

Pg. 637 4-44 by 4's, 45,
(46, 47)

GRAPHING Graph the equation. Identify the vertices, co-vertices, and foci of the ellipse.

3. $\frac{x^2}{16} + \frac{y^2}{4} = 1$

4. $\frac{x^2}{4} + y^2 = 25$

5. $\frac{x^2}{9} + \frac{y^2}{49} = 1$

6. $\frac{x^2}{144} + \frac{y^2}{64} = 1$

7. $\frac{x^2}{400} + \frac{y^2}{81} = 1$

8. $\frac{x^2}{36} + \frac{y^2}{225} = 1$

9. $4x^2 + y^2 = 36$

10. $9x^2 + y^2 = 9$

11. $16x^2 + 9y^2 = 144$

12. $25x^2 + 49y^2 = 1225$

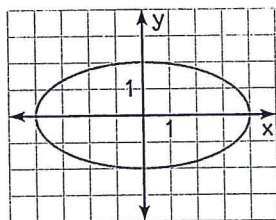
13. $16x^2 + 25y^2 = 1600$

14. $72x^2 + 8y^2 = 648$

ERROR ANALYSIS Describe and correct the error in graphing the ellipse.

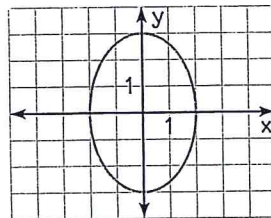
15.

$\frac{x^2}{4} + \frac{y^2}{16} = 1$



16.

$\frac{x^2}{2} + \frac{y^2}{3} = 1$



WRITING EQUATIONS Write an equation of the ellipse with the given characteristics and center at (0, 0).

17. Vertex: (5, 0)
Co-vertex: (0, -3)

18. Vertex: (0, -10)
Co-vertex: (6, 0)

19. Vertex: (14, 0)
Co-vertex: (0, -9)

20. Vertex: (0, -6)
Co-vertex: (4, 0)

21. Vertex: (0, 12)
Co-vertex: (11, 0)

22. Vertex: (20, 0)
Co-vertex: (0, -16)

23. Vertex: (0, 8)
Focus: (0, 6)

24. Vertex: (4, 0)
Focus: ($\sqrt{7}$, 0)

25. Vertex: (0, 9)
Focus: (0, $-4\sqrt{2}$)

26. Vertex: (-5, 0)
Focus: (3, 0)

27. Vertex: (0, -4)
Focus: (0, $-2\sqrt{3}$)

28. Vertex: (13, 0)
Focus: ($-4\sqrt{3}$, 0)

29. Co-vertex: (0, $\sqrt{7}$)
Focus: (-3, 0)

30. Co-vertex: ($-3\sqrt{5}$, 0)
Focus: (0, 6)

31. Co-vertex: (0, $-5\sqrt{7}$)
Focus: (-15, 0)

32. Co-vertex: (0, 15)
Focus: (-8, 0)

33. Co-vertex: ($2\sqrt{15}$, 0)
Focus: (0, 14)

34. Co-vertex: (-32, 0)
Focus: (0, 24)

35. ★ **MULTIPLE CHOICE** What is an equation of the ellipse with center at the origin, a vertex at $(0, -12)$, and a co-vertex at $(-8, 0)$?

(A) $\frac{x^2}{144} + \frac{y^2}{64} = 1$ (B) $\frac{x^2}{64} + \frac{y^2}{144} = 1$ (C) $\frac{x^2}{12} + \frac{y^2}{8} = 1$ (D) $\frac{x^2}{8} + \frac{y^2}{12} = 1$

GRAPHING In Exercises 36–44, the equations of parabolas, circles, and ellipses are given. Graph the equation.

36. $x^2 + y^2 = 64$ 37. $25x^2 + 81y^2 = 2025$ 38. $36y + x^2 = 0$
39. $65y^2 = 130x$ 40. $30x^2 + 30y^2 = 480$ 41. $\frac{x^2}{75} + \frac{4y}{25} = 0$
42. $\frac{3x^2}{48} + \frac{4y^2}{400} = 1$ 43. $\frac{x^2}{64} + \frac{y^2}{64} = 4$ 44. $16x^2 + 10y^2 = 160$

45. ★ **SHORT RESPONSE** Consider the graph of $\frac{x^2}{9} + \frac{y^2}{25} = 1$. Describe the effects on the graph of changing the denominator of the y^2 -term first from 25 to 9 and then from 9 to 4. Graph the original equation and the two revised equations in the same coordinate plane.

46. ★ **OPEN-ENDED MATH** Write an equation of an ellipse in standard form. Graph the equation on a graphing calculator by rewriting it as two functions. Give a viewing window that does not distort the shape of the ellipse, and explain how you found your viewing window.

47. **CHALLENGE** Use the definition of an ellipse to show that $c^2 = a^2 - b^2$ for any ellipse with equation $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and foci at $(c, 0)$ and $(-c, 0)$. (Hint: Draw a diagram. Consider the point $P(a, 0)$ on the ellipse.)