

## 7.2.1 EXERCISES

For a link to all of the additional resources available for this section, click [OSttS Chapter 7 materials](#).

In Exercises 1 - 6, find the standard equation of the circle and then graph it.

For help with these exercises click on the resource below:

- [Graphing a circle whose equation is in standard form](#)

- Center  $(-1, -5)$ , radius 10
- Center  $(4, -2)$ , radius 3
- Center  $(-3, \frac{7}{13})$ , radius  $\frac{1}{2}$
- Center  $(5, -9)$ , radius  $\ln(8)$
- Center  $(-e, \sqrt{2})$ , radius  $\pi$
- Center  $(\pi, e^2)$ , radius  $\sqrt[3]{91}$

In Exercises 7 - 12, complete the square in order to put the equation into standard form. Identify the center and the radius or explain why the equation does not represent a circle.

For help with these exercises, click on the resource below:

- [Completing the square to put the equation of a circle in standard form](#)

- $x^2 - 4x + y^2 + 10y = -25$
- $-2x^2 - 36x - 2y^2 - 112 = 0$
- $x^2 + y^2 + 8x - 10y - 1 = 0$
- $x^2 + y^2 + 5x - y - 1 = 0$
- $4x^2 + 4y^2 - 24y + 36 = 0$
- $x^2 + x + y^2 - \frac{6}{5}y = 1$

In Exercises 13 - 16, find the standard equation of the circle which satisfies the given criteria.

For help with these exercises, click on the resource below:

- [Finding the equation of a circle](#)

- center  $(3, 5)$ , passes through  $(-1, -2)$
- center  $(3, 6)$ , passes through  $(-1, 4)$
- endpoints of a diameter:  $(3, 6)$  and  $(-1, 4)$
- endpoints of a diameter:  $(\frac{1}{2}, 4)$ ,  $(\frac{3}{2}, -1)$
- The Giant Wheel at Cedar Point is a circle with diameter 128 feet which sits on an 8 foot tall platform making its overall height is 136 feet.<sup>2</sup> Find an equation for the wheel assuming that its center lies on the  $y$ -axis.
- Verify that the following points lie on the Unit Circle:  $(\pm 1, 0)$ ,  $(0, \pm 1)$ ,  $(\pm \frac{\sqrt{2}}{2}, \pm \frac{\sqrt{2}}{2})$ ,  $(\pm \frac{1}{2}, \pm \frac{\sqrt{3}}{2})$  and  $(\pm \frac{\sqrt{3}}{2}, \pm \frac{1}{2})$

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<sup>2</sup>Source: [Cedar Point's webpage](#).

19. Discuss with your classmates how to obtain the standard equation of a circle, Equation 7.1, from the equation of the Unit Circle,  $x^2 + y^2 = 1$  using the transformations discussed in Section 1.7. (Thus every circle is just a few transformations away from the Unit Circle.)
20. Find an equation for the function represented graphically by the top half of the Unit Circle. Explain how the transformations in Section 1.7 can be used to produce a function whose graph is either the top or bottom of an arbitrary circle.
21. Find a one-to-one function whose graph is half of a circle. (Hint: Think piecewise.)

### Checkpoint Quiz 7.2

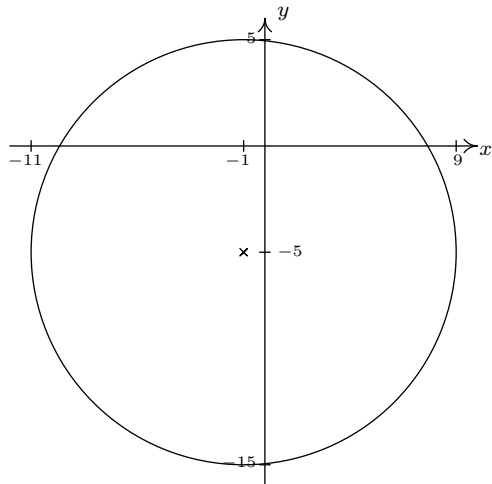
1. Put  $3x^2 + 6x + 3y^2 + 9y = 0$  into standard form and graph. Find the center and radius.
2. Find the equation of the circle centered at  $(-3, 4)$  which passes through the origin.

For worked out solutions to this quiz, click the link below:

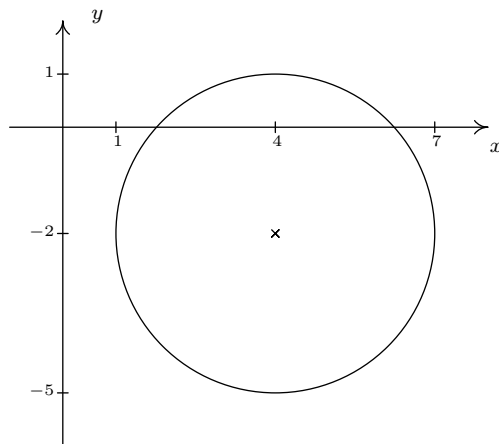
- [Quiz Solution](#)

## 7.2.2 ANSWERS

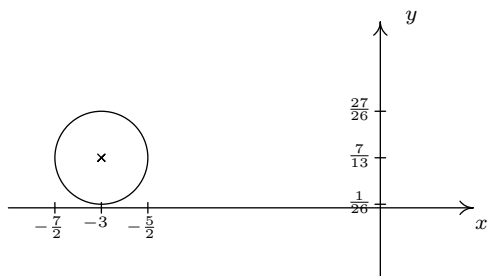
1.  $(x+1)^2 + (y+5)^2 = 100$



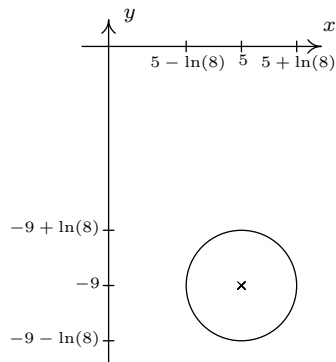
2.  $(x-4)^2 + (y+2)^2 = 9$



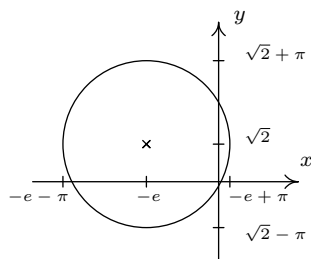
3.  $(x+3)^2 + (y-\frac{7}{13})^2 = \frac{1}{4}$



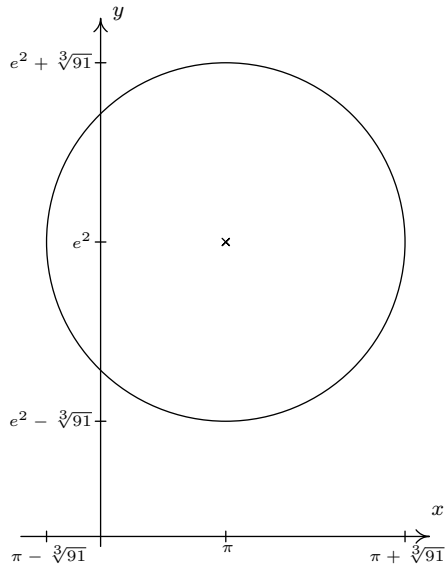
4.  $(x-5)^2 + (y+9)^2 = (\ln(8))^2$



5.  $(x+e)^2 + (y-\sqrt{2})^2 = \pi^2$



6.  $(x-\pi)^2 + (y-e^2)^2 = 91^{\frac{2}{3}}$



7.  $(x - 2)^2 + (y + 5)^2 = 4$   
Center  $(2, -5)$ , radius  $r = 2$

9.  $(x + 4)^2 + (y - 5)^2 = 42$   
Center  $(-4, 5)$ , radius  $r = \sqrt{42}$

11.  $x^2 + (y - 3)^2 = 0$   
This is not a circle.

13.  $(x - 3)^2 + (y - 5)^2 = 65$

15.  $(x - 1)^2 + (y - 5)^2 = 5$

17.  $x^2 + (y - 72)^2 = 4096$

8.  $(x + 9)^2 + y^2 = 25$   
Center  $(-9, 0)$ , radius  $r = 5$

10.  $(x + \frac{5}{2})^2 + (y - \frac{1}{2})^2 = \frac{30}{4}$   
Center  $(-\frac{5}{2}, \frac{1}{2})$ , radius  $r = \frac{\sqrt{30}}{2}$

12.  $(x + \frac{1}{2})^2 + (y - \frac{3}{5})^2 = \frac{161}{100}$   
Center  $(-\frac{1}{2}, \frac{3}{5})$ , radius  $r = \frac{\sqrt{161}}{10}$

14.  $(x - 3)^2 + (y - 6)^2 = 20$

16.  $(x - 1)^2 + (y - \frac{3}{2})^2 = \frac{13}{2}$