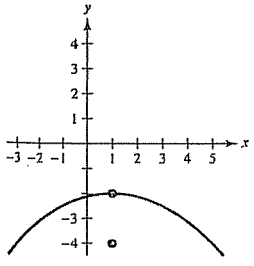
Section 4.4 *(page 372)*

Vocabulary Check *(page 372)*

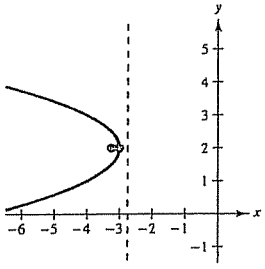
1. g 2. d 3. e 4. b
5. a 6. f 7. c

1. Center: $(-2, 1)$ horizontal shift two units to the left and vertical shift one unit upward

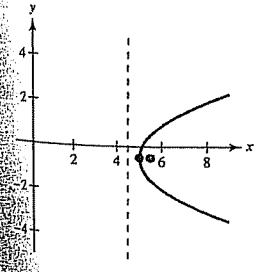
2. Vertex: $(-2, 1)$, horizontal shift left two units and vertical shift up one unit
3. Center: $(1, -3)$ horizontal shift one unit to the right and vertical shift three units downward
4. Center: $(2, -1)$, horizontal shift right two units and vertical shift down one unit
5. Center: $(-4, -2)$ horizontal shift four units to the left and vertical shift two units downward
6. Center: $(-2, 3)$, horizontal shift left two units and vertical shift up three units
7. Center: $(0, 0)$
   Radius: 7
8. Center: $(0, 0)$
   Radius: 1
9. Center: $(-3, 8)$
   Radius: 4
10. Center: $(-9, -1)$
    Radius: 6
11. Center: $(1, 0)$
    Radius: $\sqrt{10}$
12. Center: $(0, -12)$
    Radius: $\sqrt{24} = 2\sqrt{6}$
13. $(x - 1)^2 + (y + 3)^2 = 1$
    Center: $(1, -3)$
    Radius: 1
14. $(x - 5)^2 + (y - 3)^2 = 9$
    Center: $(5, 3)$
    Radius: 3
15. $\left(x + \frac{3}{2}\right)^2 + (y - 3)^2 = 1$
    Center: $\left(-\frac{3}{2}, 3\right)$
    Radius: 1
16. $(x + 3)^2 + (y - 2)^2 = \frac{100}{9}$
    Center: $(-3, 2)$
    Radius: $\frac{10}{3}$
17. Vertex: $(1, -2)$
    Focus: $(1, -4)$
    Directrix: $y = 0$



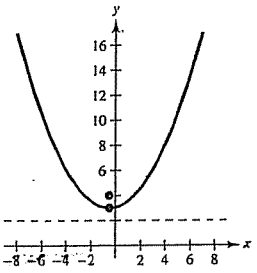
18. Vertex: $(-3, 2)$
    Focus: $\left(-\frac{13}{4}, 2\right)$
    Directrix: $x = -\frac{11}{4}$



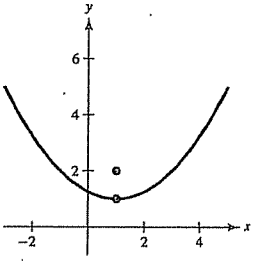
19. Vertex: $\left(5, -\frac{1}{2}\right)$
    Focus: $\left(\frac{11}{2}, -\frac{1}{2}\right)$
    Directrix: $x = \frac{9}{2}$



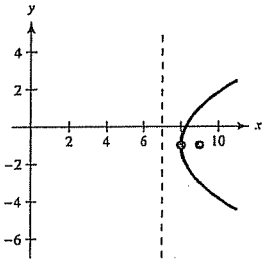
20. Vertex: $\left(-\frac{1}{2}, 3\right)$
    Focus: $\left(-\frac{1}{2}, 4\right)$
    Directrix: $y = 2$



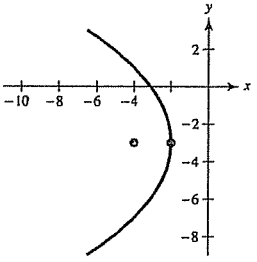
21. Vertex: $(1, 1)$
    Focus: $(1, 2)$
    Directrix: $y = 0$



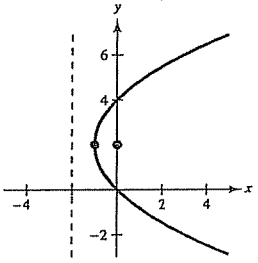
22. Vertex: $(8, -1)$
    Focus: $(9, -1)$
    Directrix: $x = 7$



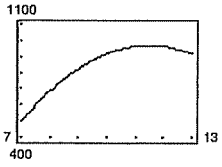
23. Vertex: $(-2, -3)$
    Focus: $(-4, -3)$
    Directrix: $x = 0$



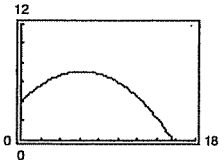
24. Vertex: $(-1, 2)$
    Focus: $(0, 2)$
    Directrix: $x = -2$



25. $(y - 2)^2 = -8(x - 3)$
26. $(x + 1)^2 = -8(y - 2)$
27. $x^2 = 8(y - 4)$
28. $(y - 1)^2 = -12(x + 2)$
29. $(y - 2)^2 = 8x$
30. $x^2 = -8(y - 2)$
31. (a) $R = -23.539t^2 + 540.23t - 2130.9$
    (b) (11.47, 968.6); the maximum revenue occurred in 2001
    (c)

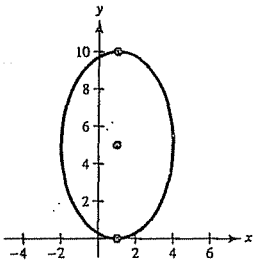


    (d) 2001 (e) 2001
    (f) Results are the same.
32. (a) $17{,}500\sqrt{2}$ miles per hour
    (b) $x^2 = -16{,}400(y - 4100)$
33. 34,295 feet
34. (a)

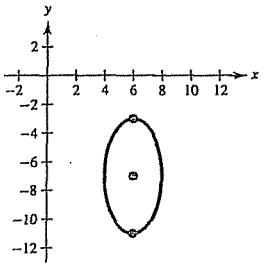


    (b) (6.25, 7.125); 15.69 feet

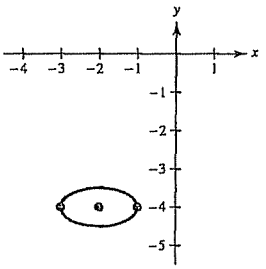
35. Center: $(1, 5)$
Foci: $(1, 9), (1, 1)$
Vertices: $(1, 10), (1, 0)$



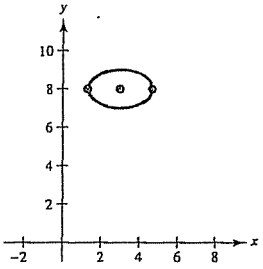
36. Center: $(6, -7)$
Foci: $\left(6, -7 \pm 2\sqrt{3}\right)$
Vertices: $(6, -3), (6, -11)$



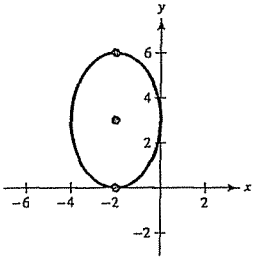
37. Center: $(-2, -4)$
Foci: $\left(\dfrac{-4 \pm \sqrt{3}}{2}, -4\right)$
Vertices: $(-3, -4), (-1, -4)$



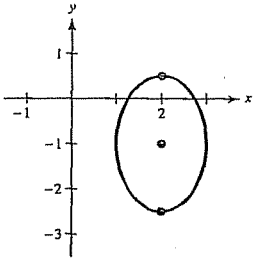
38. Center: $(3, 8)$
Foci: $\left(\frac{13}{3}, 8\right), \left(\frac{5}{3}, 8\right)$
Vertices: $\left(\frac{14}{3}, 8\right), \left(\frac{4}{3}, 8\right)$



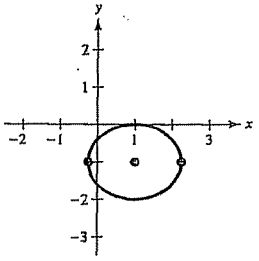
39. Center: $(-2, 3)$
Foci: $\left(-2, 3 \pm \sqrt{5}\right)$
Vertices: $(-2, 6), (-2, 0)$



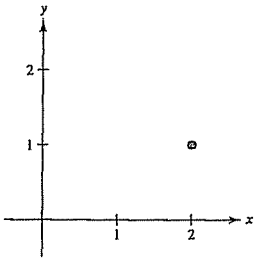
40. Center: $(2, -1)$
Foci: $\left(2, \dfrac{-2 \pm \sqrt{5}}{2}\right)$
Vertices: $\left(2, -\frac{5}{2}\right), \left(2, \frac{1}{2}\right)$



41. Center: $(1, -1)$
Foci: $\left(\frac{7}{4}, -1\right), \left(\frac{1}{4}, -1\right)$
Vertices: $\left(\frac{9}{4}, -1\right), \left(-\frac{1}{4}, -1\right)$



42. Degenerate conic: $(2, 1)$



43. $\dfrac{(x-4)^2}{9} + \dfrac{y^2}{16} = 1$

44. $\dfrac{(x-2)^2}{9} + \dfrac{(y-2)^2}{4} = 1$

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

46. $\dfrac{(x-2)^2}{16} + \dfrac{y^2}{12} = 1$

47. $\dfrac{x^2}{48} + \dfrac{(y-4)^2}{64} = 1$

48. $(x-2)^2 + \dfrac{4(y+1)^2}{9} = 1$

49. $\dfrac{x^2}{16} + \dfrac{(y-4)^2}{12} = 1$

50. $\dfrac{(x-3)^2}{36} + \dfrac{(y-2)^2}{32} = 1$

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

52. $\dfrac{(x-5)^2}{25} + \dfrac{(y-6)^2}{36} = 1$

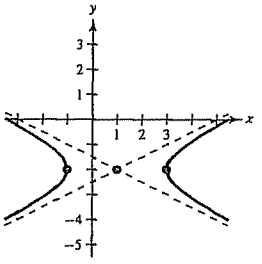
53. $\dfrac{x^2}{25} + \dfrac{y^2}{16} = 1$

54. $\dfrac{x^2}{48} + \dfrac{y^2}{64} = 1$

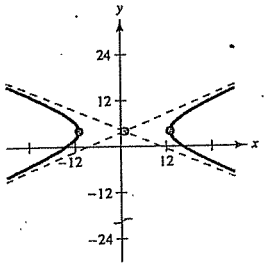
55. 2,756,170,000 miles; 4,583,830,000 miles

56. $\dfrac{x^2}{10{,}000} + \dfrac{(y-85)^2}{7225} = 1$

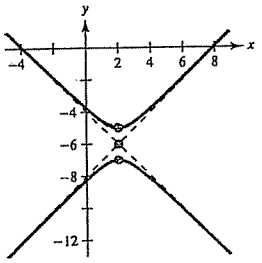
57. Center: $(1, -2)$
Foci: $\left(1 \pm \sqrt{5}, -2\right)$
Vertices: $(3, -2), (-1, -2)$



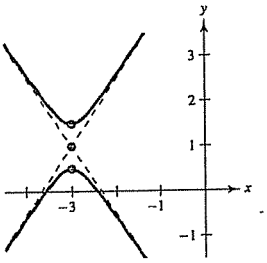
58. Center: $(1, 4)$
Foci: $(-12, 4), (14, 4)$
Vertices: $(-11, 4), (13, 4)$



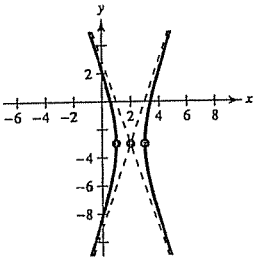
59. Center: $(2, -6)$
Foci: $\left(2, -6 \pm \sqrt{2}\right)$
Vertices: $(2, -5), (2, -7)$



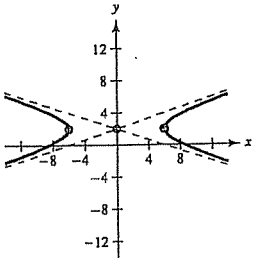
60. Center: $(-3, 1)$
Foci: $\left(-3, 1 \pm \frac{1}{6}\sqrt{13}\right)$
Vertices: $\left(-3, \frac{1}{2}\right), \left(-3, \frac{3}{2}\right)$



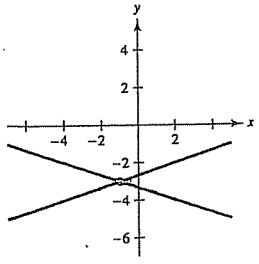
61. Center: $(2, -3)$
Foci: $\left(2 \pm \sqrt{10}, -3\right)$
Vertices: $(3, -3), (1, -3)$



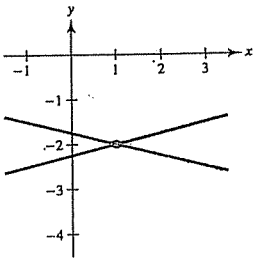
62. Center: $(0, 2)$
Foci: $\left(\pm 2\sqrt{10}, 2\right)$
Vertices: $(-6, 2), (6, 2)$



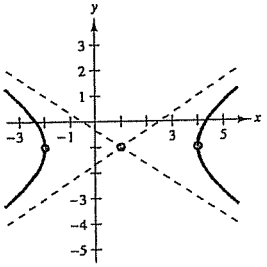
63. The graph of this equation is two lines intersecting at $(-1, -3)$.



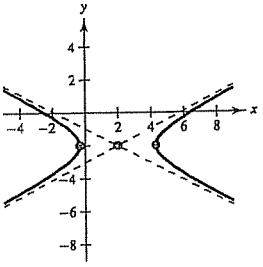
64. The graph of this equation is two lines intersecting at $(1, -2)$.



65. Center: $(1, -1)$
Foci: $\left(1 \pm \sqrt{13}, -1\right)$
Vertices: $(-2, -1), (4, -1)$



66. Center: $(2, -2)$
Foci: $\left(\frac{66 \pm 4\sqrt{462}}{33}, -2\right)$
Vertices: $\left(\frac{6 \pm 4\sqrt{3}}{3}, -2\right)$



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

68. $\frac{(x-3)^2}{4} - \frac{(y-2)^2}{5} = 1$

69. $\frac{(x-4)^2}{4} - \frac{y^2}{12} = 1$

70. $\frac{y^2}{9} - \frac{(x-2)^2}{16} = 1$

71. $\frac{(y-5)^2}{16} - \frac{(x-4)^2}{9} = 1$

72. $\frac{x^2}{4} - \frac{(y-1)^2}{5} = 1$

73. $\frac{y^2}{9} - \frac{4(x-2)^2}{9} = 1$

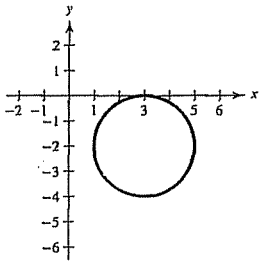
74. $\frac{x^2}{4} - \frac{3(y-1)^2}{4} = 1$

75. $\frac{(x-3)^2}{9} - \frac{(y-2)^2}{4} = 1$

76. $\frac{(y-2)^2}{4} - \frac{(x-3)^2}{9} = 1$

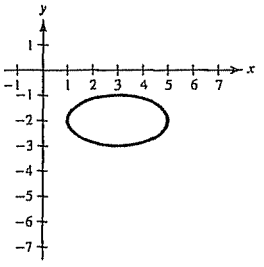
77. $(x-3)^2+(y+2)^2=4$

Circle



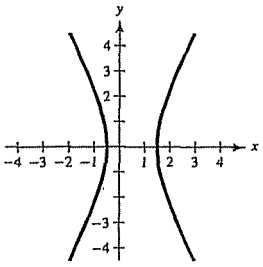
78. $\dfrac{(x-3)^2}{4}+(y+2)^2=1$

Ellipse



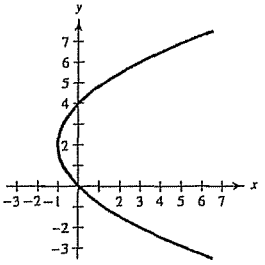
79. $\left(x-\dfrac{1}{2}\right)^2-\dfrac{y^2}{4}=1$

Hyperbola



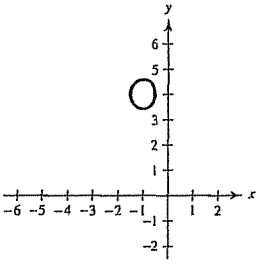
80. $(y-2)^2=4(x+1)$

Parabola



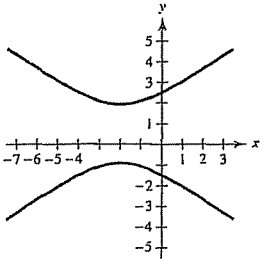
81. $\dfrac{(x+1)^2}{1/4}+\dfrac{(y-4)^2}{1/3}=1$

Ellipse



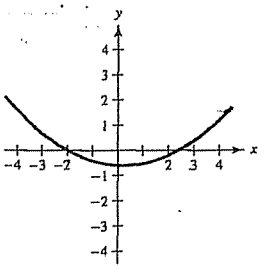
82. $\dfrac{\left(y-\frac{1}{2}\right)^2}{2}-\dfrac{(x+2)^2}{4}=1$

Hyperbola



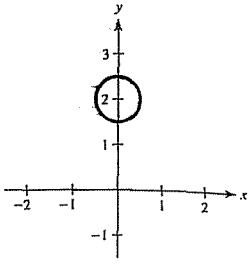
83. $\left(x-\dfrac{1}{5}\right)^2=8\left(y+\dfrac{3}{5}\right)$

Parabola



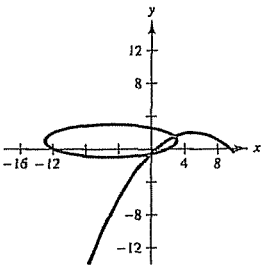
84. $x^2+(y-2)^2=\dfrac{1}{4}$

Circle



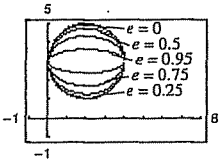
85. True. The conic is an ellipse.

86. False.



87. Answers will vary.

88.



As e approaches 0, the ellipse becomes a circle.

89. $f^{-1}(x)=\dfrac{x-10}{7}$

90. $f^{-1}(x)=\sqrt[3]{-(x-2)}$

91. $f^{-1}(x)=x^2-8, \quad x\geq -8$

92. $f^{-1}(x)=\pm\sqrt{x^3-4}$