LESSON MAKER PRO

Circle Clues

Read a graph, find a radius, and model a circular boundary.

HIGH SCHOOL · PC.CS.1

PC.CS.1 "Investigate conic sections. Model real-world situations which involve conic sections. Identify key features of conic sections (foci, directrix, radii, axes, asymptotes, center) graphically and algebraically..."

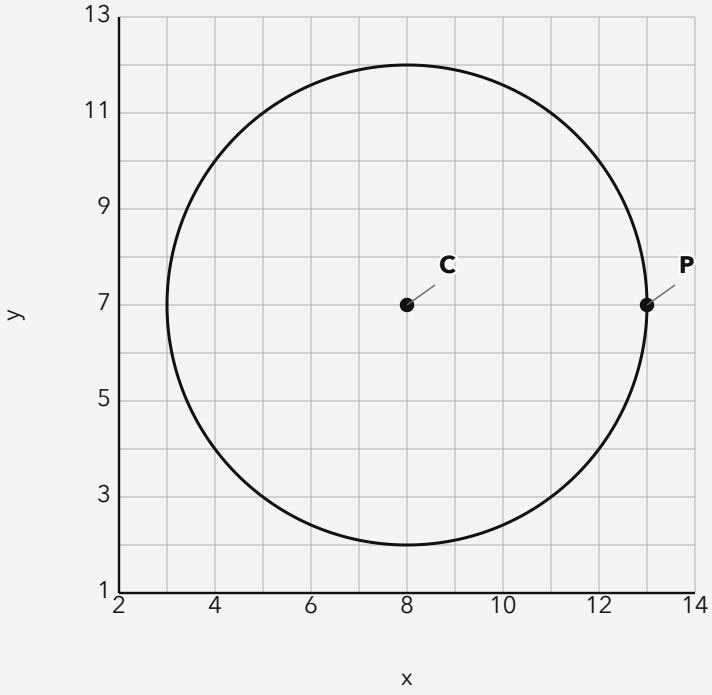
NAME _____ **DATE** _____

CENTER AND RADIUS

A circle with center (h, k) and radius r has equation $(x - h)^2 + (y - k)^2 = r^2$. On a graph, count from the center to a point on the circle to find the radius. If an equation is expanded, complete the square in x and y to reveal the center and radius.

WORKED EXAMPLE

Use the circle on the graph to write its equation.

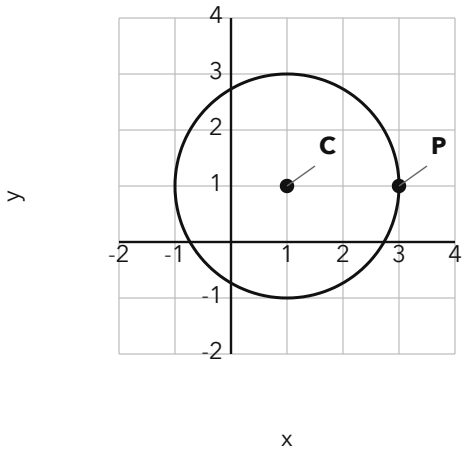


1. Read the center C: (8, 7).
2. Count from C to P: the radius is 5.
3. Substitute h = 8, k = 7, and r = 5 into the circle equation.

Answer: $(x - 8)^2 + (y - 7)^2 = 25$

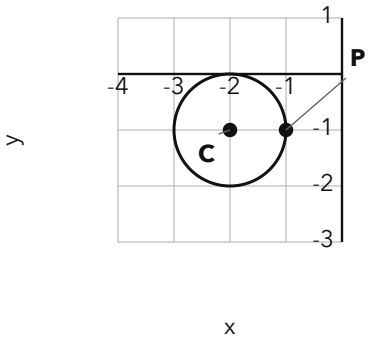
PRACTICE 6 problems

1 Use the circle on the graph to write its equation.



ANSWER _____

2 Use the circle on the graph to state its center and radius.



ANSWER _____

_____

3 State the center and radius of $(x + 3)^2 + (y - 1)^2 = 9$.

ANSWER _____

_____

4 A circle has center (0, -2) and passes through (0, 1). Write its equation.

ANSWER _____

5 Complete the square to find the center and radius of $x^2 + y^2 - 6x + 2y + 1 = 0$.

ANSWER _____

_____

6 Write $x^2 + y^2 + 4x - 2y + 1 = 0$ in center-radius form, then state its radius.

ANSWER _____

_____

APPLY IT Show your work

1 A Wi-Fi hotspot covers a circular area on a school map. Coordinates are measured in meters. The hotspot is at (0, 1), and its signal reaches 3 meters in every direction. Write an equation for the boundary. Is a student at (2, 2) inside the coverage area?

WORK SPACE

ANSWER _____

2 On a game map, a circular safe zone is centered at (-1, -2). Its boundary passes through (3, -2). Write the boundary equation. Is a player at (1, 1) inside the safe zone?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A circle has equation $x^2 + y^2 - 6x + 4y + k = 0$ and radius 2. Find k and write the equation in center-radius form. Show how you found k.

WORK SPACE AND ANSWER

Circle Clues

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the circle on the graph to write its equation.	**$(x - 1)^2 + (y - 1)^2 = 4$**
2	Use the circle on the graph to state its center and radius.	**Center: (-2, -1). Radius: 1.**
3	State the center and radius of $(x + 3)^2 + (y - 1)^2 = 9$.	**Center: (-3, 1). Radius: 3.**
4	A circle has center (0, -2) and passes through (0, 1). Write its equation.	**$x^2 + (y + 2)^2 = 9$**
5	Complete the square to find the center and radius of $x^2 + y^2 - 6x + 2y + 1 = 0$.	**Center: (3, -1). Radius: 3.**
6	Write $x^2 + y^2 + 4x - 2y + 1 = 0$ in center-radius form, then state its radius.	**$(x + 2)^2 + (y - 1)^2 = 4$. Radius: 2.**

PART 2 · APPLY IT

1. **Boundary: $x^2 + (y - 1)^2 = 9$. Yes, the student is inside.** The center is (0, 1) and the radius is 3. At (2, 2), $x^2 + (y - 1)^2 = 5$, which is less than 9.
2. **Boundary: $(x + 1)^2 + (y + 2)^2 = 16$. Yes, the player is inside.** The boundary point is 4 units from the center. At (1, 1), $(x + 1)^2 + (y + 2)^2 = 13$, which is less than 16.

CHALLENGE

Completing the square gives $(x - 3)^2 + (y + 2)^2 = 13 - k$. Since the radius is 2, $13 - k = 4$, so $k = 9$. The equation is $(x - 3)^2 + (y + 2)^2 = 4$.

Accept equivalent circle equations. For coverage and safe-zone questions, accept a correct distance comparison as the justification for being inside.