

12 $(x-h)^2 + (y-k)^2 = r^2$

8.05 Circles Day 2 - Converting to Standard Form

Date: _____

What if the equation for the circle is not already in standard form? The following are ALL equations of circles. Can you identify the center and radius of each circle?

$x^2 + y^2 = 4$
 $(x-0)^2 + (y-0)^2 = 4$
 $C(0,0) \quad r = \sqrt{4} = 2$

$(x+1)^2 + (y+5)^2 = 20$
 $C(-1,-5) \quad r = \sqrt{20}$

$x^2 + y^2 - 6x + 8y + 9 = 0$

How can we determine the center and radius for the last equation?

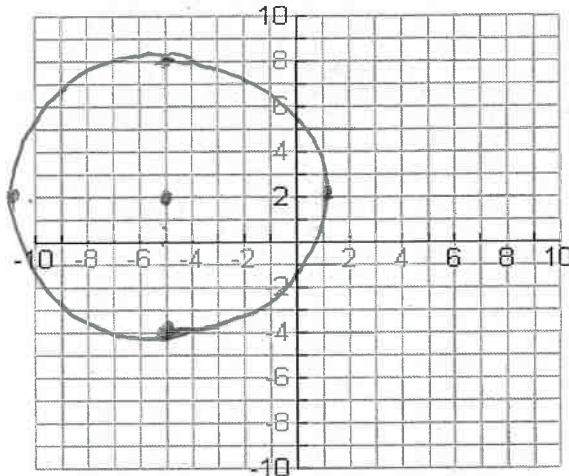
$(\frac{6}{2})^2 = 9$
 $x^2 + y^2 - 6x + 8y + 9 = 0$
 $x^2 - 6x + 9 + y^2 + 8y + 16 = -9 + 9 + 16$
 $(x-3)(x-3) + (y+4)(y+4) = 16$
 $(\frac{6}{2})^2 = 9$
 $(\frac{8}{2})^2 = 4^2 = 16$

$(x-3)^2 + (y+4)^2 = 16$
 $C(3,-4) \quad r = \sqrt{16} = 4$

Examples: Write the standard form of the equation of each circle and then graph the equation. Identify the center and radius.

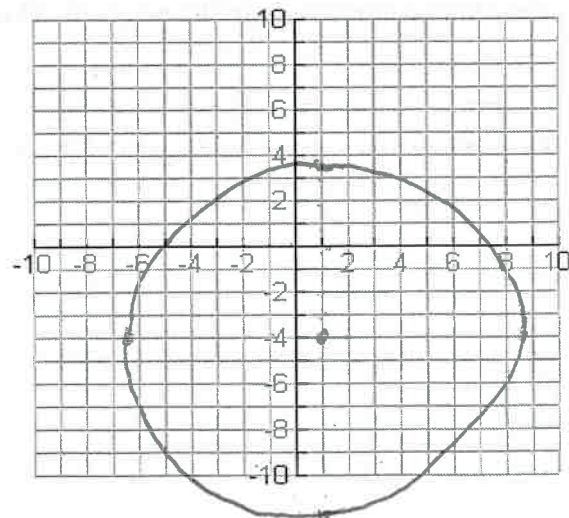
$(\frac{10}{2})^2 = 25$
 1. $x^2 + y^2 + 10x - 4y - 7 = 0$ $(\frac{4}{2})^2 = 2^2 = 4$

$x^2 + 10x + 25 + y^2 - 4y + 4 = 7 + 25 + 4$
 $(x+5)(x+5) + (y-2)(y-2) = 36$
 $(x+5)^2 + (y-2)^2 = 36$
 $C(-5,2) \quad r = \sqrt{36} = 6$



2. $4x^2 + 4y^2 - 8x + 32y - 170 = 2$

$4x^2 - 8x + 4y^2 + 32y = 170 + 2$
 $4x^2 - 8x + 4y^2 + 32y = 172$
 $x^2 - 2x + 1 + y^2 + 8y + 16 = 43 + 1 + 16$
 $(x-1)(x-1) + (y+4)(y+4) = 60$
 $(x-1)^2 + (y+4)^2 = 60$
 $C(1,-4) \quad r = \sqrt{60}$



8.05 Circles Day 2 Practice

Write the standard form of the equation of each circle and then graph the equation. Identify the center and radius.

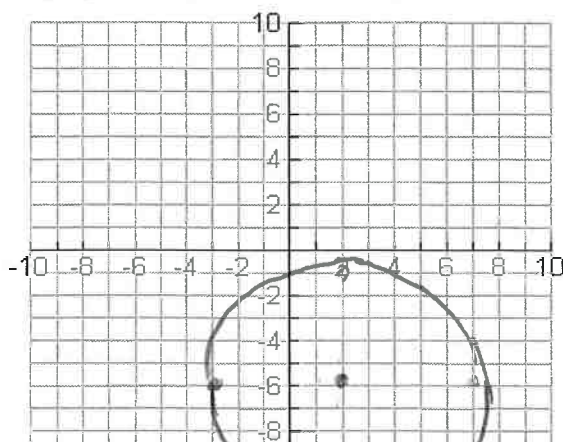
1. $x^2 + y^2 - 4x + 12y + 15 = 0$

$$x^2 - 4x + \frac{4}{2} + y^2 + 12y + \frac{36}{2} = -15 + \frac{4}{2} + \frac{36}{2}$$

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

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

$$C(2, -6) \quad r = \sqrt{25} = 5$$



2. $2x^2 + 2y^2 + 4x - 8y + 8 = 6$

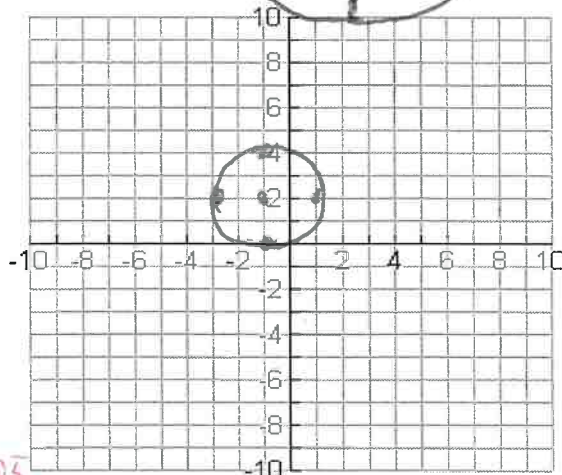
$$\frac{x^2 + y^2 + 2x - 4y + 4}{2} = \frac{3}{2}$$

$$x^2 + 2x + \frac{1}{2} + y^2 - 4y + \frac{4}{2} = -4 + 3 + \frac{1}{2} + \frac{4}{2}$$

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

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

$$C(-1, 2) \\ r = 2$$

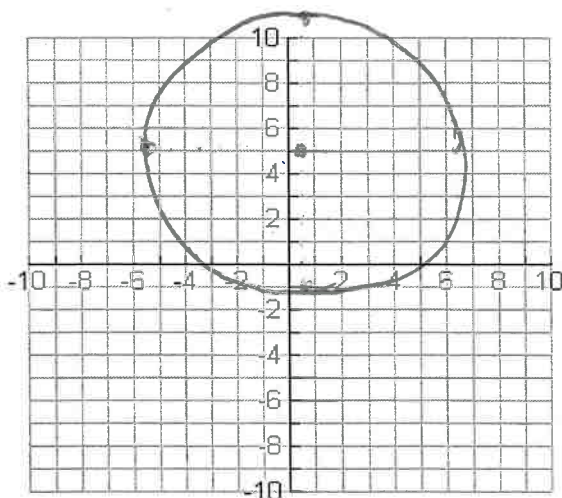


3. $16x^2 + 16y^2 - 16x - 160y = 172$

$$x^2 + y^2 - 1x - 10y = 10.75 + \frac{1}{16} + \frac{25}{4}$$

$$x^2 - 1x + \frac{0.25}{4} + y^2 - 10y + \frac{25}{4} = 10.75 + \frac{0.25}{4} + \frac{25}{4}$$

$$(x-0.5)^2 + (y-5)^2 = 36 \quad \left| \begin{array}{l} C(1/2, 5) \\ r = \sqrt{36} = 6 \end{array} \right.$$



4. $162 - 3x^2 = 3y^2 - 24y$

$$162 = 3x^2 + 3y^2 - 24y$$

$$3x^2 + 3y^2 - 24y = 162$$

$$x^2 + y^2 - 8y = 54$$

$$x^2 + y^2 - 8y + \frac{16}{2} = 54 + \frac{16}{2}$$

$$(x-0)^2 + (y-4)^2 = 70$$

$$(x-0)^2 + (y-4)^2 = 70 \\ C(0, 4) \quad r = \sqrt{70}$$