

Circle Equation Lab

Build equations from centers, radii, and plotted features.

HIGH SCHOOL • MA.912.GR.7.2

MA.912.GR.7.2 "Given a mathematical or real-world context, derive and create the equation of a circle using key features."

NAME _____

DATE _____

CENTER-RADIUS FORM

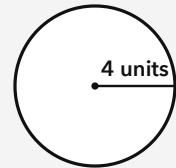
For a circle with center (h, k) and radius r , use $(x-h)^2 + (y-k)^2 = r^2$. Use the opposite sign of each center coordinate inside the parentheses, then square the radius.

WORKED EXAMPLE

The circle shown has center $(2, -5)$. Write its equation.

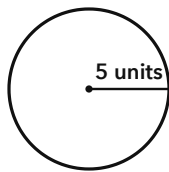
1. Use $(x-h)^2 + (y-k)^2 = r^2$.
2. Substitute the center and radius: $(x-2)^2 + (y-(-5))^2 = 4^2$.
3. Simplify the sign and square the radius: $(x-2)^2 + (y+5)^2 = 16$.

Answer: $(x-2)^2 + (y+5)^2 = 16$



PRACTICE 6 problems

- 1** The circle shown has center $(-3, 1)$. Write its equation.



ANSWER _____

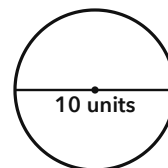
- 2** Write the equation of the circle with center $(6, -2)$ that passes through $(6, 5)$.

ANSWER _____

- 3** The endpoints of a diameter are $(-6, 1)$ and $(0, 1)$. Write the equation of the circle.

ANSWER _____

- 4** The circle shown has center $(-1, 6)$. Write its equation.



ANSWER _____

- 5** Rewrite $x^2 + y^2 - 16x + 12y + 51 = 0$ in center-radius form.

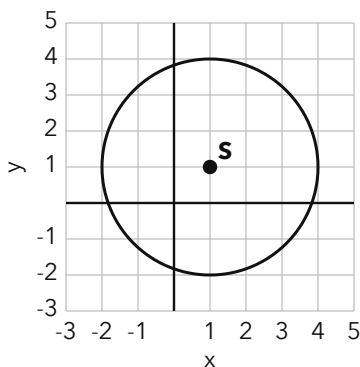
ANSWER _____

- 6** A circle has center $(-9, 7)$ and passes through $(-9, -1)$. Write its equation.

ANSWER _____

APPLY IT Show your work

- 1** At a gaming tournament, a signal booster covers a circular area on the coordinate map. The boundary of the coverage area and booster location S are shown. Write the equation of the coverage boundary.



ANSWER _____

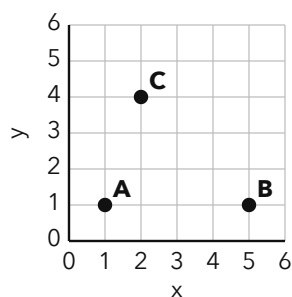
2

A school event app creates a circular geofence with center $(-4, 3)$. A point on the boundary is $(2, 3)$. Write the equation the app can use for the geofence.

WORK SPACE

ANSWER _____**CHALLENGE** One step up

Points A, B, and C lie on the same circular boundary. Use their plotted coordinates to derive the equation of the circle. Explain how you found the center and radius.



WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	The circle shown has center $(-3, 1)$. Write its equation.	$(x+3)^2 + (y-1)^2 = 25$
2	Write the equation of the circle with center $(6, -2)$ that passes through $(6, 5)$.	$(x-6)^2 + (y+2)^2 = 49$
3	The endpoints of a diameter are $(-6, 1)$ and $(0, 1)$. Write the equation of the circle.	$(x+3)^2 + (y-1)^2 = 9$
4	The circle shown has center $(-1, 6)$. Write its equation.	$(x+1)^2 + (y-6)^2 = 25$
5	Rewrite $x^2 + y^2 - 16x + 12y + 51 = 0$ in center-radius form.	$(x-8)^2 + (y+6)^2 = 49$
6	A circle has center $(-9, 7)$ and passes through $(-9, -1)$. Write its equation.	$(x+9)^2 + (y-7)^2 = 64$

PART 2 • APPLY IT

1. $(x-1)^2 + (y-1)^2 = 9$ Read the center as $S(1, 1)$. The boundary is 3 units from the center, so the radius is 3.
2. $(x+4)^2 + (y-3)^2 = 36$ The center and boundary point have the same y -coordinate, so the radius is the horizontal distance, 6. Substitute the center and $r^2 = 36$ into center-radius form.

CHALLENGE

Center: $(3, 2)$. Radius: $\sqrt{5}$. Equation: $(x-3)^2 + (y-2)^2 = 5$. The perpendicular bisector of AB is $x = 3$, and the perpendicular bisector of AC meets it at $(3, 2)$.

Accept equivalent equations in center-radius form or correctly expanded general form. For the challenge, accept any valid reasoning that identifies center $(3, 2)$ and radius $\sqrt{5}$.