

Algebra 2

Lesson 9-1 - Practice and Problem-Solving Exercises Answers

7. 5, 8, 11, 14, 17, 20
8. -4, -9, -14, -19, -24, -29
9. $\frac{1}{2}, 1, \frac{3}{2}, 2, \frac{5}{2}, 3$
10. 2, 5, 10, 17, 26, 37
11. 2, 10, 24, 44, 70, 102
12. 1, 3, 7, 15, 31, 63
13. $-\frac{1}{2}, 3, \frac{25}{2}, 31, \frac{123}{2}, 107$
14. -3, 9, -27, 81, -243, 729
15. $a_1 = 80$ and $a_n = a_{n-1} - 3$
16. $a_1 = 4$ and $a_n = 2a_{n-1}$
17. $a_1 = 0$ and $a_n = a_{n-1} + (n + 1)$
18. $a_1 = 1$ and $a_n = a_{n-1} + 3$
19. $a_1 = 100$ and $a_n = \frac{1}{10}a_{n-1}$
20. $a_1 = \frac{1}{2}$ and $a_n = \frac{1}{2}a_{n-1}$
21. $a_1 = 4$ and $a_n = -2a_{n-1}$
22. $a_1 = 1$ and $a_n = na_{n-1}$
23. $a_1 = 1$ and $a_n = a_{n-1} + n^2$
24. $a_n = n + 3$; 13
25. $a_n = 3n + 1$; 31
26. $a_n = 4n - 1$; 39
27. $a_n = \frac{n-6}{2}$; 2
28. $a_n = n^2$; 100
29. $a_n = n^2 + 1$; 101
30. $a_n = \frac{1}{n+1}$; $\frac{1}{11}$
31. $a_n = 3^{n-1}$; 19,683
32. $a_n = -\left(-\frac{1}{2}\right)^n$ or $a_n = (-1)^{n+1} \frac{1}{2^n}$ or $a_n = (-1)^{n-1} \frac{1}{2^n}$; $-\frac{1}{1024}$
33. 5
34. 29
35. $\frac{5}{16}$
36. -29
37. $\frac{9}{1024}$
38. $\frac{1}{256}$
39. -47
40. -96
41. $-\frac{9}{8}$
42. 13.8 mi
43. recursive; 3, 9, 21, 45, 93
44. explicit; 0, 1, 3, 6, 10
45. explicit; -24, -21, -16, -9, 0

46. recursive; $-2, 6, -18, 54, -162$

47. explicit; $-6, -18, -38, -66, -102$

48. explicit; $3, 9, 19, 33, 51$

49. $25, 36, 49, 64$

50. $54, 128, 250, 432$

51. $\frac{16}{5}, \frac{25}{6}, \frac{36}{7}, \frac{49}{8}$

52. $\frac{5}{6}, \frac{6}{7}, \frac{7}{8}, \frac{8}{9}$

53. \$140

54. $15, 26, 40$

55. $20, 23$; recursive formula: $a_n = a_{n-1} + 3, a_1 = 5$ OR explicit formula: $a_n = 3n + 2$

56. $96, 192$; recursive formula: $a_n = 2a_{n-1}, a_1 = 3$ OR explicit formula: $a_n = 3 \cdot 2^{n-1}$

57. $216, 343$; explicit formula: $a_n = n^3$

58. $4096, 16, 384$; recursive formula: $a_n = 4a_{n-1}, a_1 = 4$, OR explicit formula: $a_n = 4^n$

59. $144, 169$; explicit formula: $a_n = (n + 6)^2$ OR recursive formula: $a_n = a_{n-1} + 2n + 11, a_1 = 49$

60. $-1, 1$; explicit formula: $a_n = (-1)^n$, OR recursive formula: $a_n = -1(a_{n-1}), a_1 = -1$

61. $-1, -\frac{1}{2}$; recursive formula: $a_n = \frac{a_{n-1}}{2}, a_1 = -16$ OR explicit formula: $a_n = \frac{-32}{2^n}$

62. $-47, -40$; recursive formula: $a_n = a_{n-1} + 7, a_1 = -75$ OR explicit formula: $a_n = -82 + 7n$

63. $-11, -19$; recursive formula: $a_n = a_{n-1} - 8, a_1 = 21$ OR explicit formula: $a_n = 29 - 8n$

Answers may vary. Sample:

64a. $1, -2, 4, -8, \dots$

64b. Answers may vary. Sample:
recursive formula: $a_n = -2(a_{n-1})$, where $a_1 = 1$
explicit formula: $a_n = (-2)^{n-1}$

64c. $-524, 288$.

65a. 25 boxes

65b. 110 boxes

65c. 9 levels

66a. $10, 15$

66b. $a_n = a_{n-1} + n, a_1 = 1$

66c. Yes, the formula yields the same values as the recursive formula.

67. $a_n = 10 \cdot 2^{n-1}$

68. $a_n = -n - 4$

69. $a_n = 1 + 4(n - 1)$

70a. $a_n = a_{n-1} + 5, a_1 = 25$
 $a_n = 20 + 5n$

70b. \$40

70c. $a_n = (a_{n-1} + \$20) \cdot 1.005, a_1 = \40.20

70d. 6.5%

71. 34.9

72. 12

73. 2.19

74. 80.5

75. 36.5

76. 2

77. 4

78. -5

79. -1

80. 1

81. 2

82. subtract 2; $-2, -4, -6$

83. add 17; 185, 202, 219

84. add $\frac{3}{7}; \frac{17}{7}, \frac{20}{7}, \frac{23}{7}$

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Lesson 9-2 - Practice and Problem-Solving Exercises Answers

7. yes; 10

8. no

9. yes; 3

10. yes; -11

11. yes; 4

12. no

13. 127

14. 0.3

15. 240

16. -146

17. 12.5

18. 225

19. -7

20. 21

21. 13

22. 82

23. 7.5

24. 2.5

25. \$135

26. 23

27. 18

28. -17

29. 36

30. $\frac{7}{10}$

31. 2

32. \$2950

33. The student multiplied the third term by 2 instead of adding 2.
The correct answer is 6.

34. 4

35. 120

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

37. 1.1

38. $\frac{r+s}{2}$

39. 0

40a. Answers may vary. Sample:
25, 18, 11, 4, -3 , -10 , $\dots$; to find the 6th term, multiply 5 times (-7) and add to a_1 ; to find the 8th term, multiply 7 times (-7) and add to a_1 ; to find the 20th term, multiply 19 times (-7) and add to a .

40b. Answers may vary. Sample:
Start with the first term and continue to subtract 7 for each term.
For each term, you subtract $7 \cdot (\text{term number} - 1)$ from the first term.

41. $a_n = 2 + 2(n-1); a_n = a_{n-1} + 2, a_1 = 2$

42. $a_n = 6(n-1); a_n = a_{n-1} + 6, a_1 = 0$

43. $a_n = -5 + 1(n-1); a_n = a_{n-1} + 1, a_1 = -5$

44. $a_n = -4 - 4(n-1); a_n = a_{n-1} - 4, a_1 = -4$

45. $a_n = -5 + 1.5(n-1); a_n = a_{n-1} + 1.5, a_1 = -5$

46. $a_n = -32 + 12(n-1); a_n = a_{n-1} + 12, a_1 = -32$

47. $a_n = 1 + \frac{1}{3}(n-1); a_n = a_{n-1} + \frac{1}{3}, a_1 = 1$

48. $a_n = \frac{1}{8}(n-1); a_n = a_{n-1} + \frac{1}{8}, a_1 = 0$

49. $a_n = 27 - 12(n-1); a_n = a_{n-1} - 12, a_1 = 27$

50. To find a term using an explicit formula, you need the common difference, the first term, and the term number.

51. Answers may vary. Sample:

An advantage of a recursive formula is that only the preceding term must be known to find the next term; a disadvantage is that many calculations may be required to find a term. An advantage of an explicit formula is that it is easy to find any term. Use the recursive formula when the previous term and the common difference are known. Use the explicit formula when the term number and common difference are known.

52. 6 minutes; 1 minute

53. -4, -10, -16

54. 4.6, -0.8, -6.2

55. -8, -17, -26

56. $\frac{19}{5}, 5, \frac{31}{5}$

57. 17, 17, 17

58. 681, 702, 723

59. -12.5, -8, -3.5

60. $a+5, a+9, a+13$

61. \$5055

62. $8.5 \text{ in.} \cdot \frac{20 \text{ s}}{1.15 \text{ in.}} \cdot \frac{1 \text{ min}}{60 \text{ s}} \approx 2.46 \text{ min or } 2 \text{ min } 28 \text{ s}$

63. 21st term

64. 43rd term

65. 54

66. 8

67. $a_1 = -1, d = 3$

68. $d = 4, a_1 = -4$

69. $a_1 = 52, d = -10$

70. $d = 4\frac{1}{4}, a_1 = -21\frac{1}{4}$

71. $d = 22, a_1 = -100.5$

72. $d = 2.2, a_1 = -9$

73. $9k + 32$

74. $21k - 43$

75. D

76. F

$$77. \frac{3}{(x-1)(x+1)} + \frac{4x(x-1)}{(x-1)(x+1)} = \frac{1.5(x+1)}{(x-1)(x+1)}, x \neq \pm 1$$

$$3 + 4x^2 - 4x = 1.5x + 1.5$$

$$4x^2 - 5.5x + 1.5 = 0$$

$$x^2 - \frac{11}{8}x + \frac{3}{8} = 0$$

$$(x-1)\left(x - \frac{3}{8}\right) = 0$$

$$x = \frac{3}{8}$$

(reject $x = 1$ because 1 is not in the domain)

78. recursive; -2, -7, -12, -17, -22

79. explicit; 6, 18, 36, 60, 90

80. explicit; 0, 3, 8, 15, 24

$$81. \text{ recursive; } -121, -108, -95, -82, -69$$

$$82. \ y - 3 = \frac{8}{3}x \text{ or } y - 11 = \frac{8}{3}(x - 3)$$

$$83. \ y - 6 = 4(x - 4) \text{ or } y - 30 = 4(x - 10)$$

$$84. \ y - 10 = 8(x - 1) \text{ or } y - 42 = 8(x - 5)$$

$$85. \ r = \frac{\sqrt[3]{6\pi^2 V}}{2\pi}$$

$$86. \ 32$$

$$87. \ 625$$

$$88. \ -81$$

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Lesson 9-3 - Practice and Problem-Solving Exercises Answers

7. yes; 2
8. no
9. yes; -2
10. yes; -1
11. yes; 0.4
12. yes; 0.1
13. yes; $-\frac{1}{3}$
14. no
15. yes; 1.5
16. yes; -5
17. yes; 6
18. no
19. 6561
20. 384
21. 0.078125
22. $\frac{256}{6561}$
23. $\frac{-3}{2048}$
24. $\frac{15}{8192}$
25. about 656.1 g; about 182.5 g; about 96.2 g
26. ± 67.5
27. ± 1530
28. $\pm \frac{4}{15}$
29. ± 1.5
30. ± 3.75
31. ± 6
32. $a_n = 0.5^{n-1}; 1, 0.5, 0.25, 0.125, 0.0625$
33. $a_n = 100(-20)^{n-1}; 100, -2000, 40,000, -800,000, 16,000,000$
34. $a_n = 7 \cdot 1^{n-1}; 7, 7, 7, 7, 7$
35. $a_n = 1024(0.5)^{n-1}; 1024, 512, 256, 128, 64$
36. $a_n = 4 \cdot 0.1^{n-1}; 4, 0.4, 0.04, 0.004, 0.0004$
37. $a_n = 10 \cdot (-1)^{n-1}; 10, -10, 10, -10, 10$
38. geometric; 720, 1440
39. arithmetic; 125, 150
40. geometric; 3, -3
41. geometric; $-80, 160$
42. geometric; 0.125, 0.0625
43. neither; 25, 36
44. 324, 108, 36 or $-324, -108, -36$
45. $a_3 = \sqrt{2.5 \cdot 202.5} = 22.5$ or -22.5
 $a_2 = \sqrt{2.5 \cdot 22.5} = 7.5$ or -7.5
 $a_1 = \sqrt{22.5 \cdot 202.5} = 67.5$ or -67.5
7.5, 22.5, 67.5 or $-7.5, 22.5, -67.5$

46. $\alpha_3 = \sqrt{12.5 \cdot 5.12} = 8$ or -8
 $\alpha_2 = \sqrt{12.5 \cdot 8} = 10$ or -10
 $\alpha_4 = \sqrt{8 \cdot 5.12} = 6.4$ or -6.4
 10, 8, 6.4 or -10 , 8, -6.4
47. $\alpha_3 = -\sqrt{4 \cdot 303 \frac{3}{8}} \approx -11.02$ or 11.02
 $\alpha_2 \approx -\sqrt{4 \cdot 11.02} \approx -6.64$ or 6.64
 $\alpha_4 \approx -\sqrt{11.02 \cdot 30 \frac{3}{8}} \approx -18.30$ or 18.30
 -6.64 , -11.02 , -18.30 or 6.64 , -11.02 , 18.30
48. about 375.42 cm^3
49. about 74.3 mi
- 50a. Answers may vary. Sample:
 3 and 12;6
- 50b. Answers may vary. Sample:
 3, 6, 12;2
- 50c. Answers may vary. Sample:
 768
- 50d. Answers may vary. Sample:
 48;5th term
51. 768
52. $3 \cdot 4^{16}$ or 12,884,901,888
53. $3 \cdot 4^{19}$ or 825,633,720,832
54. $3(4^{n-1})$
55. 4
56. 2.5
57. 10
58. $-\frac{1}{6}$
59. Both the common difference and the common ratio are used to find the next term in a sequence, but a common difference is added and a common ratio is multiplied.
60. \$142.79,\$613.59,\$28.62,\$58.92,\$105.82,\$262.94
61. 7
62. 128
63. B
64. H
65. C
66. G
67. $x \neq -1$, -5 ; there is a hole in the graph at $x = -1$. There is a vertical asymptote at $x = -5$.
68. $\alpha_n = -3 + 3(n-1); \alpha_n = \alpha_{n-1} + 3, \alpha_1 = -3$
69. $\alpha_n = 17 - 9(n-1); \alpha_n = \alpha_{n-1} - 9, \alpha_1 = 17$
70. $\alpha_n = -2 - 11(n-1); \alpha_n = \alpha_{n-1} - 11, \alpha_1 = -2$
71. $7\sqrt{14}$
72. $\frac{3\sqrt{3x}}{7x}$
73. $\frac{x}{y}$
74. $5\sqrt[3]{6}$
75. vertical asymptote: $x = -3$
76. vertical asymptote: $x = -1$
77. vertical asymptotes: $x = 0, 1$
78. vertical asymptote: $x = 3$; hole at $x = -3$

79. $a_n = a_{n-1} + n, a_1 = 1$

80. $a_n = a_{n-1} + (2n - 1), a_1 = 1$

81. $a_n = a_{n-1} + n^2, a_1 = 1$

Algebra 2
Lesson 9-4 - Practice and Problem-Solving Exercises Answers

8. 20

9. 92

10. 56

11. 176

12. 840

13. -165

14a. 95

14b. 510

15. $\sum_{n=1}^5 4n$

16. $\sum_{n=1}^8 (2n + 5)$

17. $\sum_{n=1}^{12} (3n + 2)$

18. $\sum_{n=1}^{10} (-10n + 110)$

19. $\sum_{n=1}^{10} (-3n)$

20. $\sum_{n=1}^{23} (-8n + 113)$

21. 25

22. 125

23. 20

24. 30

25. -2

26. 75

27. 2400

28. 5148

29. 682

30. 15,400

31. -8556

32. 1757

33. 432 seats

34. sequence; infinite

35. sequence; finite

36. series; finite

37. series; infinite

38. sequence; infinite

39. series; finite

40. 32

41. -48

42. 264

43. 35

44. 4292

45. -146

46a. $\sum_{n=1}^{20} (3n + 15)$

46b. 930

46c. \$46,950

47a. $a_n = n + 1$

47b. $\sum_{n=1}^9 (n + 1)$

47c. 18 cans

47d. No; no; 13 rows have 104 cans, 14 rows have 119 cans, 15 rows have 135 cans, and 16 rows have 152 cans. The number of rows would not be an integer for 110 cans or 140 cans.

48. 110

49. -765

50a. Check students' work.

50b. Check students' work.

50c. Check students' work.

50d. Check students' work.

51. 300

52. -200

53. 34

54. 37

55. $10x + 45y$

56. $45x - 210y$

57. C

58. H

59. B

60. H

61.
$$\left(\frac{b}{2}\right)^2 = \left(\frac{10}{2}\right)^2 = 25$$
$$x^2 + 10x + 25 = -35 + 25$$
$$(x + 5)^2 = -10$$
$$x + 5 = \pm\sqrt{-10}$$
$$x = -5 \pm i\sqrt{10}$$

62. $2^{n-1}; 1, 2, 4$

63. $a_n = -1(-1)^{n-1}; -1, 1, -1$

64. $a_n = 3\left(\frac{3}{2}\right)^{n-1}; = 3, \frac{9}{2}, \frac{27}{4}$

65. $\frac{x+3}{x-4}; x \neq 4, x \neq -1$

66. $\frac{c-2}{c-5}; c \neq 5, c \neq 6$

67. $\frac{z^2+12z+20}{z-1}; z \neq 1, z \neq 0$

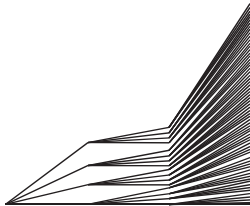
68. $-\frac{1}{3}$

69. $\frac{3}{4}$

70. $-\frac{1}{2}$

Algebra 2 **Lesson 9-5 - Practice and Problem-Solving Exercises Answers**

8. 255
9. 1456
10. 1533
11. -5115
12. 363
13. $\frac{15}{32}$
14. $\frac{65}{27}$
15. $\frac{121}{81}$
16. no; \$133.76.
17. converges; $\frac{4}{3}$
18. converges; $\frac{2}{3}$
19. converges; 8
20. diverges
21. diverges
22. converges; -81
23. diverges
24. converges; $\frac{5}{4}$
25. diverges
26. $1.\overline{2}$
27. 1
28. $\frac{5}{6}$
29. $\frac{9}{2}$
30. 9
31. $\frac{9}{5}$
32. geometric; 2046
33. arithmetic; 420
34. geometric; -1,627,605
35. geometric; about 96.47
36. arithmetic; 500,500
37. geometric; 121.5
38. 39 m
- 39a.



Stage 1 Stage 2 Stage 3
4 calls 16 calls 64 calls
4 calls, 16 calls, 64 calls
- 39b. $4 + 16 + 64 + 256 + 1024 + 4096$
- 39c. 5460 employees
- 40a. 20,18,16.2,14,58
- 40b. about 198.59
- 40c. $S = \frac{20}{1 - 0.9} = 200$

40d. Check students' work. .

41. $\frac{5}{4}$

42. 4

43. $\frac{3}{4}$

44. no sum

45. $0.8\bar{3}$

46. Check students' work.

47a. $\frac{7}{8}$

47b. 10

48. choice (b) ; (a) yields \$26,000; using the formula for finding the sum of a finite geometric series, (b) yields \$1,342,177.26.

49a. Answers may vary. Sample:
The student used $r - 1$ instead of $1 - r$ in the formula for the sum of an infinite geometric series.

49b. $\frac{1}{2}$

50a. 70th swing

50b. 10,000 cm

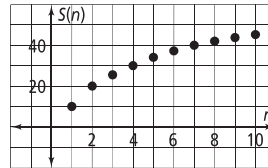
51a. $rS_n = r(a_1 + a_1r + \dots + a_1r^{n-1}) = a_1r + a_1r^2 + \dots + a_1r^n$

51b.
$$\begin{aligned} S_n - rS_n &= a_1 + a_1r + a_1r^2 + \dots + a_1r^{n-1} \\ &\quad - a_1r - a_1r^2 - \dots - a_1r^{n-1} - a_1r^n \\ &= a_1 - a_1r^n \end{aligned}$$

51c.
$$\begin{aligned} S_n - rS_n &= a_1 - a_1r^n \\ S_n(1 - r) &= a_1 - a_1r^n \\ S_n &= \frac{a_1 - a_1r^n}{1 - r} = \frac{a_1(1 - r^n)}{1 - r} \end{aligned}$$

52a. all positive integers ≥ 1 and $\leq n$

52b. 10;18;24.4;29.52;33.62; 36.89;39.51;41.61;43.29;44.63



52c. 50

53.
$$a_1 = \frac{9}{10}, r = \frac{1}{10}; S = \frac{\frac{9}{10}}{1 - \frac{1}{10}} = 1$$

54. 15

55. $\frac{2}{3}$

56. 0.82

57. 1.11

58. 27.7

59. 140

60. -825

61. $\frac{7c - 4}{2c^2}$

62. $\frac{10(2y + 3)}{(y + 3)(y - 3)}$

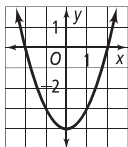
63. $\frac{x^2 + 6x + 4}{(x + 6)(x - 6)}$

64. 0

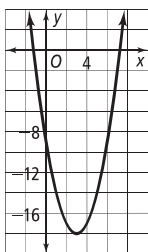
65. 2

66. 1

67.



68.



69.

