A CIRCLE is the locus (set) of all points that are equidistant from a fixed point called the center.

Standard Form (aka Center-Radius form) of a circle with center (*h*, *k*) and radius *r*:

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

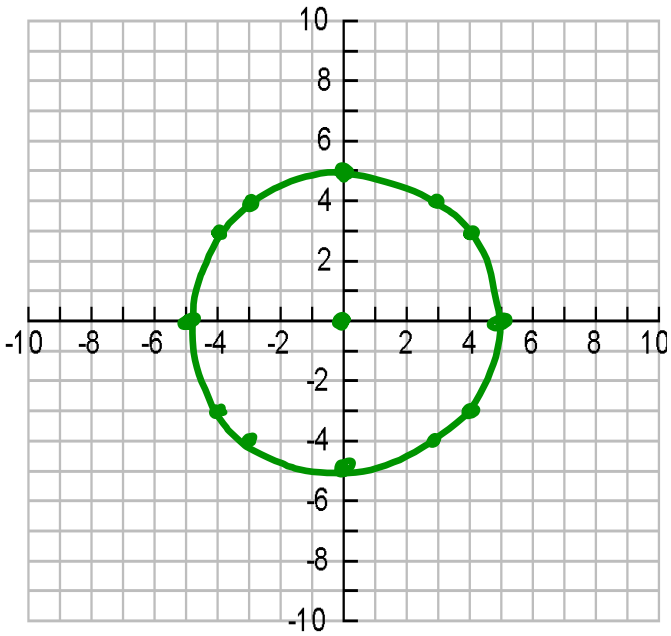
Rewrite the equation in standard form.
Identify the center and radius, and graph the circle.

$$x^2=25-y^2$$

$x^2+y^2=25$

$C:(0,0)$

$r=5$

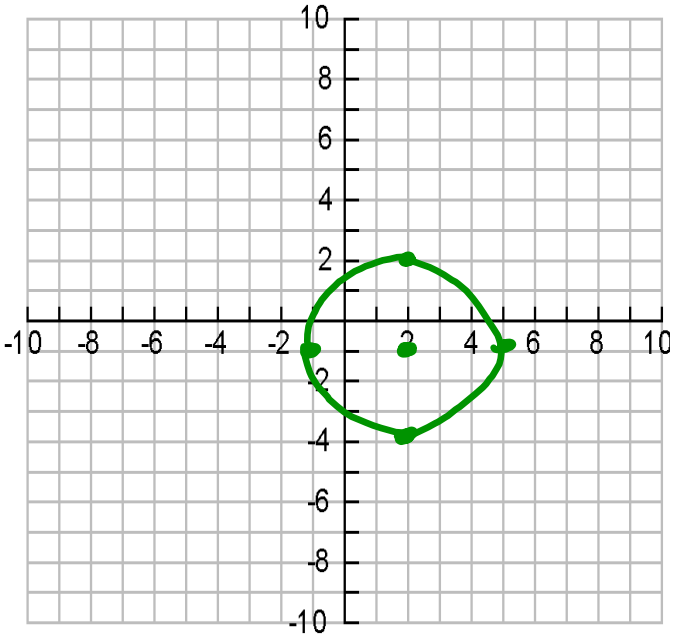


$$(x-2)^2+(y+1)^2-9=0$$

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

$C:(2,-1)$

$r=3$

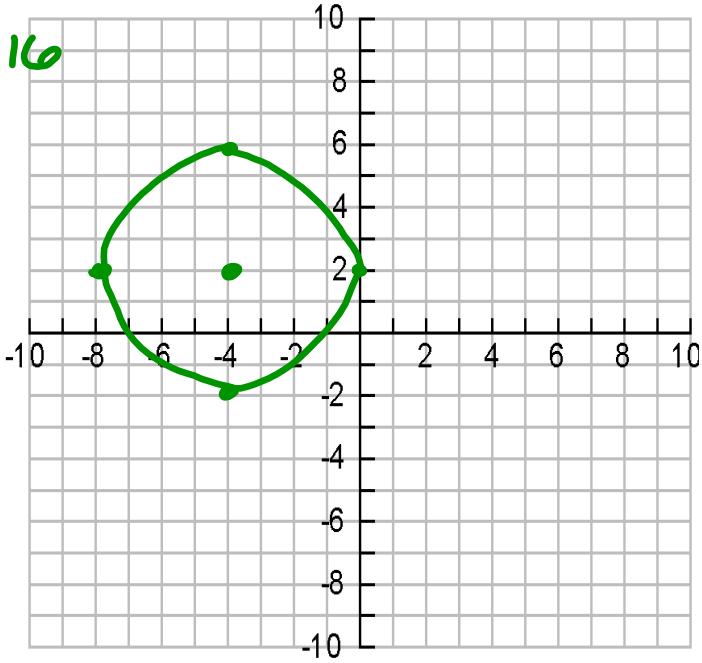


$$(x+4)^2+(y-2)^2-16=0$$

$(x+4)^2+(y-2)^2=16$

$C:(-4,2)$

$r=4$



Convert from standard form to general form

$$(x-3)^2+(y+5)^2=25$$

$$(x-3)(x-3)+(y+5)(y+5)=25$$

$$x^2-6x+9+y^2+10y+25=25$$

$$x^2+y^2-6x+10y+9=0$$

$$(x+4)^2+(y+2)^2=36$$

$$x^2+8x+16+y^2+4y+4-36=0$$

$$x^2+y^2+8x+4y-16=0$$

Convert from general form to standard form by completing the square. Then graph the circle.

$$x^2 + y^2 - 8x + 7 = 0$$

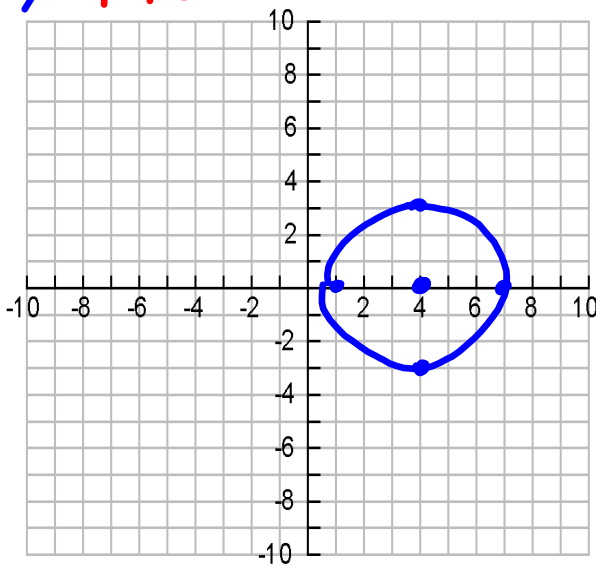
$x^2 - 8x + 16 + y^2 = -7 + 16$

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

3

$C = (4, 0)$

$r = 3$



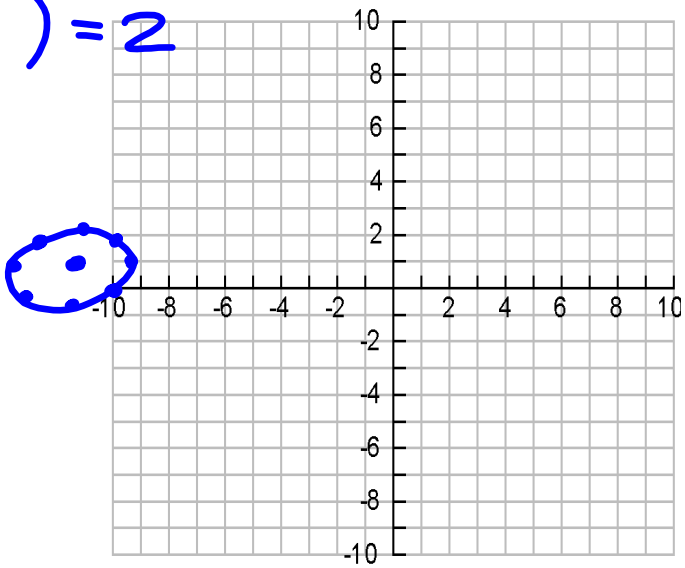
$$x^2 + y^2 + 22x - 2y = -120$$

$x^2 + 22x + 121 + y^2 - 2y + 1 = -120 + 121 + 1$

$(x + 11)^2 + (y - 1)^2 = 2$

$C = (-11, 1)$

$r = \sqrt{2}$



Write the equation of the circle (in standard form) using the given information:

The point (6, 2) lies on a circle whose center is at the origin.

x y

$$x^2 + y^2 = r^2$$
$$6^2 + 2^2 = r^2$$
$$40 = r^2$$
$$x^2 + y^2 = 40$$

The point (3, 0) lies on a circle whose center is at (1, -1).

$$(x-1)^2 + (y+1)^2 = r^2$$
$$(3-1)^2 + (0+1)^2 = r^2$$
$$4 + 1 = r^2$$
$$5 = r^2$$
$$(x-1)^2 + (y+1)^2 = 5$$

Write the equation of a line tangent to the circle $x^2 + y^2 = 10$ at (-1, 3)

$C: (0,0)$

$m_{radius}: \frac{0-3}{0-(-1)} = \frac{-3}{1} = -3$

$m_{tangent}: \frac{1}{3}$

$y - 3 = \frac{1}{3}(x+1)$

$y - 3 = \frac{1}{3}x + \frac{1}{3}$

$y = \frac{1}{3}x + \frac{10}{3}$

Using the given information, write the standard form for the circle:

radius: 8
center: (3, -2)

$(x-3)^2 + (y+2)^2 = 64$

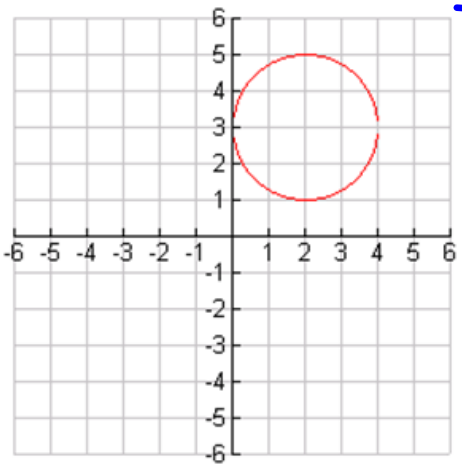
diameter: $3/4$

center: (-1, 12)

$r = \frac{1}{2}\left(\frac{3}{4}\right) = \frac{3}{8}$

$(x+1)^2 + (y-12)^2 = \frac{9}{64}$

Write the equation of the circle in both standard and general forms



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

gen: $x^2 - 4x + 4 + y^2 - 6y + 9 - 4 = 0$

$x^2 + y^2 - 4x - 6y + 9 = 0$

Point *C* is the center of a circle. Point *P* lies on this circle. Determine whether or not point *A* also lies on the circle.

C(-1, -1) *P*(4, -1) *A*(3, 2)

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

P: $(4+1)^2 + (-1+1)^2 = r^2$

$25 = r^2$

A: $(3+1)^2 + (2+1)^2 = r^2$

$16 + 9 = r^2$

$25 = r^2$

∴ Point A does lie on circle C.