2.1 Linear and Quadratic Equations

1. Solving the equation:
   
   \[ 7y - 4 = 2y + 11 \]
   \[ 5y - 4 = 11 \]
   \[ 5y = 15 \]
   \[ y = 3 \]

3. Solving the equation:
   
   \[ -\frac{2}{5}x + \frac{2}{15} = \frac{2}{3} \]
   \[ 15\left(-\frac{2}{5}x + \frac{2}{15}\right) = 15\left(\frac{2}{3}\right) \]
   \[ -6x + 2 = 10 \]
   \[ -6x = 8 \]
   \[ x = -\frac{4}{3} \]

5. Solving the equation:
   
   \[ 0.14x + 0.08(10,000 - x) = 1220 \]
   \[ 0.14x + 800 - 0.08x = 1220 \]
   \[ 0.06x + 800 = 1220 \]
   \[ 0.06x = 420 \]
   \[ x = 7,000 \]

7. Solving the equation:
   
   \[ 5(y + 2) - 4(y + 1) = 3 \]
   \[ 5y + 10 - 4y - 4 = 3 \]
   \[ y + 6 = 3 \]
   \[ y = -3 \]

9. Solving the equation:
   
   \[ x^2 - 5x - 6 = 0 \]
   \[ (x + 1)(x - 6) = 0 \]
   \[ x = -1, 6 \]

11. Solving the equation:
   
   \[ 9a^3 = 16a \]
   \[ 9a^3 - 16a = 0 \]
   \[ a(9a^2 - 16) = 0 \]
   \[ a(3a + 4)(3a - 4) = 0 \]
   \[ a = -\frac{4}{3}, 0, \frac{4}{3} \]

13. Solving the equation:
   
   \[ (x + 6)(x - 2) = -7 \]
   \[ x^2 + 4x - 12 = -7 \]
   \[ x^2 + 4x - 5 = 0 \]
   \[ (x + 5)(x - 1) = 0 \]
   \[ x = -5, 1 \]

15. Solving the equation:
   
   \[ 2y^3 - 9y = -3y^2 \]
   \[ 2y^3 + 3y^2 - 9y = 0 \]
   \[ y(2y^2 + 3y - 9) = 0 \]
   \[ y(2y - 3)(y + 3) = 0 \]
   \[ y = -3, 0, \frac{3}{2} \]
17. Solving the equation:
   \[4x^3 + 12x^2 - 9x - 27 = 0\]
   \[4x^2(x + 3) - 9(x + 3) = 0\]
   \[(x + 3)(4x^2 - 9) = 0\]
   \[(x + 3)(2x + 3)(2x - 3) = 0\]
   \[x = -3, \frac{3}{2}, \frac{3}{2}\]

19. a. Solving the equation:
   \[8x - 5 = 0\]
   \[8x = 5\]
   \[x = \frac{5}{8}\]

   b. Adding: \((8x - 5) + (2x - 3) = 10x - 8\)

   c. Multiplying: \((8x - 5)(2x - 3) = 16x^2 - 24x - 10x + 15 = 16x^2 - 34x + 15\)

   d. Solving the equation:
   \[16x^2 - 34x + 15 = 0\]
   \[(8x - 5)(2x - 3) = 0\]
   \[x = \frac{5}{8}, \frac{3}{2}\]

21. a. Solving the equation:
   \[9x - 25 = 0\]
   \[9x = 25\]
   \[x = \frac{25}{9}\]

   b. Solving the equation:
   \[9x^2 - 25 = 0\]
   \[(3x + 5)(3x - 5) = 0\]
   \[x = -\frac{5}{3}, \frac{5}{3}\]

   c. Solving the equation:
   \[9x^2 - 25 = 56\]
   \[9x^2 - 81 = 0\]
   \[9(x + 3)(x - 3) = 0\]
   \[x = -3, 3\]
23. Solving the equation:

\[-3 - 4x = 15\]
\[-4x = 18\]
\[x = -\frac{9}{2}\]

27. Solving the equation:

\[0 = 6,400a + 70\]
\[-70 = 6,400a\]
\[a = -\frac{70}{6,400} = -\frac{7}{640}\]

31. Solving the equation:

\[100P = 2,400\]
\[P = \frac{2,400}{100} = 24\]

35. Solving the equation:

\[3x^2 + x = 10\]
\[3x^2 + x - 10 = 0\]
\[(3x - 5)(x + 2) = 0\]
\[x = -2, \frac{5}{3}\]

39. Solving the equation:

\[15 - 3(x - 1) = x - 2\]
\[15 - 3x + 3 = x - 2\]
\[-3x + 18 = x - 2\]
\[-4x + 18 = -2\]
\[-4x = -20\]
\[x = 5\]

25. Solving the equation:

\[x^3 - 5x^2 + 6x = 0\]
\[x(x^2 - 5x + 6) = 0\]
\[x(x - 2)(x - 3) = 0\]
\[x = 0, 2, 3\]

29. Solving the equation:

\[5(2x + 1) = 12\]
\[10x + 5 = 12\]
\[10x = 7\]
\[x = \frac{7}{10}\]

33. Solving the equation:

\[5\left(-\frac{19}{15}\right) + 5y = 9\]
\[-\frac{19}{3} + 5y = 9\]
\[5y = \frac{27}{3} + \frac{19}{3} = \frac{46}{3}\]
\[y = \frac{46}{15}\]

37. Solving the equation:

\[(y + 3)^2 + y^2 = 9\]
\[y^2 + 6y + 9 + y^2 = 9\]
\[2y^2 + 6y = 0\]
\[2y(y + 3) = 0\]
\[y = -3, 0\]

41. Solving the equation:

\[2(20 + x) = 3(20 - x)\]
\[40 + 2x = 60 - 3x\]
\[40 + 5x = 60\]
\[5x = 20\]
\[x = 4\]
43. Solving the equation:
   \[
   0.08x + 0.09(9,000 - x) = 750 \\
   0.08x + 810 - 0.09x = 750 \\
   -0.01x + 810 = 750 \\
   -0.01x = -60 \\
   x = 6,000
   \]

45. Solving the equation:
   \[
   (x + 3)^2 + 1^2 = 2 \\
   x^2 + 6x + 9 + 1 = 2 \\
   x^2 + 6x + 8 = 0 \\
   (x + 4)(x + 2) = 0 \\
   x = -4, -2
   \]

47. Solving the equation:
   \[
   3x - 6 = 3(x + 4) \\
   3x - 6 = 3x + 12 \\
   -6 = 12 \\
   \text{Since this statement is false, there is no solution.}
   \]

49. Solving the equation:
   \[
   2(4t - 1) + 3 = 5t + 4 + 3t \\
   8t - 2 + 3 = 8t + 4 \\
   8t + 1 = 8t + 4 \\
   1 = 4 \\
   \text{Since this statement is false, there is no solution.}
   \]

51. Solving the equation:
   \[
   7(x + 2) - 4(2x - 1) = 18 - x \\
   7x + 14 - 8x + 4 = 18 - x \\
   -x + 18 = -x + 18 \\
   18 = 18 \\
   \text{Since this statement is true, the solution is all real numbers.}
   \]

53. Solving the equation:
   \[
   -35 = -0.0035A + 70 \\
   -105 = -0.0035A \\
   A = \frac{-105}{-0.0035} = 30,000 \\
   \text{The altitude is 30,000 feet.}
   \]

55. Solving the equation:
   \[
   x \cdot 42 = 21 \\
   x = \frac{21}{42} = \frac{1}{2}
   \]
59. Solving the equation:
   \[ 12 - 4y = 12 \]
   \[ -4y = 0 \]
   \[ y = 0 \]

61. Solving the equation:
   \[ 525 = 900 - 300p \]
   \[ -375 = -300p \]
   \[ p = \frac{-375}{-300} = \frac{5}{4} \]

63. Solving the equation:
   \[ 48 = 64t - 16t^2 \]
   \[ 16t^2 - 64t + 48 = 0 \]
   \[ 16(t^2 - 4t + 3) = 0 \]
   \[ 16(t - 1)(t - 3) = 0 \]
   \[ t = 1, 3 \]

65. Solving the equation:
   \[ 486.7 = 78.5 + 31.4h \]
   \[ 408.2 = 31.4h \]
   \[ h = \frac{408.2}{31.4} = 13 \]