Unit 11- Circumference & Area

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 4**
Length: **1-2 weeks**
Status: **Published**

Brief Summary of Unit

Students will continue working with two-dimensional figures by solving for perimeters and areas of various polygons. Students will also work with specifically finding a circle's arc length and sector area. The majority of this unit will be focused on real world applications of formulas and concepts.

Revision Date: July 2024

Standards

MATH.9-12.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.
ELA.L.KL.9–10.2.A	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.
MATH.9-12.G.GMD.A.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.
MATH.9-12.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).
MATH.9-12.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).
MATH.9-12.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).
ELA.SL.PE.11–12.1.A	Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
WRK.9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
WRK.9.2.12.CAP.6	Identify transferable skills in career choices and design alternative career plans based on those skills.

Essential Questions

- How do you solve for an unknown arc length of a circle?

- How do you solve for area sector of a circle given real world context?
- What information do you need to solve for the area of a regular polygon?
- What is the difference between an arc measure and an arc length?

Enduring Understandings

- Find angle measures and areas of regular polygons given real world contexts.
- Find areas of circles and areas of sectors of circles given real world contexts.
- Understand circumference, arc length, and radian measure when analyzing properties of circles.
- Understand the concept of population density and modeling with area.

Students Will Know

- How to find areas of circles and sectors.
- How to find areas of polygons.
- How to find circumferences of circles and arc lengths of sectors.
- How to solve real-life problems involving area.

Students Will Be Skilled At

- Explaining how the area of a triangle is related to the area formulas for rhombi, kites, and regular polygons.
- Explaining radian measure and convert between degree and radian measure.
- Explaining what population density means.
- Finding and using population densities.
- Finding angle measures in regular polygons.
- Finding arc lengths and use arc lengths to find measures.
- Finding areas of regular polygons.
- Finding areas of rhombi and kites.
- Finding areas of sectors of circles.
- Solving problems involving areas of sectors.
- Solving real-life problems involving circumference.
- Using area formulas to solve problems.
- Using the formula for area of a circle to find measures.
- Using the formula for the circumference of a circle to find measures.

Evidence/Performance Tasks

Assessments

- Formative: Daily assessments using examples from class notes, NJSLA test bank problems, and/or Albert/AP Classroom assessments
- Summative: Teacher-created assessments, NJSLA test bank problems, Big Ideas Math online platform problems, Albert/AP Classroom and/or Big Ideas Math unit assessments
- Benchmark: IXL or teacher created diagnostic assessments in addition to unit assessments from Big Ideas Math
- Alternative Assessments: Student-centered activities such as scavenger hunts, various projects involving real world applications, and differentiated learning tasks in Khan Academy, DeltaMath, and IXL

- Answer essential questions
- Class discussion of daily topic
- Classwork and homework that assess the essential questions
- Provide alternative means of assessments for certain students
- Teacher Observation
- Tests and quizzes that assess the essential questions
- Written assignments that assess the essential questions that involves providing explanations

Learning Plan

The following list is meant to create a day-to-day plan. Teachers are encouraged to slow down or condense days as appropriate to the student population in the class. Assessment(s) should be given when appropriate.

- Begin by having students recall circumference formula for a circle. Discuss the difference between arc measures and arc lengths, as this is a difficult distinction for students to understand at first. Introduce the proportion to solve for an arc length. Apply this to real world scenarios.
- Students should recall the area formula for a circle. Define the sector of a circle. Introduce the proportion to solve for an area sectors. Apply this to real world scenarios (e.g., designing an object or structure to satisfy physical constraints or minimize cost).
- Students will likely need additional time to practice finding arc length and area sectors. Encourage students to reduce fractions when possible to make solving simpler.
- Remind students of the definition regarding regular polygons. Introduce the important information needed to solve for the area of the polygon. Have plenty of examples prepared, as this can be a difficult topic for students to understand.

Materials

Core instructional materials: Core Book List including Big Ideas Math Common Core Geometry

Supplemental materials: Khan Academy, Edia, DeltaMath

- District approved textbook
- Khan Academy
- Teacher created activiites
- Teacher created notes
- Whiteboard tables

Suggested Strategies for Modifications

Possible accommodations/modification for Geometry