Algebra 1 - Semester 2 Final Review

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1. **Graph the system of linear inequalities.**

   $y \geq -1$

   $y < -5x - 1$

4. **Graph the function. Compare the graph to the graph of $f(x) = |x|$. Describe the domain and range.**

   $g(x) = |x| + 3$

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2. **Tell whether the ordered pair is a solution of the system of linear inequalities.**

   $y < 2$

   $y > x + 2;$

   $(3,0)$

5. **Graph the system of linear inequalities.**

   $y > -4x - 1$

   $-x + y \geq -2$

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6. **Graph the system of linear inequalities.**

   $x + y \leq 4$

   $y + 1 \geq -x$

3. **Graph the function. Compare the graph to the graph of $f(x) = |x|$. Describe the domain and range.**

   $g(x) = |x + 2|$

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7. **Simplify the expression. Write your answer using only positive exponents.**

   $$\dfrac{-4^{-1} n^{-4} q^{0}}{6^{2} p^{-9}}$$

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8. **Solve the inequality. Graph the solution, if possible.**
   $|x + 4| \geq 1$

9. A social media website had 350,000 followers in 2014. The number y of followers increases by 15% each year.

   a. Write an exponential growth function that represents the number of followers t years after 2014.

   b. How many people will be following the website in 2024? Round your answer to the nearest thousand.

10. **Simplify the expression. Write your answer using only positive exponents.**
$b^{-10} \cdot b^{-3}$

11. **Simplify the expression. Write your answer using only positive exponents.**
$(x^4)^7$

12. **Simplify the expression. Write your answer using only positive exponents.**
$(x^{-3})^6$

13. **Simplify the expression. Write your answer using only positive exponents.**
$\dfrac{s^5 \cdot s^3}{s^4}$

14. **Solve the equation. Check your solution.**
$\sqrt{x+9} + 4 = 15$

15. **Solve the equation. Check your solution.**
$2\sqrt{x-4} = 14$

16. **Solve the equation.**
$4^{2x+3} = 8^{-4x-3}$

17. **Solve the equation.**
$512^{1-x} = 128^{2x-2}$

18. **Solve the equation.**
$\left(\dfrac{1}{4}\right)^{x-3} = 16^x$

19. **Simplify the expression.**
$\left(\sqrt{11} + \sqrt{44}\right)\left(\sqrt{28} + \sqrt{7}\right)$

20. You want to determine how quickly messages can spread on a social media website. On the first day, you create a message that is shared with 2 people. On the second day, each of those people share it with 7 people. On third day, everyone who received the message shares it with 7 more people, and so on. Write an equation that represents the nth term of the geometric sequence. Then find a_6.

21. **Determine whether the function represents *exponential growth* or *exponential decay*. Identify the percent rate of change.**
$m(t) = 0.75(1.2)^t$

22. **Determine whether the function represents *exponential growth* or *exponential decay*. Identify the percent rate of change.**
$y = 0.75(1.05)^t$

23. **Find the difference.**

$(6x + x^2 + 5) - (7 - 3x - 5x^2)$

a. $6x^2 + 3x + 12$

b. $6x^2 + 9x - 2$

c. $-4x^2 + 3x + 12$

d. $-4x^2 + 9x - 2$

24. **Graph the function. Compare the graph to the graph of $f(x) = |x|$. Describe the domain and range.**

$g(x) = -\dfrac{1}{4}|x|$

25. **Graph the function. Compare the graph to the graph of $f(x) = |x|$. Describe the domain and range.**

$g(x) = 4|x|$

26. **Evaluate the function for the given value of x.**

$f(x) = \dfrac{1}{4}(64)^x; x = \dfrac{4}{3}$

27. **Evaluate the function for the given value of x.**

$f(x) = \dfrac{1}{2}(64)^x; x = \dfrac{5}{6}$

28. **Find (a) the axis of symmetry and (b) the vertex of the graph of the function.**

$f(x) = 3x^2 + 24x + 17$

29. **Find (a) the axis of symmetry and (b) the vertex of the graph of the function.**

$f(x) = \dfrac{1}{4}x^2 - 3x - 3$

30. You deposit $7400 in a savings account that earns 3% annual interest compounded quarterly. Write a function that represents the balance after t years.
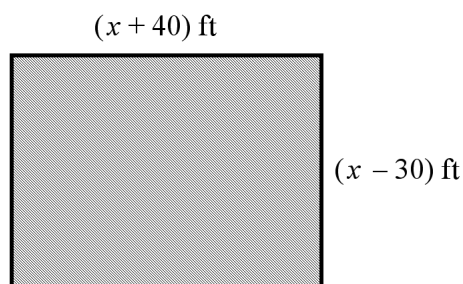
31. **Solve the equation.**

$(-x + 4)^2 = 9$

32. **Solve the equation.**

$9(x - 2)^2 = 4$

33. A homeowner's lawn is rectangular, as shown.

$(x + 40)$ ft

$(x - 30)$ ft

a. Write a polynomial that represents the area of the lawn.

b. Use the polynomial in part (a) to find the area of the lawn when $x = 70$.

c. The homeowner is able to mow 200 square feet in 2 minutes. How long does it take the homeowner to mow the entire lawn?

3

34. You deposit $6200 in a savings account that earns 9% annual interest compounded semiannually. Write a function that represents the balance after t years.

35. **Write the polynomial in standard form. Identify the degree and classify the polynomial by the number of terms.**
$-4d^3 - 5 - 3d^4$

36. **Factor the polynomial completely.**
$10x^2 - 27x + 18$

37. **Factor the polynomial completely.**
$5x^2 + 26x + 5$

38. **Graph the function. Compare the graph to the graph of $f(x) = x^2$.**
$g(x) = 2(x-2)^2 + 2$

39. **Graph the function. Compare the graph to the graph of $f(x) = x^2$.**
$g(x) = 2(x-3)^2 - 2$

40. **Use the discriminant to determine the number of real solutions of the equation.**
$-4x^2 - 6x - 18 = 0$

41. **Use the discriminant to determine the number of real solutions of the equation.**
$x^2 + 9x + 16 = 0$

42. **Use the discriminant to determine the number of real solutions of the equation.**
$-3x^2 + 6x + 9 = 0$

43. **Solve the equation.**
$(1+s)(-5+s) = 0$

44. **Solve the equation.**
$-2z(2z-9)(-3z-10) = 0$

45. **Solve the equation.**
$(2+s)(-3+s) = 0$

46. **Solve the equation.**
    $2z(z-6)(-3z-1) = 0$

47. **Factor the polynomial completely.**
    $m^2 - 49$

48. **Factor the polynomial completely.**
    $25y^2 - 30y + 9$

49. **Factor the polynomial completely.**
    $m^2 - 4$

50. **Factor the polynomial completely.**
    $4y^2 + 36y + 81$

51. **Factor the polynomial completely.**
    $x^2 - 5x - 24$

52. **Factor the polynomial completely.**
    $x^2 - 2x - 24$

53. You are playing in the driveway with two bouncy balls. The function $h(t) = -16t^2 + 32t$ represents the height h (in feet) after the first bounce of a blue bouncy ball after t seconds.

    a. When does the blue ball reach its maximum height?

    b. Can the blue ball clear a wall that is 13 feet tall? If so, by how much?

54. **Solve the equation. Round to the nearest hundredth, if necessary.**
    $4x + 7 = x^2$

55. **Solve the equation. Round to the nearest hundredth, if necessary.**
    $3x^2 = -9x + 4$

56. **Find the product.**
    $(2x + 8y)^2$

57. **Find the product.**
    $(2x - 4y)(2x + 4y)$

58. **Find the product.**
    $(2x - 7y)^2$

59. **Find the product.**
    $(4x + 4y)(4x - 4y)$

60. **Simplify the expression.**
    $-\sqrt{63}$

61. **Simplify the expression.**
    $-\sqrt{\dfrac{18}{25}}$

62. **Simplify the expression.**
$$\sqrt{20}$$

63. **Simplify the expression.**
$$-\sqrt{\frac{45}{121}}$$

64. **Complete the square for the expression. Then factor the trinomial.**
$$x^2 + 8x$$

65. **Complete the square for the expression. Then factor the trinomial.**
$$x^2 - 13x$$

66. **Write an equation for the nth term of the geometric sequence. Then find a_7.**

1, 4, 16, 64,…

67. **Write an equation for the nth term of the geometric sequence. Then find a_7.**

8, 56, 392, 2744,…

68. **Tell whether the table of values represents a *linear*, an *exponential*, or a *quadratic* function.**

x	−1	0	1	2	3
y	0.6	3	15	75	375

69. **Tell whether the table of values represents a *linear*, an *exponential*, or a *quadratic* function.**

x	0	1	2	3	4
y	2	3.5	5	6.5	8

70. **Tell whether the table of values represents a *linear*, an *exponential*, or a *quadratic* function.**

| x	3	4	5	6	7
y	6.75	12	18.75	27	36.75

71. A cannon ball is shot from a cannon that is 23 feet above the ground. The upward velocity of the cannon ball is 115 feet per second.

  a. Write a function that models the height h (in feet) of the cannon ball after t seconds.

  b. After how many seconds does the cannon ball land?

  c. If the cannon ball's velocity is increased by 45 feet per second, what happens to the time needed for the cannon ball to hit the ground?

Algebra 1 - Semester 2 Final Review

Answer Section

1. ANS:
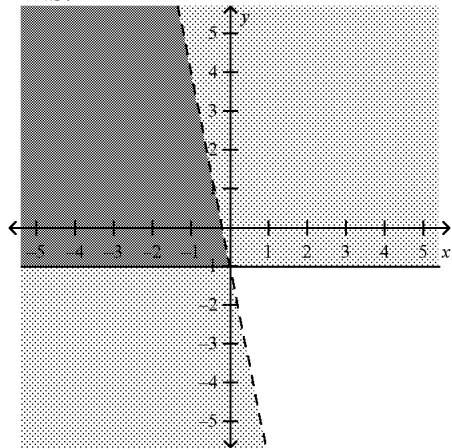
PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 5.7
NAT: HSA-CED.A.3 | HSA-REI.D.12
KEY: system of linear inequalities | graph of a system of linear inequalities | graphing systems of linear inequalities   NOT: Example 2
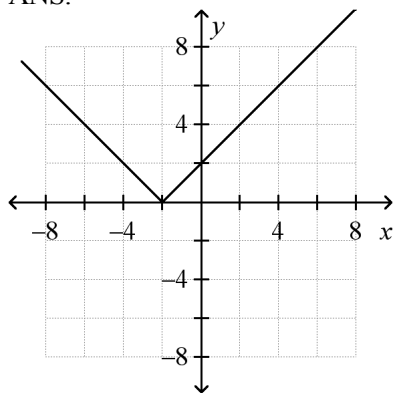
2. ANS:
no

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 5.7
NAT: HSA-CED.A.3 | HSA-REI.D.12
KEY: system of linear inequalities | solution of a system of linear inequalities | checking solutions of systems of linear inequalities   NOT: Example 1

3. ANS:

translation 2 units left
domain: all real numbers
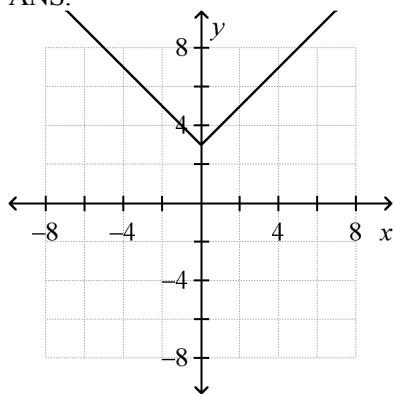range: $y \geq 0$

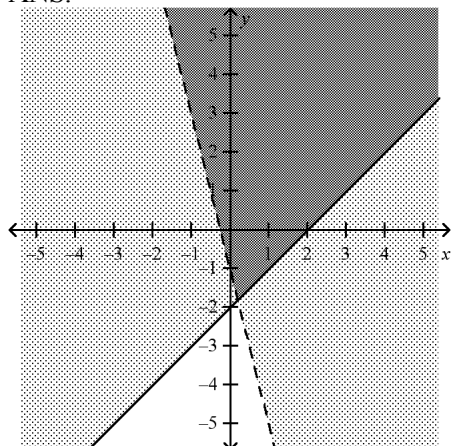PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 3.7
NAT: HSA-CED.A.2 | HSA-REI.D.10 | HSF-IF.C.7b | HSF-BF.B.3
KEY: absolute value function | parent function | transformation | translation | domain | range
NOT: Example 1

4. ANS:

translation 3 units up
domain: all real numbers
range: $y \geq 3$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 3.7
NAT: HSA-CED.A.2 | HSA-REI.D.10 | HSF-IF.C.7b | HSF-BF.B.3
KEY: absolute value function | parent function | transformation | translation | domain | range
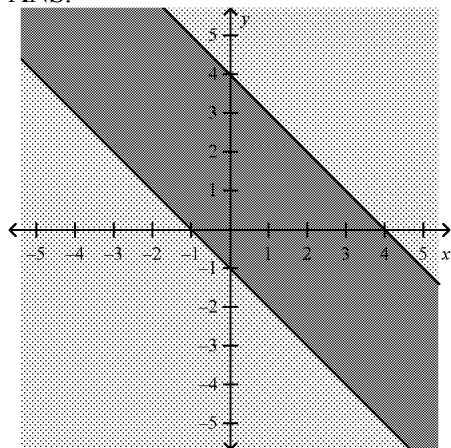NOT: Example 1

5. ANS:

PTS: 1　　　　DIF: Level 1　　　REF: Algebra 1 Sec. 5.7
NAT: HSA-CED.A.3 | HSA-REI.D.12
KEY: system of linear inequalities | graph of a system of linear inequalities | graphing systems of linear inequalities　　　NOT: Example 2

6. ANS:

PTS: 1　　　　DIF: Level 1　　　REF: Algebra 1 Sec. 5.7
NAT: HSA-CED.A.3 | HSA-REI.D.12
KEY: system of linear inequalities | graph of a system of linear inequalities | graphing systems of linear inequalities　　　NOT: Example 2

7. ANS:
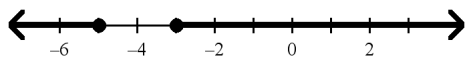
$$-\frac{p^9}{144n^4}$$

PTS: 1　　　　DIF: Level 1　　　REF: Algebra 1 Sec. 6.1
NAT: HSN-RN.A.2　　　　　　　KEY: simplify | negative exponents | zero exponents
NOT: Example 2

8. ANS:
   $x \le -5$ or $x \ge -3$

   PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 2.6
   NAT: HSA-REI.B.3
   KEY: absolute value inequality | solving absolute value inequalities | inequality | solving inequalities | graph of an inequality | graphing absolute value inequalities   NOT: Example 2

9. ANS:
   a. $y = 350,000(1.15)^t$
   b. about 1,416,000 followers

   PTS: 1   DIF: Level 2   REF: Algebra 1 Sec. 6.4
   NAT: HSA-CED.A.2 | HSF-IF.C.8b | HSF-BF.A.1a | HSF-LE.A.1c | HSF-LE.A.2
   KEY: application | exponential growth | exponential growth function | exponential function
   NOT: Example 1

10. ANS:
    $\dfrac{1}{b^{13}}$

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.1
    NAT: HSN-RN.A.2   KEY: properties of exponents | simplify
    NOT: Example 3

11. ANS:
    x^{28}

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.1
    NAT: HSN-RN.A.2   KEY: properties of exponents | simplify
    NOT: Example 3

12. ANS:
    $\dfrac{1}{x^{18}}$

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.1
    NAT: HSN-RN.A.2   KEY: properties of exponents | simplify
    NOT: Example 3

13. ANS:
    s^4

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.1
    NAT: HSN-RN.A.2   KEY: properties of exponents | simplify
    NOT: Example 3

14. ANS:
    $x = 112$

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 10.3
    NAT: HSA-CED.A.1   KEY: radical equation | solving radical equations
    NOT: Example 2
15. ANS:
    $x = 53$

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 10.3
    NAT: HSA-CED.A.1   KEY: radical equation | solving radical equations
    NOT: Example 2
16. ANS:
    $x = -\dfrac{15}{16}$

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.5
    NAT: HSA-CED.A.1 | HSA-REI.A.1
    KEY: exponential equation | solving exponential equations with unlike bases
    NOT: Example 2
17. ANS:
    $x = 1$

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.5
    NAT: HSA-CED.A.1 | HSA-REI.A.1
    KEY: exponential equation | solving exponential equations with unlike bases
    NOT: Example 2
18. ANS:
    $x = 1$

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.5
    NAT: HSA-CED.A.1 | HSA-REI.A.1
    KEY: exponential equation | solving exponential equations with unlike bases
    NOT: Example 3
19. ANS:
    $9\sqrt{77}$

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.1
    NAT: HSN-RN.A.2 | HSN-RN.B.3   KEY: multiplying radicals | radical expression
    NOT: Example 9
20. ANS:
    $a_n = 2(7)^{n-1}; a_6 = 33{,}614$

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.6
    NAT: HSF-IF.A.3 | HSF-BF.A.2 | HSF-LE.A.2   KEY: application | geometric sequence
    NOT: Example 5-1

21. ANS:
exponential growth; 20%

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.4
NAT: HSA-SSE.B.3c | HSF-IF.C.8b | HSF-BF.A.1a | HSF-LE.A.1c
KEY: identifying exponential growth and decay functions | interpreting exponential growth functions |
interpreting exponential decay functions | exponential function
NOT: Example 3

22. ANS:
exponential growth; 5%

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.4
NAT: HSA-SSE.B.3c | HSF-IF.C.8b | HSF-BF.A.1a | HSF-LE.A.1c
KEY: identifying exponential growth and decay functions | interpreting exponential growth functions |
interpreting exponential decay functions | exponential function
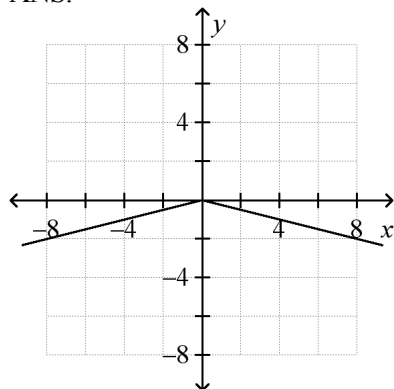NOT: Example 3

23. ANS: B   PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 7.1
NAT: HSA-APR.A.1   KEY: subtracting polynomials | polynomial
NOT: Example 5

24. ANS:

g is a vertical shrink of the graph of f by a factor of $\dfrac{1}{4}$ and a reflection in the x-axis.

domain: all real numbers
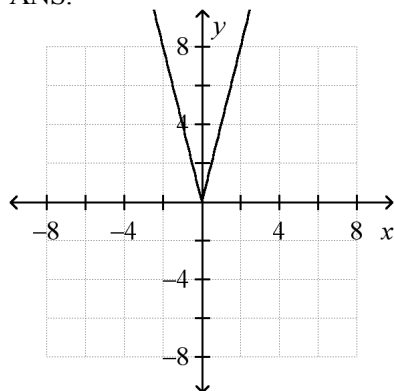range: $y \le 0$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 3.7
NAT: HSA-CED.A.2 | HSA-REI.D.10 | HSF-IF.C.7b | HSF-BF.B.3
KEY: absolute value function | transformation | reflection | vertical stretch | vertical shrink | domain | range
NOT: Example 2

25. ANS:

g is a vertical stretch of the graph of *f* by a factor of 4.
domain: all real numbers
range: $y \geq 0$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 3.7
NAT: HSA-CED.A.2 | HSA-REI.D.10 | HSF-IF.C.7b | HSF-BF.B.3
KEY: absolute value function | transformation | reflection | vertical stretch | vertical shrink | domain | range
NOT: Example 2

26. ANS:
    64

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.3
NAT: HSF-IF.C.9 | HSF-BF.A.1a | HSF-LE.A.1a | HSF-LE.A.2
KEY: evaluating exponential functions | exponential function
NOT: Example 2

27. ANS:
    16

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.3
NAT: HSF-IF.C.9 | HSF-BF.A.1a | HSF-LE.A.1a | HSF-LE.A.2
KEY: evaluating exponential functions | exponential function
NOT: Example 2

28. ANS:
    a. $x = -4$
    b. $(-4, -31)$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 8.3
NAT: HSA-CED.A.2   KEY: axis of symmetry | vertex of a parabola
NOT: Example 1

29. ANS:
    a. $x = 6$
    b. $(6, -12)$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 8.3
NAT: HSA-CED.A.2   KEY: axis of symmetry | vertex of a parabola
NOT: Example 1

30. ANS:
$y = 7400(1.0075)^{4t}$

   PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.4
   NAT: HSA-SSE.B.3c | HSA-CED.A.2 | HSF-IF.C.7e | HSF-IF.C.8b | HSF-BF.A.1a | HSF-LE.A.1c | HSF-LE.A.2
   KEY: application | exponential function | exponential growth function | compound interest
   NOT: Example 5
31. ANS:
$x = 1, x = 7$

   PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.3
   NAT: HSA-REI.B.4b
   KEY: solving quadratic equations using square roots | solving quadratic equations | equation | quadratic equation
   NOT: Example 2
32. ANS:
$x = \dfrac{4}{3}, x = \dfrac{8}{3}$

   PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.3
   NAT: HSA-REI.B.4b
   KEY: solving quadratic equations using square roots | solving quadratic equations | equation | quadratic equation
   NOT: Example 2
33. ANS:
   a. $x^2 + 10x - 1200$
   b. 4400 ft²
   c. 44 min

   PTS: 1   DIF: Level 2   REF: Algebra 1 Sec. 7.2
   NAT: HSA-APR.A.1
   KEY: application | multiplying polynomials | writing polynomials | polynomial
   NOT: Example 5-2
34. ANS:
$y = 6200(1.045)^{2t}$

   PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.4
   NAT: HSA-SSE.B.3c | HSA-CED.A.2 | HSF-IF.C.7e | HSF-IF.C.8b | HSF-BF.A.1a | HSF-LE.A.1c | HSF-LE.A.2
   KEY: application | exponential function | exponential growth function | compound interest
   NOT: Example 5
35. ANS:
$-3d^4 - 4d^3 - 5; 4$, trinomial

   PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 7.1
   NAT: HSA-APR.A.1
   KEY: classifying polynomials | polynomial | degree of a polynomial | standard form of a polynomial
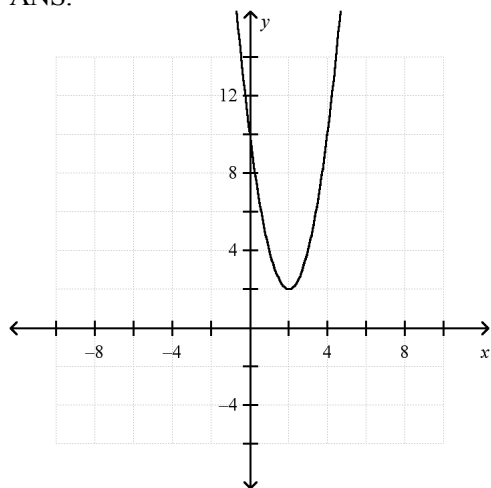   NOT: Example 3

36. ANS:
    $(2x - 3)(5x - 6)$

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 7.6
    NAT: HSA-SSE.A.2 | HSA-SSE.B.3a
    KEY: factoring ax^2 + bx + c when ac is positive | factoring polynomials | polynomial
    NOT: Example 2
37. ANS:
    $(x + 5)(5x + 1)$

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 7.6
    NAT: HSA-SSE.A.2 | HSA-SSE.B.3a
    KEY: factoring ax^2 + bx + c when ac is positive | factoring polynomials | polynomial
    NOT: Example 2
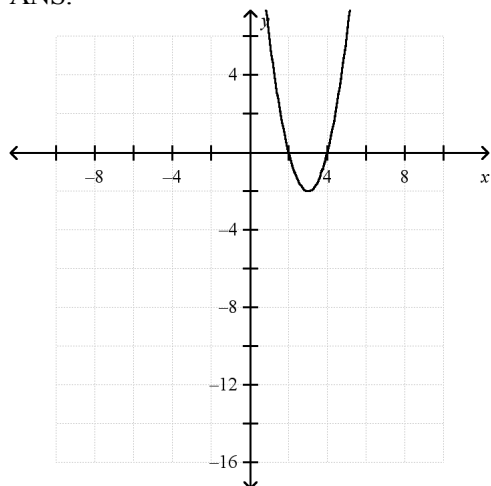38. ANS:

The graph of *g* is a vertical stretch by a factor of 2, and a translation 2 units right and 2 units up of the graph of *f*.

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 8.4
NAT: HSA-CED.A.2 | HSF-IF.B.4 | HSF-BF.A.1a | HSF-BF.B.3
KEY: graphing f(x) = a(x – h)^2 + k   NOT: Example 3

39. ANS:

The graph of *g* is a vertical stretch by a factor of 2, and a translation 3 units right and 2 units down of the graph of *f*.

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 8.4
NAT: HSA-CED.A.2 | HSF-IF.B.4 | HSF-BF.A.1a | HSF-BF.B.3
KEY: graphing f(x) = a(x – h)^2 + k   NOT: Example 3

40. ANS:
0

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.5
NAT: HSA-REI.B.4a | HSA-REI.B.4b
KEY: number of real solutions of a quadratic equation | equation | quadratic equation
NOT: Example 3

41. ANS:
2

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.5
NAT: HSA-REI.B.4a | HSA-REI.B.4b
KEY: number of real solutions of a quadratic equation | equation | quadratic equation
NOT: Example 3

42. ANS:
2

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.5
NAT: HSA-REI.B.4a | HSA-REI.B.4b
KEY: number of real solutions of a quadratic equation | equation | quadratic equation
NOT: Example 3

43. ANS:
$s = -1, s = 5$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 7.4
NAT: HSA-APR.B.3 | HSA-REI.B.4b   KEY: solving polynomial equations | polynomial equation
NOT: Example 1

44. ANS:
$z = 0, z = \dfrac{9}{2}, z = -\dfrac{10}{3}$

PTS: 1 DIF: Level 1 REF: Algebra 1 Sec. 7.4
NAT: HSA-APR.B.3 | HSA-REI.B.4b KEY: solving polynomial equations | polynomial equation
NOT: Example 2

45. ANS:
$s = -2, s = 3$

PTS: 1 DIF: Level 1 REF: Algebra 1 Sec. 7.4
NAT: HSA-APR.B.3 | HSA-REI.B.4b KEY: solving polynomial equations | polynomial equation
NOT: Example 1

46. ANS:
$z = 0, z = 6, z = -\dfrac{1}{3}$

PTS: 1 DIF: Level 1 REF: Algebra 1 Sec. 7.4
NAT: HSA-APR.B.3 | HSA-REI.B.4b KEY: solving polynomial equations | polynomial equation
NOT: Example 2

47. ANS:
$(m + 7)(m - 7)$

PTS: 1 DIF: Level 1 REF: Algebra 1 Sec. 7.7
NAT: HSA-SSE.A.2 | HSA-SSE.B.3a
KEY: factoring the difference of two squares | difference of two squares pattern | factoring polynomials | polynomial | special product patterns NOT: Example 1

48. ANS:
$(5y - 3)^2$

PTS: 1 DIF: Level 1 REF: Algebra 1 Sec. 7.7
NAT: HSA-SSE.A.2 | HSA-SSE.B.3a
KEY: factoring perfect square trinomials | perfect square trinomial pattern | factoring polynomials | special product patterns | polynomial NOT: Example 3

49. ANS:
$(m + 2)(m - 2)$

PTS: 1 DIF: Level 1 REF: Algebra 1 Sec. 7.7
NAT: HSA-SSE.A.2 | HSA-SSE.B.3a
KEY: factoring the difference of two squares | difference of two squares pattern | factoring polynomials | polynomial | special product patterns NOT: Example 1

50. ANS:
$(2y+9)^2$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 7.7
NAT: HSA-SSE.A.2 | HSA-SSE.B.3a
KEY: factoring perfect square trinomials | perfect square trinomial pattern | factoring polynomials | special product patterns | polynomial   NOT: Example 3

51. ANS:
$(x-8)(x+3)$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 7.5
NAT: HSA-SSE.A.2 | HSA-SSE.B.3a
KEY: factoring x^2 + bx + c when c is negative | factoring polynomials | polynomial
NOT: Example 3

52. ANS:
$(x-6)(x+4)$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 7.5
NAT: HSA-SSE.A.2 | HSA-SSE.B.3a
KEY: factoring x^2 + bx + c when c is negative | factoring polynomials | polynomial
NOT: Example 3

53. ANS:
a. 1 second after it bounces.
b. yes; 3 ft

PTS: 1   DIF: Level 2   REF: Algebra 1 Sec. 8.3
NAT: HSA-CED.A.2 | HSF-IF.C.7a | HSF-IF.C.9   KEY: application | vertex of a parabola
NOT: Example 5-2

54. ANS:
$x \approx -1.32, x \approx 5.32$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.5
NAT: HSA-REI.B.4a | HSA-REI.B.4b
KEY: Quadratic Formula | solving quadratic equations using the Quadratic Formula | equation | quadratic equation | solving quadratic equations   NOT: Example 1

55. ANS:
$x \approx -3.39, x \approx 0.39$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.5
NAT: HSA-REI.B.4a | HSA-REI.B.4b
KEY: Quadratic Formula | solving quadratic equations using the Quadratic Formula | equation | quadratic equation | solving quadratic equations   NOT: Example 1

56. ANS:
$4x^2 + 32xy + 64y^2$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 7.3
NAT: HSA-APR.A.1
KEY: square of a binomial pattern | multiplying binomials | polynomial | binomial
NOT: Example 1

57. ANS:
$4x^2 - 16y^2$

PTS: 1   DIF: Level 2   REF: Algebra 1 Sec. 7.3
NAT: HSA-APR.A.1
KEY: sum and difference pattern | multiplying binomials | polynomial | binomial
NOT: Example 2

58. ANS:
$4x^2 - 28xy + 49y^2$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 7.3
NAT: HSA-APR.A.1
KEY: square of a binomial pattern | multiplying binomials | polynomial | binomial
NOT: Example 1

59. ANS:
$16x^2 - 16y^2$

PTS: 1   DIF: Level 2   REF: Algebra 1 Sec. 7.3
NAT: HSA-APR.A.1
KEY: sum and difference pattern | multiplying binomials | polynomial | binomial
NOT: Example 2

60. ANS:
$-3\sqrt{7}$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.1
NAT: HSN-RN.A.2
KEY: product property of square roots | simplest form | radical expression | properties of radicals | simplifying radical expressions   NOT: Example 1

61. ANS:
$-\dfrac{3\sqrt{2}}{5}$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.1
NAT: HSN-RN.A.2
KEY: quotient property of square roots | simplest form | radical expression | properties of radicals | simplifying radical expressions   NOT: Example 2

62. ANS:

$2\sqrt{5}$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.1
NAT: HSN-RN.A.2
KEY: product property of square roots | simplest form | radical expression | properties of radicals | simplifying radical expressions   NOT: Example 1

63. ANS:

$-\dfrac{3\sqrt{5}}{11}$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.1
NAT: HSN-RN.A.2
KEY: quotient property of square roots | simplest form | radical expression | properties of radicals | simplifying radical expressions   NOT: Example 2

64. ANS:
$x^2 + 8x + 16; \ (x+4)^2$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.4
NAT: HSA-SSE.B.3b | HSA-REI.B.4a | HSA-REI.B.4b
KEY: completing the square | perfect square trinomial pattern | quadratic expression
NOT: Example 1

65. ANS:

$x^2 - 13x + \dfrac{169}{4}; \ \left(x - \dfrac{13}{2}\right)^2$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 9.4
NAT: HSA-SSE.B.3b | HSA-REI.B.4a | HSA-REI.B.4b
KEY: completing the square | perfect square trinomial pattern | quadratic expression
NOT: Example 1

66. ANS:
$a_n = (4)^{n-1}; a_7 = 4096$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.6
NAT: HSF-IF.A.3 | HSF-BF.A.2 | HSF-LE.A.2   KEY: geometric sequence
NOT: Example 4

67. ANS:
$a_n = 8(7)^{n-1}; a_7 = 941,192$

PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 6.6
NAT: HSF-IF.A.3 | HSF-BF.A.2 | HSF-LE.A.2   KEY: geometric sequence
NOT: Example 4

68. ANS:
    exponential

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 8.6
    NAT: HSF-LE.A.3   KEY: choosing functions to model data   NOT: Example 2
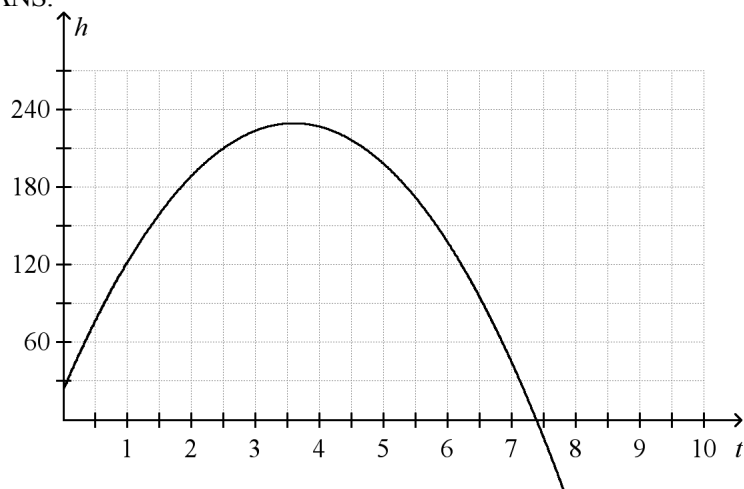69. ANS:
    linear

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 8.6
    NAT: HSF-LE.A.3   KEY: choosing functions to model data   NOT: Example 2
70. ANS:
    quadratic

    PTS: 1   DIF: Level 1   REF: Algebra 1 Sec. 8.6
    NAT: HSF-LE.A.3   KEY: choosing functions to model data   NOT: Example 2
71. ANS:

    a. $h = -16t^2 + 115t + 23$
    b. $t \approx 7.4$ sec
    c. It takes about 10.1 seconds to hit the ground, which is an increase of about 2.7 seconds.

    PTS: 1   DIF: Level 3   REF: Algebra 1 Sec. 9.2
    NAT: HSA-REI.D.11 | HSF-IF.C.7a   KEY: application | approximating zero(s) of functions
    NOT: Example 6-3