Answers for 4.6

For use with pages 279–282

4.6 Skill Practice

1. $a + bi$

2. No. *Sample answer:* 7 is a complex number because it can be written as $7 + 0i$, but it is not an imaginary number.

3. $\pm 2i\sqrt{7}$ **4.** $\pm 4i\sqrt{39}$

5. $\pm 2i$ **6.** $\pm 3i\sqrt{10}$

7. $\pm i\sqrt{11}$ **8.** $\pm 2i\sqrt{3}$

9. $\pm i$ **10.** $\pm\frac{1}{2}i$

11. $3 \pm i\sqrt{2}$ **12.** $11 + i$

13. $17 - i$ **14.** -6

15. $-8 + 6i$ **16.** $16 + 8i$

17. $19 - 9i$ **18.** $-1 - 9i$

19. $21 + 9i$ **20.** $-10 + 2i$

21. C **22.** $-12 + 18i$

23. $-8 - 4i$ **24.** $-41 + 13i$

25. $-18 - 13i$ **26.** 26

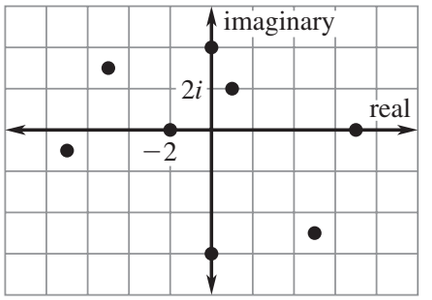
27. 73 **28.** $\frac{7}{65} + \frac{56}{65}i$

29. $-\frac{3}{5} + \frac{9}{5}i$ **30.** $-\frac{5}{3} + \frac{2}{3}i$

31. $\frac{3}{4} - \frac{1}{3}i$ **32.** $\frac{2}{13} + \frac{29}{13}i$

33. $-\frac{59}{106} - \frac{21}{106}i$

34–41.



42. 5 **43.** $\sqrt{109}$ **44.** $\sqrt{149}$

45. $\sqrt{37}$ **46.** 8 **47.** 4

48. $\sqrt{17}$ **49.** $7\sqrt{2}$ **50.** B

51. $-20 + 2i$ **52.** $8 + 7i$

53. $-125 + 90i$

54. $-179 + 53i$

55. $-\frac{5}{26} - \frac{51}{26}i$ **56.** $-\frac{2}{5} + \frac{1}{5}i$

57. $i^2 = -1$, so $-2i^2 = 2$;
$4 - i + 8i - 2i^2 = 6 + 7i$.

58. The absolute value formula is $\sqrt{a^2 + b^2}$; $\sqrt{2^2 + (-3)^2} = \sqrt{13}$.

59. a. additive: $-2 - i$,
multiplicative: $\frac{2}{5} - \frac{1}{5}i$

b. additive: $-5 + i$,
multiplicative: $\frac{5}{26} + \frac{1}{26}i$

c. additive: $1 - 3i$,
multiplicative: $-\frac{1}{10} - \frac{3}{10}i$

60. *Sample answer:* $3 + 2i$ and $6 - 2i$; the imaginary parts are opposities.

61. $\dfrac{ac + bd + (bc - ad)i}{c^2 + d^2}$

62. $\dfrac{ac + bd + (ad - bc)i}{c^2 + d^2}$

63. $\dfrac{ac - bd + (bc + ad)i}{c^2 + d^2}$

64. $\dfrac{ac - bd - (bc + ad)i}{c^2 + d^2}$

4.6 Problem Solving

65. $4 - 3i$ ohms

66. $14 - i$ ohms

67. $12 - 8i$ ohms

68. **a.** $6 + 5i$ **b.** $-5 + i$

c. $2 - 3i$ **d.** $-1 - i$

69.

Powers of *i*	i^1	i^2	i^3	i^4
Simplified	i	-1	$-i$	1

Powers of *i*	i^5	i^6	i^7	i^8
Simplified	i	-1	$-i$	1

The pattern repeats every four powers of i; $i^9 = i$, $i^{10} = -1$, $i^{11} = -i$, $i^{12} = 1$.

70. does not belong to the Mandelbrot set

71. does not belong to the Mandelbrot set

72. belongs to the Mandelbrot set

73. belongs to the Mandelbrot set

74. -10, 10; no

75. **a.** $\dfrac{519}{125} + \dfrac{167}{125}i$

b. $\dfrac{2326}{265} + \dfrac{668}{265}i$

c. $\dfrac{98}{37} - \dfrac{4}{37}i$

76. **a.** belongs to the Julia set

b. does not belong to the Julia set

c. does not belong to the Julia set

d. does not belong to the Julia set

4.6 Mixed Review

77. function; each input has exactly one output

78. not a function; the input 3 has more than one output

79. not a function; the input 1 has more than one output

80. function; each input has exactly one output

81. $\begin{bmatrix} 5 & 5 \\ -1 & -2 \end{bmatrix}$ **82.** $\begin{bmatrix} -3 & 6 \\ -9 & 0 \end{bmatrix}$

83. $\begin{bmatrix} -3 & 13 \\ 12 & -20 \end{bmatrix}$

84. $\begin{bmatrix} -3 \\ -14 \end{bmatrix}$

85. $-3, 4$

86. $\frac{1}{2}, 4$

87. ± 4

88. $\pm\frac{\sqrt{26}}{2}$

89. ± 5

90. ± 6