Curriculum Sample Template
Max. 8 Pages

Grade Level	10th Grade	**Content Area**	Mathematics
Course Title (grades 9-12 Only)	Geometry		
Expected Prior Knowledge *List the knowledge/skills mastered earlier in the year foundational to the mastery of the Required Standard(s).*	Students are expected to have prior knowledge of and/or skills mastered to: **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. **G-C.A.1:** Prove that all circles are similar. **G-C.A.2:** Identify and describe relationships among inscribed angles, radii, and chords.		
Alignment to Program of Instruction *Describe how the methods of instruction found in this sequence of lessons that align to the Program of Instruction described in the application package.*	Mathematics lessons focus on problem solving, critical thinking, and practical applications. Direct Instruction includes lecture (structured overview), small-group (peer partners), and teacher-directed (guided overview) learning activities. Formative assessments include didactic questioning, visual presentation of direct instruction, Cornell Notes and graphic organizers, summaries and reflections, and collaborative activities. Summative assessments designed for student mastery of content.		
Standard Number* and Description *The standard number and description of the Required Standard(s) being instructed and assessed to mastery in the curriculum sample.*	G-GPE.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.		
Materials/Resources Needed *List all items the teacher and students will need for the entire sequence of instruction (excluding common consumables).*	Math Dictionary, Scientific Calculator		

* ***Standard Number****: For English Language Arts (Reading and Writing), use Grade, Strand, Standard (e.g., 3.RI.2). For K-8 Math, use Grade, Domain, Standard (e.g., 6.EE.7). For HS Math, use Conceptual Category-Domain, Standard (e.g., A-REI.6). For Science, use Grade, Strand, Concept, PO (e.g., 4.1.3.1).*

Lesson (add as needed)	**Instructional Strategies**	**Student Activities**
1	**Circles on the Coordinate Plane** (1) Teacher will review warm-up problems to assess prior knowledge and provide re-teaching assignments as needed. (2) Teacher will introduce key vocabulary: circle, radius, center point, endpoints, midpoint, and diameter. (3) Teacher will present structured overview for (a) rewriting the distance formula into an equation of a circle; (b) identifying the radius and center point of a circle in the equation; (c) writing the equation using the radius; (c) writing the equation using the radius and center point; and (d) writing the equation using the endpoints of the diameter. (4) Teacher will present guided instruction to: (a) find the equation of a circle given the radius; (b) finding the equation given the radius and center point; (c) finding the equation given two endpoints of the diameter.	(1) Students will access prior knowledge by completing warm-up problems for (a) finding the radius of a circle using the distance formula and (b) finding the midpoint of a circle using the endpoints. (2) Students will document key vocabulary and meanings in their Math Dictionary. (3) Students will take Cornell Notes for (a) rewriting the distance formula into an equation of a circle; (b) identifying the radius and center point of a circle in the equation; (c) writing the equation using the radius; (c) writing the equation using the radius and center point; and (d) writing the equation using the endpoints of the diameter. (4) Students will work with peer partner to solve problems for each concept, after it is presented in guided instruction. (see Instructional Strategies 4a-c) (5) Students will complete four-six practice problems for each concept presented in the lesson. (see Instructional Strategies 4a-c)
2	**Circles on the Coordinate Plane** (1) Teacher will review guided instruction for circles on a coordinate plane.	(1) **Summative Assessment:** Students will complete Circles on the Coordinate Plane Quiz. (2) **Summative Assessment:** Students will complete Circles on the Coordinate Plane Mathematical Applications.
3	**Completing the Square to Find Center and Radius of a Circle** (1) Teacher will present structured overview for the process of completing the square to rewrite quadratic polynomials. (2) Teacher will present guided practice of (a) completing the square for one variable in an equation to determine the center and radius of a circle and (b) completing the square for both variables in an equation to determine the center and radius of a circle.	(1) Students will take Cornell Notes for the process of completing the square to rewrite quadratic polynomials. (2) Students will work with peer partner to solve problems for completing the square to rewrite quadratic polynomials. (3) Students will take Cornell Notes for (a) completing the square for one variable in an equation to determine the center and radius of a circle and (b) completing the square for both variables in an equation to determine the center and radius of a circle. (4) Students will work with peer partner to solve problems for each concept, after it is presented in guided instruction. (see Instructional Strategies 2a-b)

		(5) Students will complete four-six practice problems for each concept presented in the lesson. (see Instructional Strategies 2a-b)
4	**Completing the Square to Find Center and Radius of a Circle** (1) Teacher will review guided instruction for Completing the Square to Find Center and Radius of a Circle.	(1) **Summative Assessment:** Students will complete Completing the Square to Find Center and Radius of a Circle Quiz. (2) **Summative Assessment:** Students will complete Completing the Square to Find Center and Radius of a Circle Mathematical Applications.

Summative Assessment Items and Scoring: *Below, provide at least three Summative Assessment items that together accurately measure student mastery of the application of the content and/or skills as defined by the grade-level rigor in the Required Standard(s). For each assessment item, provide an answer key or scoring rubric which clearly describes how assessment items are to be scored and how points will be awarded, such that mastery of the application of the content and/or skills as defined by the grade-level rigor in the Required Standard is clearly demonstrated by an acceptable score.*

(1) **Circles on the Coordinate Plane Quiz:** Assessment is scored on a 40 point scale, each question is worth 5 points and partial credit may be given. Students will score 32 out of 40 points (80%) to demonstrate mastery.
(2) **Circles on the Coordinate Plane Mathematical Applications:** Assessment is scored on a 20 point scale, each question is worth 5 points and partial credit may be given. Students will score 16 out of 20 points (80%) to demonstrate mastery.*
(3) **Completing the Square to Find Center and Radius of a Circle Quiz:** Assessment is scored on a 40 point scale, each question is worth 5 points and partial credit may be given. Students will score 32 out of 40 points (80%) to demonstrate mastery.
(4) **Completing the Square to Find Center and Radius of a Circle Mathematical Applications:** Assessment is scored on a 25 point scale, each question is worth 5 points and partial credit may be given. Students will score 20 out of 25 points (80%) to demonstrate mastery.*

*assessment independent from instruction

For each summative assessment item, partial credit will be awarded as follows:

5 points for correct answer and writing of ALL mathematical calculations required to solve item.
4 points for correct answer and writing of SOME but not ALL mathematical calculations required to solve item.
3 points for correct answer and no writing of mathematical calculations required to solve item.
2 points for incorrect answer and writing of ALL mathematical calculations required to solve item.
1 point for incorrect answer and writing of SOME but not ALL mathematical calculations required to solve item.
0 points for incorrect answer and no writing of mathematical calculations required to solve item.

Circles on the Coordinate Plane Quiz

Score: _____

Answer the questions below. Be sure to show all of your work.

1. Identify the center and radius of the circle.
   a. $(x - 5)^2 + y^2 = 225$
   b. $(x + 4)^2 + (y - 2)^2 = 13$

2. Write the equation of a circle centered at the origin with the given radius.
   a. radius = 6
   b. radius = $\sqrt{12}$

3. Write the equation of a circle given the center and radius.
   a. center: (7, 2); radius = 5
   b. center: (-4, -2); radius = 9

4. Write the equation of a circle given two endpoints.
   a. diameter with endpoints (2, 5) and (−10, 7)
   b. diameter with endpoints (−2, −3) and (2, −3)

Answer Key

1. a. Center: (5, 0); Radius: 15 b. Center: (−4, 2); Radius: $\sqrt{13}$
2. a. $x^2 + y^2 = 36$ b. $x^2 + y^2 = 12$
3. a. $(x - 7)^2 + (y - 2)^2 = 25$ b. $(x + 4)^2 + (y + 2)^2 = 81$
4. a. $(x + 4)^2 + (y - 6)^2 = 37$ b. $x^2 + (y - 1)^2 = 20$

Circles on the Coordinate Mathematical Applications

Score: _____

Read each problem carefully. Answer the question and provide mathematical evidence to support your answer.
Be sure to show all of your work.

1. Wyatt made the statement that the point (2, √6) lies on the circle centered at the origin and contains the point (0, 4). He gave the following proof to support his statement:

   Radius = 4

   Equation of circle: $(x - 0)^2 + (y - 0)^2 = 4^2$

   $x^2 + y^2 = 16$

   Substitute (2, √6) for (*x*, *y*) in the equation

   $2^2 + \sqrt{6}^2 = 16$

   $4 + 12 = 16$

   $16 = 16$

   Do you agree with Wyatt? Provide justification to support your answer.

2. A circle has the following three points: *A*(−4, −1), *B*(6, −1), and *C*(6, 5). Find the center point and write the equation of the circle.

Answer Key

1. No.

   Wyatt made a math error when he computed $\sqrt{6}^2$. $\sqrt{6}^2$=6, not 12; and 4 + 6 = 10, not 16. So the point (2, √6) does not lie on the circle.

2. Center: (1, 2)

   Equation: $(x - 1)^2 + (y - 2)^2 = 34$

Completing the Square to Find Center and Radius of a Circle Quiz

Score: _____

Answer the questions below. Be sure to show all of your work.

1. Complete each square and write the equation in the form $(x - h)^2 + (y - k)^2 = r^2$. Identify the center and radius of each circle.
   a. $x^2 - 2x + y^2 = 3$
   b. $x^2 + 6x + (y - 2)^2 = 16$

2. Complete each square and write the equation in the form $(x - h)^2 + (y - k)^2 = r^2$. Identify the center and radius of each circle.
   a. $x^2 - 8x + y^2 - 14y = 16$
   b. $x^2 + 6x + y^2 + 12y = 4$

Answer Key

1. a. Equation: $(x - 1)^2 + (y - 0)^2 = 4$ Center: (1, 0); Radius: 2

   b. Equation: $(x + 3)^2 + (y - 2)^2 = 25$ Center: (-3, 2); Radius: 5

2. a. Equation: $(x - 4)^2 + (y - 7)^2 = 81$ Center: (4, 7); Radius: 9

   b. Equation: $(x + 3)^2 + (y + 6)^2 = 49$ Center: (-3, -6); Radius: 7

Completing the Square to Find Center and Radius of a Circle Mathematical Applications

Score: _____

Read each problem carefully. Answer the question and provide mathematical evidence to support your answer.
Be sure to show all of your work.

1. Given an equation of a circle, how can you determine when you need to complete the square to determine the coordinates of the center of the circle? Write an example of an equation of a circle where you would have to complete the square to determine that the circle has a radius of 10 and a center of (4, 6).

2. On a two-dimensional diagram of the solar system, the orbit of Jupiter is represented by circle *J*. Circle *J* is drawn on the diagram according to the equation $x^2 - 4x - 9 + y^2 + 5 = 0$.

   a. The center of the circle falls on which axis?
   b. What are the coordinates of the center of the circle?
   c. What is the radius?

Answer Key

1. Sample answer: When the equation does not show a squared binomial for the *x*- and *y*-terms
   Sample answer: $x^2 - 8x + y^2 - 12y = 48$
2. a. x-axis b. Center: (-2, 0) c. Radius: $\sqrt{8}$