LESSON MAKER PRO

Circle Code

Find centers, radii, and equations

HIGH SCHOOL · G.C.1

G.C.1 "Solve real-world and mathematical problems using the properties of circles. Apply the properties of circles to solve problems involving circumference and area, using approximate values and in terms of pi..."

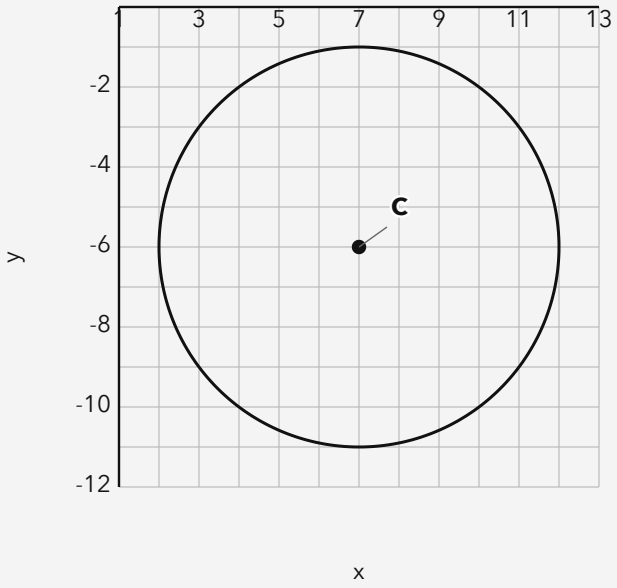
NAME _____ DATE _____

THE BIG IDEA

A circle contains all points the same distance from its center. If the center is (h, k) and the radius is r, its equation is $(x - h)^2 + (y - k)^2 = r^2$. When you know the endpoints of a diameter, their midpoint is the center, and half the distance between them is the radius.

WORKED EXAMPLE

Use the graph to write the circle's equation in standard form.

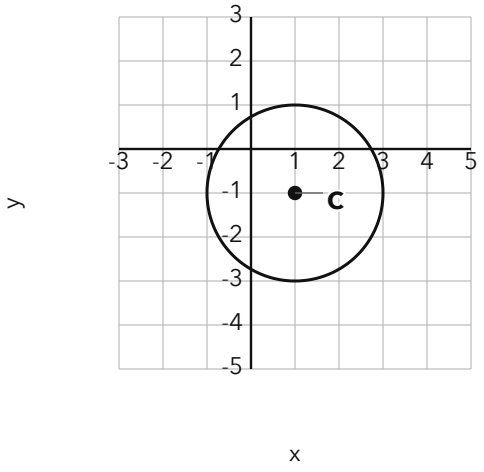


1. Read the center from the graph: (7, -6).
2. Count from the center to the circle: r = 5, so $r^2 = 25$.
3. Substitute h = 7, k = -6, and $r^2 = 25$ into the standard form.

Answer: $(x - 7)^2 + (y + 6)^2 = 25$

PRACTICE 6 problems

1 Use the graph to write the circle's equation in standard form.

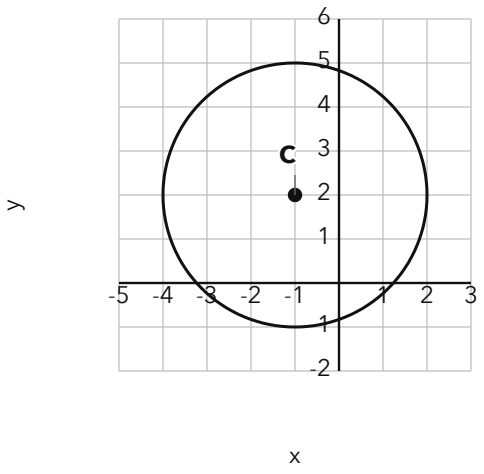


ANSWER _____

2 Find the center and radius of $x^2 + (y - 3)^2 = 16$.

ANSWER _____

3 Use the graph to write the circle's equation in standard form.



ANSWER _____

4 A circle has diameter endpoints (0, 0) and (8, 0). Write its equation in standard form.

ANSWER _____

5 A circle has center (2, 0) and passes through (8, 8). Write its equation in standard form.

ANSWER _____

6 A circle has diameter endpoints (-1, 1) and (3, 7). Write its equation in standard form.

ANSWER _____

APPLY IT Show your work

1 A festival's Wi-Fi signal reaches 3 blocks from a router at (2, -1) on a city grid. Write an equation for the edge of its coverage. Is a food truck at (4, 1) within range?

WORK SPACE

ANSWER _____

2 A game map has a circular safe zone centered at (-4, -2) with a radius of 3 grid units. Write an equation for its boundary and find its exact area.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A circle has diameter endpoints (-4, 1) and (8, 7). Write its equation in standard form. Then decide whether (9, 4) is inside, on, or outside the circle, and show how you know.

WORK SPACE AND ANSWER

ANSWER KEY # Circle Code

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the graph to write the circle's equation in standard form.	**$(x - 1)^2 + (y + 1)^2 = 4$**
2	Find the center and radius of $x^2 + (y - 3)^2 = 16$.	**Center: (0, 3); radius: 4**
3	Use the graph to write the circle's equation in standard form.	**$(x + 1)^2 + (y - 2)^2 = 9$**
4	A circle has diameter endpoints (0, 0) and (8, 0). Write its equation in standard form.	**$(x - 4)^2 + y^2 = 16$**
5	A circle has center (2, 0) and passes through (8, 8). Write its equation in standard form.	**$(x - 2)^2 + y^2 = 100$**
6	A circle has diameter endpoints (-1, 1) and (3, 7). Write its equation in standard form.	**$(x - 1)^2 + (y - 4)^2 = 13$**

PART 2 · APPLY IT

1. **$(x - 2)^2 + (y + 1)^2 = 9$; yes, the food truck is within range.** The router is the center and the range is the radius. For the truck, $(4 - 2)^2 + (1 + 1)^2 = 8$, which is less than 9.
2. **$(x + 4)^2 + (y + 2)^2 = 9$; area = 9π square grid units** Substitute the center and radius into the circle equation. The area is $\pi r^2 = 9\pi$ square grid units.

CHALLENGE

The midpoint is (2, 4), and the radius squared is 45, so the equation is $(x - 2)^2 + (y - 4)^2 = 45$. At (9, 4), the left side is 49, which is greater than 45, so the point is outside.

Accept equivalent equations that are algebraically identical to standard form. For the challenge, accept any correct comparison of the point's distance from the center with the radius.