Unit 09 Circles

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 3**
Length: **4 weeks**
Status: **Published**

Brief Summary of Unit

Students will understand and apply theorems about circles. They will translate between geometric descriptions and equations for circles. Vocabulary and symbols related to circles will be introduced as well as the precise definition of a circle. Students will have conceptual understanding of a line tangent to a circle and common tangents. Students will learn about naming arcs and finding arc measures. The measures of segments and angles will be found when lines intersect circles.

Revision Date: July 2024

Standards

Students will analyze geometric designs which connects to various cultures. Embracing the diversity within society incorporates the following:

Amistad Commission

This unit also reflects the goals of the Department of Education and the Amistad Commission including the infusion of the history of Africans and African-Americans into the curriculum in order to provide an accurate, complete, and inclusive history regarding the importance of of African-Americans to the growth and development of American society in a global context.

Asian American and Pacific Islander History Law

This unit includes instructional materials that highlight the history and contributions of Asian Americans and Pacific Islanders in accordance with the New Jersey Student Learning Standards in Social Studies.

New Jersey Diversity and Inclusion Law

In accordance with New Jersey's Chapter 32 Diversity and Inclusion Law, this unit includes instructional materials that highlight and promote diversity, including:

economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance.

ELA.K-12.1	Developing Responsibility for Learning: Cultivating independence, self-reflection, and responsibility for one's own learning.
MATH.9-12.G.C.A.1	Prove that all circles are similar.
ELA.K-12.3	Valuing Evidence in Argumentation: Constructing viable claims and evaluating, defending, challenging, and qualifying the arguments of others.
ELA.K-12.4	Building Knowledge: Building strong content knowledge and connecting ideas across disciplines using a variety of text resources and media.
MATH.9-12.G.C.A.2	Identify and describe relationships among inscribed angles, radii, and chords. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.
MATH.9-12.G.C.A.3	Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
ELA.K-12.5	Leveraging Technology: Employing technology and digital media thoughtfully, strategically and capably to enhance reading, writing, speaking, listening, and language use.
MATH.9-12.G.C.A.4	Construct a tangent line from a point outside a given circle to the circle.
MATH.9-12.G.CO.A.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.
MATH.9-12.G.CO.D.13	Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.
MATH.9-12.G.GPE.A.1	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
MATH.9-12.G.GPE.B.4	Use coordinates to prove simple geometric theorems algebraically.
CS.K-12.3.a	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
CS.K-12.3.b	Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
TEC.K-12.8.1	All students will use computer applications to gather and organize information and to solve problems.
TEC.K-12.8.2	All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world as they relate to the individual society, and the environment.
WORK.K-12.9.1	All students will develop career awareness and planning, employability skills and foundational knowledge necessary for success in the workplace.
WORK.K-12.9.2	All students will develop career awareness and planning, employability skills and foundational knowledge necessary for success in the workplace.

Essential Questions

- How can you apply the properties of circles to solve real world problems?
- What are the special segments and angles involved in a circle?

- What information is needed to graph a circle in a coordinate plane?
- What special relationships are formed with specific angles and their respective arcs?

Enduring Understandings

- A radius of a circle and the tangent that intersects the endpoint of the radius on the circle have a special relationship.
- Angles formed by intersecting lines have a special relationship to the arcs the intersecting lines intercept.
- Angles formed by intersecting lines have a special relationship to the related arcs formed when the lines intersect a circle.
- The information in the equation of a circle allows you to graph the circle.
- You can use information about congruent parts of a circle (or congruent circles) to find information about other parts of a circle (or circles).
- You can write the equation of a circle if you know its center and radius.

Students Will Know

- How to apply the properties of a tangent to a circle.
- How to find measure of angles formed by chords, secants, and tangents.
- How to find the lengths of segments associated with circles.
- How to find the measure of an angle formed by a tangent and a chord.
- How to find the measure of an inscribed angle.
- How to identify lines and segments that intersect circles and use the to solve problems.
- How to understand the equation of a circle.
- How to use and apply the properties of congruent chords, arcs, and central angles.

Students Will Be Skilled At

- Constructing a square inscribed in a circle.
- Describing the relationhship between a diameter and a chord perpendicular to a diameter.
- Drawing and identifying common tangents.
- Finding angle measures and arc measures involving chords, secants, and tangents.
- Finding angle measures of inscribed polygons.
- Finding arc measures.
- Finding center and radius of circles.
- Finding lengths of segments of chords.
- Finding lengths of segments of secants and tangents.
- Finding measures of inscribed angles and intercepted arcs.
- Finding the center of a circle given three points on a circle.

- Graphing circles given an equation.
- Identifying angles and arcs determined by chords, secants, and tangents.
- Identifying congruent arcs.
- Identifying segments of secants and tangents.
- Identifying special segments and lines that intersect circles.
- Proving that all circles are similar.
- Using chords of circles to find arc measures.
- Using chords of circles to find lengths.
- Using circumscribed angles to solve problems.
- Using properties of tangents to solve problems.
- Writing equations of circles.

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

Unit 9: Chapter 10, Circles (2 days per topic, 14 days instruction, 3 days practice, 3 days review, 3 days assessment for 23 days)

24-25 School Year: approx April 30 (April 3 is beginning of 4th marking period)

- Lines and Segments That Intersect Circles 10.1
    - Vocabulary associated with Circles
    - Properties of Tangents
    - Verifying a Tangent
    - Construct a Tangent to a Circle
- Finding Arc Measures 10.2
    - Central Angles, Major and Minor Arcs
    - Measures of Central Angles and Arcs
    - Similar Circles Theorem
- Using Chords 10.3
    - Interpret and apply 4 Theorems involving Chords
    - Find arc measures and lengths using chords
- Inscribed Angles and Polygons 10.4
    - Find measures of inscribed angles and intercepted arcs
    - Relationships associated with Inscribed Right Triangles
    - Relationships associated with Inscribed Quadrilaterals
- Angle Relationships in Circles 10.5
    - Measures of angles associated with Tangent and Chord intersection
    - Measures of angles associated with intersecting Lines and Circles; intersection inside or outside of the circle
    - Circumscribed angles
- Segment Relationships in Circles 10.6
    - Measures of segments of intersecting Chords
    - Measures of segments of intersecting Tangent and Secant Lines
    - Measures of segments of intersecting Secant Lines
- Circles in the Coordinate Plane 10.7

- Standard Equation of a Circle in the Coordinate Plane
- Writing the equation given a graph
- Graph circle given equation

Materials

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

Supplemental materials: Khan Academy, Edia, DeltaMath

- District approved textbook
- Online resources: Khan Academy, IXL, Delta Math, Edia Geogebra
- Teacher created activiites
- Teacher created notes

Suggested Strategies for Modifications

Possible accommodations/modification for Geometry CP.