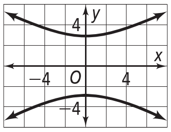
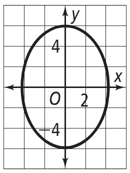
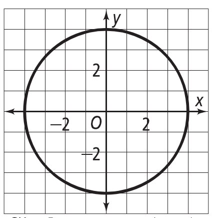
Algebra 2
Lesson 10-1 - Practice and Problem-Solving Exercises Answers

7. 

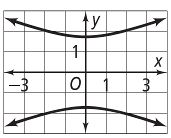
Hyperbola: center (0, 0), y-intercepts at $\pm\frac{5\sqrt{3}}{3}$, no x-intercepts, the lines of symmetry are the x- and y-axes
domain: all real numbers, range: $y \geq \frac{5\sqrt{3}}{3}$ or $y \leq -\frac{5\sqrt{3}}{3}$.

8. 

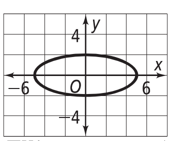
Ellipse: center (0, 0), x-intercepts at $\pm 3\sqrt{2}$, y-intercepts at ± 6, the lines of symmetry are the x- and y-axes
domain: $-3\sqrt{2} \leq x \leq 3\sqrt{2}$, range $-6 \leq y \leq 6$.

9. 

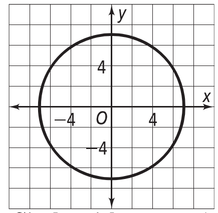
Circle: center (0, 0), radius 4, x-intercepts at ± 4, y-intercepts at ± 4, there are infinitely many lines of symmetry
domain: $-4 \leq x \leq 4$, range: $-4 \leq y \leq 4$.

10. 

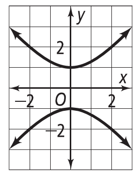
Hyperbola: center (0, 0), y-intercepts at $\pm\sqrt{3}$, no x-intercepts, the lines of symmetry are the x- and y-axes
domain: all real numbers, range: $y \leq \sqrt{3}$ or $y \geq \sqrt{3}$.

11. 

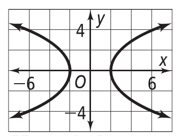
Ellipse: center (0, 0), y-intercepts at ± 2, x-intercepts at ± 5, the lines of symmetry are the x- and y-axes
domain: $-5 \leq x \leq 5$, range: $-2 \leq y \leq 2$.

12. 

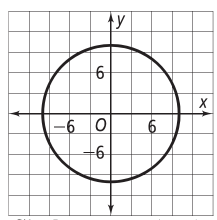
Circle with center (0, 0), radius 7, and x- and y-intercepts at ± 7.
lines of symmetry: every line through the origin
domain: $-7 \leq x \leq 7$
range: $-7 \leq y \leq 7$

13. 

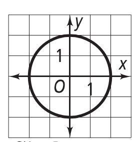
Hyperbola: center $(0,\ 0)$, y-intercepts at ± 1, no x-intercepts, the lines of symmetry are the x- and y-axes
domain: all real numbers, range: $y \leq -1$ or $y \geq 1$.

14. 

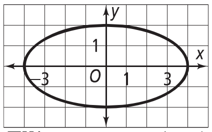
Hyperbola: center (0, 0), x-intercepts at ± 2, no y-intercepts, the lines of symmetry are the x- and y-axes
domain: $x \leq -2$ or $x \geq 2$, range: all real numbers.

15. 

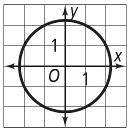
Circle: center (0, 0), radius 10, x- and y-intercepts at ± 10, there are infinitely many lines of symmetry
domain: $-10 \leq x \leq 10$, range: $-10 \leq y \leq 10$.

16. 

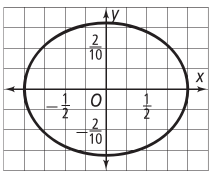
Circle: center (0, 0), radius 2, x- and y-intercepts at ± 2, there are infinitely many lines of symmetry
domain: $-2 \leq x \leq 2$, range: $-2 \leq y \leq 2$.

17. 

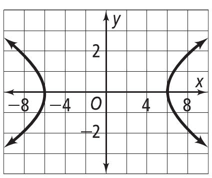
Ellipse: center (0, 0), x-intercepts at ± 4, y-intercepts at ± 2, the lines of symmetry are the x- and y-axes
domain: $-4 \le x \le 4$, range: $-2 \le y \le 2$.

18. 

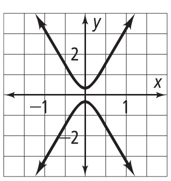
Circle: center (0, 0), radius $\sqrt{5}$, x- and y-intercepts at $\pm\sqrt{5}$, there are infinitely many lines of symmetry
domain: $-\sqrt{5} \le x \le \sqrt{5}$, range: $-\sqrt{5} \le y \le \sqrt{5}$.

19. 

Ellipse: center (0, 0), x-intercepts at ± 1, y-intercepts at $\pm\frac{1}{3}$, the lines of symmetry are the x- and y-axes
domain: $-1 \le x \le 1$, range: $-\frac{1}{3} \le y \le \frac{1}{3}$.

20. 

Hyperbola: center (0, 0), x-intercepts at ± 6, no y-intercepts, the lines of symmetry are the x- and y-axes
domain: $x \le -6$ or $x \ge 6$, range: all real numbers.

21. 

Hyperbola: center (0, 0), y-intercepts at $\pm\frac{1}{2}$, no x-intercepts, the lines of symmetry are the x- and y-axes
domain: all real numbers, range: $y \le -\frac{1}{2}$ or $y \ge \frac{1}{2}$.

22. Ellipse: center (0, 0), x-intercepts at ± 3, y-intercepts at ± 2
domain: $-3 \le x \le 3$, range: $-2 \le y \le 2$

23. Hyperbola: center (0, 0), no x-intercepts, y-intercepts at ± 2
domain: all real numbers, range: $y \le -2$ or $y \ge 2$

24. Ellipse: center (0, 0), x-intercepts at ± 8, y-intercepts at ± 4
domain: $-8 \le x \le 8$, range: $-4 \le y \le 4$

25. Hyperbola: center (0, 0), x-intercepts at ± 3, no y-intercepts
domain: $x \le -3$ or $x \ge 3$, range: all real numbers

26. Ellipse: center (0, 0), x-intercepts at ± 3, y-intercepts at ± 5
domain: $-3 \le x \le 3$, range: $-5 \le y \le 5$

27. Hyperbola: center (0, 0), no x-intercepts, y-intercepts at ± 3
domain: all real numbers, range: $y \le -3$ or $y \ge 3$

28. $x^2 - y^2 = 9$
$y^2 = x^2 - 9$
intercepts $(\pm 3,\ 0)$, hyperbola; 25

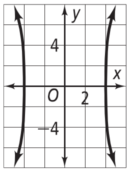
29. $4x^2 + 9y^2 = 36$
$9y^2 = 36 - 4x^2$
$y = \pm\sqrt{\frac{36 - 4x^2}{9}}$
intercepts $(0,\ \pm 2)$, $(\pm 3,\ 0)$, ellipse; 22

30. $y^2 - x^2 = 4$
$y^2 = x^2 + 4$
$y = \pm\sqrt{x^2 + 4}$
intercepts $(0,\ \pm 2)$, hyperbola; 23

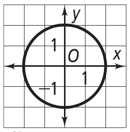
31. $x^2 + 4y^2 = 64$
$4y^2 = 64 - x^2$
$y = \pm\sqrt{\frac{64 - x^2}{4}}$
intercepts $(0,\ \pm 4)$, $(\pm 8,\ 0)$, ellipse; 24

32. $25x^2 + 9y^2 = 225$
$9y^2 = 225 - 25x^2$
$y = \pm\sqrt{\frac{225 - 25x^2}{9}}$
intercepts $(0,\ \pm 5)$, $(\pm 3,\ 0)$, ellipse; 26

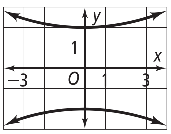
33. $y^2 - x^2 = 9$
$y^2 = x^2 + 9$
$y = \pm\sqrt{x^2 + 9}$
intercepts $(0,\ \pm 3)$, hyperbola; 27

34. 

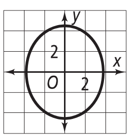
Hyperbola: center (0, 0), x-intercepts ± 4, the lines of symmetry are the x- and y-axes
domain: $x \le -4$ or $x \ge 4$, range: all real numbers.

35. 

Circle: center (0, 0), radius 2, x- and y-intercepts at ± 2, there are infinitely many lines of symmetry
domain: $-2 \le x \le 2$, range: $-2 \le y \le 2$.

36. 

Hyperbola: center (0, 0), y-intercepts at ± 2, the lines of symmetry are the x- and y-axes
domain: all real numbers, range: $y \le -2$ or $y \ge 2$.

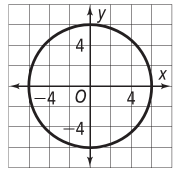
37. 

Ellipse: center (0, 0), x-intercepts at $\pm \frac{8\sqrt{5}}{5}$, y-intercepts at $\pm 2\sqrt{5}$, the lines of symmetry are the x- and y-axes
domain: $-\frac{8\sqrt{5}}{5} \le x \le \frac{8\sqrt{5}}{5}$, range: $-2\sqrt{5} \le y \le 2\sqrt{5}$.

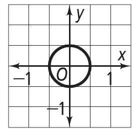
38. A drawing or model can help you visualize how the lamp shade casts shadows on the wall.
To form a parabola, hold the lamp so that the edge of the shade furthest from the wall is parallel to the plane of the wall.
To form a circle, hold the lamp so that the circular top rim of the shade is parallel to the wall.
To form a hyperbola, let the lamp sit in a normal, upright position, but close enough to the wall for the bottom rim of the shade to almost touch the wall.
To form an ellipse, hold the lamp at an angle so that the light from the top of the shade gives a closed, curved oblong area of light on the wall.

39a. All lines in the plane that pass through the center of a circle are axes of symmetry of the circle.

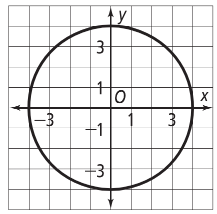
39b. The axes of symmetry of an ellipse intersect at the center of the ellipse. The same is true for a hyperbola. This can be confirmed using, for example,
$4x^2 + 9y^2 = 36$ and $4x^2 - 9y^2 = 36$.

40. 

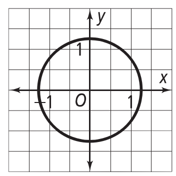
$x^2 + y^2 = 36$

41. 

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

42. 

$x^2 + y^2 = 16$

43. 

$x^2 + y^2 = 1.5625$

44. (2, 4)

45. $\left(\sqrt{2},\ 1\right)$

46. $\left(-2,\ 2\sqrt{2}\right)$

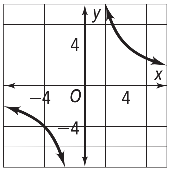
47. $\left(2,\ 0\right)$

48. $\left(-3,\ \sqrt{51}\right)$

49. $\left(0,\ -\sqrt{7}\right)$

50. From the diagram you can see that the shape of the path on the ground is one branch of a hyperbola.

51. Check students' work.

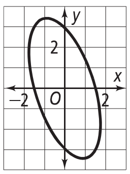
52a. 

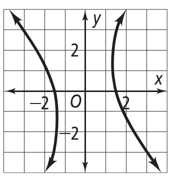
52b. The equation appears to model a hyperbola.

52c. There are no intercepts because for y to be 0, x would be undefined. $y = x$ and $y = -x$ are lines of symmetry.

52d. Yes, the graph represents a function. For every x value there is only one y value.

$f(x) = \dfrac{16}{x}$

53a. 

53b. 

54. D

55. I

56. D

57. H

58. $a_n = (n+1)^2$, 100

59. $|r| = 3 > 1$, the series diverges

60. $|r| = \dfrac{4}{3} > 1$, the series diverges

61. $|r| = \dfrac{1}{2} < 1$, the series converges

sum = 1

62. $x^3 - 3x^2y + 3xy^2 - y^3$

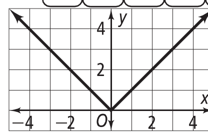
63. $p^6 + 6p^5q + 15p^4q^2 + 20p^3q^3 + 15p^2q^4 + 6pq^5 + q^6$

64. $x^4 - 8x^3 + 24x^2 - 32x + 16$

65. $243 - 405x + 270x^2 - 90x^3 + 15x^4 - x^5$

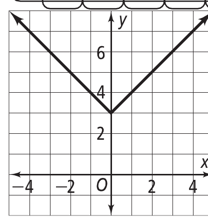
66.

x	−2	−1	0	1	2
y	2	1	0	1	2



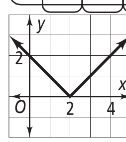
67.

x	−2	−1	0	1	2
y	5	4	3	4	5



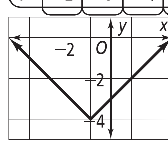
68.

x	0	1	2	3	4
y	2	1	0	1	2



69.

x	−3	−2	−1	0	1
y	−2	−3	−4	−3	−2



Algebra 2
Lesson 10-2 - Practice and Problem-Solving Exercises Answers

7. $x = \frac{1}{24}y^2$

8. $y = -\frac{1}{16}x^2$

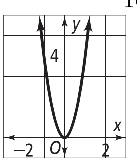
9. $y = \frac{1}{28}x^2$

10. $x = -\frac{1}{4}y^2$

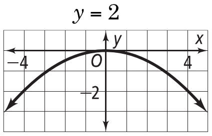
11. $x = \frac{1}{8}y^2$

12. $y = -\frac{1}{20}x^2$

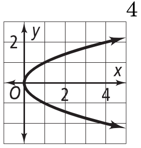
13. vertex: (0, 0)
focus: $(0, c) = \left(0, \frac{1}{16}\right)$
directrix:
$y = -c$
$y = -\frac{1}{16}$



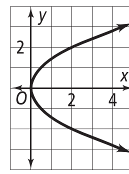
14. vertex: (0, 0)
focus: $(0, c) = (0, -2)$
directrix:
$y = -c$
$y = 2$



15. vertex: (0, 0)
focus: $(c, 0) = \left(\frac{1}{4}, 0\right)$
directrix:
$x = -c$
$x = -\frac{1}{4}$



16. vertex: (0, 0)
focus: $(c, 0) = \left(\frac{1}{2}, 0\right)$
directrix:
$x = -c$
$x = -\frac{1}{2}$



17. $x = \frac{1}{12}y^2$

18. $y = -\frac{1}{20}x^2$

19. $y = \frac{3}{4}x^2$

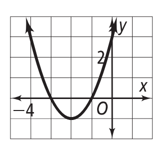
20. $x = -\frac{1}{36}y^2$

21. $y = -\frac{5}{56}x^2$

22. $x = \frac{1}{15}y^2$

23. Answers may vary. Sample:
$y = x^2$
The light produced by the bulb will reflect off the parabolic mirror in parallel rays.

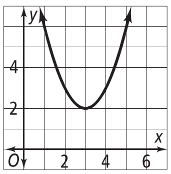
24. vertex $= (-2, -1)$
focus $= \left(-2, -\frac{3}{4}\right)$
directrix $y = -\frac{5}{4}$



25. vertex $= (3,2)$

focus $= \left(3,\frac{9}{4}\right)$

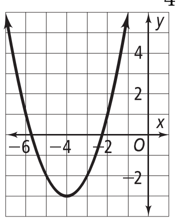
directrix $y = \frac{7}{4}$



26. vertex $= (-4,-3)$

focus $= \left(-4,-2\frac{3}{4}\right)$

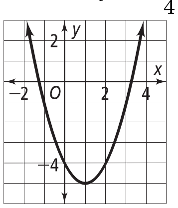
directrix $y = -3\frac{1}{4}$



27. vertex $= (1,-5)$

focus $= \left(-1,-4\frac{3}{4}\right)$

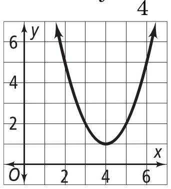
directrix $y = -5\frac{1}{4}$



28. vertex $= (4, 1)$

focus $= \left(4, \frac{5}{4}\right)$

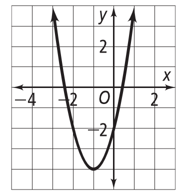
directrix $y = \frac{3}{4}$



29. vertex $= (-1,-4)$

focus $= \left(-1,-3\frac{7}{8}\right)$

directrix $y = -4\frac{1}{8}$



30. $x = \frac{1}{8}(y-1)^2 + 4$

31. $x = -\frac{1}{32}(y-3)^2$

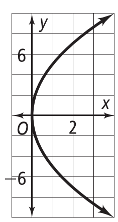
32. $y = -\frac{1}{16}(x+5)^2 + 4$

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

34. vertex: $(0,\ 0)$

focus: $\left(\frac{25}{4},\ 0\right)$

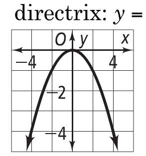
directrix: $x = -\frac{25}{4}$



35. vertex: $(0,\ 0)$

focus: $(0,\ -1)$

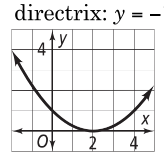
directrix: $y = 1$



36. vertex: $(2,\ 0)$

focus: $(2,\ 1)$

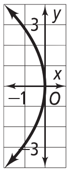
directrix: $y = -1$



37. vertex: $(0, 0)$

focus: $(-2, 0)$

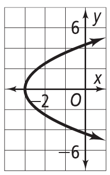
directrix: $x = 2$



38. vertex: $(-3, 0)$

focus: $\left(-\frac{3}{2}, 0\right)$

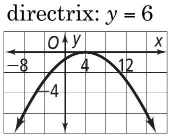
directrix: $x = -\frac{9}{2}$



39. vertex: $(4, 0)$

focus: $(4, -6)$

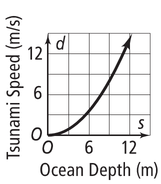
directrix: $y = 6$



40. The diagram provides the focal distance, 6 ft. To write an equation that models the cross section of the mirror you need the focus and the vertex. If you use (0, 0) for the vertex, then the focus is (0, 6).

$y = \frac{1}{24}x^2$

41.



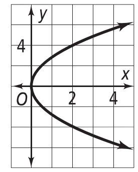
42. $x = -\frac{1}{8}y^2$

43. $y = \frac{1}{4}x^2$

44. $x = y^2$

45. The receiver should be placed 3.5 in. above the vertex.

46.



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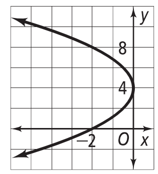
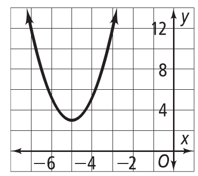


48.



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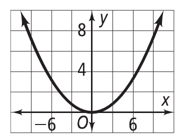
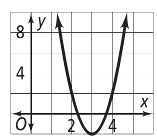
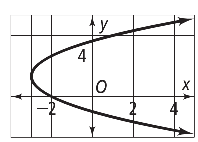


50.



51.



52. $y = \frac{1}{6}(x-1)^2 + 1$

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

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

55. Answers may vary. Sample:

Write the equation in the form $x = \frac{1}{4\left(\frac{1}{8}\right)}y^2$.

The distance from the focus to the directrix is $2\left(\frac{1}{8}\right)$, or $\frac{1}{4}$.

56. The directrix will have equation $y = k - c$. A point (x, y) is on the parabola if and only if the distance from (x, y) to the directrix is equal to the distance from (x, y) to the focus. So, (x, y) is on the parabola if and only if

$$|y - (k - c)| = \sqrt{(x - h)^2 + (y - k - c)^2}.$$

Square and simplify to get the equivalent equation:

$$4cy - 4kc = (x - h)^2$$

or

$$(x - h)^2 = 4c(y - k)$$

57a. the top half of the parabola $y^2 = x$, or $x = y^2$

57b. domain: $x \geq 0$
range: $y \geq 0$

58. Let d represent depth and r represent radius.
If $d = \frac{1}{4c}r^2$ and $d = r$, then:

$$r = \frac{1}{4c}r^2$$
$$4cr = r^2$$
$$4c = r$$

The radius is 4 times the focal length, c.

59. D

60. F

61. B

62. Product Property:

$$\log 12 = \log 3 \cdot \log 4$$
$$= \log 3 + \log 4$$

Product and Power Property:

$$\log 12 = \log 3 \cdot 2^2$$
$$= \log 3 + 2 \log 2$$

Quotient Property:

$$\log 12 = \log \frac{24}{2}$$
$$= \log 24 - \log 2$$

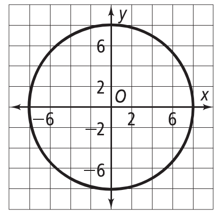
Power Property:

$$\log 12 = \log 144^{\frac{1}{2}}$$
$$= \frac{1}{2} \log 144$$

63. $x^2 + y^2 = 64$

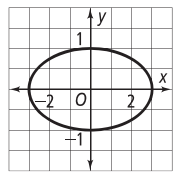
$$y^2 = 64 - x^2$$
$$y = \pm\sqrt{64 - x^2}$$

points: $(0, \pm 8)$, $(\pm 8, 0)$



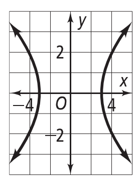
Circle: center (0, 0), radius 8; x-intercepts $(\pm 8, 0)$, y-intercepts, $(0, \pm 8)$. Infinitely many lines of symmetry.
domain: $-8 \leq x \leq 8$
range: $-8 \leq y \leq 8$

64.



Ellipse: center (0, 0), x-intercepts $(\pm 3, 0)$, y-intercepts, $(0, \pm 1)$.
lines of symmetry: x-axis and y-axis
domain: $-3 \leq x \leq 3$
range: $-1 \leq y \leq 1$

65.



Hyperbola: center (0, 0), x-intercepts $(\pm 3, 0)$, no y-intercepts.
lines of symmetry: x-axis and y-axis
domain: $x \leq -3$ or $x \geq 3$
range: all real numbers

66. 1

67. 4

68. 25

69. 9

Algebra 2
Lesson 10-3 - Practice and Problem-Solving Exercises Answers

7. $x^2 + y^2 = 100$
Solution checks.

8. $(x+4)^2 + (y+6)^2 = 49$
Solution checks.

9. $(x-2)^2 + (y-3)^2 = 20.25$
Solution checks.

10. $(x+6)^2 + (y-10)^2 = 1$
Solution checks.

11. $(x-1)^2 + (y+3)^2 = 100$
Solution checks.

12. $(x+1.5)^2 + (y+3)^2 = 4$
Solution checks.

13. $x^2 + (y+1)^2 = 9$

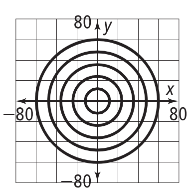
14. $(x+1)^2 + y^2 = 1$

15. $(x-2)^2 + (y+4)^2 = 25$

16. $(x+1)^2 + (y-3)^2 = 81$

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

18. $(x-3)^2 + (y-2)^2 = 49$

19.


$x^2 + y^2 = 144$

$x^2 + y^2 = 576$

$x^2 + y^2 = 1296$

$x^2 + y^2 = 2304$

$x^2 + y^2 = 3600$

20. $(x+3)^2 + (y-4)^2 = 9$

21. $(x-2)^2 + (y+6)^2 = 16$

22. center $(1,\ 1)$ and radius 1

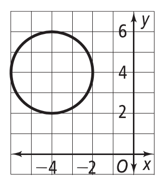
23. center $(-2,\ 10)$ and radius 2

24. center $(3,\ -1)$ and radius 6

25. center $(-3,\ 5)$ and radius 9

26. center $(0,\ -3)$ and radius 5

27. center $(-6,\ 0)$ and radius 11

28.


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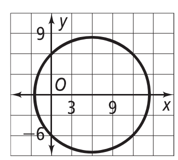

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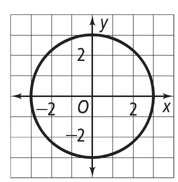
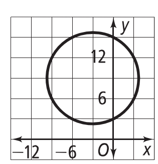
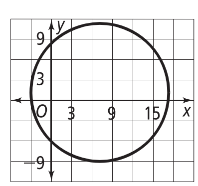
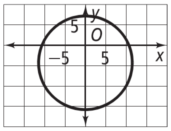


31.


32.


33. 

34. $x^2 + y^2 = 16$

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

36. $x^2 + y^2 = 25$

37. $x^2 + y^2 = 3$

38. $x^2 + y^2 = 25$

39. $x^2 + y^2 = 169$

40. $x^2 + y^2 = 13$

41. $x^2 + y^2 = 26$

42. $x^2 + y^2 = 52$

43. The diagram helps you figure out the vertex of each circle with the given radius.

$$x^2 + y^2 = 6^2$$
$$x^2 + y^2 = 36$$

$$(x-h)^2 + (y-k)^2 = 4^2$$
$$(x-8)^2 + (y-6)^2 = 16$$

$$(x-h)^2 + (y-k)^2 = 2^2$$
$$(x-8)^2 + (y-0)^2 = 4$$
$$(x-8)^2 + y^2 = 4$$

44. Answers may vary. Sample: $y = \sqrt{25 - x^2}$ and $y = -\sqrt{25 - x^2}$

45. $(x+6)^2 + (y-13)^2 = 49$

46. $(x-5)^2 + (y+3)^2 = 25$

47. $(x+2)^2 + (y-7.5)^2 = 2.25$

48. $(x-1)^2 + (y+2)^2 = 10$

49. $(x-2)^2 + (y-1)^2 = 25$

50. $(x-6)^2 + (y-4)^2 = 25$

51. $(x+1)^2 + (y+7)^2 = 36$

52. Gear A:
$(x+7)^2 + y^2 = 16$
Gear B:
$x^2 + y^2 = 9$
Gear C:
$(x-4)^2 + y^2 = 1$

53. center $(0,\ 0)$ and radius $\sqrt{2}$

54. center $(0,\ -1)$ and radius $\sqrt{5}$

55. center $(0,\ 0)$ and radius $\sqrt{14}$

56. center $(0,\ 4)$ and radius $\sqrt{11}$

57. center $(-5,\ 0)$ and radius $3\sqrt{2}$

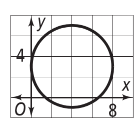
58. center $(-2,\ -4)$ and radius $5\sqrt{2}$

59. center $(-3,\ 5)$ and radius $\sqrt{38}$

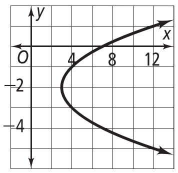
60. center $(-1,\ 0)$ and radius 2

61. center $(3,\ 1)$ and radius $\sqrt{6}$

62. center $(0,\ 2)$ and radius $2\sqrt{5}$

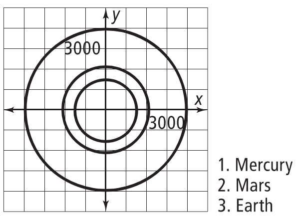
63. 

$(x-4)^2 + (y-3)^2 = 16$

64. 

$x = (y+2)^2 + 3$

65a. Mercury:
radius = 1515.5 mi
Mars:
radius = 2111 mi
Earth:
radius = 3963 mi.
Let one unit of the graph represent 500 mi.



65b. Earth:
$x^2 + y^2 = 15{,}705{,}369$
Mars:
$x^2 + y^2 = 4{,}456{,}321$
Mercury:
$x^2 + y^2 = 2{,}296{,}740$

66a. $(x-3)^2 + (y-4)^2 = 25$

66b. $y = -\frac{1}{3}x^2 + \frac{10}{3}x$

67. $144 = 12^2$
radius = 12

68. 1.45
Enter $y_1 = x^2 + 2x - 5$ and trace the graph to $y = 0$.

69. 5

70. The common ratio is $\frac{2}{3}$.

71. 0.42

72. $x = -\frac{1}{12}y^2$

73. $x = -1$

74. $x = 2,\ x = 3$

75. no points of discontinuity

76. 4

77. 2

78. −3

79. 4

80. $\frac{1}{2}$

81. 1

82. $x = -9,\ x = -2$

83. $m = 0,\ m = \pm 4,\ m = \pm 4i$

84. The solutions are $p = \pm 2,\ \pm 2\sqrt{2}$.

Algebra 2
Lesson 10-4 - Practice and Problem-Solving Exercises Answers

7. vertex $(4,\ 0)$ and co-vertex $(0,\ 3)$

$$\frac{x^2}{16}+\frac{y^2}{9}=1$$

8. vertex $(2,\ 0)$ and co-vertex $(0,\ 1)$

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

9. vertex $(3,\ 0)$ and co-vertex $(0,\ -1)$

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

10. vertex $(0,\ 6)$ and co-vertex $(1,\ 0)$

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

11. vertex $(0,\ -7)$ and co-vertex $(4,\ 0)$

$$\frac{x^2}{16}+\frac{y^2}{49}=1$$

12. vertex $(-6,\ 0)$ and co-vertex $(0,\ 5)$

$$\frac{x^2}{36}+\frac{y^2}{25}=1$$

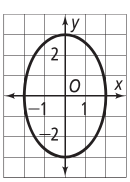
13. vertex $(-9,\ 0)$ and co-vertex $(0,\ -2)$

$$\frac{x^2}{81}+\frac{y^2}{4}=1$$

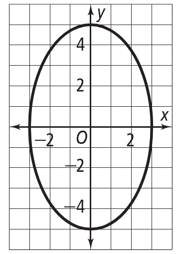
14. vertex $(0,\ 5)$ and co-vertex $(-3,\ 0)$

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

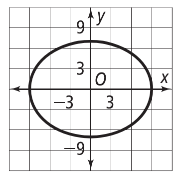
15. foci at $(0,\ \pm\sqrt{5})$



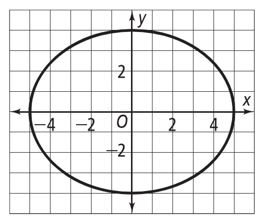
16. foci at $(0,\ \pm 4)$



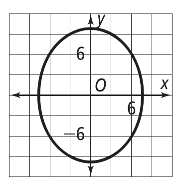
17. foci at $(\pm 4\sqrt{2},\ 0)$



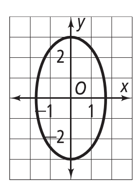
18. foci at $(\pm 3,\ 0)$



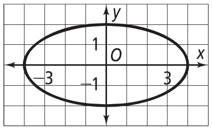
19. foci at $(0,\ \pm 6)$



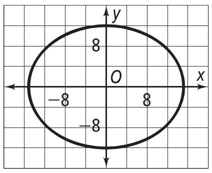
20. foci at $(0,\ \pm\sqrt{6})$



21. foci at $\left(\pm 2\sqrt{3},\ 0\right)$



22. foci at $\left(\pm 9,\ 0\right)$



23. The distance between the foci is 32.

24. The distance between the foci is 24.

25. The distance between the foci is 6.

26. The distance between the foci is $2\sqrt{39}$.

27. The distance between the foci is 12.

28. The distance between the foci is $8\sqrt{2}$.

29. The distance between the foci is $24\sqrt{2}$.

30. The distance between the foci is $2\sqrt{7}$.

31. $\frac{x^2}{100}+\frac{y^2}{64}=1$

32. $\frac{x^2}{64}+\frac{y^2}{128}=1$

33. $\frac{x^2}{89}+\frac{y^2}{64}=1$

34. $\frac{x^2}{4}+\frac{y^2}{20}=1$

35a. The hole is about 22.25 ft from the tee.

35b. Due to the reflective prop. of an ellipse, you can aim your putt at any part of the border. The ball will reflect off the border and go directly into the hole.

36. foci at $\left(\sqrt{5},\ 0\right), \left(-\sqrt{5},\ 0\right)$

37. foci at $\left(0,\ 2\sqrt{3}\right), \left(0,\ -2\sqrt{3}\right)$

38. foci at $\left(4\sqrt{2},\ 0\right), \left(-4\sqrt{2},\ 0\right)$

39. foci at $\left(0,\ \sqrt{21}\right), \left(0,\ -\sqrt{21}\right)$

40. foci at $\left(0,\ 2\sqrt{7}\right), \left(0,\ -2\sqrt{7}\right)$

41. foci at $(0,\ 1), (0,\ -1)$

42. The length of the ellipse is equal to $2a$. The width of the ellipse is $2b$. Because the center of the ellipse is at the origin, the standard form of the ellipse is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. Using $2a = 1058$ and $2b = 902$, $a = 529$ and $b = 451$, and the equation is $\frac{x^2}{(529)^2}+\frac{y^2}{(451)^2}=1$ or $\frac{x^2}{279{,}841}+\frac{y^2}{203{,}401}=1$.

43a. eccentricity $=\frac{c}{a}=\frac{9}{10}=0.9$

43b. eccentricity $=\frac{c}{a}=\frac{1}{10}=0.1$

43c. The shape is close to a circle.

43d. The shape is close to a line segment.

44. $\frac{x^2}{9}+\frac{y^2}{4}=1$

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

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

47. Check students' work.

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

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

50. $\frac{x^2}{121}+\frac{y^2}{81}=1$

51. $\frac{x^2}{702.25}+\frac{y^2}{210.25}=1$

52. $\frac{x^2}{169}+\frac{y^2}{144}=1$

53. $\frac{x^2}{256}+\frac{y^2}{324}=1$

54. $\frac{x^2}{72.25}+\frac{y^2}{90.25}=1$

55. $\frac{x^2}{16}+\frac{y^2}{12}=1$

56. $\frac{x^2}{39}+\frac{y^2}{64}=1$

57. $\frac{x^2}{36}+\frac{y^2}{27}=1$

58. Answers may vary. Samples are given.
$a=3,$ so $a^2=9$
$b=2,$ so $b^2=4$
$\frac{x^2}{4}+\frac{y^2}{9}=1$ or $\frac{x^2}{9}+\frac{y^2}{4}=1$

59. Answers may vary. Samples are given.
$a=2\sqrt{5},$ so $a^2=20$
$b=3\sqrt{2},$ so $b^2=18$
$\frac{x^2}{18}+\frac{y^2}{20}=1$ or $\frac{x^2}{20}+\frac{y^2}{18}=1$

60. $\frac{x^2}{1681}+\frac{y^2}{841}=1$

61a. 3×10^6 mi

61b. eccentricity $=\frac{c}{a}=\frac{1.5\times10^6}{9.3\times10^7}\approx0.016$

61c. $\frac{x^2}{8.649\times10^{15}}+\frac{y^2}{8.64675\times10^{15}}=1$

62. When c is close to 0, the values of a and b are almost the same. Thus πab is close to πa^2, which is close to the area of a circle of radius a.

63. B

64. H

65. A

66. Divide $5x + 7$ by $x + 3$:

$$\begin{array}{r} 5 \\ x+3\overline{)5x+7} \\ \underline{5x+15} \\ -8 \end{array}$$

Write the quotient:
$y=5-\frac{8}{x+3}$

There is a horizontal asymptote at $y = 5$.

67. The center of the circle is $(1,-5)$ and the radius is 3.
$(x-1)^2+(y+5)^2=9$

68. The center of the circle is $(-2, 4)$ and the radius is 9.
$(x+2)^2+(y-4)^2=81$

69. $x\neq0,\ \sqrt[3]{\frac{2}{3}}$

70. $x\neq1,\ -6$

71. $x\neq-2,\ 1\pm i\sqrt{3}$

72. $\log\ 15$

73. $\log_3\ 12-\log_3\ 2=\log_3\ \frac{12}{2}=\log_3\ 6$

74. $\log\ 2$

75. $y=2x+4$

76. $y=\frac{1}{3}x$

Lesson 10-5 - Practice and Problem-Solving Exercises Answers

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

9. $\frac{x^2}{144} - \frac{y^2}{25} = 1$

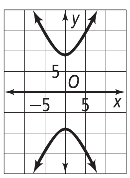
10. $\frac{x^2}{19} - \frac{y^2}{81} = 1$

11. $\frac{x^2}{49} - \frac{y^2}{121} = 1$

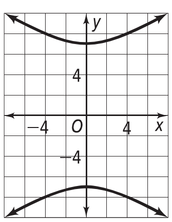
12. $\frac{x^2}{144} - \frac{y^2}{25} = 1$

13. $\frac{x^2}{4} - \frac{y^2}{5} = 1$

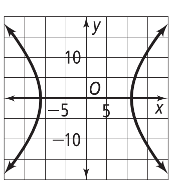
14. vertices are $(0, \pm 9)$
foci are $(0, \sqrt{97})$ and $(0, -\sqrt{97})$
asymptotes are $y = \pm\frac{9}{4}x$



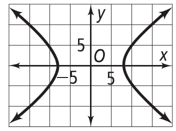
15. vertices are $(0, \pm 7)$
foci are $(0, \sqrt{113})$ and $(0, -\sqrt{113})$
asymptotes are $y = \pm\frac{7}{8}x$



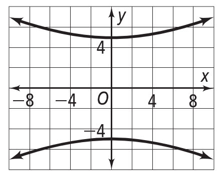
16. vertices are $(\pm 11, 0)$
foci are $(\sqrt{265}, 0)$ and $(-\sqrt{265}, 0)$
asymptotes are $y = \pm\frac{12}{11}x$



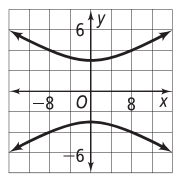
17. vertices are $(\pm 8, 0)$
foci are $(10, 0)$ and $(-10, 0)$
asymptotes are $y = \pm\frac{3}{4}x$



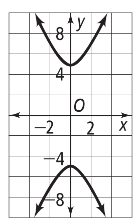
18. vertices are $(0, \pm 5)$
foci are $(0, 5\sqrt{5})$ and $(0, -5\sqrt{5})$
asymptotes are $y = \pm\frac{1}{2}x$



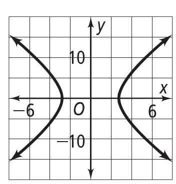
19. vertices are $(0, \pm 3)$
foci are $(0, 3\sqrt{10})$ and $(0, -3\sqrt{10})$
asymptotes are $y = \pm\frac{1}{3}x$



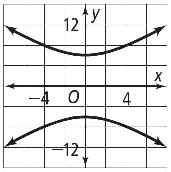
20. vertices are $(0, \pm 5)$
foci are $(0, \sqrt{29})$ and $(0, -\sqrt{29})$
asymptotes are $y = \pm\frac{5}{2}x$



21. vertices are $(\pm 2\sqrt{2}, 0) \approx (\pm 2.8, 0)$
foci are $(2\sqrt{11}, 0)$ and $(-2\sqrt{11}, 0)$
asymptotes are $y = \pm\frac{3\sqrt{2}}{2}x$



22. vertices are $\left(0,\ \pm 4\sqrt{2}\right) \approx \left(0,\ \pm 5.7\right)$ asymptotes are $y = \pm x\sqrt{2}$
foci are $\left(0,\ 4\sqrt{3}\right)$ and $\left(0,\ -4\sqrt{3}\right)$



23. $\dfrac{x^2}{6.25} - \dfrac{y^2}{6} = 1$

24. Assuming that the center of the hyperbola is at the origin and the transverse axis is horizontal, the equation will be of the form $\dfrac{x^2}{a^2} - \dfrac{y^2}{b^2} = 1$. You will need a^2 and b^2. You are given a and c.
Because $b^2 = c^2 - a^2$, you can find b^2.
$a^2 = 4.770 \times 10^{12}$
$b^2 = 3.668 \times 10^{12}$
So,
$$\frac{x^2}{4.770 \times 10^{12}} - \frac{y^2}{3.668 \times 10^{12}} = 1$$

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

26. $\dfrac{y^2}{25} - \dfrac{x^2}{144} = 1$

27. $y^2 - \dfrac{x^2}{3} = 1$

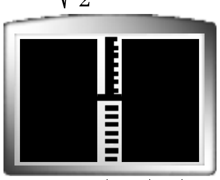
28. $\dfrac{x^2}{4} - y^2 = 1$

29. $\dfrac{y^2}{20.25} - \dfrac{x^2}{4} = 1$

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

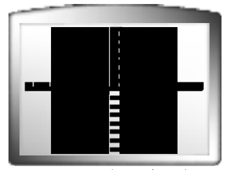
31. $\dfrac{x^2}{32} - \dfrac{y^2}{64} = 1$

32. $y = \pm\sqrt{\dfrac{x^2}{2} - 2}$



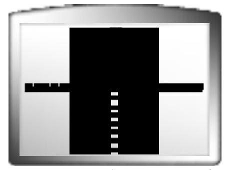
vertices: $\left(2,\ 0\right),\ \left(-2,\ 0\right)$

33. $y = \pm\sqrt{x^2 - 1}$



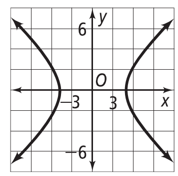
vertices: $\left(1,\ 0\right),\ \left(-1,\ 0\right)$

34. $y = \pm\sqrt{3x^2 - 2}$

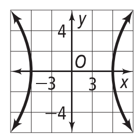


vertices: $\left(-0.816,\ 0\right),\ \left(0.816,\ 0\right)$

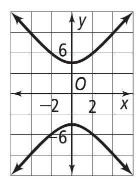
35.



36.



37.



38. $\dfrac{x^2}{1.6 \times 10^{15}} - \dfrac{y^2}{6.1 \times 10^{16}} = 1$

39. Check students' work.

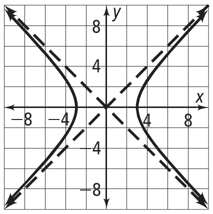
40. right: the foci are located on the vertical axis;
wrong: $c^2 = 100 + 21$
$= 121$
so the foci are $(0, \pm 11)$, not $(0, \pm\sqrt{79})$

41a. For the x-values in those rows, the value of $x^2 - 9$ is negative and so $\sqrt{x^2 - 9}$ is not a real number.

41b. As x increases, y increases, but the difference between x and y gets closer to zero.

41c. No; for positive values of x greater than 3, $x = \sqrt{x^2}$ and $\sqrt{x^2} \neq \sqrt{x^2 - 9}$.

41d. $y = x$ and $y = -x$

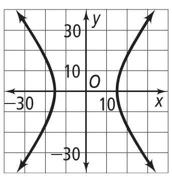


42a. The signal from your airport arrives first, so the plane is closer to your airport.

42b. 30 km

42c. $\dfrac{x^2}{225} - \dfrac{y^2}{351} = 1$

42d.



The flight path is the branch that contains the vertex closer to your airport.

43. A

44. G

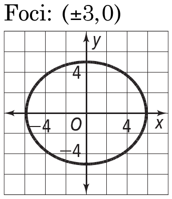
45. A

46. $\sum_{n=1}^{6}(-1 + 4n)$ or equivalent expression;

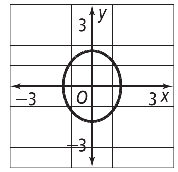
$$\begin{aligned} a_6 &= 3 + (6 - 1)4 \\ &= 23 \end{aligned}$$

$$\begin{aligned} S_6 &= 6\frac{(3 + 23)}{2} \\ &= 78 \end{aligned}$$

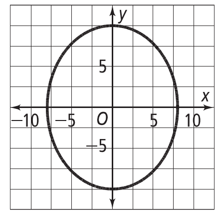
47. Foci: $(\pm 3, 0)$



48. Foci: $(0, \pm 1)$



49. Foci: $(0, \pm 6)$



50. $x = \dfrac{1}{3}$

51. $125 = x$

52. $x = 6$

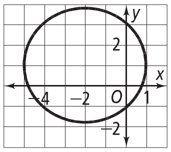
53. $y = (x - 3)^2 - 8$

54. $y = 2(x + 3)^2 - 18$

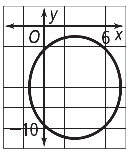
55. $y = 3(x + 4)^2 - 50$

Lesson 10-6 - Practice and Problem-Solving Exercises Answers

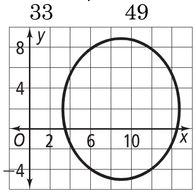
8. $\dfrac{(x+2)^2}{9}+\dfrac{(y-1)^2}{8}=1$



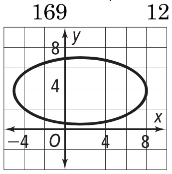
9. $\dfrac{(x-3)^2}{21}+\dfrac{(y+6)^2}{25}=1$



10. $\dfrac{(x-9)^2}{33}+\dfrac{(y-2)^2}{49}=1$



11. $\dfrac{4\left(x-\frac{3}{2}\right)^2}{169}+\dfrac{(y-4)^2}{12}=1$

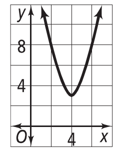


12. center = $(-11,\ 0)$
vertices = $(-15,\ 0),\ (-7,\ 0)$
foci = $(-16,\ 0),\ (-6,\ 0)$

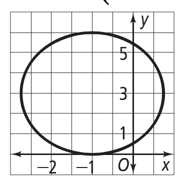
13. center = $(3,\ 4)$
vertices = $(3,\ 7),\ (3,\ 1)$
foci = $(3,\ 4\pm\sqrt{13})$

14. center = $(-3,\ -8)$
vertices = $(-3,\ -6),\ (-3,\ -10)$
foci = $(-3,\ -8\pm\sqrt{53})$

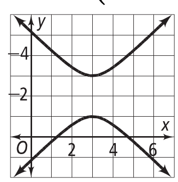
15. $y=(x-4)^2+3$
parabola with vertex $(4,\ 3)$



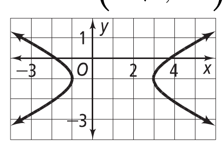
16. $\dfrac{(x+1)^2}{3}+\dfrac{(y-3)^2}{9}=1$
ellipse with center $(-1,\ 3)$
foci are $(-1,\ 3\pm\sqrt{6})$



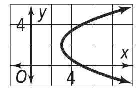
17. $(y-2)^2-(x-3)^2=1$
hyperbola with center $(3,\ 2)$
foci are $(3,\ 2\pm\sqrt{2})$



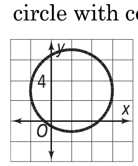
18. $\dfrac{(x-1)^2}{4}-(y+1)^2=1$
hyperbola with center $(1,\ -1)$ and horizontal transverse axis
foci are $(1\pm\sqrt{5},\ -1)$



19. $x=\dfrac{1}{2}(y-2)^2+3$
parabola with vertex $(3,\ 2)$



20. $(x-2)^2+(y-3)^2=4^2$
circle with center $(2,\ 3)$ and radius 4



21a. hyperbola

21b. The lighthouse represents one focus point. The shoreline represents the other focus point.

21c. The equation $x^2 - \frac{y^2}{3} = 1$ with the center at the origin represents the path of the boat.

22. By sketching the points you can determine that the ellipse is horizontal. To write the equation you need to know how many units each vertex is from the center.

The vertices are 6 units from the center.

$a = 6$

$a^2 = 36$

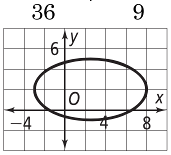
The co-vertices are 3 units from the center.

$b = 3$

$b^2 = 9$

Substitute the known values into the standard equation for a vertical ellipse.

$$\frac{(x-3)^2}{36} + \frac{(y-2)^2}{9} = 1$$



23a. $Bxy = F$

$xy = \frac{F}{B}$, inverse variation

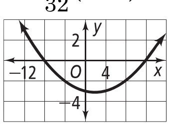
hyperbola

23b. $Ey + F = 0$

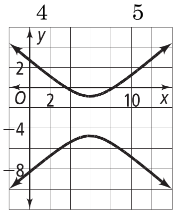
$Ey = -F$, linear function

horizontal line

24. $y = \frac{1}{32}(x-2)^2 - 3$



25. $\frac{(y+3)^2}{4} - \frac{(x-6)^2}{5} = 1$



26. $\frac{(x-9)^2}{36} + \frac{(y-7)^2}{16} = 1$

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

28. $x - 1 = (y+3)^2$

or

$x = (y+3)^2 + 1$

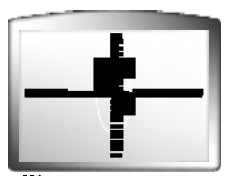
29. $x^2 + y^2 = 16$

30. $\frac{(x-1)^2}{64} + \frac{(y-7)^2}{36} = 1$

31. $y = 2(x+2)^2 + 4$

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

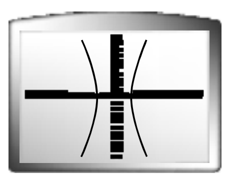
33.



ellipse

$\frac{x^2}{9} + \frac{y^2}{36} = 1$

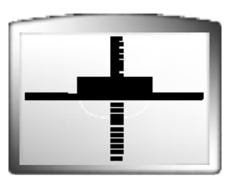
34.



hyperbola

$\frac{x^2}{9} - \frac{y^2}{36} = 1$

35.



ellipse

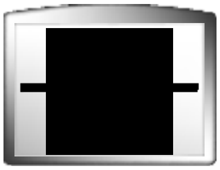
$\frac{x^2}{36} + \frac{y^2}{9} = 1$

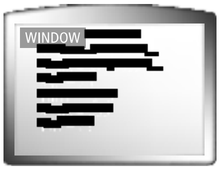
36. Check students' work.

37a. Earth: $\dfrac{x^2}{(149.60)^2}+\dfrac{y^2}{(149.58)^2}=1$

Mars: $\dfrac{x^2}{(227.9)^2}+\dfrac{y^2}{(226.9)^2}=1$

Mercury: $\dfrac{x^2}{(57.9)^2}+\dfrac{y^2}{(56.6)^2}=1$


[redacted]



[redacted]

37b. Earth: $\dfrac{a}{b}$ is closest to 1 for Earth.

38. B

39. I

40. B

41. Let a_1, a_2, and a_3 represent the missing terms in the arithmetic sequence: 15, a_1, a_2, a_3, 47. a_2 is the arithmetic mean of 15 and 47, so

$$a_2 = \frac{15+47}{2} = 31$$

Likewise,

$$a_1 = \frac{15+a_2}{2} = \frac{15+31}{2} = 23$$

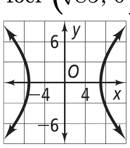
and

$$a_3 = \frac{a_2+47}{2} = \frac{31+47}{2} = 39$$

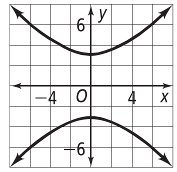
The missing terms are 23, 31, and 39.

42.

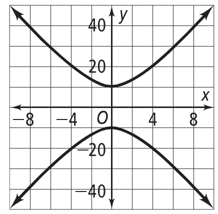
foci $(\sqrt{85}, 0)$, $(-\sqrt{85}, 0)$



43. foci $(0, \sqrt{21})$, $(0, -\sqrt{21})$



44. foci $(0, 2\sqrt{26})$, $(0, -2\sqrt{26})$



45. $x = \dfrac{3 \pm \sqrt{17}}{2}$

46. $x = 5$

47. $x = \dfrac{9+\sqrt{201}}{12}$ or $x = \dfrac{9-\sqrt{201}}{12}$

48. $x = 1$

49. $x = 2$

50. $x = 3$

51. $x = 8$

52. −19

53. 6