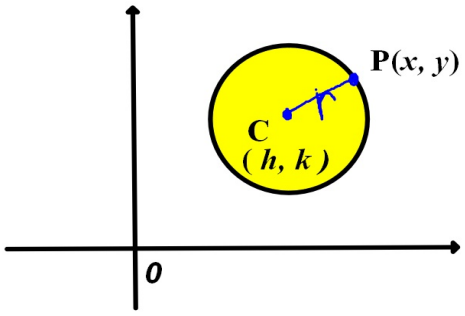
10.3 Equation of a Circle

A **circle** is the set of all points in a plane at a fixed distance (**radius**) from a given point (**center**).



$$\left(\sqrt{(x-h)^2+(y-k)^2}\right)^2 = (r)^2$$

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

Equation of circle in standard form.

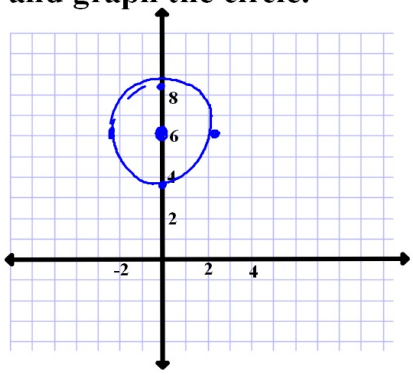
C(h, k) radius = r

Ex. 1 Find the center and radius of the circle $4x^2 + 4(y-6)^2 = 20$ and graph the circle.

$$\frac{4x^2}{4} + \frac{4(y-6)^2}{4} = \frac{20}{4}$$

$$(x-0)^2+(y-6)^2 = 5$$

C(0, 6) $r=\sqrt{5}$ $r \approx 2.2$



(h, k)

Ex. 2 Write the equation of a circle with center (-2, -3) that passes through (0, 2).

x, y

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

$$(0-(-2))^2+(2-(-3))^2 = r^2$$

$$29 = r^2$$

$$(x+2)^2+(y+3)^2 = 29$$

Ex. 3 **Write $x^2 + y^2 - 14x + 10y - 2 = 0$ in standard form. Find center and radius.**

$(x^2 - 14x + 49) + (y^2 + 10y + 25) = 2 + 74$

$(x-7)^2 + (y+5)^2 = 76$

$C(7, -5)$ $\quad r = \sqrt{76} = 2\sqrt{19}$

$\sqrt{4}\sqrt{19}$