

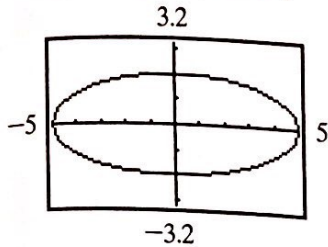
$$\left(x \pm \frac{D}{2A}\right) = -\frac{E}{A}y + \frac{D^2 - 4AF}{4A^2}$$

(b)-(d) If  $E = 0$ , the graph of the equation contains no points if  $D^2 - 4AF < 0$ , is a single vertical line if  $D^2 - 4AF = 0$ , and is two vertical lines if  $D^2 - 4AF > 0$ .

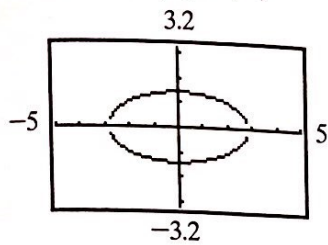
### 10.3 Exercises

1. C 3. B 5. C 7. D

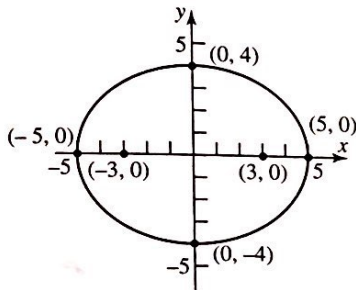
9. Vertices:  $(-5, 0), (5, 0)$   
Foci:  $(-\sqrt{21}, 0), (\sqrt{21}, 0)$



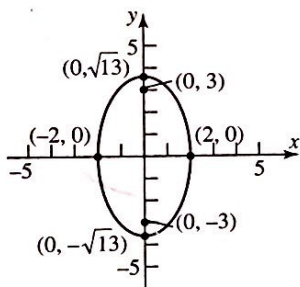
15. Vertices:  $(-2\sqrt{2}, 0), (2\sqrt{2}, 0)$   
Foci:  $(-\sqrt{6}, 0), (\sqrt{6}, 0)$



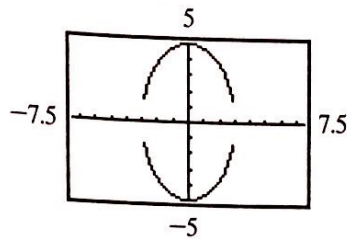
19.  $\frac{x^2}{25} + \frac{y^2}{16} = 1$



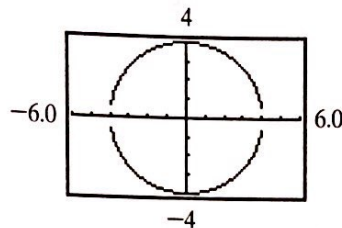
25.  $\frac{x^2}{4} + \frac{y^2}{13} = 1$



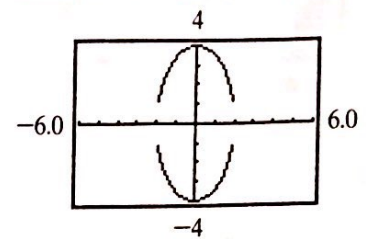
11. Vertices:  $(0, -5), (0, 5)$   
Foci:  $(0, -4), (0, 4)$



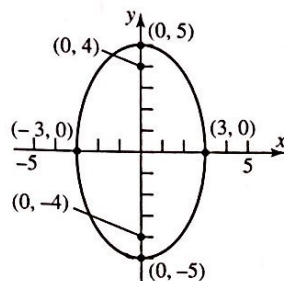
17. Vertices:  $(-4, 0), (4, 0), (0, -4), (0, 4)$   
Focus:  $(0, 0)$



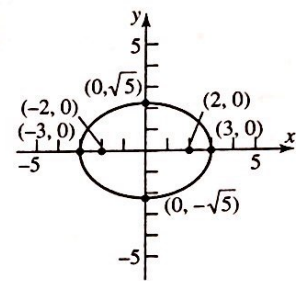
13. Vertices:  $(0, -4), (0, 4)$   
Foci:  $(0, -2\sqrt{3}), (0, 2\sqrt{3})$



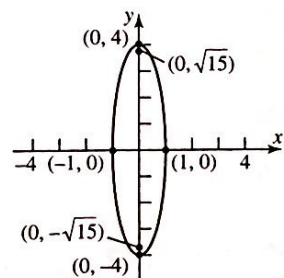
21.  $\frac{x^2}{9} + \frac{y^2}{25} = 1$



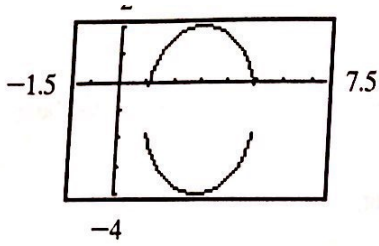
23.  $\frac{x^2}{9} + \frac{y^2}{5} = 1$



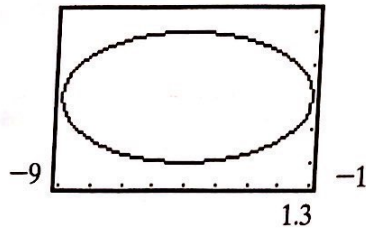
27.  $x^2 + \frac{y^2}{16} = 1$



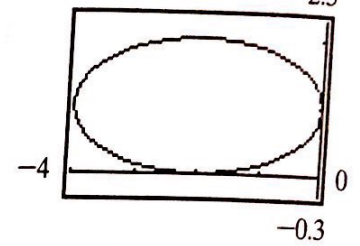
29.  $\frac{(x+1)^2}{4} + (y-1)^2 = 1$  31.  $(x-1)^2 + \frac{y^2}{4} = 1$



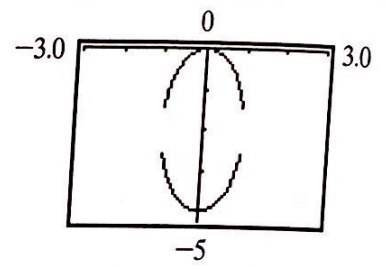
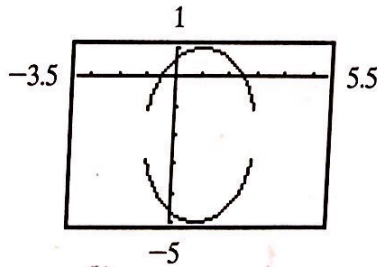
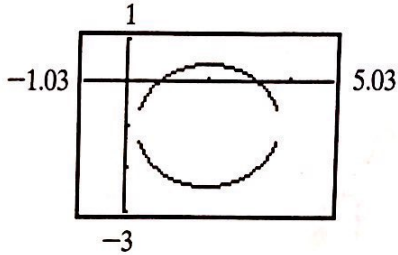
39. Center:  $(2, -1)$   
 Vertices:  $(2 - \sqrt{3}, -1), (2 + \sqrt{3}, -1)$   
 Foci:  $(1, -1), (3, -1)$



41. Center:  $(1, -2)$   
 Vertices:  $(1, -5), (1, 1)$   
 Foci:  $(1, -2 - \sqrt{5}), (1, -2 + \sqrt{5})$



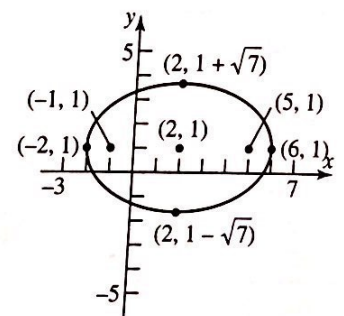
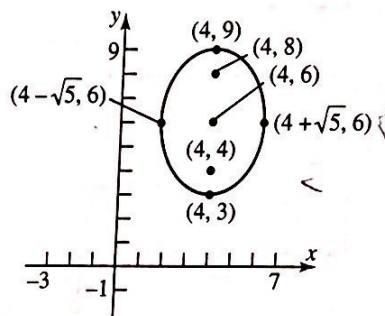
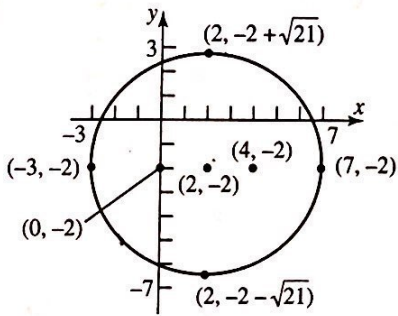
43. Center:  $(0, -2)$   
 Vertices:  $(0, -4), (0, 0)$   
 Foci:  $(0, -2 - \sqrt{3}), (0, -2 + \sqrt{3})$



45.  $\frac{(x - 2)^2}{25} + \frac{(y + 2)^2}{21} = 1$

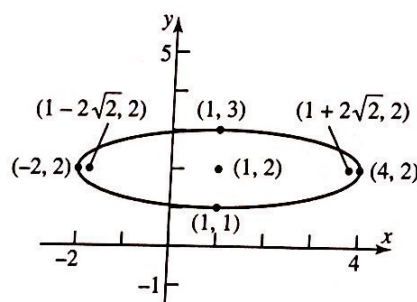
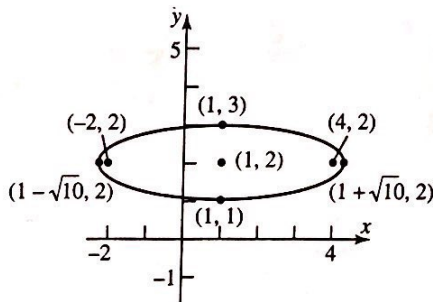
47.  $\frac{(x - 4)^2}{5} + \frac{(y - 6)^2}{9} = 1$

49.  $\frac{(x - 2)^2}{16} + \frac{(y - 1)^2}{7} = 1$

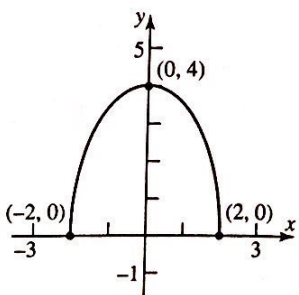


51.  $\frac{(x - 1)^2}{10} + (y - 2)^2 = 1$

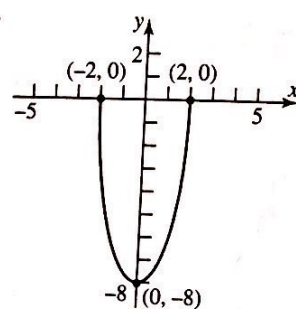
53.  $\frac{(x - 1)^2}{9} + (y - 2)^2 = 1$



55.



57.



59.  $\frac{x^2}{100} + \frac{y^2}{36} = 1$

61. 43.3 ft    63. 24.65 ft, 21.65 ft, 13.82 ft    65. 0 ft, 12.99 ft, 15 ft, 12.99 ft, 0 ft    67. 91.5 million miles;  $\frac{x^2}{(93)^2} + \frac{y^2}{8646.75} = 1$

69. perihelion: 460.6 million miles; mean distance: 493.0 million miles; aphelion: 525.4 million miles