Answer Key

1. {1, 2, 3, 4, 6, 12}
2. {1, 2, 4, 5, 10, 20}
3. {1, 3, 7, 21}
4. {1, 2, 3, 4, 6, 8, 12, 24}
5. {1, 5, 25}
6. {1, 2, 13, 26}
7. {1, 3, 9, 27}
8. {1, 2, 4, 7, 14, 28}
9. {1, 2, 3, 5, 6, 10, 15, 30}
10. {1, 2, 4, 8, 16, 32}
11. $\frac{1}{2}$
12. $\frac{2}{3}$
13. $\frac{6}{7}$
14. $\frac{2}{7}$
15. $\frac{8}{11}$
16. $\frac{3}{8}$
17. $\frac{7}{8}$
18. $\frac{7}{9}$
19. $\frac{5}{7}$
20. $\frac{5}{6}$
21. $\frac{8}{9}$
22. $\frac{9}{11}$
23. $\frac{7}{11}$
24. $\frac{2}{5}$
25. $\frac{6}{11}$
26. $\frac{4}{9}$
27. $\frac{5}{9}$
28. $\frac{7}{10}$
29. $\frac{3}{4}$
30. $\frac{5}{8}$
31. $9\frac{5}{6}$
    59÷6 = 9 *r* 5
32. $4\frac{1}{12}$
    49÷12 = 4 *r* 1
33. $9\frac{1}{7}$
    64÷7 = 9 *r* 1
34. $4\frac{3}{8}$
    35÷8 = 4 *r* 3
35. $7\frac{1}{8}$
    57÷8 = 7 *r* 1
36. $2\frac{8}{9}$
    26÷9 = 2 *r* 8
37. $3\frac{2}{9}$
    29÷9 = 3 *r* 2
38. $7\frac{2}{9}$
    65÷9 = 7 *r* 2
39. $5\frac{1}{11}$
    56÷11 = 5 *r* 1
40. $5\frac{1}{12}$
    61÷12 = 5 *r* 1
41. $11\frac{1}{4}$
42. $10\frac{1}{6}$
43. $11\frac{1}{8}$
44. $8\frac{1}{9}$
45. $7\frac{1}{6}$
46. $10\frac{2}{4}$
47. $10\frac{2}{6}$
48. $10\frac{3}{8}$
49. $8\frac{1}{9}$
50. $6\frac{1}{6}$
51. 35
52. 42
53. 10
54. 12
55. 45
56. 24
57. 25
58. 21
59. 24
60. 24
61. 72
62. 25
63. 900
64. 9.6
65. 3150
66. 112
67. 84
68. 3
69. 50
70. 10
71. 192
72. 5
73. 2
74. 5.2
75. 77
76. 520
77. 8.5
78. 117
79. 28
80. 3.6
81. 64 - 8 = 56 books
82. 125×8 = 1000 cans
83. 20,200×7 = 141,400
84. Jerald: 60
    Kerry: 80
    Larry: 75
85. 400×8 = 3200 m = 3.2 km
86. 8×4 = 32 people
87. 15 + 9 = 24
    32 - 24 = 8 (left)
88. 2(1.35 + 1.65) = 6 km
89. See the following table.

apples	3	
bananas	4	
peaches	10	
pears	5	

90. 3×12×0.5 = $18
91. 1.2÷2 = 0.6
    3×12×0.6 = $21.60
92. 2÷5 = 0.4
    3×12×0.4 = $14.40
93. 450 + 367 + 402 + 390 + 451 + 375 = 2435
94. 2(7.3 + 8.7) = $32
95. 8×1.5 = $12
96. 150×3 = 450 (pounds)
97. (180 - 10)÷2 = 85 (Wilson)
    180 - 85 = 95 (Larry)
98. 200 ÷ 5 = 40
99. 4.5×220 =
    4.5×2×110 = 9×110 = $990
100. 64 ounces = 2 quarts
     2×15 = 30 quarts
101. 3 + 1 = 4
     12÷4 = 3 apples
102. 5280÷6 = 880 feet
103. 5×125 = 625¢ = $6.25
104. 63÷7 = 9 colors
105. 40
106. 30 dimes
107. 5 dimes = 2 quarters, 20 dimes = 8 quarters
108. 7 Q & 2 D
109. 3×0.25 + 2×0.10 = 0.95
110. 2 dimes & 8 nickels.
111. 1/4
112. 108÷12 = 9 yrs old
113. 2×0.75 + 0.80 = $2.30
114. 7 (tickets) ×22 = 154
     160 - 154 = $6 (change)
115. 15÷3 = 5 hours
116. 126 - 30 = 96
     126 + 96 = $222
117. 10×2 = 20 (cups)

118. 1.50×2 = $3 119. 1.5×2 - 1 = $2 120. 3×3 = $9

Answer Key

1. 10
2. 4
3. $4\frac{1}{2}$
4. $10\frac{1}{2}$
5. $10\frac{2}{3}$
6. $12\frac{1}{2}$
7. 12
8. 8
9. $7\frac{1}{2}$
10. $9\frac{1}{3}$
11. 2.8
12. 4.2
13. 5.6
14. 2.4
15. 8.4
16. 9.8
17. 2.7
18. 4.5
19. 6.3
20. 2.1

21. 10.5
22. 12
23. 13.5
24. 16.5
25. 18
26. 19.5
27. 21
28. 22.5
29. 24
30. 25.5
31. $\frac{1}{4}$
32. $\frac{3}{8}$
33. $\frac{3}{10}$
34. $\frac{10}{21}$
35. $\frac{11}{72}$
36. $\frac{15}{56}$
37. $\frac{5}{14}$
38. $\frac{5}{6}$
39. $\frac{7}{36}$
40. $\frac{9}{56}$

41. 24
42. 27
43. 36
44. 28
45. 270
46. 24
47. 2.1
48. 1.5
49. 100
50. 56
51. 60
52. 0.3
53. .00006
54. $\frac{2}{3}$
55. 20÷⅔ = 50
56. 7
57. $\frac{1}{4}$ = 1/4
58. $\frac{1}{2}$
59. 60,000
60. 60

61. 9
62. $\frac{2}{3}$
63. 5
64. 10
65. 4
66. 10
67. 80
68. {7, 13, 91}
69. F
70. 1
71. $12
72. 116
73. $0.70
74. 80 sq. in.
75. $25
76. $1.75
77. $4
78. $280
79. 30 ft
80. 48×6 = 288 oz

MAP 249+ (T3) Issue 9

81. 9 qt
82. $23
83. 20 min
84. 40 (plates)
85. $7.50
86. 25 times
87. 2,940÷7 = 420
88. $7
89. 3 in
90. $30
91. B
92. 1/3
93. $\frac{1}{4}$
94. 39
95. 15
96. 12
97. 4 possible outcomes:
98. 3
99. 20
100. $\frac{1}{2}$ = ½
101. $\frac{1}{3}$ = 1/3
102. $\frac{72\times2\times4}{48} = \frac{9\times2\times4}{6} = \frac{9\times1\times4}{3} = \frac{3\times1\times4}{1} = 12$ cans
103. 4 of them
    HHH
    HHT (including HTH, THH)
    HTT (including THT, TTH)
    TTT
104.
    HHH
    HHT
    HTT
105.
    TTT
106. 3×2 = 6 ways
    To scramble the work "map" as map, mpa, amp, apm, pam, pma.
107. 5×4 = 20
108. 1.25×24 = $1\frac{1}{4}$×24 = 24 + 6 = 30
109. 7×3 = 21 (with change)
    7×4 = 28 (not enough)
    Ans = 3 books at most
110. Note: to get $\frac{1}{4}$ of red, the ratio of red to white is 1:3.
    1:3 = 2:6 = 3:9, thus there are at 3 red goldfish and 9 white goldfish that can be put into the tank.
    Ans = 3 red & 9 white

Answer Key

1. 256
2. 576
3. 676
4. 1156
5. 1296
6. 1936
7. 2916
8. 2116
9. 3136
10. 4356
11. $\frac{1}{3}$
12. $\frac{1}{2}$
13. $\frac{1}{3}$
14. $\frac{1}{5}$
15. $\frac{1}{3}$
16. $\frac{1}{5}$
17. $\frac{1}{2}$
18. $\frac{3}{5}$
19. $\frac{10}{7} = 1\frac{3}{7}$
20. $\frac{15}{7} = 2\frac{1}{7}$
21. $46\frac{1}{14}$
22. $53\frac{4}{9}$
23. $64\frac{1}{15}$
24. $73\frac{1}{35}$
25. $19\frac{4}{15}$
26. $28\frac{7}{18}$
27. $21\frac{7}{18}$
28. $23\frac{5}{32}$
29. $24\frac{4}{9}$
30. $26\frac{23}{30}$
31. $\frac{1}{15}$
32. $\frac{11}{12}$
33. $\frac{13}{72}$
34. $\frac{2}{45}$
35. $\frac{29}{144}$
36. $\frac{34}{75}$
37. $\frac{41}{45}$
38. $\frac{49}{96}$
39. $\frac{67}{144}$
40. $\frac{8}{105}$
41. 140
42. 0.21
43. 40
44. 22.5
45. 0.2
46. 0.36
47. 0.36
48. 4.5
49. 0.875
50. 1.75
51. 1600
52. 0.96
53. 600
54. 0.7
55. 0.0125
56. 0.08
57. 2800
58. 0.16
59. 0.0225
60. 0.3
61. 10,000
62. 10,000
63. 0.016
64. 4.8
65. 1.8
66. 0.06
67. 4
68. 4
69. 5.6
70. 28,000
71. 18,000
72. 0.018
73. 4,000
74. 70,000
75. 160
76. 0.01
77. 0.004
78. 0.36
79. 150
80. 0.021
81. 225 cm^2
82. 100
83. 54
84. 36
85. 12 (in)
86. 144 sq. in
87. 225 sq. in
88. 15
89. 12 (tiles)
90. 275 (total area)
91. 460
92. 250
93. 350
94. 250
95. 90 cm
96. 400 cm^2
97. 80
98. 107 (in.)
99. 20
100. 32

MAP 259+ (T3) Issue 9

101. 2(7+9) = 32

102. 5×6 = 30

103. left : used
= 15% : 85%
= 3 : 17
= 6 ft : 34 ft
Ans = 34 ft (used)

104. 0.2×150 = 30

105. $\frac{50-32}{50} = \frac{18}{50} = \frac{36}{100}$ = 36%

106. 160÷8 = 20
320÷20 = 16 hr

107. 1000÷12 = $83.3\frac{1}{3}$ (dimes) = $8.33

108. (a) 40 × 3 = 120
(b) 240 ÷ 40 = 6

109. $\frac{1}{2}(30) = 15$ (half-perimeter)
Since the length is twice the width, the ratio is 2:1, thus, the partition is $\frac{1}{3}$ and $\frac{2}{3}$.
$\frac{1}{3}(15) = 5$ (width)
$\frac{2}{3}(15) = 10$ (length)
5×10 = 50 ft² (area)

110. 10÷2 = 5
5×16 = 80 bottles

111. $\frac{18-12}{12} = \frac{6}{12}$ = 50%

112. 240×(1 – 12% – 18%) = 168

113. 10π = 31.4 cm (circumference)
31.4×5 = 157 (cm)

114. $36

115. $2^4 \times 3^2$

116. $20^2\pi = 400(3.14) =$ 1256 cm²
$10^2\pi = 100(3.14) =$ 314 cm²
1256 – 314 = 942 cm²

117. C
$1\frac{1}{4}$ = 1.25, 125% = 1.25, both the same.

118. $35y = 700$
$y = 20$
$5x = 20$
$x = 4$

119. 16 bacteria, 64 bacteria
1 hour 20 min = 4×(20 min)
2^4 = 16 bacteria.
2 hours = 6×(20 min)
2^6 = 64 bacteria

120. 3×4 + 20 = 32 (leftover books if 3 students take none)
32 students with 5 books and 3 students without a book.
32 + 3 = 35 (total number of students)

Answer Key

1. $23.5x^4 - 14.5x^2 - 16.5$
   $-16.5 - 14.5x^2 + 23.5x^4$
2. $4.5x^3 + 2x^2 - 11.5$
   $-11.5 + 2x^2 + 4.5x^3$
3. $14.5x^3 + 4.5x^2 + 17$
   $17 + 4.5x^2 + 14.5x^3$
4. $23x^3 + 23.5x - 25.5$
   $-25.5 + 23.5x + 23x^3$
5. $9.5x^4 + 20.5x^2 - 8.5$
   $-8.5 + 20.5x^2 + 9.5x^4$
6. $9.5x^3 + 16.5x + 20$
   $20 + 16.5x + 9.5x^3$
7. $8x^3 + 23x^2 + 1$
   $1 + 23x^2 + 8x^3$
8. $9x^4 + 17x^3 + 7.5x + 18.5$
   $18.5 + 7.5x + 17x^3 + 9x^4$
9. $17x^4 + 8x^2 + 2x - 10$
   $-10 + 2x + 8x^2 + 17x^4$
10. $-21.5x^4 + 6.5x^3 - 10x^2 + 22x - 11.5$
    $-11.5 + 22x - 10x^2 + 6.5x^3 - 21.5x^4$
11. $x^2 + 4x - 45$
12. $x^2 - 7x + 10$
13. $3x^2 - 15x + 15$
14. $4x^2 - 16x - 20$
15. $-0.5x^2 - 1.5x + 20$
16. $\frac{1}{3}x^2 - x - \frac{10}{3}$
17. $9x^2 - 81x + 180$
18. $2x^2 - 15x + 27$
19. $4x^2 - 9$
20. $-2x^2 - 5x + \frac{8}{9}$
21. $(x + 3)(x + 6)$
22. $(x + 5)(x + 6)$
23. $(x - 9)(x - 2)$
24. $(x - 2)(x - 1)$
25. $(x - 3)(x + 6)$
26. $(x - 2)(x + 8)$
27. $(x - 8)(x + 1)$
28. $(x - 6)(x + 5)$
29. $(3x + 2)(x + 4)$
30. $(2x + 7)(4x - 1)$
31. 3
32. 4
33. 5
34. 7
35. 6
36. 1/5
37. 12
38. 19
39. $2(-3)^3 - (-3)^2 - 4(-3) + 2$
    $= 2(-27) - (9) + 12 + 2$
    $= -54 - 9 + 14$
    $= -63 + 14$
    $= -49$
40. $-(3)^2 + (3) - 5 = -11$
41. $4 \times 16 = 64$
    $\frac{1}{4} \times 16 = 4$
    $64 + 4 = \underline{68}$
42. 1.5
43. 2.5
44. D
45. $125 \times (15 \div 5) = 375{,}000$
46. $7 \div 14 = \$0.50$
47. $900 \div 20 = 45$
    $20 \times (1 - 25\%) = 15$
    $900 \div 15 = 60$
    $60 - 15 = \$15$ more
48. 10 ways
    AK, AL, AO, AS,
    KL, KO, KS,
    LO, LS, and
    SO.
    Note that AK and KA are the same since the order does not matter.
49. $(10 \times 20) - \{(12+20) \times 10 \div 2\} = 200 - 160 = 40$
50. $36 \div (1\text{-}25\%) = 36 \div \frac{3}{4} = \$48$
51. 12
52. $138 \times \frac{46.5}{34.5} = 138 \times \frac{93}{69} = 2 \times 93 = \$186$
53. (a) 1st: 1
    2nd: $(1 + 5) \div 2 = 3$
    (b) 3rd: $(6 + 5) \div 3 = 3\frac{2}{3}$
    4th: $(11 + 5) \div 4 = 4$ (stars)
    $4 - 1 = 3$ (books in five-star)
54. 54
55. $\frac{1}{4} = 0.25 = 25\%$

56. Sharon must have $50 more than Lester.
Ans = $80 (Sharon)

57. $W = 45\times\frac{2}{9} = 10$
(a) (10+45)×2 = 110 cm (perimeter)
(b) 10×45 = 450 cm^2 (area)

58. (a) 3 × (80 ÷ 40) = $6
(b) 3 × (100 ÷ 40) = $7.50

59. 183÷6 = 30.5
30.5×10 = 305 mi

60. 8 small + 4 large
4×(2 small + 1 large) = 10
2 small + 1 large = 2.5 (lbs)

61. 35÷(1 – 30%) = 35÷0.7 = $50

62. 0.8×**3000** = 2400
or
2400÷0.8 = $3,000

63. $\frac{5000-4000}{5000}$ = 0.2 = 20%

64. 80×30% = 80×0.3 = $24

65. 1 – 80% = 20%

66. 60×0.3 = $18.00

67. Method (I)
60 – 18 = $42
Method (II)
60×0.7 = 42

68. 6÷15% = 6÷0.15 = 600÷15 = 40 ft

69. 31.5 – 30 = $1.50

70. 1.5 ÷ 30 = 0.05 = 5%

71. 1 – 20% = 1- 0.2 = 0.8
200×0.8 = 160

72. 2×(1 + 25%)
= 2×1.25
= 2.5 gal
= 2 gal 4 pints

73. 200×(1 + 20%)
= 200×1.2
= $240

74. 200×(1 + 15%)
= 200×1.15
= 2×115
= 230

75. 240×(1 – 12% – 18%) = 168

76. $48\times\frac{3}{4}$ = $36

77. 32×25% = 8
8 + 32 = $40.00

78. 48 – 32 = 16
16 ÷ 32 = 50%

79. 20×1.08 = $21.60

80. 21×70% = 21×0.7 = $14.70

Answer Key

1. $\frac{33}{2} = 15\frac{1}{2}$
2. $\frac{36}{5} = 7\frac{1}{5}$
3. $12 + \frac{13}{7} = 13\frac{6}{7}$
4. $15 + \frac{5}{3} = 16\frac{2}{3}$
5. $25 + \frac{5}{2} = 27\frac{1}{2}$
6. $36 + \frac{8}{5} = 37\frac{3}{5}$
7. $48 + \frac{18}{7} = 50\frac{4}{7}$
8. $6 + \frac{6}{5} = 7\frac{1}{5}$
9. $30 + \frac{8}{3} = 32\frac{2}{3}$
10. $12 + \frac{6}{5} = 13\frac{1}{5}$
11. a) -3
    b) $3x + y = -8$
    c) $3x + y = 11$
    d) $x - 3y = 4$
    e) $x - 3y = -6$
12. a) -1/5
    b) $x + 5y = 23$
    c) $x + 5y = -4$
    d) $5x - y = 5.8$
    e) $5x - y = 11$
13. a) -2/3
    b) $2x + 3y = 7$
    c) $2x + 3y = -2$
    d) $3x - 2y = 30$
    e) $3x - 2y = 4$
14. a) 3
    b) $3x - y = 16$
    c) $3x - y = -3$
    d) $x + 3y = -18$
    e) $x + 3y = 12$
15. a) 3/4
    b) $3x - 4y = 3$
    c) $3x - 4y = 21$
    d) $4x + 3y = 10.25$
    e) $4x + 3y = 29$
16. a) – 6, + 4
    b) 1
    c) 1, -50
    d) 2
    e) 2, – 6, + 4
    f) 2, -4, -48
    g) 2, 1, -50
17. a) + 5, – 3
    b) -1
    c) -1, 32
    d) -2
    e) -2, + 5, – 3
    f) -2, -4, 30
    g) -2, -1, 32
18. a) – 3, + 5
    b) -1
    c) -1, 80
    d) -5
    e) -5, – 3, + 5
    f) -5, -10, 75
    g) -5, -1, 80
19. a) – 0, – 3
    b) 1.5
    c) 1.5, -27
    d) 12
    e) 12, – 0, – 3
    f) 12, -36, 0
    g) 12, 1.5, -27
20. a) + 4.5, – 1.5
    b) -1.5
    c) -1.5, -36
    d) 4
    e) 4, + 4.5, – 1.5
    f) 4, 12, -27
    g) 4, -1.5, -36
21. $23.5x^4 - 14.5x^2 - 16.5$
    $-16.5 - 14.5x^2 + 23.5x^4$
22. $4.5x^3 + 2x^2 - 11.5$
    $-11.5 + 2x^2 + 4.5x^3$
23. $14.5x^3 + 4.5x^2 + 17$
    $17 + 4.5x^2 + 14.5x^3$
24. $23x^3 + 23.5x - 25.5$
    $-25.5 + 23.5x + 23x^3$
25. $9.5x^4 + 20.5x^2 - 8.5$
    $-8.5 + 20.5x^2 + 9.5x^4$
26. $9.5x^3 + 16.5x + 20$
    $20 + 16.5x + 9.5x^3$
27. $8x^3 + 23x^2 + 1$
    $1 + 23x^2 + 8x^3$
28. $9x^4 + 17x^3 + 7.5x + 18.5$
    $18.5 + 7.5x + 17x^3 + 9x^4$
29. $17x^4 + 8x^2 + 2x - 10$
    $-10 + 2x + 8x^2 + 17x^4$
30. $-21.5x^4 + 6.5x^3 - 10x^2 + 22x - 11.5$
    $-11.5 + 22x - 10x^2 + 6.5x^3 - 21.5x^4$
31. $33x + 14$
32. $21x + 26$
33. 10
34. $4x^6$
35. $12x^2$
36. 6
37. $-11x$
38. $-7x^3$
39. $8x^2 - 3x + 18$
40. $-2x^2 + 3x - 4$
41. $x^2 + 10x + 24$
42. $x^2 + x - 12$
43. $x^2 + 12x + 27$
44. $7x^2 + 9x + 2$
45. $x^2 - 5x + 6$
46. $16x^2 + 12x + 2$
47. $2x^2 - 9x + 10$
48. $16x^2 + 10x + 1$
49. $6x^2 - 3x - 18$
50. $6x^2 + x - 12$
51. $(x + 1)(x + 5)$
52. $(x + 4)(x + 5)$
53. $(x + 3)(x + 9)$
54. $(x - 4)(x - 3)$
55. $(x - 6)(x - 5)$
56. $(x - 1)(x + 4)$
57. $(x - 7)(x + 3)$
58. $(2x - 5)(x - 3)$
59. $(x + 7)(3x - 4)$
60. $(3x - 2)(3x - 1)$
61. $(x + 2)(x + 4)$
62. $(x + 4)(x + 5)$
63. $(x + 5)(x + 7)$
64. $(x - 9)(x - 3)$
65. $(x - 6)(x - 1)$
66. $(x - 8)(x + 4)$
67. $(x - 5)(x + 8)$
68. $2(x + 2)(x - 8)$
69. $(3x + 8)(x + 3)$
70. $(3x + 2)(3x + 1)$
71. D
72. B
73. B
74. D
75. A
76. C
77. A
78. D
79. B
80. B
81. C
82. C
83. B
84. C
85. C
86. A
87. D
88. 20 years old
89. A
    $2 \times 2^{16} = 2^{17}$
90. $y = x^2$ or $x^2 = y$

Answer Key

1. $36x^4y^2z^2$
2. $80x^5y^4z^6$
3. $2z^2$
4. $8x^4z^3$
5. $7\frac{1}{2}xy^4z^2$
6. $\frac{4}{3}x^2y^4z^2$
7. $3\frac{3}{4}\frac{x^2}{z}$
8. $3xy^2$
9. xz^3
10. $\frac{3}{4}yz^2$
11. 8000
12. 160000
13. 729
14. 900
15. 27000
16. 4096
17. 4096
18. 1024
19. 6.25
20. 2.25
21. 3
22. 4
23. 2
24. 3
25. 4
26. 2
27. 3
28. 3
29. 2
30. 2
31. $\frac{1}{4}+\frac{3}{2} = 1\frac{3}{4}$
32. $\frac{8}{4}+\frac{2}{3} = 2\frac{2}{3}$
33. $\frac{8}{5}+\frac{5}{6} = 2\frac{13}{30}$
34. $\frac{1}{3}+\frac{1}{5}+\frac{2}{3} = 1\frac{1}{5}$
35. $\frac{8}{5}+\frac{4}{1}+\frac{1}{3} = 5\frac{14}{15}$
36. $3(8x + 5)(6x + 5)$
37. $5(5x + 3)(8x – 5)$
38. $2(3x + 7)(4x + 5)$
39. $10(x + 3)(4x – 5)$
40. $-4(3x – 4)(4x – 5)$
41. $4x + 3$
    $8x^2 + 10x + 3 = (4x + 3)(2x + 1)$
    $4x^2 + 11x + 6 = (4x + 3)(x + 2)$
42. $3x – 2$
    $9x^2 – 9x + 2 = (3x – 2)(3x – 1)$
    $6x^2 – 7x + 2 = (3x – 2)(2x – 1)$
43. $3x + 1$
    $3x^2 + 10x + 3 = (3x + 1)(x + 3)$
    $3x^2 + 13x + 4 = (3x + 1)(x + 4)$
44. $x + 1$
    $x^2 + 2x + 1 = (x + 1)(x + 1)$
    $x^2 + 3x + 2 = (x + 1)(x + 2)$
45. $x – 1$
    $x^2 – 2x + 1 = (x – 1)(x – 1)$
    $3x^2 – 5x + 2 = (x – 1)(3x – 2)$
46. Assumption of non-zero denominator: $n \neq 0$.
    Multiply both sides by $5n$.
    $5n^2 – 10 = 23n$
    $5n – 23n – 10 = 0$
    $(5n + 2)(n – 5) = 0$
    $n = \boxed{-\frac{2}{5} \text{ or } 5}$
47. No solution
    Assumption of non-zero denominator: x cannot be 6 for the common denominator is $x – 6$. So, we can safely multiply the factor $(x – 6)$.
    $x – 3(x – 6) = 6$
    $(x – 6) – 3(x – 6) = 0$
    $-2(x – 6) = 0$
    $x = 6$ (violation of assumption)
48. $5(4x – 5) = 3(7x – 3)$
    $20x – 25 = 21x – 9$
    $x = -16$
49. $3(x + 1) + 2(x – 2) = 9$
    $5x – 1 = 9$
    $5x = 10$
    $x = 2$
50. $7(x + 3) – 2(x – 4) = 14$
    $5x + 29 = 14$
    $5x = -15$
    $x = -3$
51. Multiply $(x – 4)(x + 7)$
    $2(x – 4)(x + 7) – 3x(x + 7) = 14(x – 4)$
    $2x^2 + 6x – 56 – 3x^2 – 21x = 14x – 56$
    $x^2 + 29x = 0$
    $x = 0$ or -29
52. $n = 8(65 – n) + 2$
    $n = 520 – 8n + 2$
    $9n = 522$
    $n = 58$
53. -2 or 23/8
    Assumption of non-zero denominator: $n \neq 1$ or 6.
    Multiply both sides by $3(n – 1)(n – 6)$.
    $9n(n – 6) – (n – 1)(n – 6) = -40(n – 1)$
    $8n^2 – 7n – 46 = 0$
    $(8n – 23)(n + 2) = 0$
    $n = -2$ or $23/8$ (both valid)
54. 8
    Assumption of non-zero denominator: $n \neq 0$.
    Multiply both sides by $2n$.
    $10 + n = 18$
    $n = 8$ (valid)
55. 5 or $-\frac{2}{5}$
    Assumption of non-zero denominator: $n \neq 0$.
    Multiply both sides by $5n$.
    $5n^2 – 10 = 23n$
    $5n^2 – 23n – 10 = 0$
    $(n – 5)(5n + 2) = 0$
    $n = 5$ or $-\frac{2}{5}$ (both valid)
56. 6
    Assumption of non-zero denominator: $x \neq 0$.
    Multiply both sides by $3x$.
    $15 + x = 21$
    $x = 6$ (valid)
57. 5
    Assumption of non-zero denominator: $n \neq 0$.
    Multiply both sides by n.
    $47 – n = 8n + 2$
    $9n = 45$
    $n = 5$ (valid)

58. $\frac{x}{3x+1}-\frac{5}{4}=\frac{3}{2x-5}$
$\frac{4x}{3x+1}-5=\frac{12}{2x-5}$
$\frac{4x-15x-5}{3x+1}=\frac{12}{2x-5}$
$\frac{-11x-5}{3x+1}=\frac{12}{2x-5}$
$36x + 12 + 22x^2 - 45x - 25 = 0$
$22x^2 - 9x - 13 = 0$
$(x - 1)(22x + 13) = 0$
$x = 1$ or $\frac{-22}{13}$

59. .7
$\frac{9+10x}{12x}=\frac{16}{12x}$
$\frac{10x-7}{12x}=0$
$10x - 7 = 0$
$x = .7$

60. $\frac{-8}{11}$ or 2
The common denominator is $2(x + 2)(3x + 1)$.
Let's assume $x \neq -2$ or $-\frac{1}{3}$, so we may safely multiply the common denominator.
$2(3x + 1)(3x) + 2(x + 2)(3x + 1) = 35(x + 2)$
$18x^2 + 6x + 2(3x^2 + 7x + 2) = 35x + 70$
$24x^2 + 20x + 4 = 35x + 70$
$24x^2 - 15x - 66 = 0$
$8x^2 - 5x - 22 = 0$
$(8x + 11)(x - 2) = 0$
$x = \frac{-8}{11}$ or 2 (both valid)

61. x = -3, or 1
The common denominator is $(x + 1)(x - 3)$. Let's assume $x = -1$ or 3.
So, we can safely multiply the denominator:
$x(x - 3) - 2(x + 1)(x - 3) = 3(x + 1)$
$x^2 - 3x - 2(x^2 - 2x - 3) = 3x + 3$
$x^2 - 3x - 2x^2 + 4x + 6 = 3x + 3$
$-x^2 - 2x + 3 = 0$
$x^2 + 2x - 3 = 0$
$(x - 1)(x + 3) = 0$
$x = 1$ or -3, (both valid)

62. 0 or -29
Assumption of non-zero denominator: $x \neq 4$ or -7.
Multiply both sides by the factor $(x - 4)(x + 7)$.
$2(x - 4)(x + 7) - 3x(x + 7) = 14(x - 4)$
$-x^2 - 29x = 0$
$-x(x + 29) = 0$
$x = 0$ or -29 (valid)

63. 58
$n = 8(65 - n) + 2$
$n = 520 - 8n + 2$
$9n = 522$
$n = 58$

64. $\frac{1}{4}$ or 4
Assumption of non-zero denominator: $n \neq 0$.
Multiply both sides by $4n$.
$4n^2 + 4 = 17n$
$4n^2 - 17n + 4 = 0$
$(4n - 1)(n - 4) = 0$
$n = \frac{1}{4}$ or 4 (valid)

65. 2

66. $\frac{2}{x+4}=\frac{5}{3x}$
$5(x + 4) = 6x$
$x = 20$

67. $(2x - 3)(x - 2) = (x + 1)(x + 6)$
$2x^2 - 7x + 6 = x^2 + 7x + 6$
$x^2 - 14x = 0$
$x = 0$ or 14

68. $x+2=\frac{5x-20}{x-4}$
$(x + 2)(x - 4) = 5x - 20$
$x^2 - 2x - 8 = 5x - 20$
$x^2 - 7x + 12 = 0$
$(x - 3)(x - 4) = 0$
$x = 3$ (4 is invalid)

69. $\frac{x^2-2x-4x-12}{(x+3)(x-2)}=\frac{-5x^2}{x^2+x-6}$
$x^2 - 6x - 12 = -5x^2$
$6x^2 - 6x - 12 = 0$
$x^2 - x - 2 = 0$
$(x - 2)(x + 1) = 0$
$x = -1$ (2 is invalid)

70. $\frac{3x}{(x+2)(x+3)}+\frac{2}{(x+2)(x-1)}=\frac{5x}{(x+3)(x-1)}$
$3x(x - 1) + 2(x + 3) = 5x(x + 2)$
$2x^2 + 11x - 6 = 0$
$(2x - 1)(x + 6) = 0$
$x = \frac{1}{2}$ or -6

71. Multiply $(x - 1)(x - 2)$, we have
$7x - 4 = a(x - 2) + b(x - 1)$
$7x - 4 = (a + b)x - 2a - b$
Thus, we conclude
$7 = a + b$
$4 = 2a + b$
$a = -3$
$b = 10$
Therefore, we conclude that
$\frac{7x-4}{(x-1)(x-2)}=\frac{-3}{x-1}+\frac{10}{x-2}$

72. $\frac{4x}{x(1+\frac{1}{x})}+\frac{3\times2}{3(x+\frac{2}{3})}=\frac{13}{2}$
$\frac{4x}{x+1}+\frac{6}{3x+2}=\frac{13}{2}$
$\frac{4x(3x+2)}{(x+1)(3x+2)}+\frac{6(x+1)}{(x+1)(3x+2)}=\frac{13}{2}$
$\frac{12x^2+14x+6}{3x^2+5x+2}=\frac{13}{2}$
$24x^2 + 28x + 12 = 39x^2 + 65x + 26$
$15x^2 + 37x + 14 = 0$
$(x + 2)(15x + 7) = 0$
$x = -2$ or $\frac{-7}{15}$

73. $\frac{8}{7}$

74. $\frac{6}{5}$

75. $\frac{8}{5}$

76. $\frac{9}{5}$

77. $\frac{9}{7}$

78. $\frac{6}{5}$

79. $\frac{9}{2}$

80. $\frac{5}{6}$

81. $\frac{6}{7}$

82. $\frac{5}{6}$

83. $\frac{a}{b}=c \Rightarrow b=a=b^2 \Rightarrow b=\pm\sqrt{a}$

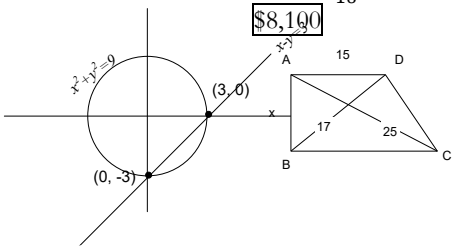
84. $a=\frac{ax}{1-x} \Rightarrow 1=\frac{x}{1-x}$ (cancellation)
$1 - x = x \Rightarrow x = \frac{1}{2}$

85. $7^{0.7} = 7^{1-0.3} = 7/ 7^{0.3} = 7/a$.

86. $\frac{2d}{\frac{d}{b-a}+\frac{d}{b+a}}=\frac{2}{\frac{1}{b-a}+\frac{1}{b+a}}=\frac{2}{\frac{1}{b-a}+\frac{1}{b+a}}=\frac{2}{\frac{2b}{(b-a)(b+a)}}=\frac{b^2-a^2}{b}$

87. $1+r+r^2+\ldots+r^n = (1 - r^{n+1})/(1-r)$
$1 + .2 + .2^2 + .2^3 + \ldots + .2^{10} = (1 - .2^{11})/(1-.2)$
Note that $.2^{11} \approx 0$, we have $(1 - .2^{11})/(1-.2) = 1/.8 = 1.25$

88. Substitution method proves to be effective as follows. From the first equation, we have $y = x - 3$. Plug it in to the second equation, we have
$x^2 + (x-3)^2 = 9 \Rightarrow 2x^2-6x+9=9 \Rightarrow x^2-3x = 0$
$\Rightarrow x(x-3) = 0 \Rightarrow x =$ 0 or 3, thus, $y=x-3=$ -3, or 0. Therefore, the solution is $(x, y) = (0, -3)$ and $(3, 0)$.
Let's picture the equation.



89. -2

90. There are $n - m + 1$ numbers in the sequence. The sum is $\frac{1}{2}(n - m + 1)(n+m)$. Note: that the previous problem is a special case when $m = 1$.

91. Mr. Power only works $\frac{12}{16}$as much as Mr. Fixit, however, charging $\frac{3}{2}$ as much, so he deserves $\$7{,}200\times\frac{12}{16}\times\frac{3}{2} =$ $\boxed{\$8{,}100}$

92. $\angle CBD=\frac{1}{2}(180°-70°)=55°$
$\angle CBA=\angle BCD=\frac{1}{2}(55°)=27.5°$
$\angle BAC=180° - 2\times(27.5°)=125°$

93. C_2^n or $\binom{n}{2} = \frac{1}{2}n(n-1)$

94. $2(ab+bc+ca)$.

95. $m((1 + \frac{r}{365})^{730} -1)\approx m(e^{2r} - 1)$
where $e = 2.71828\ldots$ is the natural base.

96. $\$70\times400\div350=\$80$
$80 - 70 = \$10$

97. B
$9x < 36$
$x < 4$

98. 78

99. 51

100. $a = 9$, $b = 11$, $c = 17$

101. $m = 5$ and $n = 7$
35

102. $\left(3^{\sqrt[5]{16}}\right)^{\frac{\sqrt[20]{8^{13}}}{\sqrt[4]{8}}} = \left(3^{2^{\frac{4}{5}}}\right)^{2^{\frac{39}{20}-\frac{3}{4}}} = \left(3^{2^{\frac{4}{5}}}\right)^{2^{\frac{6}{5}}} = 3^{2^2} = 3^4 = 81$
Checking: