

Definition:

A **circle** is the set of points (x, y) that are equidistant from a fixed point, called the **center** of the circle. The distance between the center of the circle and any point on the circle is the **radius**.

Use the eraser to reveal the answers.

What is the equation of a circle?

Standard Form:

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

General Form:

$$x^2 + y^2 + Dx + Ey + F = 0$$

Example 1:

Graph the circle that has the equation $(x - 1)^2 + (y + 4)^2 = 16$.

Step 1:

Identify h and k.

$$h = \underline{1} \quad k = \underline{-4}$$

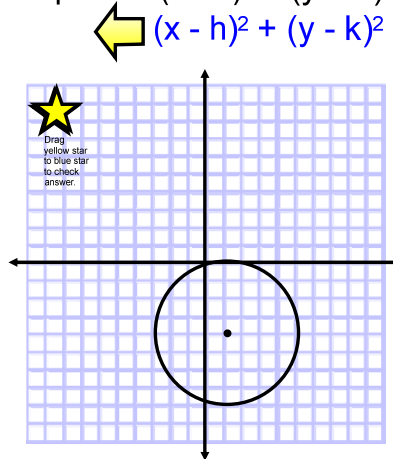
The center of the circle is $(1, -4)$.

Step 2: Identify the radius.

$$r^2 = \underline{16}$$
$$r = \underline{4}$$

Step 3: Graph the circle.

Erase to reveal the answers.



Example 2:

Graph the circle that has the equation $(x + 2)^2 + y^2 = 25$.

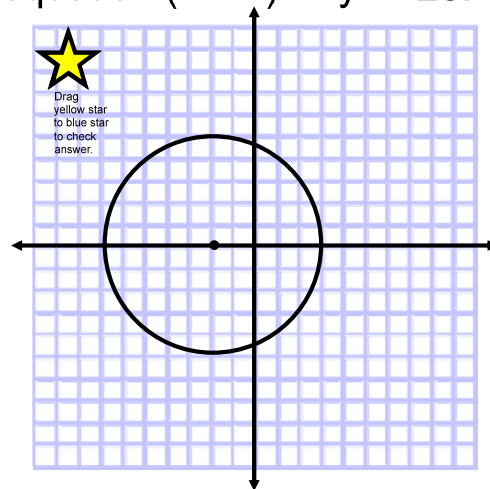
$$h = \underline{-2} \quad k = \underline{0}$$

Center: $\underline{(-2, 0)}$

$$r^2 = \underline{25}$$

radius = $\underline{5}$

Erase to reveal answers.



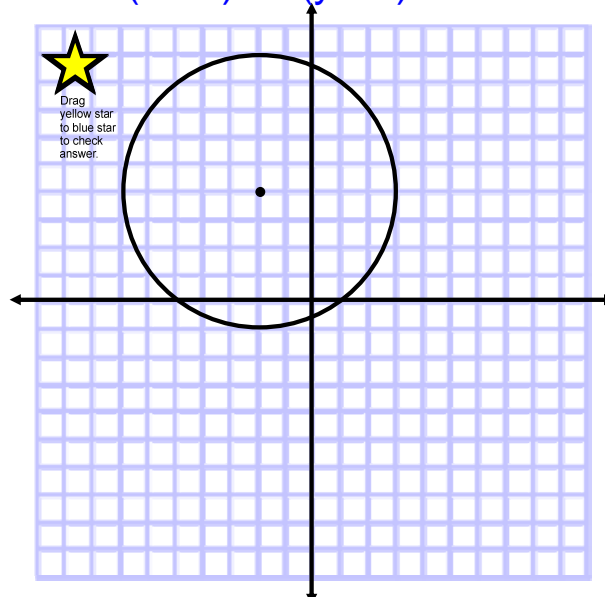
Example 3:

What is the equation in of the circle that has a center at $(-2, 4)$ and a diameter of 10? $(x - h)^2 + (y - k)^2 = r^2$

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

What does the graph look like?

$$(x + 2)^2 + (y - 4)^2 = 25$$



Example 4:

What is the equation of the circle that has a radius of 3 and a center at $(0, -2)$?

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

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

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



How do I convert equations of circles from general form to standard form using completing the square?



Example 5:

Convert $x^2 + y^2 + 6x - 10y - 2 = 0$ to standard form.

Step 1:

Move the constant to the right side of the equation. Group the x-terms. Group the y-terms.



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

Step 2:

Complete the square in x. Add to both sides.

Complete the square in y. Add to both sides.



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

Step 3:

Write in factored form.



$$(x + 3)^2 + (y - 5)^2 = 36$$



How do I convert equations of circles from general form to standard form using completing the square?



Example 6:

Convert $x^2 + y^2 - 8x + 2y + 8 = 0$ to standard form.

Step 1:

Move the constant to the right side of the equation. Group the x-terms. Group the y-terms.



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

Step 2:

Complete the square in x. Add to both sides.

Complete the square in y. Add to both sides.



$$x^2 - 8x + 16 + y^2 + 2y + 1 = -8 + 16 + 1$$

Step 3:

Write in factored form.



$$(x - 4)^2 + (y + 1)^2 = 9$$