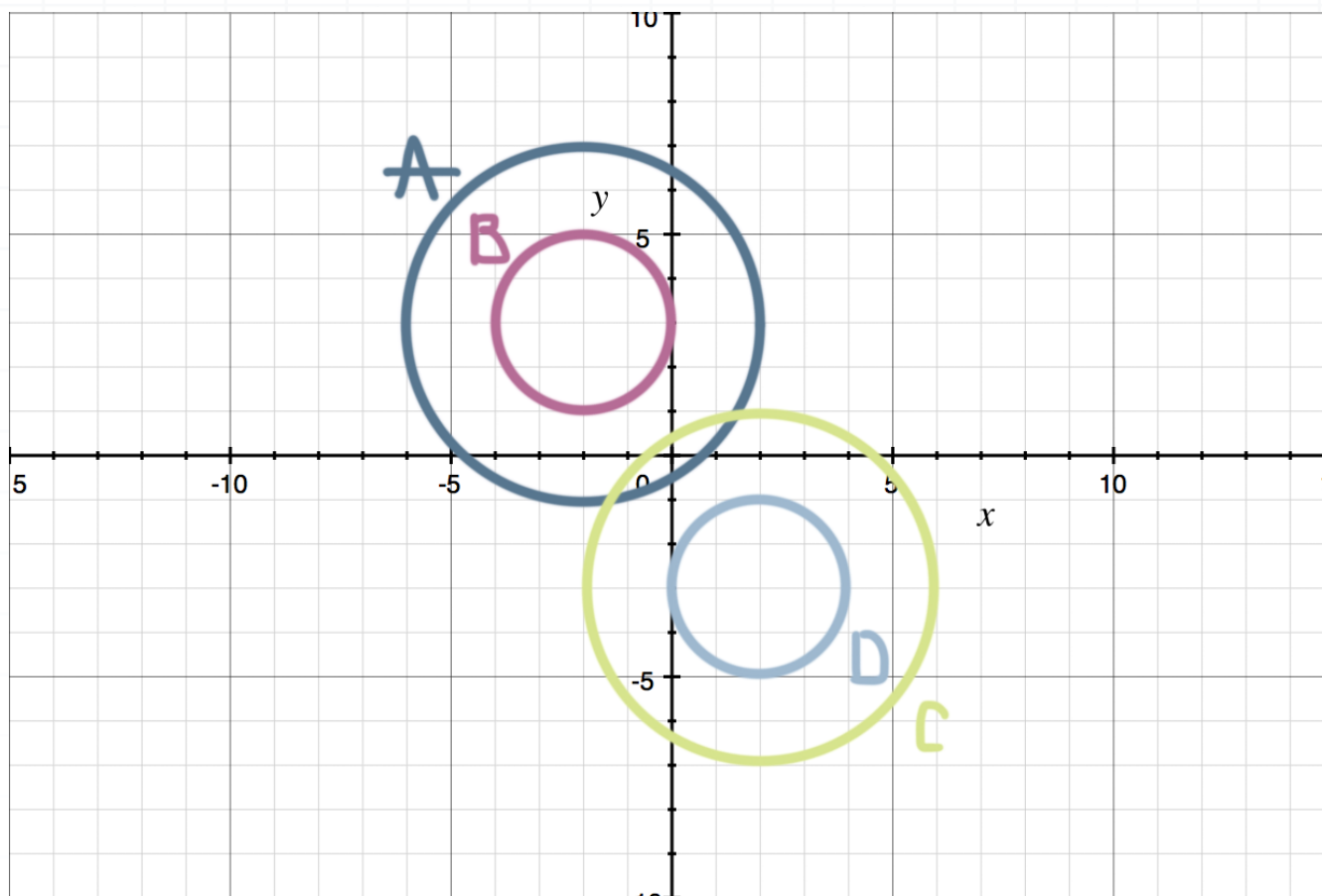


**Topic:** Graphing circles

**Question:** Which circle is the graph of  $(x - 2)^2 + (y + 3)^2 = 4$ ?



**Answer choices:**

A      A

B      B

C      C

D      D



**Solution: D**

Given

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

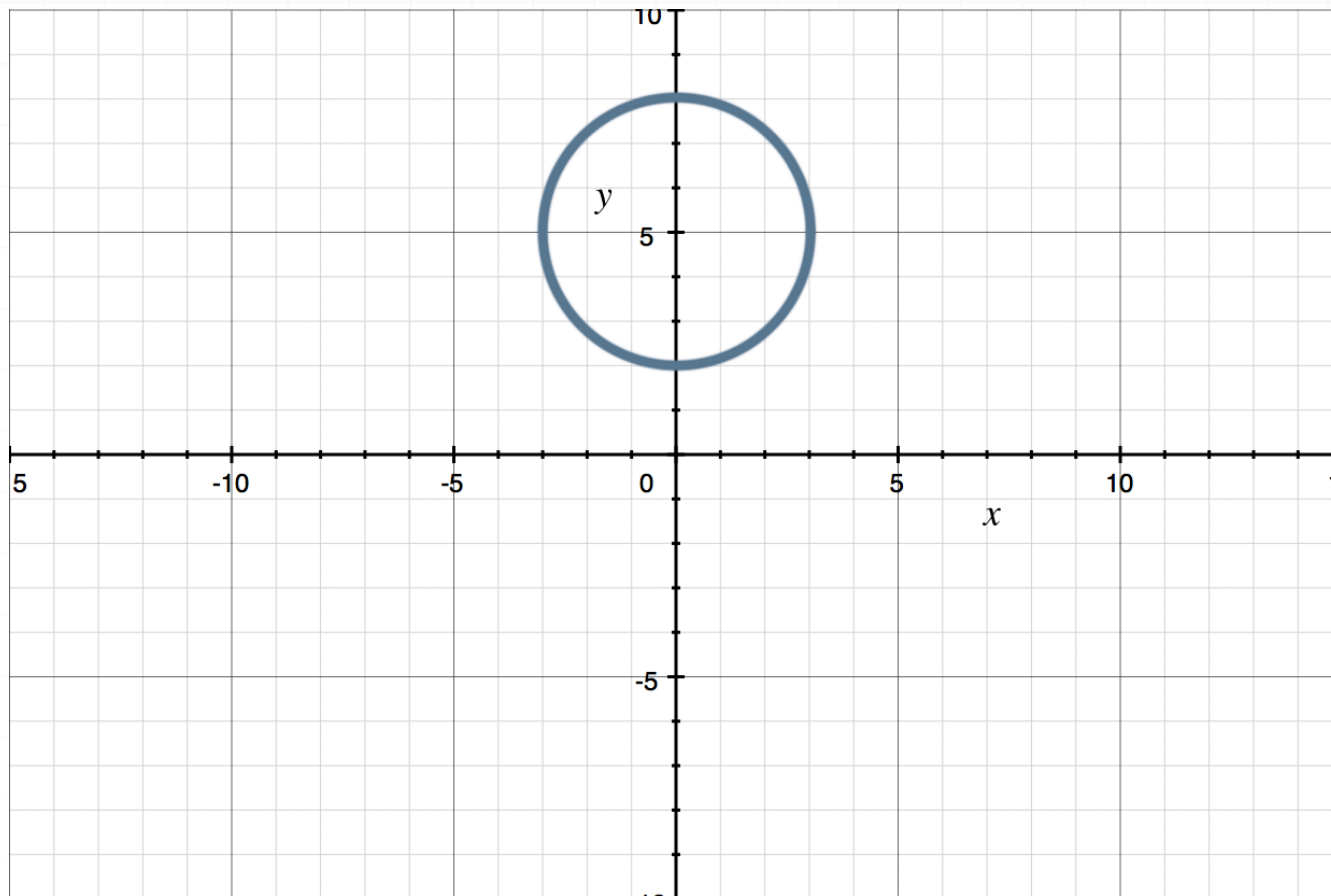
we can put this in the form  $(x - h)^2 + (y - k)^2 = r^2$  by rewriting it.

$$(x - 2)^2 + [y - (-3)]^2 = 2^2$$

We can see that  $h = 2$ ,  $k = -3$ , and  $r = 2$ .

The circle with center at  $(2, -3)$  and radius 2 is D.



**Topic:** Graphing circles**Question:** What is the equation of the given circle?**Answer choices:**

- A  $x^2 - 10x + y^2 + 16 = 0$
- B  $x^2 + y^2 + 10y + 16 = 0$
- C  $x^2 + y^2 - 10y + 16 = 0$
- D  $x^2 + 10x + y^2 + 16 = 0$



**Solution: C**

The points  $(3,5)$  and  $(-3,5)$  are at opposite ends of a diameter of this circle. They both have a  $y$ -coordinate of 5, so the center of the circle also has a  $y$ -coordinate of 5 and it lies halfway between them.

The distance between the points  $(3,5)$  and  $(-3,5)$  is the difference in their  $x$ -coordinates, which is  $3 - (-3) = 6$ , so the center of the circle is at a distance of 3 units from both of those points. Therefore, the center of the circle is at the point  $(0,5)$ , and it has a radius of 3. That tells us that  $h = 0$ ,  $k = 5$ , and  $r = 3$ .

Substitute the values of  $h$ ,  $k$ , and  $r$  into the equation  $(x - h)^2 + (y - k)^2 = r^2$ , then expand and simplify.

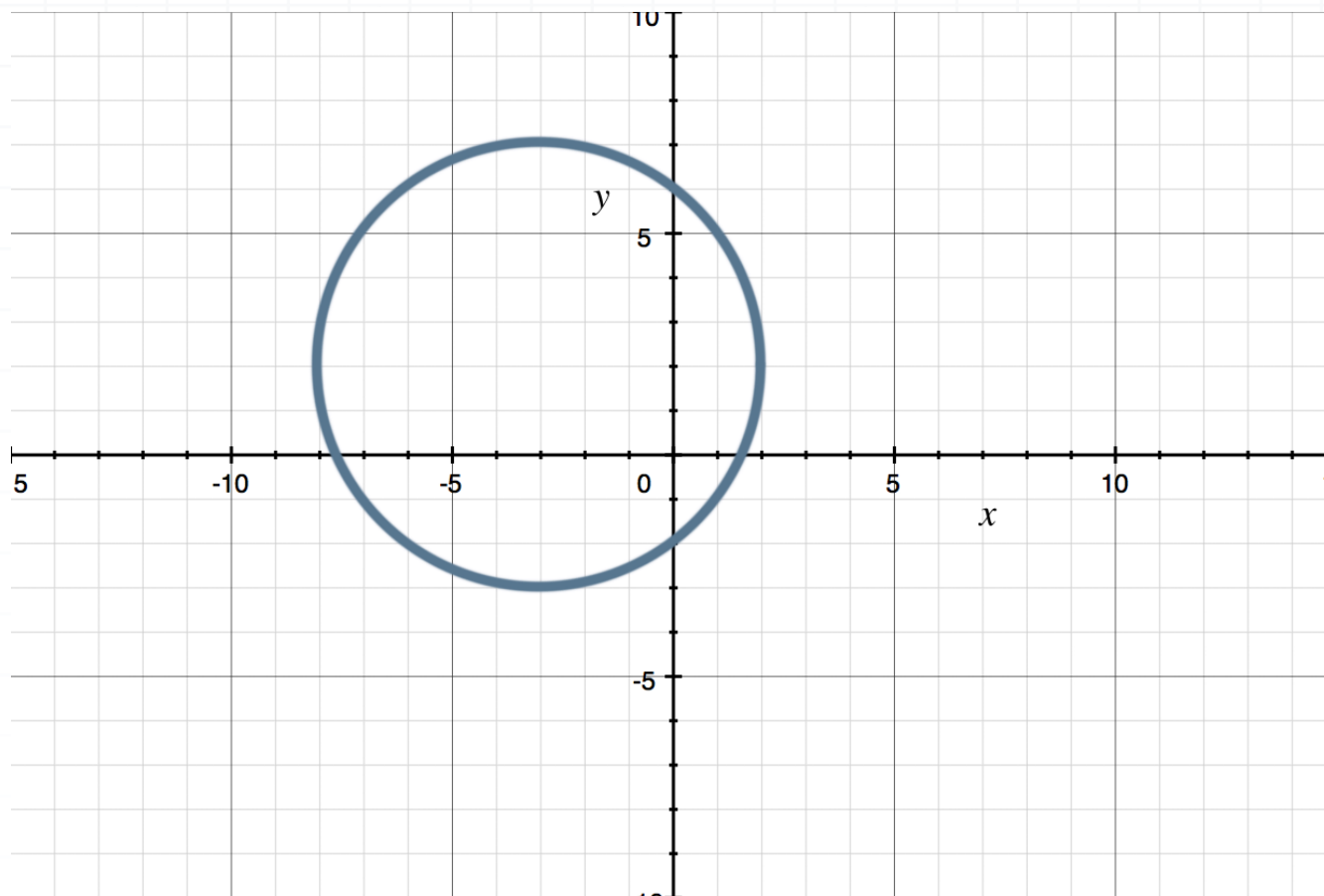
$$(x - 0)^2 + (y - 5)^2 = 3^2$$

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

$$x^2 + y^2 - 10y + 16 = 0$$

This matches answer choice C.



**Topic:** Graphing circles**Question:** What is the equation of the given circle?**Answer choices:**

- A  $x^2 + 6x + y^2 - 4y = 12$
- B  $x^2 - 6x + y^2 + 4y = 12$
- C  $x^2 + 6x + y^2 - 4y = -12$
- D  $x^2 + 6x + y^2 - 4y = 25$



**Solution: A**

The points  $(-3, 7)$  and  $(-3, -3)$  are at opposite ends of a diameter of this circle. They both have an  $x$ -coordinate of  $-3$ , so the center of the circle also has an  $x$ -coordinate of  $-3$  and it lies halfway between them.

The distance between the points  $(-3, 7)$  and  $(-3, -3)$  is the difference in their  $y$ -coordinates, which is  $7 - (-3) = 10$ , so the center of the circle is at a distance of 5 units from both of those points. Therefore, the center of the circle is at the point  $(-3, 2)$ , and it has a radius of 5. That tells us that  $h = -3$ ,  $k = 2$ , and  $r = 5$ .

Substitute the values of  $h$ ,  $k$ , and  $r$  into the equation  $(x - h)^2 + (y - k)^2 = r^2$ , then expand and simplify.

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

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

$$x^2 + 6x + 9 + y^2 - 4y + 4 = 25$$

$$x^2 + 6x + y^2 - 4y = 12$$

This matches answer choice A.

