Exercises

7.2.1 Exercises

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

1. Center $(-1,-5)$, radius 10
2. Center $(4,-2)$, radius 3
3. Center $\left(-3,\frac{7}{13}\right)$, radius $\frac{1}{2}$
4. Center $(5,-9)$, radius $\ln(8)$
5. Center $\left(-e,\sqrt{2}\right)$, radius π
6. Center (π,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.

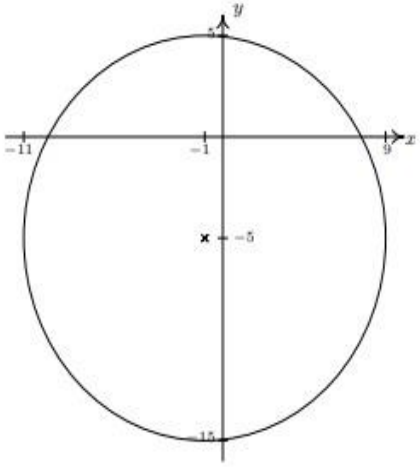
7. $x^2-4x+y^2+10y=-25$
8. $-2x^2-36x-2y^2-112=0$
9. $x^2+y^2+8x-10y-1=0$
10. $x^2+y^2+5x-y-1=0$
11. $4x^2+4y^2-24y+36=0$
12. $x^2+x+y^2-\frac{6}{5}y=1$

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

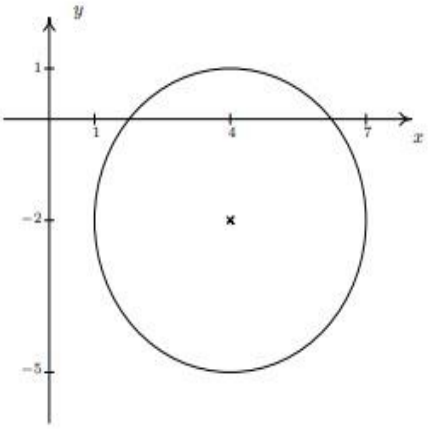
13. center $(3,5)$, passes through $(-1,-2)$
14. center $(3,6)$, passes through $(-1,4)$
15. endpoints of a diameter: $(3,6)$ and $(-1,4)$
16. endpoints of a diameter: $\left(\frac{1}{2},4\right)$, $\left(\frac{3}{2},-1\right)$
17. The Giant Wheel at Cedar Point is a circle with diameter 128 feet which sits on an 8 foot tall platform making its overall height is 136 feet.[2] Find an equation for the wheel assuming that its center lies on the y-axis and that the ground is the x-axis.
18. Verify that the following points lie on the Unit Circle: $(\pm1,0)$, $(0,\pm1)$, $\left(\pm\frac{\sqrt{2}}{2},\pm\frac{\sqrt{2}}{2}\right)$, $\left(\pm\frac{1}{2},\pm\frac{\sqrt{3}}{2}\right)$ and $\left(\pm\frac{\sqrt{3}}{2},\pm\frac{1}{2}\right)$
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 is 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.)

Answers

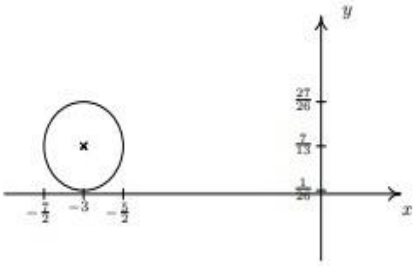
1. $(x+1)^2+(y+5)^2=100$



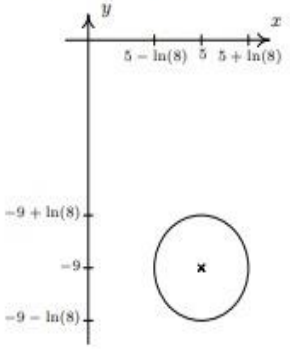
2. $(x-4)^2+(y+2)^2=9$



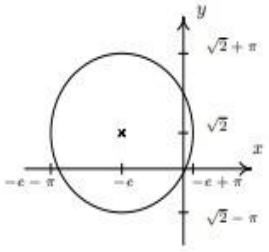
3. $(x+3)^2+\left(y-\frac{7}{13}\right)^2=\frac{1}{4}$



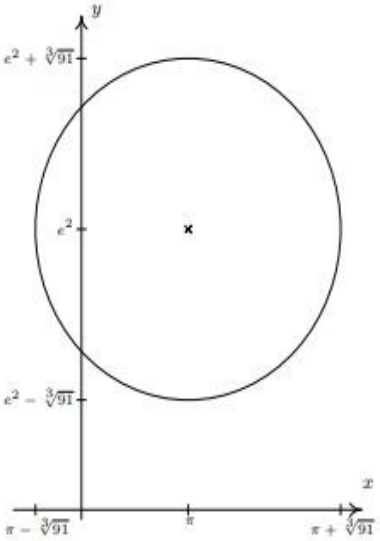
4. $(x-5)^2+(y+9)^2=(\ln(8))^2$



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



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



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

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

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

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

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

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

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

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

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

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

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