Instructor's Manual for

Beginning Algebra for College Students

THIRD EDITION

Karl J. Smith • Patrick J. Boyle

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BEGINNING ALGEBRA
FOR COLLEGE STUDENTS
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Answers

Sample Tests and Solutions

CHAPTER 1

PROBLEM SET 1.1, PAGES 8-9

1. a. constant b. constant c. constant d. constant e. constant f. constant g. constant h. variable i. variable

2. variable; domain 3. counting or natural 4. constant

5. 3.1416 6. $\leq$ 7. sum; terms 8. difference 9. product; factors 10. $a = bc$ 11. $<$ or $\leq$ 12. $>$ or $\geq$ 13. $>$ or $\geq$

14. $>$ or $\geq$ 15. $\geq$ or $\leq$ 16. $>$ or $\geq$ 17. $<$ or $\leq$

18. $\geq$ or $\leq$ 19. $>$ or $\geq$ 20. $<$ or $\leq$ 21. $30 = 5 \cdot 6$; correct

22. $32 = 4 \cdot 8$; correct 23. $54 = 8 \cdot 7$; not correct

24. $42 = 7 \cdot 6$; correct 25. $52 = 13 \cdot 4$; correct 26. $51 = 17 \cdot 3$; correct 27. $128 = 4 \cdot 32$; correct 28. $4 = 0 \cdot 4$; not correct

29. $5 = 0 \cdot 0$; not correct 30. $0 = 6 \cdot 0$; correct 31. $9 = 4 + 5$

32. $9 - 4 = 5$ 33. $17 = 9 + 8$ 34. $8 = 17 - 9$ 35. $7 = 9 - 2$

36. $7 \cdot 9 = 63$ 37. $7 = \frac{63}{9}$ 38. $8 \cdot 7 < 63$ 39. $63 > 5 \cdot 12$

40. $\frac{60}{0} \neq 6$ 41. $N + 1$ 42. $2N$ 43. $3N$ 44. $4 + N$

45. $5 - N$ 46. $\frac{N}{6}$ 47. $7 + N$ 48. $\frac{8}{N}$ 49. $N \cdot 9$ 50. $10N$

51. $1 - N$ 52. $N \cdot 7$ 53. $8 + N$ 54. $N - 9$ 55. $N + 10$

56. $(2N) \cdot 3$ 57. $3 + 2N$ 58. $3(2N)$ 59. $M + N$

60. $N + (N + 1)$

PROBLEM SET 1.2, PAGES 12-13

1. numerical expression 2. numerical expression 3. neither

4. neither 5. numerical expression 6. neither 7. numerical expression 8. variable expression 9. variable expression

10. numerical expression 11. variable expression 12. variable expression 13. numerical expression 14. variable expression

15. answers vary; see Page 10. 16. 14 17. 23 18. 20

19. 93 20. 8 21. 6 22. 7 23. 15 24. 6 25. 2

26. 17 27. 64 28. 20 29. 20 30. 754 31. 12

32. 13 33. 6 34. 2 35. 22 36. 20 37. 16 38. 8

39. 21 40. 27 41. $3 + (2 \cdot 1) = 5$ 42. $3(2 + 1) = 9$

43. $3 + \frac{2}{1} = 5$ 44. $\frac{3}{2 + 1} = 1$ 45. $8(9 + 10) = 152$

46. $8 \cdot 9 + 10 = 82$ 47. $N + 3$ 48. $N \cdot 10$ 49. $10N + 3$

50. $10(N + 3)$

PROBLEM SET 1.3, PAGES 16-17

1. 2^3 2. 3^3 3. 2^4 4. 3^4 5. 2^5 6. $2 \cdot 3^3$

7. $2^2 \cdot 3^2$ 8. $2^3 \cdot 3$ 9. $2^3 \cdot 3^2$ 10. $2^2 \cdot 3 \cdot 5$ 11. 5^4

12. $2 \cdot 173$ 13. $2 \cdot 3^2 \cdot 5^2 \cdot 7$ 14. $2^2 \cdot 3 \cdot 5^2 \cdot 11$

15. $2 \cdot 3^4 \cdot 5 \cdot 11$ 16. $2^3 \cdot 5^3$ 17. $2^2 \cdot 5^2 \cdot 7^2$ 18. $2 \cdot 5 \cdot 331$

19. $2^6 \cdot 5^6$ 20. $2^8 \cdot 5^8$ 21. 32 22. 64 23. 108 24. 72

25. xxxx 26. yyyyyyy 27. tttttt 28. sssss 29. 2xx

30. 3yyy 31. 8aa 32. 9bbb 33. 5xx 34. 25xx

35. 10aabb 36. 100aabb 37. 216 38. 216 39. 144

40. 144 41. 1 42. 2 43. 230 44. 325 45. 215

46. 125 47. 6 48. 40 49. 42 50. 2 51. 15

52. 97 53. 148 54. 104 55. a^6 56. b^7 57. a^5

58. b^7 59. x^7y^5 60. x^5y^6 61. x^2y^4z 62. x^4y^3

63. 2^5 64. 3^5 65. 5^2x^5 66. 7^2y^2 67. $a^{10}b^5$

68. $w^{10}z^7$ 69. $(x + y)^5$ 70. $(a + b)^7$ 71. $3^2 + 5^2 = 34$

72. $(3 + 5)^2 = 64$ 73. $3^2 + 2^3 = 17$ 74. $3^3 - 2^2 = 23$

75. $N^2 + 5$ 76. $6N^3$ 77. $7^2 + N^2$ 78. $(7 + N)^2$

79. $N^3 - M^3$ 80. $(N - M)(N + M)$

PROBLEM SET 1.4, PAGES 20-21

1. 19 2. 7 3. 19 4. 24 5. 7 6. 6 7. 12

8. 12 9. 49 10. 27 11. 1 12. 41 13. 23

14. 13 15. 1 16. 5 17. 33 18. 0 19. 100

20. 58 21. 2, 4, 6 22. 2, 20, 40 23. 350 ft

24. 72 yd^2 25. 30π or about 94 in. 26. 36π $in.^2$ or about 113 $in.^2$ 27. \$1650 28. \$2800 29. \$7.60 30. 2010 mi

31. $A = bh$ 32. $A = \frac{1}{2}bh$ 33. $A = \frac{1}{2}pq$ 34. $A = \frac{h}{2}(a + b)$

35. $V = s^3$ 36. $V = \ell wh$ 37. $V = \pi r^2 h$ 38. $V = \frac{1}{3}\pi r^2 h$

39. $V = \frac{4}{3}\pi r^3$ 40. $c^2 = a^2 + b^2$

PROBLEM SET 1.5, PAGES 25-26

1. commutative 2. commutative 3. associative 4. commutative

5. commutative 6. both 7. commutative 8. commutative

9. commutative 10. commutative 11. associative

12. commutative 13. associative 14. associative

15. commutative 16. commutative (twice) 17. associative

18. both 19. commutative 20. commutative 21. sum

22. difference 23. sum 24. difference 25. sum

26. difference 27. product 28. product 29. product

30. sum 31. sum 32. sum 33. sum 34. quotient

35. sum 36. quotient 37. sum 38. sum 39. difference

40. sum 41. $ab + ac$ 42. $st + su$ 43. $xy + xz$ 44. $5x + 10$

45. $7y + 28$ 46. $3z + 15$ 47. $6x + 8$ 48. $6y + 3$

49. $15z + 20$ 50. $x^2 + 3x$ 51. $y^2 + yz$ 52. $2z + z^2$

53. $2x^2 + 2xy + 2xz$ 54. $4x^3 + 4xy^2 + 4xz^2$ 55. $5x^4 + 10x^3 + 35x^2$

56. $6y^4 + 12y^3 + 15y^2$ 57. $a(x + w)$ 58. $b(s + a)$

59. $c(x + y)$ 60. $ab(c + d)$ 61. $uv(w + s)$ 62. $n(m + 2p)$

63. $3(x + y)$ 64. $3(x + 2y)$ 65. $3(3x + 2y)$ 66. $3(a + 1)$

67. $7(2y + 1)$ 68. $5(5z + 1)$ 69. $x(x + 5)$ 70. $y(x + y)$

71. $N + 1 = 1 + N$ 72. $2 + N = N + 2$ 73. $3(N + 4) = 16$

74. $3(N + 4) = 16$ 75. $5(N + 1) = 5N + 5$ 76. $5N + 12 = 6(N + 2)$

77. $N(7 + N) = 0$ 78. $N^2 + 8N = 6$ 79. $N(9 + N) = 9N + N^2$

80. $N^2 + 8N = N(8 + N)$

PROBLEM SET 1.6, PAGES 26-27

1. a. $\geq$ or $>$ b. $\geq$ or $\leq$ c. $>$ or $\geq$ d. $<$ or $\leq$ 2. a. $45 = 9 \cdot 5$; correct b. $35 = 6 \cdot 7$; not correct c. $54 = 8 \cdot 7$; not correct d. $5 = 0 \cdot 0$; not correct 3. a. $12 + 3 = 15$ b. $5 = 9 - 4$ c. $8 = \frac{40}{5}$ d. $6 \cdot 8 < 7^2$ 4. a. $2N + 5$ b. $N + (N + 1)$ c. $2(N - 5)$ d. $2N - 5$ 5. a. 11 b. 13 c. 1 d. 86

6. a. 713,000,000 b. exponent c. factor d. base

7. a. $2^3 \cdot 3^2 \cdot 5$ b. $2s^3t^2$ c. $5^5x^2y^3$ d. $3^3a^3b^3$

8. a. $18 > 14$ or $18 \geq 14$ b. $25 > 13$ or $25 \geq 13$ c. $35 > 23$ or $35 \geq 23$ d. $48 \geq 48$ or $48 \leq 48$ 9. a. $5x + 5y$ b. $6a + 9b$ c. $6x^3y^2 + 2x^2y^3$ d. $3a^2bc + c$ 10. a. $st(u + v)$ b. $5(x + 3y)$ c. $2mn(1 + 3m)$ d. $x^2y^2(1 + xy)$

CHAPTER 1 REVIEW PROBLEMS, PAGES 27-28

1. 23 2. 35 3. 1 4. 11 5. 5 6. 7 7. 11 8. 10

9. 6 10. 1 11. 13 12. 2 13. 6 14. 13 15. 20

16. 17 17. 20 18. 60 19. 17 20. 2 21. 30 22. 8

23. 24 24. 98 25. 1 26. 2 27. 20 28. 144 29. 100

30. 136 31. d^4 32. h^7 33. k^6 34. m^7 35. n^8

36. p^{10} 37. $3x^6$ 38. $5y^6$ 39. $2z^4$ 40. a^5b^9 41. b^6c^9

42. c^4d^6 43. $x^4y^2z^5$ 44. $x^6y^3z^2$ 45. xy^3z^4 46. 5

47. 1 48. 0 49. 10 50. 16 51. 7 52. 8 53. 12

54. 20 55. 2 56. 7 57. 7 58. 16 59. 26 60. 2

61. 1 62. 3 63. 3 64. 20 65. 4 66. 0 67. 24

68. 49 69. 45 70. 4 71. 2 72. 0 73. 49 74. 3

75. 1 76. $rs + rt$ 77. $wx + wy$ 78. $pm + pn$ 79. $3s + 6$

80. $5x + 10$ 81. $7m + 21$ 82. $6s + 4$ 83. $15x + 6$

84. $35m + 15$ 85. $s^2 + 2s$ 86. $x^2 + 2x$ 87. $m^2 + 3m$

88. $a(x + y)$ 89. $b(x + z)$ 90. $c(y + z)$ 91. $xy(z + w)$

92. $ab(c + e)$ 93. $mn(p + q)$ 94. $5(x + y)$ 95. $2(x + 3y)$

96. $3(y + 2z)$ 97. $7(x + 1)$ 98. $7(x + 2)$ 99. $7(7x + 1)$

100. $x(x + 7)$

CHAPTER 2

PROBLEM SET 2.1, PAGES 33-34

1. a. +6 b. a loss of six dollars c. -6 2. a. -8 b. a gain of eight dollars c. +8 3. a. -7 b. seven steps to the right c. +7 4. a. +9 b. nine steps to the left c. -9 5. a. +2 b. 2° below zero c. -2 6. a. -5 b. 5° above zero c. +5 7. a. +12 b. 12° latitude South c. -12 8. a. +150 b. a withdrawal of 150 dollars c. -150 9. a. +10 b. a 10-yard loss c. -10 10. a. -2 b. up two floors c. +2 11. a. +6200 b. Ocean floor 6200 ft deep c. -6200 12. a. -3 b. a 3-yard gain c. +3 13. a. +500 b. a $500 penalty c. -500 14. a. -150 b. a $150 bonus c. +150 15. a. +5 b. a five dollar price reduction c. -5 16. a. -100 b. a hill 100 ft above sea level c. +100 17. a. +70 b. 70° longitude West c. -70 18. a. -25 b. a twenty-five dollar increase in price c. +25 19. a. -50 b. 50° latitude North c. +50 20. a. -100 b. 100° longitude East c. +100 21. minus 22. negative 23. opposite 24. minus 25. opposite 26. opposite 27. negative 28. minus 29. opposite 30. opposite 31. -4 32. 9 33. 0 34. 2 35. 3 36. -1 37. -18 38. -9 39. -17 40. 0 41. 1 42. -2 43. 3 44. 4 45. -5 46. -6 47. -8 48. 8 49. 8 50. -8 51. 4; 4 52. 3; 4 53. 5; 7 54. 9; 9 55. -10; 11 56. -12; 20 57. 4; 13 58. 13; 13 59. 4; 4 60. $-\pi$; 4 61. No; suppose $x = -3$, then $-x = -(-3) = 3$ which is positive 62. a. when x is negative b. when x is positive c. when x is zero

PROBLEM SET 2.2, PAGES 37-38

Show the solutions to Problems 1-10 on a number line.

1. -3 2. -2 3. -4 4. 4 5. -4 6. -2 7. -3

8. 0 9. 3 10. 1 11. 11 12. -11 13. 5 14. -2

15. 4 16. -3 17. 5 18. 5 19. 5 20. 47 21. 39

22. 46 23. 71 24. 40 25. 60 26. -31 27. -40

28. -37 29. -20 30. -46 31. -27 32. -8 33. -10

34. -12 35. 2 36. 3 37. 3 38. -5 39. -3 40. -3

41. 3 42. -6 43. 6 44. -3 45. -5 46. -1 47. 4

48. 4 49. 7 50. -2 51. 0 52. -6 53. -2 54. -6

55. 0 56. -5 57. -6 58. 4 59. -12 60. -13

61. -13 62. 0 63. 0 64. -5 65. 6 66. 1 67. 6

68. -4 69. 1 70. -36 71. -6 72. -10 73. -12

74. 13 75. -6 76. 2 77. -1 78. -5 79. -3 80. 20

81. -28 82. -43 83. -3 84. 9 85. -7 86. -8

87. 2 88. -8 89. 0 90. 36

PROBLEM SET 2.3, PAGES 40-41

1. -2 2. 3 3. -10 4. 7 5. -7 6. -9 7. -15

8. -12 9. -7 10. 12 11. 16 12. 13 13. -2

14. -7 15. 3 16. 0 17. 0 18. 12 19. 15 20. 2

21. -1 22. 14 23. 5 24. 11 25. 6 26. -1

27. -5 28. 14 29. -7 30. 10 31. 5 32. 6 33. -3

34. 8 35. -3 36. -6 37. -9 38. -6 39. -5 40. 2

41. 8 42. 6 43. 9 44. -8 45. -4 46. -1 47. -14

48. -18 49. 16 50. 20 51. -4 52. -65 53. 26

54. 0 55. 104 56. 5 57. -49 58. -60 59. 31

60. -37 61. $(5 - 7) + [(-8) - (-6)] = -4$

62. $[(-9) + 6] - [10 + (-8)] = -5$ 63. $[(-6) + 3] - [(-4) - 5] = 6$

64. $[6 - (-9)] + [(-5) + (-4)] = 6$ 65. $(-2) + [(-2) - 8] = -12$

66. $(-5) + [5 - (-5)] = 5$ 67. $[(-3) + (-6)] - (-6) = -3$

68. $[(-1) - (-6)] - (-1) = 6$ 69. $(-3) - [1 + (-3)] = -1$

70. $(-4) - [2 - (-4)] = -10$

PROBLEM SET 2.4, PAGES 46-47

1. -48 2. -28 3. -15 4. 28 5. -81 6. 16 7. 35

8. 0 9. 0 10. 27 11. -40 12. -24 13. -64

14. 54 15. -35 16. 0 17. -42 18. 64 19. -72

20. -10 21. 10 22. -42 23. -54 24. 160 25. 8

26. 40 27. 6 28. 8 29. -84 30. 70 31. 6

32. -5 33. -4 34. -8 35. 20 36. -3 37. 5

38. -3 39. -4 40. 4 41. 12 42. -2 43. 7

44. -8 45. -4 46. -16 47. 16 48. -32 49. -32

50. 1 51. -1 52. 17 53. 43 54. -31 55. 49

56. -1 57. -17 58. -3 59. 7 60. -2 61. 4

62. -2 63. -2 64. 1 65. -3 66. -1 67. -2

68. -5 69. 1 70. 4 71. 9 72. -30 73. 1 74. 7

75. -7 76. 13 77. -12 78. 0 79. -1 80. -2

81. 8 82. 6 83. 30 84. 5 85. 2 86. 4 87. 1

88. -2 89. -3 90. -5

PROBLEM SET 2.5, PAGES 49-50

1.

Term	a. Numerical coefficient	b. exponent
$7x^4$	7	4
$6x^3$	6	3
x^2	1	2
$5x$	5	1

2.

Term	a. Numerical coefficient	b. exponent
a^5	1	5
$3n^4$	3	4
$2a$	2	1

3. $3x$, $(5 \cdot 2)x$ and $11x$; $4xy$ and $7xy$; $2x^2y$ and $6x^2y$

4. $4a$ and $12a$; $6a^2b$ and $12a^2b$ 5. a. $21ab$ b. $21ab$ 6. a. $8xy$ b. $8xy$ 7. a. $-36st$ b. $-36st$ 8. a. $-6xy$ b. $6xy$

9. a. $12xyz$ b. $-12xyz$ 10. a. $-8stw$ b. $8stw$ 11. a. $36xy^2$ b. $12xy^2$ 12. a. $10xy^2$ b. $20x^2y$ 13. a. $16m^3$ b. $-32n^4$

14. a. $-6x^3$ b. $-12x^3$ 15. a. $20y^6$ b. $20y^6$ 16. a. $-6z^6$ b. $6z^6$ 17. a. $-21a^3b^3$ b. $-49b^6$ 18. a. $-6r^5s$ b. $-6r^3s^3$

19. a. $-63m^7$ b. $441m^8$ 20. a. x^{12} b. x^{12} 21. $7x$

22. $11y$ 23. $15z$ 24. $5z$ 25. w 26. $3u$ 27. $4a$

28. $-7b$ 29. $-10c$ 30. $-14h$ 31. $-3k$ 32. $-2j$ 33. $-3m$

34. $-4n$ 35. $-5p$ 36. $4x$ 37. $-7y$ 38. $5z$ 39. $62a$

40. $80b$ 41. $13x$ 42. $13y$ 43. $9a$ 44. $4b$ 45. $2c + 3d$

46. $5e - 2f$ 47. $-4x$ 48. $-y$ 49. $2a$ 50. $-2b$ 51. $6w$

52. $8x$ 53. $-3y$ 54. $-3z$ 55. $-8x$ 56. $-6y$ 57. 0

58. 0 59. 0 60. $-2d$ 61. $9x - 24$ 62. $7x + 9$

63. $7x - 10$ 64. $8y - 23$ 65. $6x^2 - 6x + 10$

66. $6a^2 - 6ab - 2b^2$ 67. $7x^3 - x^2y + 8x^2 - 3x$

68. $6x^4 + 2x^3 + x^2 - 2x - 4$ 69. $8r^3 - 9r^2s + 5rs^2 - 3$

70. $u^3 - 2u^2v + 8uv^2$

PROBLEM SET 2.6, PAGE 51

1. a. -12 b. $+50$ c. -17 d. -17 e. $+17$

2. -2 3. a. -2 b. -8 c. 1

d. -2 e. 8 4. a. 12 b. 4 c. -7 d. -6 e. $-5y$

5. a. $[(-11) + 9] - [12 + (-8)] = -6$ b. -2 c. $(n - 8) + n = 2n - 8$

6. a. -35 b. 12 c. 24 d. 14 e. 1 7. a. -1 b. 0

c. 0 d. 1 e. 30 8. Term x^3: a. 1 b. 3

Term $-2x^2$: a. -2 b. 2 Term $7x$: a. 7 b. 1 9. a. $-35ab$

b. $24x^4$ c. $16y^4$ d. $24y^7$ e. $2b^8$ 10. a. $2x + 3y$ b. $-8y$

c. $2z$ d. $6a + 14$ e. $a^3 + b^2$

CHAPTER 2 REVIEW PROBLEMS, PAGES 51-53

1. -31 2. 7 3. -7 4. 0 5. -40 6. -7 7. 0 8. 9

9. -2 10. 2 11. 24 12. 0 13. -34 14. 34 15. -11

16. -21 17. 11 18. -2 19. 39 20. 36 21. -48

22. 152 23. 98 24. 136 25. 54 26. -105 27. -156

28. 28 29. -36 30. 30 31. 64 32. -8 33. -1 34. 9

35. -1 36. -6 37. -31 38. 31 39. 23 40. 3 41. -5

42. 4 43. -3 44. -7 45. -13 46. 6 47. -1 48. 1

49. 2 50. 1 51. 2 52. 3 53. -3 54. 3 55. 1

56. -5 57. -2 58. -5 59. -1 60. -2 61. 0 62. -6

63. 4 64. 5 65. -1 66. -5 67. -1 68. 10 69. -3

70. -5 71. -13 72. 1 73. -7 74. 1 75. 11

76. $6x^2$ 77. $-12y^2$ 78. $5z^3$ 79. $-a^5$ 80. $-b^5$ 81. c^4

82. $-6x^3y^2$ 83. $30a^2b^2$ 84. $-6m^2n^3$ 85. $-14x^3y^2$ 86. $10x$

87. $6x$ 88. $-4x$ 89. $-4y$ 90. $-4y$ 91. 0 92. $z^2 + 7z$

93. $-3z - 2$ 94. $5z - 3z^2$ 95. $3y - 6x$ 96. $8y - 7z$

97. $-2x - 3z$ 98. $2 - 2x$ 99. $2y + 6$ 100. $2z - 14$

CHAPTER 3

PROBLEM SET 3.1, PAGE 57

1. no 2. yes 3. yes 4. yes 5. no 6. no 7. yes

8. no 9. yes 10. yes 11. yes 12. no 13. yes

14. no 15. yes 16. yes 17. yes 18. yes 19. no

20. no 21. no 22. no 23. no 24. no Answers to Problems 25-50 may vary. 25. 3 + NUMBER = 11; 3 + N = 11

26. 7 + NUMBER = 43; 7 + N = 43 27. -2 + NUMBER = -6; -2 + N = -6

28. 3(NUMBER) = -7; 3N = -7 29. 4(NUMBER) = 72; 4N = 72

30. 10 - NUMBER = 3; 10 - N = 3 31. NUMBER -6 = 15; N - 6 = 15

32. $\frac{\text{NUMBER}}{2} = -5$; $\frac{N}{2} = -5$ 33. $\frac{\text{NUMBER}}{7} = 12$; $\frac{N}{7} = 12$

34. 5(NUMBER) -3 = 12; 5N - 3 = 12 35. 5(NUMBER) - 3 = 12; 5N - 3 = 12

36. NUMBER + 12 = 4(NUMBER); N + 12 = 4N

37. NUMBER + 12 = 4(ANOTHER NUMBER); N + 12 = 4M

38. $\frac{3(\text{NUMBER})}{2} = 5(\text{ANOTHER NUMBER})$; $\frac{3N}{2} = 5M$

39. $\frac{3(\text{NUMBER})}{2} = 5(\text{NUMBER})$; $\frac{3N}{2} = 5N$

40. 7 + 5(NUMBER) = 4 - 3(NUMBER); 7 + 5N = 4 - 3N

41. $\frac{\text{NUMBER} + 7}{2} = 11(\text{NUMBER})$; $\frac{N + 7}{2} = 11N$ 42. SON'S AGE + DAUGHTER'S AGE = 21; S + D = 21 43. 2(DAUGHTER'S AGE) = SON'S AGE; 2D = S

44. 2(LENGTH) + 2(WIDTH) = 140; 2L + 2W = 140

45. WIDTH + 10 = 2(LENGTH); W + 10 = 2L 46. LENGTH = 3(WIDTH) + 2; L = 3W + 2 47. CIRCUMFERENCE = 3(RADIUS) + .7; C = 3R + .7

48. $\text{CURRENT} = \frac{110}{\text{RESISTANCE}}$; $C = \frac{110}{R}$ 49. $\text{DOSAGE} = \frac{(\text{CHILD'S AGE}) + 2}{50(\text{CHILD'S AGE})}$; $D = \frac{A + 2}{50A}$ 50. $\text{VOLUME} = \frac{4}{3}\pi(\text{RADIUS})^2$; $V = \frac{4}{3}\pi R^2$

PROBLEM SET 3.2, PAGE 61

1. 6 2. 17 3. 16 4. 9 5. 17 6. 18 7. -18

8. -14 9. -34 10. -20 11. -43 12. -13 13. -18

14. 3 15. -4 16. -5 17. 15 18. 12 19. -14

20. -2 21. -6 22. -43 23. -112 24. -7 25. -6

26. -3 27. -7 28. -2 29. -9 30. 9 31. 9 32. -3

33. 10 34. 9 35. 2 36. -12 37. 3 38. 16 39. 4

40. 2 41. 4 42. 22 43. 3 44. -2 45. -8 46. -28

47. 0 48. 6 49. 17 50. 16

PROBLEM SET 3.3, PAGES 64-65

1. x 2. t 3. m 4. p 5. y 6. s 7. z 8. k

9. t 10. 3 11. 5 12. 2 13. 6 14. 25 15. 13

16. -5 17. 12 18. -14 19. 2 20. 101 21. 10 22. 6

23. 12 24. 15 25. 52 26. -88 27. 112 28. 10

29. 12 30. 32 31. -6 32. -40 33. -96 34. 96

35. -60 36. -120 37. -44 38. -192 39. -30 40. -30

41. -64 42. -12 43. 1 44. 3 45. 2 46. $\frac{9}{2}$

47. $-\frac{1}{6}$ 48. $\frac{13}{11}$ 49. 3 50. -1 51. 2 52. 6 53. 21

54. -18 55. -20 56. -10 57. 12 58. 5 59. 4

60. 4

PROBLEM SET 3.4, PAGE 67

1. 0 2. 7 3. 20 4. 2 5. 7 6. 25 7. 2

8. 5,000 9. 6 10. -96 11. 81 12. 400 13. 13

14. 3 15. -39 16. 135 17. 62 18. 18 19. 41

20. 15 21. 14 22. 3 23. 8 24. 3 25. 2 26. 9

27. 9 28. -7 29. 13 30. 7 31. -9 32. 18 33. 19

34. 3 35. 2 36. 5 37. 2 38. 3 39. -3 40. -4

41. 5 42. -1 43. 13 44. -15 45. All values 46. 6

47. 7 48. 1 49. 0 50. -26 51. -12 52. -8 53. -4

54. -22 55. 0 56. -28 57. No roots 58. All values

59. 8 60. -3 61. 0

PROBLEM SET 3.5, PAGES 70-71

1. $B = c - a$ 2. $E = c - d$ 3. $Y = -x + 7$ 4. $Y = x - 3$

5. $Y = 3x - 5$ 6. $S = aw - t$ 7. $P = m - rt$ 8. $K = v - gt$

9. $D = rt$ 10. $R = \frac{d}{t} - k$ 11. $R = \frac{d}{t}$ 12. $W = \frac{p - 2\ell}{2}$

13. $R = \frac{c}{2\pi}$ 14. $P = \frac{i}{rt}$ 15. $X = 2y - 2a$ 16. $y = 2x + 3$

17. $y = 6x + 5$ 18. $y = 9x + 7$ 19. $y = -3x + 4$

20. $y = -2x + 7$ 21. $y = -2x - 4$ 22. $y = -3x - 2$

23. $y = -3x - 8$ 24. $y = -5x - 1$ 25. $y = 4x + 5$

26. $y = 2x - 3$ 27. $y = x - 5$ 28. $y = -3x - 2$

29. $y = -2x + 4$ 30. $y = -2x - 4$ 31. $y = 2x - 3$

32. $y = x - 50$ 33. $y = 2x - 7$ 34. $y = 3x - 2$

35. $y = 2x - 4$ 36. $y = 2x + 3$ 37. $r = \frac{C}{2\pi}$ 38. $p = \frac{I}{rt}$

39. $R = \frac{k}{I}$ 40. $E = \frac{IR}{k}$ 41. $F = \frac{W}{d}$ 42. $k = \frac{P}{d}$ 43. $\ell = \frac{k}{f}$

44. $r = \frac{k}{C}$ 45. $s = \frac{D}{4\pi b^2}$ 46. $R = \frac{H}{\pi t I^2}$ 47. a. varies

b. Extra material needed = New circumference - Old circumference

$$= \pi(d + 12) - \pi d$$

$$= \pi d + 12\pi - \pi d$$

$$= 12\pi$$

The amount needed is about 38 ft.