Suggested Exercises: Do All

THE ELLIPSE

For the following exercises, write the equation of the ellipse in standard form. Then identify the center, vertices, and foci.

1. $\dfrac{x^2}{25} + \dfrac{y^2}{64} = 1$

2. $\dfrac{(x-2)^2}{100} + \dfrac{(y+3)^2}{36} = 1$

3. $9x^2 + y^2 + 54x - 4y + 76 = 0$

4. $9x^2 + 36y^2 - 36x + 72y + 36 = 0$

For the following exercises, graph the ellipse, noting center, vertices, and foci.

5. $\dfrac{x^2}{36} + \dfrac{y^2}{9} = 1$

6. $\dfrac{(x-4)^2}{25} + \dfrac{(y+3)^2}{49} = 1$

7. $4x^2 + y^2 + 16x + 4y - 44 = 0$

8. $2x^2 + 3y^2 - 20x + 12y + 38 = 0$

For the following exercises, use the given information to find the equation for the ellipse.

9. Center at $(0, 0)$, focus at $(3, 0)$, vertex at $(-5, 0)$

10. Center at $(2, -2)$, vertex at $(7, -2)$, focus at $(4, -2)$

11. A whispering gallery is to be constructed such that the foci are located 35 feet from the center. If the length of the gallery is to be 100 feet, what should the height of the ceiling be?

THE HYPERBOLA

For the following exercises, write the equation of the hyperbola in standard form. Then give the center, vertices, and foci.

12. $\dfrac{x^2}{81} - \dfrac{y^2}{9} = 1$

13. $\dfrac{(y+1)^2}{16} - \dfrac{(x-4)^2}{36} = 1$

14. $9y^2 - 4x^2 + 54y - 16x + 29 = 0$

15. $3x^2 - y^2 - 12x - 6y - 9 = 0$

For the following exercises, graph the hyperbola, labeling vertices and foci.

16. $\dfrac{x^2}{9} - \dfrac{y^2}{16} = 1$

17. $\dfrac{(y-1)^2}{49} - \dfrac{(x+1)^2}{4} = 1$

18. $x^2 - 4y^2 + 6x + 32y - 91 = 0$

19. $2y^2 - x^2 - 12y - 6 = 0$

For the following exercises, find the equation of the hyperbola.

20. Center at $(0, 0)$, vertex at $(0, 4)$, focus at $(0, -6)$

21. Foci at $(3, 7)$ and $(7, 7)$, vertex at $(6, 7)$

THE PARABOLA

For the following exercises, write the equation of the parabola in standard form. Then give the vertex, focus, and directrix.

22. $y^2 = 12x$ **23.** $(x+2)^2 = \dfrac{1}{2}(y-1)$ **24.** $y^2 - 6y - 6x - 3 = 0$ **25.** $x^2 + 10x - y + 23 = 0$

For the following exercises, graph the parabola, labeling vertex, focus, and directrix.

26. $x^2 + 4y = 0$ **27.** $(y-1)^2 = \dfrac{1}{2}(x+3)$ **28.** $x^2 - 8x - 10y + 46 = 0$ **29.** $2y^2 + 12y + 6x + 15 = 0$

For the following exercises, write the equation of the parabola using the given information.

30. Focus at $(-4, 0)$; directrix is $x = 4$

31. Focus at $\left(2, \dfrac{9}{8}\right)$; directrix is $y = \dfrac{7}{8}$

32. A cable TV receiving dish is the shape of a paraboloid of revolution. Find the location of the receiver, which is placed at the focus, if the dish is 5 feet across at its opening and 1.5 feet deep.