

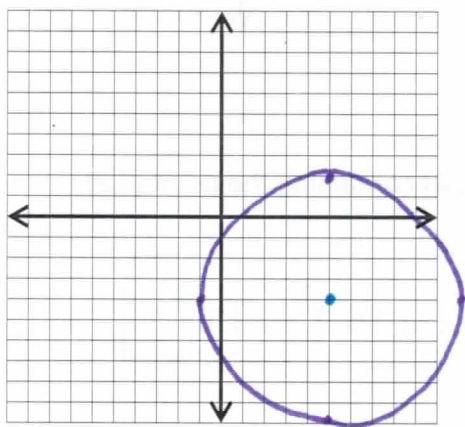
Transform the equation or inequality by completing the square. Then sketch the graph and include the center and radius.

1. $x^2 + y^2 - 10x + 8y + 5 = 0$

$$\begin{array}{r} x^2 - 10x + y^2 + 8y = -5 \\ +25 \quad +16 \quad +25 \\ \hline \end{array}$$

$$(x-5)^2 + (y+4)^2 = 36$$

center (5, -4)
radius 6

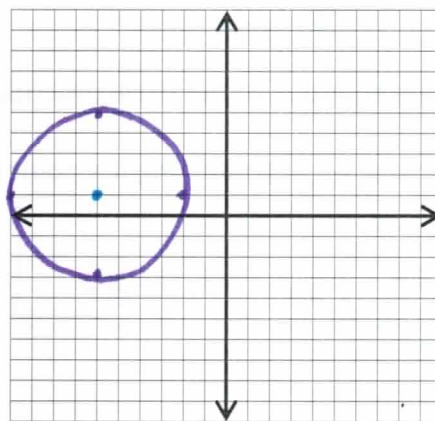


2. $x^2 + y^2 + 12x - 2y + 21 = 0$

$$\begin{array}{r} x^2 + 12x + y^2 - 2y = -21 \\ +36 \quad +1 \quad +36 \\ \hline \end{array}$$

$$(x+6)^2 + (y-1)^2 = 16$$

center (-6, 1)
radius 4

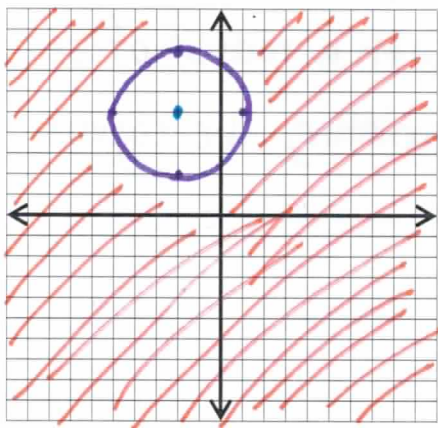


3. $x^2 + y^2 + 4x - 10y + 20 \geq 0$

$$\begin{array}{r} x^2 + 4x + y^2 - 10y \geq -20 \\ +4 \quad +25 \quad +4 \\ \hline \end{array}$$

$$(x+2)^2 + (y-5)^2 \geq 9$$

center (-2, 5)
radius 3

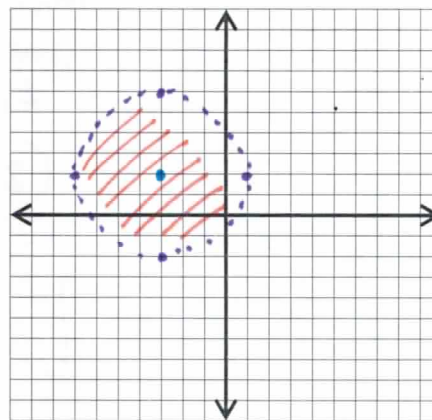


4. $x^2 + 6x + y^2 - 4y - 3 < 0$

$$\begin{array}{r} x^2 + 6x + y^2 - 4y < 3 \\ +9 \quad +4 \quad +9 \\ \hline \end{array}$$

$$(x+3)^2 + (y-2)^2 < 16$$

center (-3, 2)
radius 4

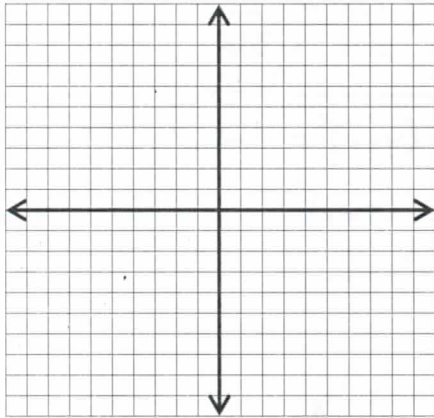


5. $x^2 + y^2 + 16 = 0$

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

radius is 4i

No CIRCLE

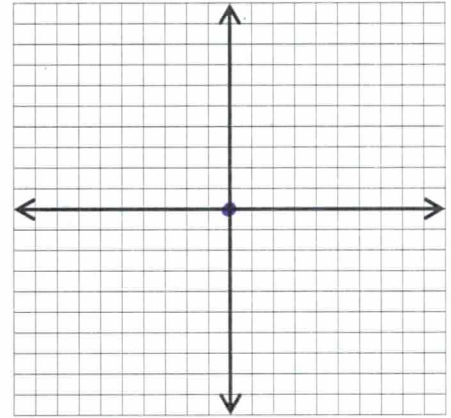


6. $x^2 + y^2 = 0$

center (0,0)

radius 0

only a point



Write the equation of the circle described.

7. Center at (-4,6) containing the point (-2,-3).

$$(x+4)^2 + (y-6)^2 = 85$$

8. Center at (5,-4) containing the point (0,3).

$$(x-5)^2 + (y+4)^2 = 74$$

$$d = \sqrt{(-4-2)^2 + (6+3)^2}$$

$$r = \sqrt{4+81}$$

$$r = \sqrt{85}$$

$$d = \sqrt{(5-0)^2 + (-4-3)^2}$$

$$r = \sqrt{25+49}$$

$$r = \sqrt{74}$$

9. Endpoints of the diameter of (0,-2) and (4,2).

$$d = \sqrt{(0-4)^2 + (-2-2)^2}$$

$$= \sqrt{16+16}$$

$$= \sqrt{32}$$

$$d = 4\sqrt{2}$$

$$r = 2\sqrt{2} \quad r^2 = 8$$

midpoint

$$\frac{0+4}{2}, \frac{-2+2}{2}$$

$$(2,0)$$

$$(x-2)^2 + y^2 = 8$$

10. What do you suppose is meant by a "point circle"? How can you tell from the equation that a circle will be a point circle?

A circle with a radius of zero.

After completing the square,
 $r^2 = 0$.