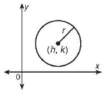
Geometry Notes Section 12-7 April 30

Circles in the Coordinate Plane

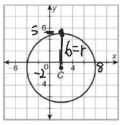
Equation of a Circle

The equation of a circle with center (h, k) and radius r is $(x-h)^2 + (y-k)^2 = r^2$.



Write the equation of circle *C* with center *C*(2, –1) and radius 6.

$(x-h)^2 + (y-k)^2 = r^2$	Equation of a circle
$(x-2)^2 + (y-(-1))^2 = 6^2$	Substitute 2 for h, –1 for k, and 6 for r.
$(x-2)^2 + (y+1)^2 = 36$	Simplify.



You can also write the equation of a circle if you know the center and one point on the circle.

Write the equation of circle *L* that has center *L*(3, 7) and passes through (1, 7).

Step 1 Find the radius.

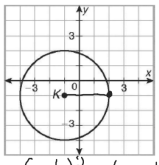
$r = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$	Distance Formula
$r = \sqrt{(1-3)^2 + (7-7)^2}$	Substitution
$r = \sqrt{4} = 2$	Simplify.

Step 2 Use the equation of a circle.

$(x-h)^2 + (y-k)^2 = r^2$	Equation of a circle
$(x-3)^2 + (y-7)^2 = 2^2$	$(h, k) = (3, 7)$
$(x-3)^2 + (y-7)^2 = 4$	Simplify.

Write the equation of each circle.

1.



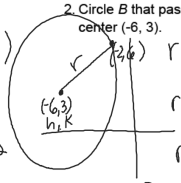
h k
K(-1, -1)
r = 3

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

$(x-(-1))^2 + (y-(-1))^2 = 3^2$

$(x+1)^2 + (y+1)^2 = 9$

2. Circle *B* that passes through (-2, 6) and has center (-6, 3).



$r = \sqrt{(-6-(-2))^2 + (3-6)^2}$

$r = \sqrt{(-4)^2 + (-3)^2}$

$r = \sqrt{25} = 5$

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

$(x-(-6))^2 + (y-3)^2 = 5^2$

$(x+6)^2 + (y-3)^2 = 25$

You can use an equation to graph a circle by making a table or by identifying its center and radius.

Graph $(x-1)^2 + (y+4)^2 = 9$.

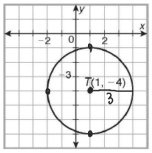
The equation of the given circle can be rewritten.

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

$(x-1)^2 + (y-(-4))^2 = 3^2$

$h = 1$, $k = -4$, and $r = 3$

The center is at (h, k) or $(1, -4)$, and the radius is 3. Plot the point (1, –4). Then graph a circle having this center and radius 3.

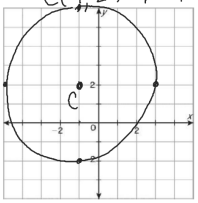


Graph each equation.

3. $(x+1)^2 + (y-2)^2 = 16$

$(x-(-1))^2 + (y-2)^2 = 4^2$

C(-1, 2) r = 4



4. $x^2 + (y+3)^2 = 4$

$(x-0)^2 + (y-(-3))^2 = 2^2$

C(0, -3) r = 2