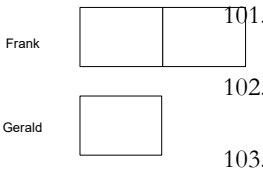
Answer Key

1. 10.9
2. 12.6
3. 12.6
4. 8.5
5. 1.9
6. 1.8
7. 8.5
8. 3.2
9. 3.6
10. 4.1
11. 2.6
12. 2.1
13. 11.9
14. 7.27
15. 5.04
16. 9.02
17. 5.15
18. 10.01
19. 15.91
20. 8.06
21. {1, 3, 19, 57}
22. {1, 3, 7, 9, 21, 63}
23. {1, 2, 4, 8, 16, 32, 64}
24. {1, 5, 13, 65}
25. {1, 2, 3, 6, 11, 22, 33, 66}
26. {1, 2, 4, 17, 34, 68}
27. {1, 2, 5, 7, 10, 14, 35, 70}
28. {1, 3, 5, 15, 25, 75}
29. {1, 3, 6, 14, 28, 84}
30. { 23, 29, 31, 37 }
31. $\frac{7}{9}$
32. $\frac{5}{7}$
33. $\frac{2}{7}$
34. $\frac{3}{10}$
35. $\frac{7}{10}$
36. $\frac{3}{4}$
37. $\frac{2}{3}$
38. $\frac{5}{6}$
39. $\frac{5}{9}$
40. $\frac{2}{9}$
41. $\frac{2}{5}$
42. $\frac{4}{9}$
43. $\frac{3}{7}$
44. $\frac{6}{11}$
45. $\frac{3}{5}$
46. $\frac{4}{7}$
47. $\frac{6}{7}$
48. $\frac{5}{8}$
49. $\frac{7}{8}$
50. $\frac{4}{5}$
51. $4\frac{2}{4}$
52. $2\frac{3}{6}$
53. $2\frac{5}{8}$
54. $1\frac{8}{9}$
55. $1\frac{4}{6}$
56. $3\frac{3}{4}$
57. $2\frac{3}{6}$
58. $1\frac{3}{8}$
59. $2\frac{4}{9}$
60. $2\frac{3}{6}$
61. 120
62. 9.6
63. 144
64. 6
65. 16 & 2 (R)
66. 84
67. 2
68. 10
69. 174
70. 2
71. 7.2
72. 3
73. 45
74. 25
75. 4.4
76. 20
77. 5
78. 4.8
79. 6
80. 960
81. 30 + 60 + 90 + 120 = 300 (sec)
    0.25×4 = $1
82. 12:00 - 8:45 = 3:15
    3:15 + 6:45 = 10:00 = 10 hr
83. 120 - 2×20 = $80
84. 220 - 30 = 190
    190 ÷ 2 = $95
85. 255 - 90×2 = 75
    75 ÷ 3 = $25
86. 24÷3 = 8
87. 60.75÷5 = $12.15
88. 1 + 2 = 3
    18 ÷ 3 = 6 (Gerald)
    6×2 = 12 (Frank)



89. 1 + 2 = 3
    18 ÷ 3 = 6 (Jon)
    6×2 = 12 (Tom)
90. Every group of five marbles, Jon receives 2 and Ken receives 3. There are 30÷5 = 6 groups,
    (a) 2×6 = 12 (Jon)
    (b) 3×6 = 18 (Ken)
91. 1600÷4÷2 = 200 mi
92. 33 - 15 + 1 = 19 rows (not just 18)
    19×6 = 114
93. 2×1.50 = 3
    3 - 2 = 1
    1÷2 = $0.50
    0.5 + 2 = $2.50
94. 2 × 8+ 3 × 16 = 64
    2(3×8 + 4×16) = 176
    64 + 176 = <u>240 books</u>
95. 60÷2 = 30
    60÷3 = 20
    60 - 30 - 20 = $10
96. Parakeet: 2
    Canary: 4 (= 6 - 2)
    Goldfish: 5 (= 4 + 1)
    Turtle: 1 (= 5 - 4)
    2 + 4 + 5 + 1 = 12 (pets)
97. 6×20 = 120
    ⅝×120 = 75
    ⅔×75 = 50 sq. ft.
98. (2.50 - 1)÷2 = $0.75
99. 30 + 10 = 40
    40 ÷ 2 = 20
100. 3×16 + 2 = 50 (oz)
     4 ÷ 50 = $0.08
101. 2800÷7 = $400 each baby pig
102. 2800÷7 = $400 each day
103. 2800÷7 = 400 pages a day
104. 6 + 1 = 7 (including herself)
     280÷7 = $40 each sister
105. 60×10×2 = 1200
106. 30 - 6 = 24
     24 ÷ 2 = $12
107. 172÷4 = 43 sheep
108. 54 + 6 = 60
     60÷4 = $15
109. 1000÷200 =5 (bulbs)
110. 56÷8 = 7 (boxes)

MAP 239+ (T3) Issue 12

111. $14\times2 + 5 = 33$ (points)

112. $30 - 15 = 15$
$15 + 25 = 40$ days

113. $34\div2 = 17$
$17 - 5 = 12$ (length)

114. $\frac{12}{3}\times\frac{21}{3} = 4\times7 = 28$

115. $200 - 15\times4 = 140$ cm

116. $3+6 + 3\times2 + 2\times4 =$ 23 waffles

117. $40\times0.30 = \$12$

118. $40\div8 = 5$ (cartons)

119. $5\times2 = \$10$

120. $23.75\times5 = 118.75$
(a) $120 = 6\times20 = 6$ bills of \$20
(b) $120 - 118.75 =$ \$1.25 for change

Answer Key

1. $27\frac{1}{2}$
2. $73\frac{1}{2}$
3. $127\frac{1}{2}$
4. $250\frac{2}{3}$
5. $76\frac{1}{2}$
6. $77\frac{1}{3}$
7. $150\frac{2}{3}$
8. $169\frac{2}{3}$
9. $137\frac{1}{2}$
10. $82\frac{1}{5}$
11. 5.6
12. 27
13. 40
14. 35
15. 63
16. 99
17. 14
18. 27
19. 20
20. 80

21. 7.2
22. 45
23. 56
24. 49
25. 24
26. 3
27. 15
28. 33
29. 30
30. 85
31. $\frac{1}{4}$
32. $\frac{3}{8}$
33. $\frac{3}{5}$
34. $\frac{10}{21}$
35. $\frac{15}{56}$
36. $\frac{5}{14}$
37. $\frac{5}{6}$
38. $\frac{7}{36}$
39. $\frac{11}{72}$
40. $\frac{9}{56}$

41. 14
42. 2
43. 4.2
44. 420
45. 6.4
46. 72
47. 12
48. 4.9
49. 2.4
50. 180
51. 40
52. 8
53. 78
54. 0.02
55. 3
56. 1.4
57. 12
58. 24
59. 200
60. 10

61. 197
62. 280
63. 10
64. 10
65. 0
66. 0.7
67. 100
68. 770
69. ~~(1, 2, 4, 8)~~ 16, 32, 64
70. 25
71. 14
72. 4
73. 8
74. 48 pounds
75. 3
76. 69
77. 124
78. 4 & 6
79. 12
80. 18

81. (5 - 3) + (7 - 3) = 12 - 6 = 6
82. 20 yrs old, James & 10 yrs old, Isaac
83. 24 yrs old, James & 14 yrs old, Isaac
84. (17 + 3) - (15 + 3) = 17 - 15 = 2
85. (17 - 3) - (15 - 3) = 17 - 15 = 2
86. Method I)
    30 - 2×8 = <u>14</u>

    Method II)
    30 - 8 = 22 (Brian)
    22 - 8 = 14 (difference)
87. 1 + 2 = 3
    24 ÷ 3 = 8
    8×2 = 16 yrs old
88. $\frac{11-3}{2}$ = 4 yrs old
89. 15×2 = 30 (sum)
    30 - 12 = 18 (Elisa)
90. 50 × 3 = 150
    150 - (40 + 30) = 80 lb
91. 42
92. 60
93. 20+40+80 = 140
94. 0.12 = $\frac{12}{100}$ = $\frac{3}{25}$ = 3/25
95. 15
96. 125
97. 5 tickets
98. 20
99. 800
100. $48\times\frac{3}{4}$ = $\boxed{36}$
101. 3 & 27
102. $\frac{17}{24}$

$$\begin{array}{r} \frac{38}{24} \\ -\ \frac{21}{24} \\ \hline \end{array} = \frac{17}{24} = 17/24$$

103. 2 quarters = 5 dimes, 12 quarters = 30 dimes

MAP 249+ (T3) Issue 12

104. $2\times3\times4\times5\times\frac{1}{2}\times\frac{1}{3}\times\frac{1}{4}\times\frac{1}{5}$
= $(2\times\frac{1}{2})\times(3\times\frac{1}{3})\times(4\times\frac{1}{4})\times(5\times\frac{1}{5})$
= 1

105. 34

106. C

107. 6

108. C

109. 50 (mph)

110. 50÷2 = 25
25-10 = 15 (length)
15×10 = $\boxed{150\ (in^2)}$

111. Uno = 7, Tom = 10, Sam = <u>20 (yrs old Sam)</u>

112. 8 + 8 + 8 = 24

113. 21 - 7 - 3 = 11 yrs old

114. Kirk = 10 – 4 = 6 (4 years ago)
Jake = 12 (4 years ago)
Jake = <u>16 (now)</u>

115. (a) $\frac{11-3}{2} = 4$ (Brandon)
(b) $\frac{11+3}{2} = 7$ (Andy)

Answer Key

1. 3844
2. 5329
3. 5476
4. 5625
5. 5776
6. 5929
7. 6084
8. 6241
9. 6400
10. 15,129
11. $\frac{2}{3}$
12. $\frac{2}{5}$
13. $4+\frac{2}{7}=4\frac{2}{7}$
14. $18+\frac{3}{5}=18\frac{3}{5}$
15. $18+\frac{3}{7}=18\frac{3}{7}$
16. $48+\frac{4}{5}=48\frac{4}{5}$
17. $24+\frac{4}{3}=25\frac{1}{3}$
18. $100+\frac{5}{3}=101\frac{2}{3}$
19. $45+\frac{9}{2}=49\frac{1}{2}$
20. $90+\frac{21}{2}=100\frac{1}{2}$
21. $34\frac{2}{15}$
22. $75\frac{2}{35}$
23. $33\frac{1}{15}$
24. $66\frac{2}{15}$
25. $34\frac{2}{15}$
26. $61\frac{1}{14}$
27. $74\frac{2}{35}$
28. $34\frac{2}{15}$
29. $79\frac{4}{9}$
30. $33\frac{1}{15}$
31. $\frac{1}{240}$
32. $\frac{11}{18}$
33. $\frac{17}{40}$
34. $\frac{23}{192}$
35. $\frac{29}{80}$
36. $\frac{37}{108}$
37. $\frac{43}{210}$
38. $\frac{5}{48}$
39. $\frac{7}{108}$
40. $\frac{88}{225}$
41. 35
42. 0.6
43. 60
44. 0.32
45. 40
46. 0.35
47. 0.72
48. 12.5
49. 0.025
50. 1.4
51. 0.05
52. 0.64
53. 0.48
54. 0.035
55. 1500
56. 1000
57. 3500
58. 0.32
59. 0.175
60. 4500
61. 12,000,000
62. 18,000
63. 0.02
64. 240
65. 42,000
66. 240,000
67. 0.024
68. 50
69. 0.07
70. 0.00001
71. 0.0002
72. 1,000
73. 2.4
74. 0.0028
75. 640
76. 350,000
77. 64,000
78. 0.006
79. 800,000
80. 800
81. $\frac{80-64}{80}$ = 0.2 = 20%
82. 5×☐ = 3.5
☐ = 3.5÷5 = $0.70
83. 540÷3 = $180 (each hour Friday, better)
600÷4 = $150 (each hour Saturday)
84. -15 + 8 – 2 = -9
85. 7.5×36=$270
86. 40×8 + 5×12
= 320 + 60
= $380
87. 550 – 40×10 = 150
150÷15 = 10
10 + 40 = 50
88. C
B: 0.17
J: 55% = 0.55
N: 0.57
U: $\frac{1}{5}$ = 0.2
Great Britain, United States, Japan, The Netherlands
89. Outbound: 210/60 = 3.5 hours
Inbound: 210/70 = 3 hours
3.5 + 3 = 6.5 hours
90. 150÷60×10 = 150÷5 = 25
91. $\frac{\#\text{correct questions}}{\#\text{total questions}} = \frac{12}{\#\text{total questions}}$ = 80%
total = 15
92. 1 min = 60 sec = 3(20)
30×3 = 90 words (per min)
90×10 = 900 words
93. 5×4×3×2×1 = 120 ways
94. 4.25×4 = 17 (books)
17+4.25 = 21.25
21.25 + 7.35 = $28.60
95. $\frac{1}{2}(56°) = 28°$
96. $\frac{12.75}{3}$×5 = $21.25
97. There are four places ___ ___ __ __ to fill up. So, there are 26×26×10×10 = 67600 combinations.
98. B
$\frac{5550}{5551} = 1-\frac{1}{5551}$
$\frac{9998}{9999} = 1-\frac{1}{9999}$
Since $\frac{1}{5551} > \frac{1}{9999}$, A < B

99. Method I)

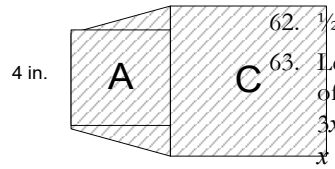
#Right	Raw Score	Deduction	Actual Score
20	100	0	100
19	95	2	93
18	90	4	86
17	85	6	79
16	80	8	**72**
15	75	10	65

Method II)
100 – 72 = 28
28÷7 = 4
20 – 4 = 16 (questions right)

100. 20×3 = 60 (wheels if all tricycles)
68 – 60 = 8 (falling short from reality)
8 ÷ (4 – 3) = 8 (sedans)
20 – 8 = 12 (tricycles)

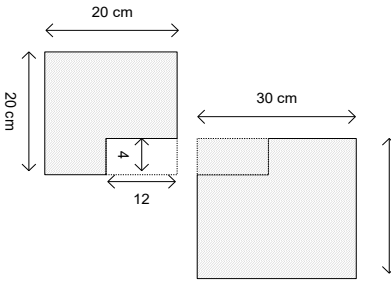
Answer Key

1. $x^2 - 4x - 21$
2. $x^2 - 6x - 7$
3. $x^2 - 11x + 28$
4. $x^2 - 12x + 35$
5. $x^2 - 5x - 14$
6. $x^2 - 2x - 35$
7. $3x^2 - 10x - 8$
8. $6x^2 + 7x + 2$
9. $9x^2 - 9x + 2$
10. $18x^2 + 51x + 8$
11. 4, -3, -4
12. 5, 3, 35
13. -2, 3, -30
14. -7, 1, -2
15. 9, 3, 11
16. 4, -4, 6
17. 5, 5, 12
18. -2, -8, 9
19. -7, 5, 1
20. 9, -8, 6
21. $a = 4$, $b = -10$, $c = -1$
22. $a = 4$, $b = 2$, $c = 3$
23. $a = -3$, $b = -3$, $c = 1$
24. $a = -2$, $b = 1$, $c = -2$
25. $a = 3$, $b = 3$, $c = 3$
26. $a = -3$, $b = -4$, $c = 8$
27. $a = 2$, $b = 1$, $c = -6$
28. $a = 2$, $b = 3$, $c = -2$
29. $a = 4$, $b = -2$, $c = 10$
30. $a = 4$, $b = 14$, $c = 2$
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. 360÷24 = 15 gal
42. $10\times \frac{1}{5}\times 8\times 5$ = \$80.00
43. A
    3.0÷12 = \$0.25 per ounce (12-ounce cheaper)
    5.4÷18 = \$0.30 per ounce
44. 240 ÷ 60 = 4 (hr)
    4 – 1 = 3 hr (expected)
    240÷3 = 80 mph
    80 – 60 = 20 mph faster
45. 400×4×0.1 = \$160
46. $\frac{14}{3\frac{1}{2}}$ = 4 hr
47. $\frac{30-21}{30}$ = 0.3 = 30%
48. 15 ÷0.75 = 20
    20×4 = 80 packets
49. B
    42.00÷600 = \$0.07 per kilowatt
    48.00÷800 = \$0.06 per kilowatt (the second cheaper)
50. $2\frac{5}{6} = \frac{17}{6}$
    $\frac{17}{6} \div \frac{1}{6} = 17$
51. 1 – 20% = 1- 0.2 = 0.8
    200×0.8 = 160
52. C
53. 125÷2.5 = 50
    50×8 = 400 mi
54. $\frac{1}{2}(4+6)(4) = 20$ in^2 (area of trapezoid)
    $6^2 = 36$ in^2 (square area)
    20 + 36 = 56 in^2 (total)



55. 24.5÷7 = 3.5
    3.5×12 = 42 in
56. $n - 3 = 1.5$
    $n = 4.5$
57. 28
58. 1.25×10^{11}
59. Method I)
    9 losses = 60% of 15
    20% = loss rate
    Total = 45 games played
    45 – 15 = <u>30 games</u> (winning in a row)

    Method II)
    0.4×15 = 6 (games won so far)
    Let x be the number of games to play and win.
    $\frac{x+6}{x+15} = 0.8$
    $x + 6 = 0.8x + 12$
    $0.2x = 6$
    $x = 30$ games
60. 2×(9+6) = 30 feet = 10 yards
61. AD is the hypotenuse of ΔAOD, also
    AO = 8
    OD = 6
    The Pythagorean triple, is 2×(3, 4, 5) = (6, 8, 10). So, the hypotenuse is 10. The perimeter is
    10×4 = 40
62. ½(12×16) = 96
63. Let x be the measure of the base angle.
    $3x + x + x = 5x$
    $x = 36$
64. 300 + 10×100 = 1300
65. 400 + 900 = 1300 cm^2 (total)
    1300 – 48 = 1252 cm^2



66. 12÷⅙×1½ = 108 mi
67. 4444÷5555 = 0.8 mi
68. 25%
69. ∠A + ∠B = 2(180° – 140°) = 80
    ∠C = 180 – 80 = 100°
70. ¾ = 3/4

Answer Key

1. 4, -3, -4
2. 5, 3, 35
3. -2, 3, -30
4. -7, 1, -2
5. 9, 3, 11
6. 4, -4, 6
7. 5, 5, 12
8. -2, -8, 9
9. -7, 5, 1
10. 9, -8, 6
11. $\frac{15}{2} = 7\frac{1}{2}$
12. $\frac{36}{5} = 7\frac{1}{5}$
13. $14 + \frac{13}{6} = 15\frac{6}{7}$
14. $18 + \frac{6}{5} = 19\frac{2}{5}$
15. $24 + \frac{6}{5} = 27\frac{1}{5}$
16. $15 + \frac{5}{3} = 16\frac{2}{3}$
17. $25 + \frac{5}{2} = 27\frac{1}{2}$
18. $36 + \frac{8}{5} = 37\frac{3}{5}$
19. $48 + \frac{18}{7} = 50\frac{4}{7}$
20. $30 + \frac{8}{3} = 32\frac{2}{3}$
21. 2, 7, 3
22. 2, 1, -6
23. 2, -1, 1, 1
24. 2, -1, -8, -3
25. 1, -5, -2
26. 2, 5, 18
27. 2, -8, 7
28. 8, -5, -6
29. 2, 1, 1
30. 2, 2, -1
31. 4 – 3 + 2
32. 2 – 5 + 1 – 10
33. 3 – 2 + 0 + 0 – 5
34. 3 - 1 + 5
35. 2 + 0 – 5 + 0 (Note: Leave 0 for missing terms.)
36. 1 + 0 - 2 + 0 + 1 (Note: Leave 0 for missing terms.)
37. $3x^3 + 2x^2 - 4x$
38. $4x^5 - 5x^3 - 1$
39. $x^2 + 2x + 3$
40. $x^3 - 2x^2 + 3x - 4$
41. $x^2 + 14x + 48$
42. $8x^2 + 22x + 5$
43. $x^2 - 8x - 33$
44. $9y^2 - 30y + 25$
45. $a^2 + a - 90$
46. $y^2 - 10y - 24$
47. x^3, x^2, x, and 1
48. 15
49. 5 + 21 = 26
50. 7 + 10 = 17
51. 14
52. $15x^3 + 26x^2 + 17x + 14$
53. $(x + 2)(x + 11)$
54. $(x - 7)(x - 5)$
55. $(x - 3)(x - 1)$
56. $(x - 2)(x + 6)$
57. $(x - 1)(x + 8)$
58. $(x - 3)(x + 4)$
59. $(x - 9)(x + 1)$
60. $(2x + 3)(x - 3)$
61. $(x + 1)(3x + 2)$
62. $(3x - 4)(4x - 1)$
63. C
64. C
65. D
66. A
67. C
68. B
69. D
70. B
71. B
72. C
73. C
74. C
75. D

Answer Key

1. $f(0) = 5.12$
   $f(-1) = 2.56$
   $f(x) = 5.12(2^x)$
2. $f(0) = -8$
   $f(5) = -256$
   $f(x) = -8(2^x)$
3. $f(0) = 0.8$
   $f(5) = 2500$
   $f(x) = 0.8(5^x)$
4. $f(0) = 125$
   $f(6) = 0.008$
   $f(x) = 125(0.2^x)$
5. $f(0) = 14$
   $f(-1) = 20$
   $f(x) = 14(0.7^x)$
6. V: $(x + 1)^2 - 9$
   F: $(x + 4)(x - 2)$
7. V: $4(x + 1.5)^2 - 9$
   F: $4(x + 3)x$
8. S: $2x^2 + 8x - 10$
   F: $2(x + 5)(x - 1)$
9. S: $-3x^2 + 30x - 102$
   F: N/A
10. S: $4x^2 + 20x - 24$
    V: $4(x + 2.5)^2 - 49$
11. 6, 17, 12
12. 6, 7, -3
13. 2, -4, -4, -6
14. 4, 8, 6, 2
15. 3, -2, 5
16. 1, 2, 1
17. 4, 7, 5
18. 5, 13, 8
19. 1, -2, -1
20. 2, 2, 12
21. 0.0625
22. 0.64
23. 0.512
24. 0.4096
25. 0.36
26. 0.216
27. 3
28. 81
29. 243
30. 8
31. $\frac{3}{4}$
32. $2\frac{1}{2}$
33. $1\frac{2}{3}$
34. $1\frac{1}{4}$
35. $\frac{5}{6}$
36. 3
37. 2
38. $1\frac{1}{2}$
39. $1\frac{1}{5}$
40. 2
41. $\frac{7}{2} + \frac{2}{4} = 4$
42. $\frac{4}{1} + \frac{1}{2} = 4\frac{1}{2}$
43. $\frac{6}{5} + \frac{1}{2} = 1\frac{7}{10}$
44. $\frac{3}{5} + \frac{5}{4} + \frac{3}{2} = 3\frac{7}{20}$
45. $\frac{5}{4} + \frac{1}{2} + \frac{3}{1} = 4\frac{3}{4}$
46. $\left(3\sqrt{x} + 5\right)^2 + \left(2\sqrt{3} - 4\right)^2 x$
    $= 9x + 30\sqrt{x} + 25 + (28 - 16\sqrt{3})x$
    $= (37 - 16\sqrt{3})x + 30\sqrt{x} + 25$
47. Factor by regrouping:
    $y^4 - 1 + x^2y^2 - x^2$
    $= (y^2 - 1)(y^2 + 1) + x^2(y^2 - 1)$
    $= (y^2 - 1)(x^2 + y^2 + 1)$
48. $25 + 30xy + 9x^2y^2 + 14xy^2 + 49xy - 24x^2y^2 + 32xy^2$
    $= -15x^2y^2 + 46xy^2 + 79xy + 25$
49. $N = \frac{(x-5)-2(x+1)}{(x+1)(x-5)} = \frac{-x-7}{(x+1)(x-5)}$
    $\frac{N}{D} = \frac{-(x+7)}{(x+1)(x-5)}\left(\frac{x+7}{x+2}\right) = \frac{-(x+7)^2}{(x+1)(x-5)(x+2)}$
50. $a(x + y) + 2z(x + y) - 5z = 4$
    $(a + 2z)(x + y) = 4 + 5z$
    $x + y = \frac{4 + 5z}{a + 2z}$
51. $((3i + 1)^2)^2 = (-8 + 6i)^2 = 28 - 96i$
52. $(a - 3)y = 8(a - 3)$
    $(a - 3)(y - 8) = 0$
    If $a = 3$, the above equation is true for all values of y.
53. $\begin{cases} 3x - 2y = -12 \\ 3x - ay = -12 \end{cases}$
    $a = \boxed{2}$
54. A
55. (15, -5, $\frac{1}{3}$)
56. (15, 5, $-\frac{1}{3}$)
57. (5, -15, 3)
58. $(-5, -15, -3)$
59. C
    C(2) = 0, C(−1) = −18
60. $\frac{3}{1-\sqrt{2x}} + \frac{3x}{1-2x}$
    $= \frac{3(1+\sqrt{2x})}{1-2x} + \frac{3x}{1-2x}$
    $= \frac{3(1 + \sqrt{2x} + x)}{1 - 2x}$