

Circle Equations

See chapter 10 section 10.3.1 in the textbook.

Class Work: 10-87 to 10-90 (see below)

Home Work: WS Circle Equations

Work thru these problems. Email questions.

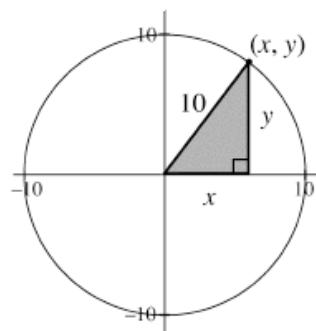
pdevry@pps.net

10-87. EQUATION OF A CIRCLE

We have equations for lines and parabolas, but what type of equation could represent a circle? On a piece of graph paper, draw a set of $x \rightarrow y$ axes. Then use a compass to construct a circle with radius 10 units centered at the origin $(0, 0)$.

- a. What do all of the points on this circle have in common? That is, what is true about each point on the circle?

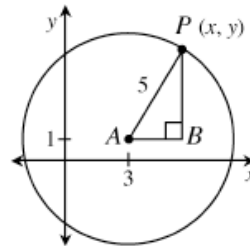
- b. Find all of the points on the circle where $x = 6$. For each point, what is the y -value? Use a right triangle (like the one shown at right) to **justify** your answer.



- c. What if $x = 3$? For each point on the circle where $x = 3$, find the corresponding y -value. Use a right triangle to **justify** your answer.
- d. Mia picked a random point on the circle and labeled it (x, y) . Unfortunately, she does not know the value of x or y ! Help her write an equation that relates x , y , and 10 based on her diagram above.
- e. Does your equation from part (d) work for the points $(10, 0)$ and $(0, 10)$? What about $(-8, -6)$? Explain.

- 10-88. In problem 10-87, you wrote an equation of a circle with radius 10 and center at $(0, 0)$.
- What if the radius were instead 4 units long? Discuss this with your team and write an equation of a circle with center $(0, 0)$ and radius 4.
 - Write the equation of a circle centered at $(0, 0)$ with radius r .
 - On graph paper, sketch the graph of $x^2 + y^2 = 36$. Can you graph it without a table? Explain your method.
 - Describe the graph of the circle $x^2 + y^2 = 0$.

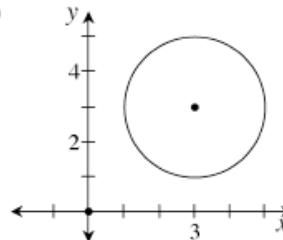
10-89. What if the center of the circle is not at $(0, 0)$? On graph paper, construct a circle with a center $A(3, 1)$ and radius 5 units.



- a. On the diagram at right, point P represents a point on the circle with no special characteristics. Add a point P to your diagram and then draw a right triangle like $\triangle ABC$ in the circle at right.
- b. What is the length of \overline{PB} ? Write an expression to represent this length. Likewise, what is the length of \overline{AB} ?
- c. Use your expressions for AB and BP , along with the fact that the radius of the circle is 5, to write an equation for this circle. (Note: You do not need to worry about multiplying any binomials.)
- d. Find the equation of each circle represented below.

(1) The circle with center $(2, 7)$ and radius 1.

(2)



(3) The circle for which $(6, 0)$ and $(-6, 0)$ are the endpoints of a diameter.

10-90. On graph paper, graph and shade the solutions for the inequalities below. Then find the area of each shaded region.

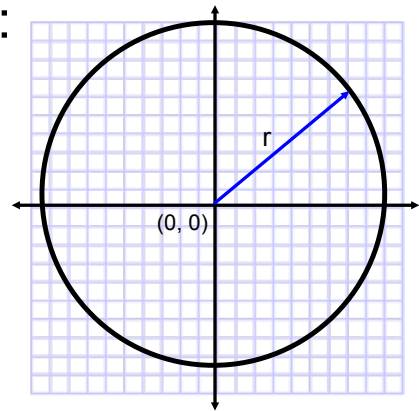
a. $x^2 + y^2 \leq 49$

b. $(x - 3)^2 + (y - 2)^2 \leq 4$

Hint: < means inside the circle, > means outside, = means the circle is included.

For a circle centered at the origin:

$$x^2 + y^2 = r^2$$

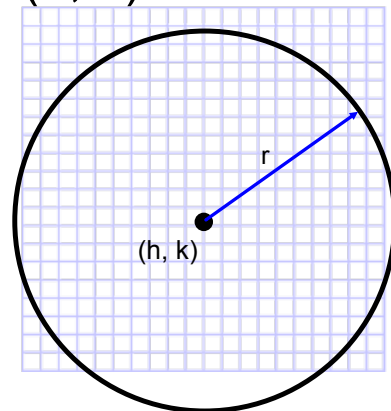


For a circle centered on the point (h, k)

$$(x - h)^2 + (y - k)^2 = r^2$$

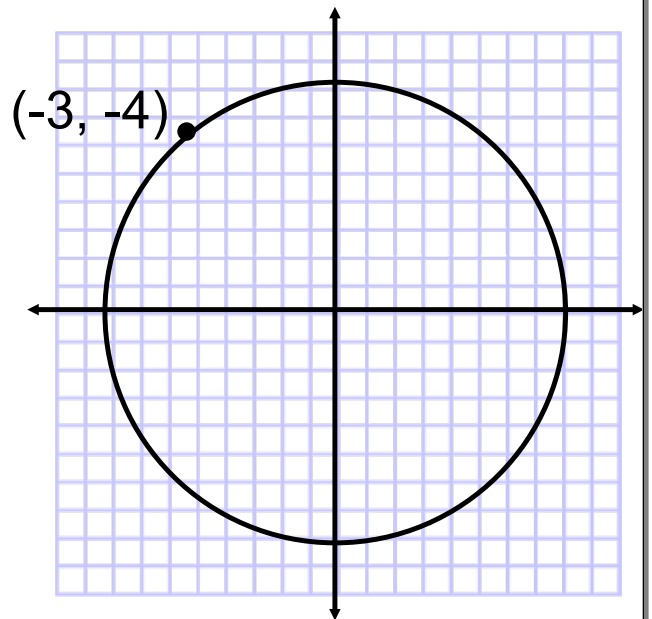
Note that (h, k) could be anywhere.

Also, at the origin (h, k) = (0, 0)

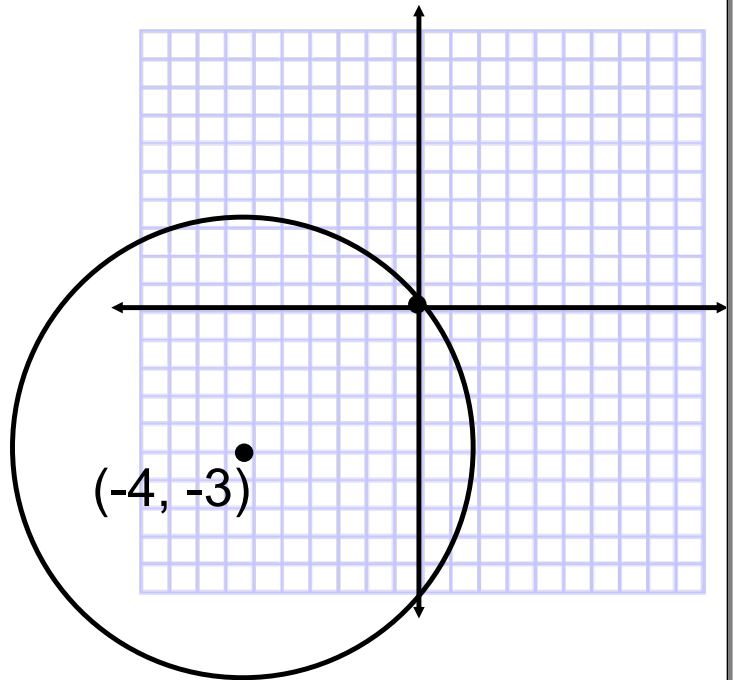


Three questions that test your skills.

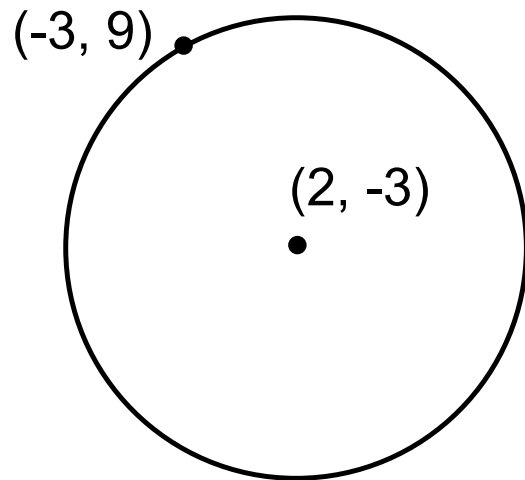
Write the equation of a circle centered at the origin that contains point $(-3, -4)$.



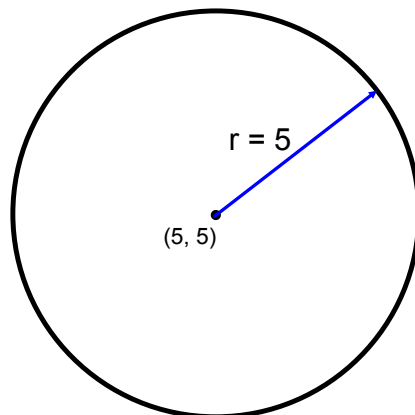
Write the equation of a circle centered at the point $(-4, -3)$ that goes thru the origin.



Write the equation of a circle centered at the point $(2, -3)$ that goes thru the point $(-3, 9)$.



Get used to sketching a circle quickly, giving the center point and the radius. It is not necessary to draw the whole x and y axes thing.



If you can do these, do the home work
WS Circle Equations.