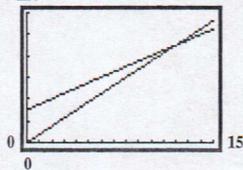


# AA8 Answers to Selected Exercises

80. a.  $F = 30 + 5x$ ;  $F = 7.5x$

b. 120



c. (12, 90); For 12 hours, both options cost the same, \$90.

81. does not make sense    82. makes sense    83. does not make sense    84. does not make sense  
 85. North campus had 600 students; South campus had 400 students.    86. \$200  
 87. Coburn = 60 years old; woman = 20 years old    88. 10 correct answers  
 89. \$4000 for the mother; \$8000 for the boy; \$2000 for the girl    90. 36 plants  
 91.  $C = \frac{VL - SN}{L - N}$     93.  $-14 - 29x + 15x^2$  or  $15x^2 - 29x - 14$     94.  $\sqrt{2}$     95.  $-\frac{54 + 43\sqrt{2}}{46}$

## Section 1.4

### Check Point Exercises

1. a.  $8 + i$     b.  $-10 + 7i$     2. a.  $63 + 14i$     b.  $58 - 11i$     3.  $\frac{16}{17} + \frac{21}{17}i$     4. a.  $7i\sqrt{3}$     b.  $1 - 4i\sqrt{3}$     c.  $-7 + i\sqrt{3}$

### Exercise Set 1.4

1.  $8 - 2i$     2.  $2 + 5i$     3.  $-2 + 9i$     4.  $2 + 16i$     5.  $24 - 3i$     6.  $33 - i$     7.  $-14 + 17i$     8.  $-12 + 26i$     9.  $21 + 15i$     10.  $16 + 56i$   
 11.  $-19 + 7i$     12.  $-4 - 28i$     13.  $-29 - 11i$     14.  $12 + 84i$     15. 34    16. 53    17. 26    18. 50    19.  $-5 + 12i$     20.  $21 - 20i$   
 21.  $\frac{3}{5} + \frac{1}{5}i$     22.  $\frac{12}{17} - \frac{3}{17}i$     23.  $1 + i$     24.  $-1 + 2i$     25.  $-\frac{24}{25} + \frac{32}{25}i$     26.  $-\frac{12}{13} - \frac{18}{13}i$     27.  $\frac{7}{5} + \frac{4}{5}i$     28.  $-i$     29.  $3i$     30.  $-3i$   
 31.  $47i$     32.  $19i\sqrt{2}$     33.  $-8i$     34.  $16 + 30i$     35.  $2 + 6i\sqrt{7}$     36.  $-7 - 4i\sqrt{11}$     37.  $-\frac{1}{3} + i\frac{\sqrt{2}}{6}$     38.  $-\frac{3}{8} + i\frac{\sqrt{7}}{16}$     39.  $-\frac{1}{8} - i\frac{\sqrt{3}}{24}$   
 40.  $-\frac{5}{11} - i\frac{\sqrt{2}}{11}$     41.  $-2\sqrt{6} - 2i\sqrt{10}$     42.  $-4\sqrt{3} - 2i\sqrt{6}$     43.  $24\sqrt{15}$     44.  $-12\sqrt{14}$     45.  $-11 - 5i$     46.  $23 + 10i$   
 47.  $-5 + 10i$     48.  $18 - 12i$     49.  $0 + 47i$  or  $47i$     50.  $0 + 19i\sqrt{2}$  or  $19i\sqrt{2}$     51. 0    52. 0    53.  $\frac{20}{13} + \frac{30}{13}i$     54.  $\frac{3}{5} - \frac{4}{5}i$   
 55.  $(47 + 13i)$  volts    56.  $(21 + i)$  volts    57.  $(5 + i\sqrt{15}) + (5 - i\sqrt{15}) = 10$ ;  $(5 + i\sqrt{15})(5 - i\sqrt{15}) = 25 - 15i^2 = 25 + 15 = 40$   
 67. makes sense    68. does not make sense    69. does not make sense    70. makes sense    71. false    72. false    73. false    74. true  
 75.  $\frac{14}{25} - \frac{2}{25}i$     76.  $\frac{6}{5} + 0i$  or  $\frac{6}{5}$     77.  $\frac{8}{5} + \frac{16}{5}i$     78.  $(2x - 1)(x + 4)$     79.  $(x - 3)(x - 3)$  or  $(x - 3)^2$     80.  $-5$

## Section 1.5

### Check Point Exercises

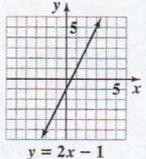
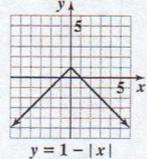
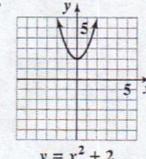
1. a.  $\{0, 3\}$     b.  $\left\{-1, \frac{1}{2}\right\}$     2. a.  $\{-\sqrt{7}, \sqrt{7}\}$     b.  $\{-3i, 3i\}$     c.  $\{-5 + \sqrt{11}, -5 - \sqrt{11}\}$     3. a.  $9; x^2 + 6x + 9 = (x + 3)^2$   
 b.  $\frac{25}{4}; x^2 - 5x + \frac{25}{4} = \left(x - \frac{5}{2}\right)^2$     c.  $\frac{1}{9}; x^2 + \frac{2}{3}x + \frac{1}{9} = \left(x + \frac{1}{3}\right)^2$     4.  $\{-2 \pm \sqrt{5}\}$     5.  $\left\{\frac{-3 + \sqrt{41}}{4}, \frac{-3 - \sqrt{41}}{4}\right\}$     6.  $\left\{\frac{-1 + \sqrt{3}}{2}, \frac{-1 - \sqrt{3}}{2}\right\}$   
 7.  $\{1 + i, 1 - i\}$     8. a. 0; one real solution that is rational    b. 81; two rational solutions    c.  $-44$ ; two imaginary solutions that are complex conjugates    9. approximately 26 years old    10. 20 in.

### Exercise Set 1.5

1.  $\{-2, 5\}$     2.  $\{4, 9\}$     3.  $\{3, 5\}$     4.  $\{-10, -1\}$     5.  $\left\{-\frac{5}{2}, \frac{2}{3}\right\}$     6.  $\left\{-\frac{2}{3}, -\frac{1}{3}\right\}$     7.  $\left\{-\frac{4}{3}, 2\right\}$     8.  $\left\{\frac{1}{4}, 3\right\}$     9.  $\{-4, 0\}$   
 10.  $\{0, 4\}$     11.  $\left\{0, \frac{1}{3}\right\}$     12.  $\left\{\frac{5}{4}\right\}$     13.  $\{-3, 1\}$     14.  $\left\{\frac{1}{2}, 1\right\}$     15.  $\{-3, 3\}$     16.  $\{-3, 3\}$     17.  $\{-\sqrt{10}, \sqrt{10}\}$     18.  $\{-4, 4\}$   
 19.  $\{\pm 5i\}$     20.  $\{\pm 2i\}$     21.  $\{-7, 3\}$     22.  $\{-3, 9\}$     23.  $\{4 \pm \sqrt{5}\}$     24.  $\{-4 \pm \sqrt{7}\}$     25.  $\{-3 \pm 4i\}$     26.  $\{1 \pm 3i\}$   
 27.  $\{3 \pm i\sqrt{5}\}$     28.  $\{-2 \pm i\sqrt{7}\}$     29.  $\left\{-\frac{5}{3}, \frac{1}{3}\right\}$     30.  $\left\{-\frac{3}{4}, \frac{5}{4}\right\}$     31.  $\left\{\frac{1 - \sqrt{7}}{5}, \frac{1 + \sqrt{7}}{5}\right\}$     32.  $\left\{\frac{3 - \sqrt{5}}{8}, \frac{3 + \sqrt{5}}{8}\right\}$   
 33.  $\left\{\frac{4 - 2\sqrt{2}}{3}, \frac{4 + 2\sqrt{2}}{3}\right\}$     34.  $\left\{\frac{-8 - 3\sqrt{3}}{2}, \frac{-8 + 3\sqrt{3}}{2}\right\}$     35.  $36; x^2 + 12x + 36 = (x + 6)^2$     36.  $64; x^2 + 16x + 64 = (x + 8)^2$   
 37.  $25; x^2 - 10x + 25 = (x - 5)^2$     38.  $49; x^2 - 14x + 49 = (x - 7)^2$     39.  $\frac{9}{4}; x^2 + 3x + \frac{9}{4} = \left(x + \frac{3}{2}\right)^2$     40.  $\frac{25}{4}; x^2 + 5x + \frac{25}{4} = \left(x + \frac{5}{2}\right)^2$   
 41.  $\frac{49}{4}; x^2 - 7x + \frac{49}{4} = \left(x - \frac{7}{2}\right)^2$     42.  $\frac{81}{4}; x^2 - 9x + \frac{81}{4} = \left(x - \frac{9}{2}\right)^2$     43.  $\frac{1}{9}; x^2 - \frac{2}{3}x + \frac{1}{9} = \left(x - \frac{1}{3}\right)^2$     44.  $\frac{4}{25}; x^2 + \frac{4}{5}x + \frac{4}{25} = \left(x + \frac{2}{5}\right)^2$   
 45.  $\frac{1}{36}; x^2 - \frac{1}{3}x + \frac{1}{36} = \left(x - \frac{1}{6}\right)^2$     46.  $\frac{1}{64}; x^2 - \frac{1}{4}x + \frac{1}{64} = \left(x - \frac{1}{8}\right)^2$     47.  $\{-7, 1\}$     48.  $\{-4, -2\}$     49.  $\{1 + \sqrt{3}, 1 - \sqrt{3}\}$   
 50.  $\{-6, 2\}$     51.  $\{3 + 2\sqrt{5}, 3 - 2\sqrt{5}\}$     52.  $\{1 + \sqrt{6}, 1 - \sqrt{6}\}$     53.  $\{-2 + \sqrt{3}, -2 - \sqrt{3}\}$     54.  $\{-3 + \sqrt{14}, -3 - \sqrt{14}\}$   
 55.  $\{2, 3\}$     56.  $\{-8, 1\}$     57.  $\left\{\frac{-3 + \sqrt{13}}{2}, \frac{-3 - \sqrt{13}}{2}\right\}$     58.  $\left\{\frac{3 + \sqrt{29}}{2}, \frac{3 - \sqrt{29}}{2}\right\}$     59.  $\left\{\frac{1}{2}, 3\right\}$     60.  $\left\{-3, \frac{1}{2}\right\}$   
 61.  $\left\{\frac{1 + \sqrt{2}}{2}, \frac{1 - \sqrt{2}}{2}\right\}$     62.  $\left\{\frac{2 + \sqrt{6}}{2}, \frac{2 - \sqrt{6}}{2}\right\}$     63.  $\left\{\frac{1 + \sqrt{7}}{3}, \frac{1 - \sqrt{7}}{3}\right\}$     64.  $\left\{\frac{5 + \sqrt{145}}{6}, \frac{5 - \sqrt{145}}{6}\right\}$     65.  $\{-5, -3\}$   
 66.  $\{-6, -2\}$     67.  $\left\{\frac{-5 + \sqrt{13}}{2}, \frac{-5 - \sqrt{13}}{2}\right\}$     68.  $\left\{\frac{-5 + \sqrt{17}}{2}, \frac{-5 - \sqrt{17}}{2}\right\}$     69.  $\left\{\frac{3 + \sqrt{57}}{6}, \frac{3 - \sqrt{57}}{6}\right\}$

70.  $\left\{\frac{-1 + \sqrt{41}}{10}, \frac{-1 - \sqrt{41}}{10}\right\}$  71.  $\left\{\frac{1 + \sqrt{29}}{4}, \frac{1 - \sqrt{29}}{4}\right\}$  72.  $\left\{\frac{3 + \sqrt{6}}{3}, \frac{3 - \sqrt{6}}{3}\right\}$  73.  $\{3 + i, 3 - i\}$  74.  $\{1 + 4i, 1 - 4i\}$   
 75. 36; 2 unequal real solutions that are rational 76. -44; 2 complex imaginary solutions 77. 97; 2 unequal real solutions that are irrational  
 78. 169; 2 unequal real solutions that are rational 79. 0; 1 real solution that is rational 80. -8; 2 complex imaginary solutions 81. 37; 2  
 unequal real solutions that are irrational 82. 40; 2 unequal real solutions that are irrational 83.  $\left\{-\frac{1}{2}, 1\right\}$  84.  $\left\{-\frac{2}{3}, 2\right\}$  85.  $\left\{\frac{1}{5}, 2\right\}$   
 86.  $\left\{-3, \frac{2}{5}\right\}$  87.  $\{-2\sqrt{5}, 2\sqrt{5}\}$  88.  $\{-5\sqrt{5}, 5\sqrt{5}\}$  89.  $\{1 + \sqrt{2}, 1 - \sqrt{2}\}$  90.  $\left\{\frac{-3 + \sqrt{17}}{4}, \frac{-3 - \sqrt{17}}{4}\right\}$   
 91.  $\left\{\frac{-11 + \sqrt{33}}{4}, \frac{-11 - \sqrt{33}}{4}\right\}$  92.  $\left\{\frac{3 + \sqrt{65}}{4}, \frac{3 - \sqrt{65}}{4}\right\}$  93.  $\left\{0, \frac{8}{3}\right\}$  94.  $\{-6, -1\}$  95.  $\{2\}$  96.  $\{3\}$  97.  $\{-2, 2\}$  98.  $\{-3, 3\}$   
 99.  $\{3 + 2i, 3 - 2i\}$  100.  $\{2 + 5i, 2 - 5i\}$  101.  $\{2 + i\sqrt{3}, 2 - i\sqrt{3}\}$  102.  $\left\{\frac{1}{5} + i\frac{\sqrt{14}}{5}, \frac{1}{5} - i\frac{\sqrt{14}}{5}\right\}$  103.  $\left\{0, \frac{7}{2}\right\}$  104.  $\left\{-3, \frac{1}{2}\right\}$   
 105.  $\{2 + \sqrt{10}, 2 - \sqrt{10}\}$  106.  $\left\{\frac{5 + \sqrt{73}}{2}, \frac{5 - \sqrt{73}}{2}\right\}$  107.  $\{-5, -1\}$  108.  $\{1, 7\}$  109. -1 and 5; d 110.  $3 - \sqrt{2}$  and  $3 + \sqrt{2}$ ; a  
 111. -3 and 1; f 112. -4 and -2; e 113. no  $x$ -intercepts; b 114. -3; c 115.  $-\frac{1}{2}$  and 2 116.  $\frac{2}{5}$  and -1 117. -6 and 3  
 118. -3 and -2 119.  $\frac{-5 - \sqrt{33}}{2}$  and  $\frac{-5 + \sqrt{33}}{2}$  120.  $\frac{2}{3}$  and 4 121.  $\frac{5 - \sqrt{7}}{3}$  and  $\frac{5 + \sqrt{7}}{3}$  122.  $\frac{-3 - \sqrt{17}}{4}$  and  $\frac{-3 + \sqrt{17}}{4}$   
 123.  $\frac{-2 - \sqrt{22}}{2}$  and  $\frac{-2 + \sqrt{22}}{2}$  124.  $\frac{4 - \sqrt{6}}{2}$  and  $\frac{4 + \sqrt{6}}{2}$  125.  $1 + \sqrt{7}$  126.  $\frac{1 - \sqrt{3}}{2}$  127.  $\left\{\frac{-1 \pm \sqrt{21}}{2}\right\}$  128.  $\left\{\frac{3 \pm \sqrt{5}}{2}\right\}$   
 129.  $\left\{-2\sqrt{2}, \frac{\sqrt{2}}{2}\right\}$  130.  $\{-\sqrt{3} \pm 2i\}$  131. 7 132. 9 133. (7, 21) 134. (9, 36) 135. 77.8 ft; (b) 136. 55.3 ft; (a)  
 137. a.  $\frac{1}{\phi - 1}$  b.  $\phi = \frac{1 + \sqrt{5}}{2}$  c.  $\frac{1 + \sqrt{5}}{2}$  138.  $3\sqrt{5}$  mi, or about 6.7 mi 139.  $2\sqrt{5}$  mi, or about 4.5 mi 140.  $20\sqrt{2}$  ft, or about 28.3 ft  
 141.  $90\sqrt{2}$  ft, or about 127.3 ft 142. a.  $\sqrt{2}a$  or  $a\sqrt{2}$  b. The length of the hypotenuse is the length of a leg times  $\sqrt{2}$ . 143. length: 9 ft; width: 6 ft  
 144. length: 15 yd; width: 12 yd 145. 5 in. 146. 4 in. 147. 5 m 148. 3 m 149. 10 in. 150. 5 in. 151. 9.3 in. and 0.7 in.  
 152. 4 in. and 4 in. 164. does not make sense 165. does not make sense 166. does not make sense 167. makes sense 168. false  
 169. true 170. false 171. false 172.  $x^2 - 2x - 15 = 0$  173.  $t = \frac{v_0 \pm \sqrt{v_0^2 - 64s}}{32}$  174. 2.4 m; yes 175.  $(x + 1)(x + 2)(x - 2)$   
 176.  $x + 5 + 2\sqrt{x + 4}$  177. true

**Mid-Chapter I Check Point**

1.  $\{6\}$  2.  $\left\{-1, \frac{7}{5}\right\}$  3.  $\{-7\}$  4.  $\left\{\frac{3 \pm \sqrt{15}}{3}\right\}$  5. all real numbers 6.  $\left\{\pm \frac{6\sqrt{5}}{5}\right\}$  7.  $\left\{\frac{3 \pm i\sqrt{23}}{4}\right\}$  8.  $\{3\}$   
 9.  $\{-3 \pm 2\sqrt{6}\}$  10.  $\{2 \pm \sqrt{3}\}$  11.  $\emptyset$  12.  $\{4\}$  13.  $-3 - \sqrt{7}$  and  $-3 + \sqrt{7}$  14. 1 15. no  $x$ -intercepts  
 16.  $\frac{-3 - \sqrt{41}}{4}$  and  $\frac{-3 + \sqrt{41}}{4}$  17. no  $x$ -intercepts 18. 0 19. -4 and  $\frac{1}{2}$  20.  $\{-5 \pm 2\sqrt{7}\}$   
 21. two imaginary solutions 22. two rational solutions 23.   $y = 2x - 1$   
 24.   $y = 1 - |x|$   
 25.   $y = x^2 + 2$   
 26.  $n = \frac{L - a}{d} + 1$  27.  $l = \frac{A - 2wh}{2w + 2h}$   
 28.  $f_1 = -\frac{ff_2}{f - f_2}$  or  $f_1 = \frac{ff_2}{f_2 - f}$   
 29. sophomore: \$1581; junior: \$2002; senior: \$2846  
 30. about 12 years after 2000, or in 2012  
 31. \$11,500 at 8%; \$13,500 at 9% 32. 20 prints; \$3.80  
 33. \$780 34. \$2500 at 4%; \$1500 at 3% loss 35. length: 17 ft; width: 6 ft 36. length: 7 ft; width: 4 ft 37. 12 yd  
 38. a. 1 year and 5 years after 2000, or in 2001 and in 2005 b. (1, 72) and (5, 72) 39. about 116 years after 1920, or in 2036  
 40.  $-1 - i$  41.  $-3 + 6i$  42.  $7 + i$  43.  $i$  44.  $3i\sqrt{3}$  45.  $1 - 4i\sqrt{3}$

**Section 1.6**

**Check Point Exercises**

1.  $\{-\sqrt{3}, 0, \sqrt{3}\}$  2.  $\left\{-2, -\frac{3}{2}, 2\right\}$  3.  $\{6\}$  4.  $\{4\}$  5. a.  $\{\sqrt[3]{25}\}$  or  $\{5^{2/3}\}$  b.  $\{-8, 8\}$  6.  $\{-\sqrt{3}, -\sqrt{2}, \sqrt{2}, \sqrt{3}\}$   
 7.  $\left\{-\frac{1}{27}, 64\right\}$  8.  $\{-2, 3\}$  9.  $\{-2, 3\}$  10. 25 years after 1996, or 2021

**Exercise Set 1.6**

1.  $\{-4, 0, 4\}$  2.  $\{-2, 0, 2\}$  3.  $\left\{-2, -\frac{2}{3}, 2\right\}$  4.  $\left\{-\frac{3}{2}, \frac{3}{2}, 3\right\}$  5.  $\left\{-\frac{1}{2}, \frac{1}{2}, \frac{3}{2}\right\}$  6.  $\left\{-1, -\frac{1}{3}, \frac{1}{3}\right\}$  7.  $\left\{-2, -\frac{1}{2}, \frac{1}{2}\right\}$   
 8.  $\left\{-\frac{2}{3}, \frac{2}{3}, 2\right\}$  9.  $\{0, 2, -1 + i\sqrt{3}, -1 - i\sqrt{3}\}$  10.  $\left\{0, 3, -\frac{3}{2} + i\frac{3\sqrt{3}}{2}, -\frac{3}{2} - i\frac{3\sqrt{3}}{2}\right\}$  11.  $\{6\}$  12.  $\{2\}$  13.  $\{6\}$  14.  $\{6\}$   
 15.  $\{-6\}$  16.  $\{8\}$  17.  $\{10\}$  18.  $\{5\}$  19.  $\{-5\}$  20.  $\{-3\}$  21.  $\{12\}$  22.  $\{9\}$  23.  $\{8\}$  24.  $\{4\}$  25.  $\emptyset$  26.  $\{2, 6\}$   
 27.  $\emptyset$  28.  $\{-2\}$  29.  $\left\{\frac{13 + \sqrt{105}}{6}\right\}$  30.  $\{0, 4\}$  31.  $\{4\}$  32.  $\{9\}$  33.  $\{13\}$  34.  $\{-1\}$  35.  $\{\sqrt[3]{4}\}$  36.  $\{\sqrt[3]{27}\}$   
 37.  $\{-60, 68\}$  38.  $\{-13, 3\}$  39.  $\{-4, 5\}$  40.  $\{1, 2\}$  41.  $\{-2, -1, 1, 2\}$  42.  $\{-3, -2, 2, 3\}$  43.  $\left\{-\frac{4}{3}, -1, 1, \frac{4}{3}\right\}$   
 44.  $\left\{-\frac{3}{2}, -1, 1, \frac{3}{2}\right\}$  45.  $\{25, 64\}$  46.  $\{36\}$  47.  $\left\{-\frac{1}{4}, \frac{1}{5}\right\}$  48.  $\left\{-\frac{1}{2}, \frac{1}{3}\right\}$  49.  $\{-8, 27\}$  50.  $\left\{-125, \frac{27}{8}\right\}$  51.  $\{1\}$