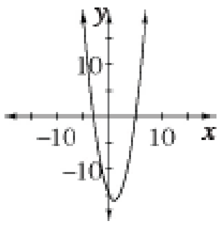
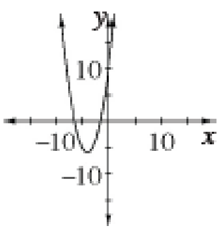
Lesson 2.1.4

2-42. See the "Suggested Lesson Activity" for expected student responses.

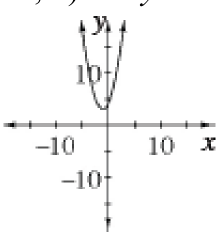
a. $y = (x - 1)^2 - 16$; Intercepts at (–3, 0), (5, 0), (0, –15), vertex is at (1, –16); graph is shown below.



b. $y = (x + 4)^2 - 6$; Intercepts at $(-4 + \sqrt{6}, 0)$, $(-4 - \sqrt{6})$ and (0, 10), vertex at (–4, –6). Both strategies work because when the x-intercepts are averaged, the radicals are eliminated and the result is –4, graph shown below.



c. $y = (x + 1)^2 + 3$; You cannot use the method of average the x-intercepts because you get the square root of a negative number when using the Quadratic Formula. This means that there is no solution for x and no x-intercepts. But you can still sketch the graph by completing the square and using the vertex (–1, 3) and y-intercept (0, 4); graph shown below.



2-43. Enter them both into the calculator and verify the tables are the same.

2-44. $(x + 2)^2 = x^2 + 4x + 4$, so the original expression has 5 too many unit tiles; $y = (x + 2)^2 + 5$

2-45. See below:

a. $2.5 \cdot 2.5 = 6.25$

b. She has 4.25 tiles too few.

c. $f(x) = (x + 2.5)^2 - 4.25$

2-46. See below:

a. $f(x) = (x + 3)^2 - 2$

b. $f(x) = (x - 2)^2 + 7$

c. $f(x) = (x + 2.5)^2 - 4.25$

d. $f(x) = (x - 3.5)^2 - 10.25$

2-47. See below:

a. vertex is at (3, –25). y-intercepts (0, –16). To find the y-intercept, set and evaluate y.

b. (–2, 0) and (8, 0), this can be done by setting y equal to 0 and solving for x.

c. Resource Page activity

d. vertex (–5, –8), y-intercept (0, 17), find x-intercepts by solving $|x+5| = \sqrt{8}$; x-intercepts at $(-5 - \sqrt{8}$, 0) and $(-5 + \sqrt{8}$, 0) or approximately (–7.8, 0) and (–2.2, 0) on the graph.

2-48. See below:

a. $\left(\frac{-b+\sqrt{b^2-4ac}}{2a}, 0\right), \left(\frac{-b-\sqrt{b^2-4ac}}{2a}, 0\right)$

b. Average intercepts to get the point halfway betwee, thus $x = -\frac{b}{2a}$.

c. $(-\frac{b}{2a}, c - \frac{b^2}{4a})$

2-49. See below:

a. Divide by a; $\frac{y}{a} = x^2 + \frac{b}{a}x + \frac{c}{a}$

b. $(x + \frac{b}{2a})^2$

c. $-\frac{b^2}{4a^2}$

d. $y = a(x + \frac{b}{2a})^2 + c - \frac{b^2}{4a}$

e. $(-\frac{b}{2a}, c - \frac{b^2}{4a})$, either the expressions are identical or can be shown algebraically to be equivalent.

2-50. See below:

a. $f(x) = (x + 3)^2 + 6$, $(–3, 6)$, $x = –3$

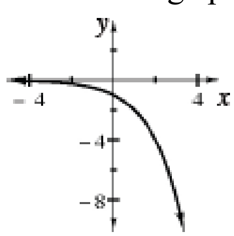
b. $y = (x – 2)^2 + 5$, $(2, 5)$, $x = 2$

c. $f(x) = (x – 4)^2 – 16$, $(4, –16)$, $x = 4$

d. $y = (x + 3.5)^2 – 14.25$, $(–3.5, –14.25)$, $x= –13.5$

2-51. $\frac{b^2}{4}$

2-52. The second graph is a reflection of the first across the x-axis; see graph below.



2-53. See below:

a. $\sqrt{45} = 3\sqrt{5} \approx 6.71$; $y = \frac{1}{2}x + 5$

b. 5; $x = 3$

c. $\sqrt{725} \approx 26.93$; $y = -\frac{5}{2}x + \frac{5}{2}$

d. 4; $y = –2$

2-54. After x is factored out, the other factor is a quadratic equation. After using the Quadratic Formula the solutions are $x = \frac{-23 \pm \sqrt{561}}{8}$ or 0.

2-55. See below:

a. $x = 21$

b. $x = 10\sqrt{5} \approx 22.4$

c. $x = 50$

2-56. See below:

a. $\frac{1}{4}$

b. $\frac{1}{3}$

2-57. B

2-58. See below:

a. A cylinder

b. $45\pi = 141.7$ cubic units

2-59. See below:

a. Answers vary.

b. Answers vary.

c. A circle.

2-60. (5, 14)

2-61. See below:

a. 0.625 hours or about 37.5 minutes.

b. 0.77 hours or about 46.2 minutes.

c. About $22.99 per minute.

2-62. See below:

a. $\sqrt{61}$

b. 30º

c. $\tan^{-1}(\frac{4}{3})$

d. $5\sqrt{3}$

2-63. See below:

a. Years; 1.06; 120,000; $120000(1.06)^x$

b. Hours; 1.22; 180; $180(1.22)^x$