliciting a deeper understanding of curriculum.
- Effective questioning techniques (focus on what's important, provide processing time, require higher order thinking
- Encourage students to explore concepts in depth and encourage independent studies or investigations

Formative Assessment

- closure area of related figures
- closure finding area using unrelated figures
- journal write
- pass out of class
- think-pair-share
- warm up area irregular figures
- warm up area perimeter problem

Summative Assessment

- Test area of irregular figures and extended thinking problems.
- Test area of two dimensional figures

Resources & Technology

Resources and Materials

- Geometry Text Book- McDougal – Littell
- Manipulatives
- Protractors
- Ruler
- Study Guide and Practice Sheet – Glencoe/McGraw Hill
- Teacher Created worksheets
- Teacher Generated worksheets

Technology

- Geometer sketchpad
- Mathxl
- Smart Board
- Ti-84 calculator
- Videos

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.