

Math: Geometry

Equations of Circles

Objectives

Students will be able to:

- Define circle and radius.
 - Sketch a circle given its radius and center.
 - Write an equation of a circle given its radius and center.
 - Match a circle to its equation.
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Warm-Up

What are the mathematical characteristics that describe a circle?
(diameter, radius, area, circumference, chord, etc.)

Lesson

- What is a circle? Give the definition.
- The equation of a circle in the coordinate plane is $(x - h)^2 + (y - k)^2 = r^2$, where r is the radius and (h, k) is the center of the circle.
- Have a student give you any h , k , and r and show the circle in W|A.



circle radius 2 center (3,6)



Assuming "(3,6)" is referring to geometry | Use as [referring to geometry](#) instead

Assuming "center" is a word | Use as [referring to geometry](#) instead

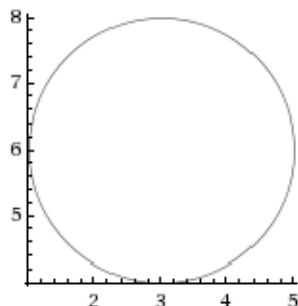
Input interpretation:

circle

radius 2

center (3, 6)

Visual representation:




Equation:

$$(x - 3)^2 + (y - 6)^2 = 4$$

Properties:

diameter	4
chord length	0
area	$4\pi \approx 12.5664$
perimeter	$4\pi \approx 12.5664$
angle	$360^\circ \approx 6.283 \text{ rad}$

- Given the radius and center of the circle, write its equation.
- ◇ Example: If the radius is 5 and the center is $(-2, 1)$, check the solution in W|A.

 **WolframAlpha**™ computational... knowledge engine

equation of circle radius 5 center (-2,1) =

Assuming Cartesian equation | Use parametric equation instead

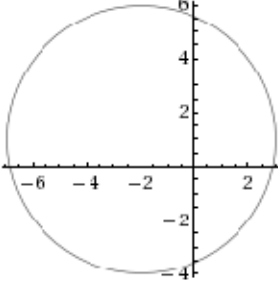
Input interpretation:

circle	radius 5	Cartesian equation
	center $(-2, 1)$	

Result:

$$(x + 2)^2 + (y - 1)^2 = 25$$

Visual representation:



Computed by: Wolfram Mathematica Download as: [PDF](#) | [Live Mathematica](#)

- Given the equation of a circle, sketch it in the coordinate plane.
 - ◇ Example: $(x - 7)^2 + (y + 5)^2 - 9 = 0$.
- What is the radius and the center?



$$(x-7)^2+(y+5)^2-9=0$$

Input:

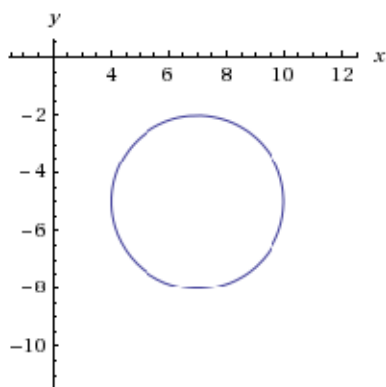
Mathematica form

$$(x-7)^2+(y+5)^2-9=0$$

Geometric figure:

circle

Implicit plot:



Properties:

center	$(7, -5)$
radius	3
diameter	6
chord length	0
area	$9\pi \approx 28.2743$
perimeter	$6\pi \approx 18.8496$
angle	$360^\circ \approx 6.283 \text{ rad}$

- Student activity: Find the equation of a circle with a diameter of 10 that lies in the second quadrant of the coordinate plane. You may use W|A as a resource.

Closing

Ticket to leave: What two pieces of data do you need in order to write the equation on a circle?

Demonstrations

Geometric Elements of a Circle