

**Unit 8: Circles**  
**Geometry**  
8 Class Meetings  
Revised May 2023

**Essential Questions**

- How can you use circles to solve real world problems?

**Enduring Understandings with Unit Goals**

**EU 1:** You can find arc length and area of a sector using the arc measure and radius.

- Derive and use the formula for arc length and area of a sector.

**EU 2:** The intersection of the tangent to a circle and the radius have a special relationship.

- Use the right angles formed by tangent lines to solve equations.

**EU 3:** Using the center and radius of a circle, you can write its equation.

- Graph and write the equation of a circle.

**Standards**

**Common Core State Standards:**

- **HSG.CO.A.1:** Know precise definitions of angle, circle, perpendicular line, and line segment, based on the undefined notions of point, line, distance of a line, and distance around a circular arc.
- **HSG.C.A.2:** Identify and describe relationships among inscribed angles, radii, and chords.
- **HSG.C.A.3:** Construct the inscribed and circumscribed circles of a triangle.
- **HSG.C.A.4:** Construct a tangent line from a point outside a given circle to the circle.
- **HSG.C.B.5:** Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius.

**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. Circles and Arcs**

- Naming arcs
- Arc measure
- Circumference of a circle
- Arc length

**2. Areas of Circles and Sectors**

- Area of a circle
- Area of a sector of a circle

**3. Tangent Lines**

- Finding angle measures
- Solving equations to find side lengths
- Finding perimeter

**4. Equation of a Circle**

- Identify center and radius
- Graph circles
- Write equations of circles

**Interdisciplinary Connection:**

- Language Arts - Word Problems
- Science – Word Problems

**Daily Learning Objectives with *TWPS Activities***

**Students will be able to...**

- Identify the measures of central angles and arcs
- Evaluate the circumference and arc length
- Calculate the areas of circles and sectors
- Use properties of a tangent to a circle
  - *How can you determine from a picture if a line is tangent to a circle?*
- Identify center and radius from an equation
- Graph circles in the coordinate plane
- Write equations of circles given center and radius

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**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 – GPS Signals
  - Problem Solving Rubric

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**SUMMATIVE ASSESSMENTS:**

- Edulastic Quiz 1 – EU 1
- Unit 8 Test – EU 1, EU 2, EU 3
- Performance Task – GPS Signals

**Unit Task**

**Unit Task Name:** GPS Signals

**Description:** Students will use information learned in this unit about how you can find the length of part of a circle's circumference by relating it to an angle in the circle and how you can use an arc measure to find the area of the sector formed by the arc and the radii of the circle (EU 1), how the intersection of the tangent to a circle and the radius have a special relationship (EU 2), in order to determine where a GPS satellite will work. Students will be given information about GPS satellites and will be told that satellites cannot work through Earth. They will be given a perpendicular distance of a satellite away from the Earth and asked to determine what the range of the GPS will be on earth. They will need to use their knowledge of circles, tangent lines, and right angles in order to calculate the distances the GPS satellite will reach.

Students will write a letter to someone in London explaining why the satellite we use for our GPSs in Connecticut is not the same satellite that they use in London. They will need to include their calculations and a picture as evidence of their argument.

**Evaluation:** Problem Solving Rubric

**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