Lesson 4.1.2

4-15. See below:

a. At this point, students may have two solutions: $x = -1$ and $x = 3$. The fact that $x = -1$ is extraneous will be addressed in part (d).

b. Both have infinite solutions.

c. Since the points of intersection lie on both graphs, the points of intersection will have coordinates that are solutions to both equations. Miranda is not interested in the y-values, but the x-values of the coordinates will be solutions to the original equation.

d. The graphs only intersect once, so there is only one solution. $x = -1$ is not a solution.

4-16. $\sqrt{2(3)+3} = 3$ but $\sqrt{2(-1)+3} \neq -1$, so $x = -1$ is not the solution of the equation $\sqrt{2x+3} = x$.

4-17. Students may say something like, "If the sideways parabola is completed, it would intersect the line again at $x = -1$ because the graph of $y = -\sqrt{2x+3}$ intersects the line at $x = -1$. The graph of $y = \sqrt{2x+3}$ did not intersect at $x = -1$ because $\sqrt{2x+3}$ has no negative values."

4-18. See below:

a. Most students may predict "two" since the equation is quadratic.

b. $x = -3$ or $x = 2$

c. He rewrote the equation so that all terms were on one side equal to zero and then used the expression to write a function. The equation will have infinite solutions; a graph of the solutions will create a parabola.

d. The solutions to the equation are the same as the x-intercepts of the function.

e. She probably graphed $y = 2x^2 + 5x - 3$ and $y = x^2 + 4x + 3$, although other systems are possible. The solutions are the x-coordinates of the points of intersection $(-3, 0)$ and $(2, 15)$.

4-19. See below:

a. There are two solutions: $x = 0$ or $x = 4$.

b. The original equation has only one variable, x, so the solutions are the x-coordinates of the points of intersection.

c. Yes, she should get the same solutions. The points of intersection for the graphs are different, but their x-values are the same.

d. Sample answer: There is not a way to solve it using the algebra that students know at this point. They can use guess and check to solve for an exponent. Even when they learn the "exponent undo" operation, they cannot use it here, because there is a linear expression as well.

4-20. See below:

a. Possibilities include $\frac{12}{x} = -(x-3)^2 + 4$ and $12 = -x^3 + 6x^2 - 5x$.

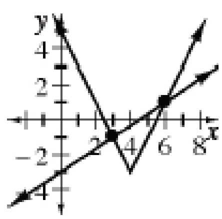
b. Points A and B give the solutions $x = 3$ and $x = 4$.

c. $x = -1$ is also a solution, as $\frac{12}{-1} = -(1-3)^2 + 4$.

Review & Preview

4-22. Students could graph $y = (x-3)^2 - 2$ and $y = x + 1$ and find the x-values of the points of intersection. They could also graph $y = x^2 - 7x + 6$ and find the x-intercepts. Solutions: $x = 1$ and $x = 6$.

4-23. See graph below. $x = 3$ and $x = 6$.



4-24. See below:

a. $x = 15$

b. $x = \frac{7}{3}$ or $x = -5$

4-25. The lines intersect at the point (2, 6). Ted will solve the system algebraically by setting $18x - 30 = -22x + 50$.

4-26. $a = 18.5$, $b = 5.5$

4-27. See below:

a. $x = 13$, $x = 5$ is extraneous

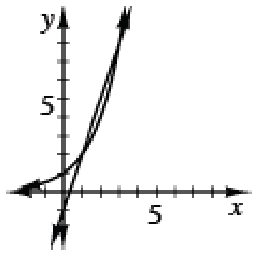
b. $x = 1$

4-28. See below:

a. $x = 36$

b. $x = 20\sqrt{2}$ or $x \approx 28.28$

4-29. See graph below. $x = 1$ and $x = 3$; No.



4-30. See below:

a. $\frac{1}{2}(x-2)^3 + 1 = 2x^2 - 6x - 3$, $x = 0$ or $x = 4$

b. $x = 6$ is also a solution

c. $\frac{1}{2}(x-2)^3 + 1 = 0$, $x \approx 0.74$

d. domain and range of $f(x)$: all real numbers, domain of $g(x)$: all real numbers, range of $g(x)$: $y \geq -7.5$

4-31. See below:

a. $x = -3$

b. $x = 1$ or $x = 3$

c. $x = -8$ or $x = 13$

d. $x = 1.2$

4-32. See below:

a. $y = \frac{5}{3}x - 4$

b. $m_2 = \frac{Fr^2}{Gm_1}$

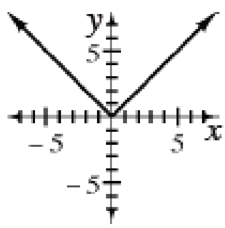
c. $m = \frac{2E}{v^2}$

d. $y = \pm\sqrt{10-(x-4)^2} + 1$

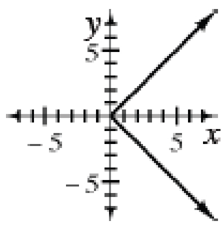
4-33. $(a + b)^2 = a^2 + 2ab + b^2$, substitute numbers, etc.

4-34. See below:

a.



b.



c. Graph (b) is similar to graph (a), but is rotated 90º clockwise.

d. (a) domain: all real numbers, range: $y \geq 0$; (b) domain: $x \geq 0$, range: all real numbers

4-35. See below:

a. 21.00

b. 117.58