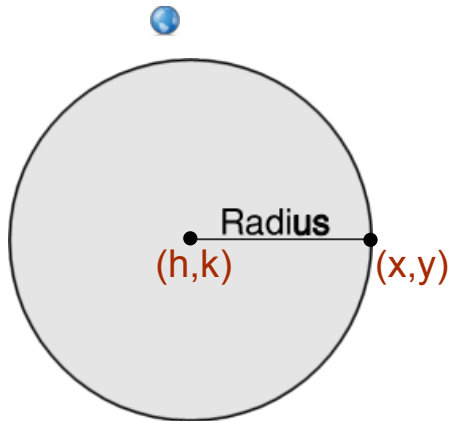


# 10.2 CIRCLES

## CONIC SECTIONS



Circle is the set of all points in a plane that are a fixed distance, called the radius, from a fixed point, called the center.

Equation of a Circle - The equation of a circle with center  $(h,k)$  and radius  $r$  units is

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

Ex. 1 Write the equation.

Given: Center  $(3, -2)$  and  $r = 5$

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

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

Ex 2. Write the equation.

Given: Center  $(-1, -5)$  and  $r = 2\sqrt{3}$

$$(x-(-1))^2 + (y-(-5))^2 = (2\sqrt{3})^2$$

$$(x+1)^2 + (y+5)^2 = 12$$

$\frac{2\sqrt{3} \cdot 2\sqrt{3}}{2 \cdot 2 \cdot \sqrt{3} \cdot \sqrt{3}}$   
 $\downarrow$

*Ex 3: Find the center and radius of the circle, then graph.*

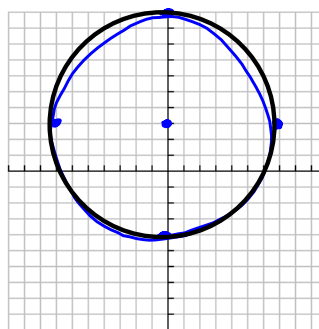
$$a) x^2 + (y-3)^2 = 49$$

$$(x-0)^2 + (y-3)^2 = 49$$

$$C(0, 3) \quad \sqrt{r^2} = \sqrt{49}$$

$$r = \pm 7$$

use 7 only



$$b) (x+2)^2 + (y-4)^2 = 12$$

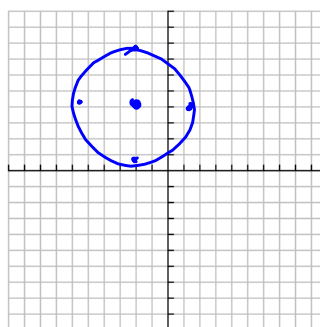
$$C(-2, 4) \quad \sqrt{r^2} = \sqrt{12}$$

$$r = \sqrt{12}$$

$$= \sqrt{4} \sqrt{3}$$

$$= 2\sqrt{3}$$

$$\approx 3.5$$



Ex 4: Write the equation in standard form.

Find the center and radius.

$$x^2 - 10x + y^2 = 11$$

$$x^2 - 10x + \frac{25}{2} + y^2 = 11 + \frac{25}{2}$$

$$(x-5)^2 + (y-0)^2 = 36$$

$$C(5, 0) \quad r^2 = 36$$

$$r = 6$$

We want:  $(x - \quad)^2 + (y - \quad)^2 = r^2$

Need to Complete the Square!!

**Lets check our work.**



Ex 5: Write the equation in standard form.

Find the center and radius.

We want:  $(x - \quad)^2 + (y - \quad)^2 = r^2$

Need to Complete the Square!!

$$x^2 + 2x + y^2 + 4y - 11 = 0$$

$$x^2 + 2x + \frac{1}{\downarrow \nearrow} + y^2 + 4y + \frac{4}{\downarrow \nearrow} = 11 + \frac{1}{\downarrow \nearrow} + \frac{4}{\downarrow \nearrow}$$

$$(x + 1)^2 + (y + 2)^2 = 16$$

$$C(-1, -2) \quad r^2 = 16$$

$$r = 4$$

Ex 6: Write the equation in standard form.

Find the center and radius.

$$x^2 - 4y + 6 = -y^2 + 7x$$

$$+y^2 - 7x - 6$$

$$\frac{-24}{1.4} + \frac{49}{4}$$

$$\frac{-8}{4} + \frac{49}{4}$$

$$x^2 - 7x + \frac{49}{4} + y^2 - 4y + 4 = 6 + \frac{49}{4} + 4$$

$$\left(x - \frac{7}{2}\right)^2 + (y - 2)^2 = \frac{41}{4}$$

$$C\left(\frac{7}{2}, 2\right) \quad \sqrt{r^2} = \sqrt{\frac{41}{4}}$$

$$r = \frac{\sqrt{41}}{2}$$