Answer Key

1. 15.42
2. 11.2
3. 31.1
4. 11.3
5. 10
6. 22.3
7. 17.03
8. 10.8
9. 5.91
10. 1.9
11. 3.7
12. 5.1
13. 3.9
14. 5.5
15. 2.7
16. 3.3
17. 3.3
18. 5.73
19. 0.69
20. 4.588
21. $21\frac{1}{4}$
22. $20\frac{1}{6}$
23. $19\frac{1}{8}$
24. $3\frac{3}{9}$
25. $6\frac{1}{6}$
26. $9\frac{1}{4}$
27. $4\frac{3}{6}$
28. $5\frac{1}{8}$
29. $4\frac{2}{9}$
30. $4\frac{4}{6}$
31. 33
32. 57
33. 56
34. 34
35. 68
36. 44
37. 47
38. 56
39. 28
40. 41
41. 9
42. 20
43. 6
44. 6
45. 24
46. 40
47. 15
48. 9
49. 27
50. 9
51. 15
52. 21
53. 10
54. 15
55. 20
56. 35
57. 20
58. 12
59. 288
60. 5
61. 60
62. 90
63. 140
64. 2
65. 1000
66. 56
67. 50
68. 30
69. 3
70. 192
71. 10
72. 36
73. 60
74. 24
75. 48
76. 15
77. 17
78. 12 + 5 = 17
    17 + 7 = 24

79. 30÷3 = 10
    10×2 = 20
    10 + 3 = 13 yrs old (Juan)
    20 + 3 = 23 yrs old (Bill)
80. 100
81. B
82. 10:10 - 8:40 = 1:30 = 1 hr & 30 min
83. 998
84. 101
85. 1000÷10 = 100 (pennies) = 1 dollar = $1.00
86. 16÷2 = 8
    8×3 = 24 ft
87. 14 ÷ 2 = 7
    7 - 5 = 2 inches
88. 2(5 + 10) = 30 cm
89. 63×7 = 441
90. 12×7 = 84
91. 12.50×2 = $25.00
92. 62 - 39 = 23
93. 15÷3 = 5 (Mary)
    5×2 = 10 (Susan)
94. 6 - $\frac{1}{2}$×6 = 3 (Amy's)
    6 - $\frac{1}{3}$×6 = 4 (Paul's)
    3 + 4 = 7 cans
95. $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}$
    1 - $\frac{3}{4}$ = 1/4 (leftover)
96. 8 & 9
97. 82 + 78 + 83 = 243
    243÷3 = 81
98. 4
99. 1 & 2& 3 & 4
100. 4
101. 3×2×1 = 6
102. 92 – 20 = 72
    72÷8 = 9
103. C
104. 30 – 2×4 = 22
    22÷2 = 11 hens
105. A
106. A
107. 10
108. 5
109. 1.25
110. C
111. 6×3÷2 = 9
112. 4×2 = 8
113. A

Answer Key

1. 4800
2. 5100
3. 5400
4. 21
5. 35
6. 49
7. 63
8. 77
9. 91
10. 105
11. 119
12. 2.4
13. 3.6
14. 20
15. 30
16. 35
17. 40
18. 45
19. 55
20. 60

21. 1/5
22. 1/8
23. 4/15
24. 6/25
25. 1/9
26. 3/20
27. 5/12
28. 7/24
29. 9/40
30. 1/9
31. .04, .004
32. .05, .005
33. .06, .006
34. .07, .007
35. .08, .008
36. .09, .009
37. .001, .0001
38. .002, .0002
39. .003, .0003
40. .004, .0004

41. 4.8
42. 4.3
43. 5.6
44. 6.5
45. 12.5
46. 7.25
47. 9.25
48. 5.125
49. 4.375
50. 4.875
51. 10
52. 27
53. 0.9
54. 6
55. 24
56. 17
57. 0.018
58. A
59. 0.006
60. 0.3

61. 0.4
62. 10
63. 25%
64. 510
65. 4
66. 1,200
67. 21
68. 2
69. .028
70. .006
71. 5 (greens)
72. $13
73. $.50
74. 18
75. 8.4 miles
76. $14
77. 21 (quarters)
78. $10
79. $12
80. $41.45

81. 5
82. $57
83. $42
84. 22
85. 13
86. 105
87. 32
88. 9 in
89. 125
90. 6 (yellow)
91. $5.20
92. 5 3/4 (cases)
93. 1 1/4 yd
94. 2 1/3credits
95. 3 11/12 mi
96. 1/9
97. 2 2/3
98. 32 1/8
99. 11 7/8 pounds
100. 24

101. $7\frac{1}{2}+15\frac{3}{4} = 23\frac{1}{4}$ = 23 1/4 inches
102. $15.7+7\frac{1}{2}+10\frac{1}{5}$ = 15.7+7.5+10.2 = 33.4
103. $2\frac{1}{2} + 3\frac{2}{3} = 6\frac{1}{6}$ = 6 1/6 credits
104. $\frac{12800}{40} = 320$
105. $38\frac{3}{4} - 31\frac{1}{4} = 7\frac{3}{4} - \frac{1}{4}$ $= 7\frac{1}{2}$ = 7 1/2 pounds
106. $\frac{4}{5}$ = 4/5
107. $1\frac{1}{2}\times 6$ = 9 hours

108. $\frac{6}{24} = \frac{1}{4} = 1/4$

109. $1\frac{1}{4}$ - $\frac{1}{2} = \frac{3}{4} = 3/4$

110. $32\frac{1}{8}$ - $27\frac{3}{4} = 5\frac{1}{8}$ - $\frac{3}{4} = 4\frac{3}{8}$ = 4 3/8 lb

Answer Key

1. 225
2. 625
3. 1225
4. 2025
5. 3025
6. 4225
7. 5625
8. 7225
9. 9025
10. 11025
11. 11/75
12. 23/72
13. 31/36
14. 41/144
15. 47/216
16. 59/144
17. 71/108
18. 19/90
19. 1/12
20. 1/96

21. 4000
22. 600
23. 100
24. 800
25. 0.02
26. 0.03
27. 0.24
28. 0.006
29. 0.08
30. 0.35
31. 200
32. 200
33. 200
34. 0.08
35. 0.2
36. 40
37. 0.025
38. 0.4
39. 0.04
40. 0.0036

41. 2.8
42. 18
43. 0.27
44. 225
45. 180
46. 0.56
47. 1.4
48. 0.125
49. 0.6
50. 0.625
51. 800
52. 0.32
53. 0.9
54. 0.025
55. 0.008
56. 0.9
57. 2100
58. 0.9
59. 0.125
60. 0.028

61. 308 yd
62. 100 cm^2.
63. 50
64. 100 cm^2
65. 50.24 (sq. cm).
66. 314 in^2
67. 20 in
68. 400 in^2
69. 160 in
70. 1600 in^2
71. 4
72. 36 (cm)
73. 60
74. 32
75. T
76. 10
77. 10 in
78. 40
79. 100
80. 200

81. $45
82. 24
83. 90
84. 64 ft^3 (volume)
85. 108
86. 40
87. 28
88. (HH)(HT)(TH)(TT)
89. (HH)(HT)(TH)
90. (T, T)
91. 40(J),80(D),160(J)
92. 90
93. (a)15ft(W)(b)20ft(L)
94. 75 miles
95. 3960 ft
96. 30 (gal)
97. 42 miles
98. 32 gallons
99. 6009
100. 8

Answer Key

1. $3x^3 + 3x^2 + 5x - 6$
2. $5x^2 - 6x - 9$
3. $6x^2 - 6x - 2$
4. $5x^3 + x^2$
5. $6x^2 - 8x$
6. $6x + 7$
7. $2x^3 + 4x^2 - 8x + 6$
8. $4x^3 - 10x^2 + 4x$
9. $8x^3 + 4x^2 - 4x + 6$
10. $4x^3 - 4x^2 - 6x - 9$
11. $4x^3 - 8x^2 - 13x$
12. $9x^4 + 3x^3 - 3x^2 - 6x - 9$
13. $4x^4 + 18x^3 + 19x^2$
14. $4x^3 + 18x^2 + 27x$
15. $12x^3 + 10x + 15$
16. $-2x^4 + 2x^3 - 6x^2$
17. $4x^4 + 6x^3 + 8x^2 - 6x$
18. $-2x^3 + 2x^2 - 4x - 6$
19. $2x^4 - 4x^3 + 8x^2 + 4x + 6$
20. $8x^3 - 4x^2 + 20x$
21. $x^2 + 7x - 18$
22. $x^2 + 2x - 8$
23. $x^2 + 4x - 12$
24. $x^2 - x - 2$
25. $x^2 + x - 6$
26. $x^2 - x - 2$
27. $9x^2 - 3x - 2$
28. $3x^2 - 31x + 36$
29. a = 2, b = 1, k = 8
30. a = 3, b = 5, k = 20
31. $(x - 5)(x + 7)$
32. $(x - 4)(x + 9)$
33. $(x + 3)(x + 5)$
34. $(x + 2)(x + 9)$
35. $(x - 7)(x - 3)$
36. $(x - 6)(x + 3)$
37. $(x - 9)(x + 3)$
38. $(x - 4)(x + 3)$
39. $(3x - 5)(x - 4)$
40. $(3x + 4)(2x - 3)$
41. $12x^3 - 8x^2 + x - 5$
42. $2x^3 + 19x^2 - x - 2$
43. $-3x^3 - 2x^2 + 8$
44. $-4x^3 - 4x^2 + x - 3$
45. $21x^2 + 1$
46. $-38x^2 + 74$
47. $-8x^3 + 63x^2 + 7x - 31$
48. $36x + 2$
49. $-2x^3 - 2x^2 + 8x - 1$
50. $-20x^6 + 12x^5 + 4x^3 + 6x^4 + 9x^2 = -20x^6 + 12x^5 + 6x^4 + 4x^3 + 9x^2$
51. $0.\overline{012345679}$
52. $0.\overline{076923}$

    Excel spread sheet:

	13
0	1
7	9
69	3
23	1

53. $0.\overline{0588235294117647}$

    Excel spread sheet:

	17
0	1
5	15
88	4
23	9
52	16
94	2
11	13
76	8
47	1

54. $0.\overline{1}$
55. 10
56. $0.\overline{037}$
57. $0.\overline{012345679}$
58. 1 + 80% = 1.8
    25×1.8 = $45
59. $1 - \frac{3}{8} = \frac{5}{8}$
    $15 \div \frac{5}{8} = 24$

60. $4\times9\times2.5 = 90$

61. Since a cube has 6 identical surfaces, each one has an area of
$\frac{1}{6}(96) = 16$ (ft^2)
$4 = 4\times4$
Each side is 4 ft.
$4\times4\times4 = 64$ ft^3 (volume)

62. 108

63. $12\div30\% = 12\div0.3 = 40$

64. $40 - 12 = 28$ or $12\times\frac{7}{3} = 28$

65. 4 possible outcomes
(H, H), (H, T), (T, H) and (T, T).

66.
(H, H), (H, T), and (T, H).

67.
(T, T).

68. Josh: 1
David: 2
Jennifer: $2\times2 = 4$
$1 + 2 + 4 = 7$
$280\div7 = 40$
$40\times1 = 40$ (Josh)
$40\times2 = 80$ (David)
$40\times4 = 160$ (Jennifer)

69. $\frac{120}{1\frac{1}{3}} = \frac{120}{\frac{4}{3}} = 90$

70. (a) $2\frac{1}{2}\times6 = 15$ ft (width)
(b) $3\frac{1}{3}\times6$ (ft) = 20 ft (length)

71. 1 hr 40 min = $1\frac{2}{3}$ hr
$1\frac{2}{3}\times45 = 75$ miles

72. $\frac{1}{60}\times45\times5280 = \frac{3}{4}\times5280 = 3960$ ft

73. $450 \div 50 = 9$
$9\times3\frac{1}{3} = 27 + 3 = 30$ (gal)

74. 6 : 9
$= 28 : 42$
Or, $28\times\frac{3}{2} = 42$ miles

75. $\frac{3}{8} - \frac{1}{4} = \frac{1}{8}$
$5\div1.25 = 4$ gal
$4\div\frac{1}{8} = 32$ gallons

76. 6009
(Note: 6889 will be the next.)

77. $2^4 \times 4^{10} = 2^4 \times 2^{20} = 2^{24} = (2^3)^{\square}$
$3\times\square = 24$
$\square = 8$

78. $(-1)^{1\times2\times3} = (-1)^6 = 1$
[Note:$(-1)^{even} = 1$,$(-1)^{odd} = -1$]

79. 0.08

80. $\frac{3}{14} = 3/14$

81. .00007

82. $3600\div9 = 400$ yd^2

83. 15

84. $200\times2800 = 560000 = 5.6\times10^5$
$a = 5$

85. $36 = 60\%\times60$
Ans = 60%

86. $3x - 13 = -\frac{1}{2}x + 1$
$3\frac{1}{2}x = 14$
$x = 4$

87. $\frac{\frac{9}{4}}{\frac{5}{3}} = \frac{27}{20} = 27/20$

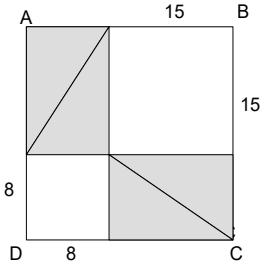
88. $168 = 24\times7$
$312 = 24\times13$
GCD = 24

89. 3250

90. $9^2\cdot3^4 = 9^2\times9^2 = 9^4$
$\square = 4$

91. $2\times$area(ΔABC)
$= 6\times12.5 = 10\times$**7.5**
BC = 7.5
perimeter
$= 10+7.5+12.5 = 30$ cm

92. Method I)



Merge the triangles to form two rectangles as the above. The remaining region is left with two separate squares. The combined area is
$8^2 + 15^2 = 289$.

Method II)
area($\square$ABCD) $= 23^2 = 529$
area(ΔAEH) $= \frac{1}{2}(8)(15) = 60$
$529 - 4\times60 = 289$

93. $20\times(15+10) + 10\times6 = 560$ in^2

94. $3\times3 + 2 = 11$
$11\times12 = 132$ in

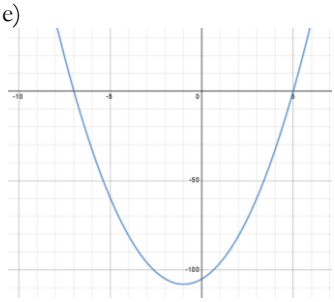
95. $9.45\div3 = \$3.15$

96. 60°

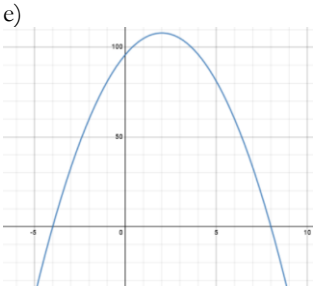
97. $8\%\times12{,}000 = 8\times120 = 960$
$960\times2 = \$1{,}920$

Answer Key

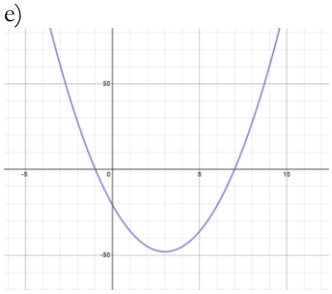
1. $6x^2 + 3x$
2. $2x^4 + 4x^3 + 6x^2$
3. $6x^2 + 3x + 2x^2 + 4x + 6$
   $= 8x^2 + 7x + 6$
4. $10x^2$
5. $6x + 3$
6. $-3x^2 + 12x + 6$
7. $6x + 3 + 2x^2 + 4x + 3$
   $= 2x^2 + 10x + 9$
8. $6x + 3 - 3x^2 + 12x + 6$
   $= -3x^2 + 18x + 9$
9. $2(3x^2 - 4x + 7) + 3(5x^2 + x + 11)$
   $= 6x^2 - 8x + 14 + 15x^2 + 3x + 33$
   $= 21x^2 - 5x + 47$
10. $8x^2 - 3x + 18$
11. $x^2 - 5x - 24$
12. $5x^2 + 7x + 2$
13. $x^2 + 10x + 21$
14. $x^2 + 2x - 24$
15. $x^2 - 2x - 24$
16. $6x^2 + 17x + 12$
17. $2x^2 - 4x - 16$
18. $18x^2 + 13x + 2$
19. $6x^2 - 21x + 18$
20. $32x^2 + 12x + 1$
21. $x^2 - 4x - 32$
22. $x^2 + 4x - 32$
23. $x^2 - 8x + 15$
24. $2x^2 + 3x - 14$
25. $6x^2 + 23x + 21$
26. $6x^2 + 27x + 27$
27. $12x^2 + 17x + 6$
28. $6x^2 - 25x + 24$
29. $28x^2 + 26x + 6$
30. $24x^2 + 24x + 6$
31. $(x - 2)(x + 4)$
32. $(x + 1)(x + 4)$
33. $(x + 1)(x + 7)$
34. $(x + 3)(x + 8)$
35. $(x - 6)(x - 4)$
36. $(x - 7)(x + 4)$
37. $(x - 4)(x - 2)$
38. $(x - 2)(x + 1)$
39. $3(x - 3)^2$
40. $(3x + 1)(2x + 1)$
41. $(x - 2)(x + 5)$
42. $(x + 2)(x + 3)$
43. $(x + 2)(x + 7)$
44. $(x + 4)(x + 7)$
45. $(x - 9)(x - 1)$
46. $(x - 8)(x + 5)$
47. $(x - 9)(x + 2)$
48. $(x + 4)(x - 5)$
49. $(x - 9)(3x - 4)$
50. $(2x + 1)(3x + 2)$
51. a) 3, $x - 5$, $x - 7$
    b) 5, -7; -1
    c) U, -1, -108
    d) 3, $x + 1$, -108
    e)



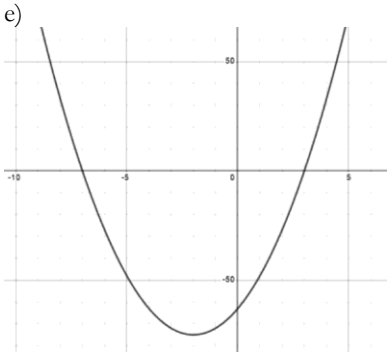
52. a) -3, $x - 8$, $x - 4$
    b) 8, -4; 2
    c) D, 2, 108
    d) -3, $x - 2$, 108
    e)



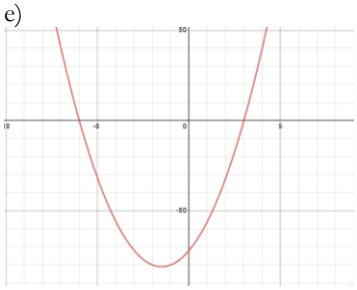
53. a) 3, $x + 1$, $x - 7$
    b) -1, 7; 3
    c) U, 3, -48
    d) 3, $x - 3$, -48
    e)



54. a) 3, $x - 3$, $x - 7$
    b) 3, -7; -2
    c) U, -2, -75
    d) 3, $x + 2$, -75
    e)



55. a) 4, $x - 3$, $x - 6$
    b) 3, -6; -1.5
    c) U, -1.5, -81
    d) 4, $x + 1.5$, -81
    e)



56. a) $-5.5, +6.5$
    b) -0.5
    c) -0.5, -144
    d) 4
    e) 4, $-5.5, +6.5$
    f) 4, 4, -143
    g) 4, -0.5, -144

57. a) $-8, +4$
    b) 2
    c) 2, 72
    d) -2
    e) -2, $-8, +4$
    f) -2, 8, 64
    g) -2, 2, 72

58. a) $+2, +6$
    b) -4
    c) -4, -7
    d) 1.75
    e) 1.75, + 2, + 6
    f) 1.75, 14, 21
    g) 1.75, -4, -7

59. a) $-2, +6$
    b) -2
    c) -2, -128
    d) 8
    e) 8, $-2, +6$
    f) 8, 32, -96
    g) 8, -2, -128

60. a) $+4, -3$
    b) -0.5
    c) -0.5, -49
    d) 4
    e) 4, + 4, -3
    f) 4, 4, -48
    g) 4, -0.5, -49

61. B
62. B
63. C
64. B
65. B
66. B
67. A
68. C
69. D
70. C
71. D
72. A
73. (5, 5)
74. A
75. C
76. B
77. B
78. A
    $10 - 0.09 - 6 = 3.01$

Answer Key

1. $3(x+2)(7x+2)$
2. $3(3x+2)(7x+6)$
3. $4(3x+4)(6x-5)$
4. $2(2x+3)(5x-2)$
5. $-(2x+3)(2x-5)$
6. $2x+1$
   $8x^2+6x+1=$
   $(2x+1)(4x+1)$
   $2x^2+3x+1=$
   $(2x+1)(x+1)$
7. $2x-1$
   $4x^2-8x+3=$
   $(2x-1)(2x-3)$
   $2x^2-5x+2=$
   $(2x-1)(x-2)$
8. $x+3$
   $x^2+7x+12=$
   $(x+3)(x+4)$
   $x^2+5x+6=$
   $(x+3)(x+2)$
9. $2x+1$
   $2x^2+5x+2=$
   $(2x+1)(x+2)$
   $2x^2+9x+4=$
   $(2x+1)(x+4)$
10. $4x-3$
    $4x^2-15x+9=$
    $(4x-3)(x-3)$
    $12x^2-17x+6=$
    $(4x-3)(3x-2)$
11. $\frac{x+1+2(x-1)}{(x-1)(x+1)}=\frac{3x-1}{(x-1)(x+1)}$
12. $\frac{3x+4(x-6)}{x^2-6x}$
    $=\frac{7x-24}{x^2-6x}$
13. $\frac{x}{2y^3}$
14. $\frac{7xy}{x-2}\times\frac{x+2}{14y}$
    $=\frac{x(x+2)}{2(x-2)}$
15. $\frac{x^2-5}{2x^2-3}$
16. $\frac{3n}{(n+1)(n+5)}-\frac{4}{(n-8)(n+1)}$
    $=\frac{3n(n-8)-4(n+5)}{(n+1)(n+5)(n-8)}$
    $=\frac{3n^2-28n-20}{(n+1)(n+5)(n-8)}$
    $=\frac{(3n+2)(n-10)}{(n+1)(n+5)(n-8)}$
17. $\frac{(2x-1)(x-6)}{(x+3)(x-6)}+\frac{(x+4)(x+3)}{(x+3)(x-6)}+\frac{3x-1}{(x+3)(x-6)}$
    $=\frac{3x^2-3x+17}{(x+3)(x-6)}$
18. $\frac{2x+x(x^2+1)-(x^3+x^2+x+1)}{(x-1)(x+1)(x^2+1)}$
    $=\frac{2x-x^2-1}{(x-1)(x+1)(x^2+1)}$
    $=\frac{-(x-1)^2}{(x-1)(x+1)(x^2+1)}$
    $=\frac{1-x}{(x+1)(x^2+1)}$
19. $\frac{(t-3)(t-5)+2t^2+19t-46-(t+4)(2t+1)}{(2t+1)(t-5)}$
    $=\frac{t^2+2t-35}{(2t+1)(t-5)}$
    $=\frac{(t-5)(t+7)}{(2t+1)(t-5)}$
    $=\frac{t+7}{2t+1}$
20. $\frac{n(n^2-1)}{(n^2+1)(n^2-1)}+\frac{n^2+3n}{(n^2+1)(n^2-1)}-\frac{(n+1)(n^2+1)}{(n-1)(n+1)(n^2+1)}$
    $=\frac{n^3-n+n^2+3n-n^3-n^2-n-1}{(n-1)(n+1)(n^2+1)}$
    $=\frac{n-1}{(n-1)(n+1)(n^2+1)}$
    $=\frac{1}{(n+1)(n^2+1)}$
21. $\frac{x^3-25x+5-x^2+5x}{(x+5)(x-5)}=\frac{x^3-x^2-20x+5}{(x+5)(x-5)}$
22. $\frac{30x+9+3(3x-2)-(x+5)(4x+3)}{(4x+3)(3x-2)}=\frac{-4(x-3)(x-1)}{(4x+3)(3x-2)}$
23. $x(1+\frac{5}{x-2}-\frac{1}{(x-2)(x+2)})$
    $x(\frac{x^2-4}{(x-2)(x+2)}+\frac{5x(x+2)}{(x-2)(x+2)}-\frac{1}{(x-2)(x+2)})$
    $=\frac{x(6x^2+10x-5)}{(x-2)(x+2)}$
24. $\frac{15x^2-10}{(x-1)(5x-2)}-\frac{4(x+1)(5x-2)}{(x-1)(5x-2)}-\frac{2(x-1)}{(x-1)(5x-2)}$
    $=\frac{15x^2-10-(20x^2+12x-8)-(2x-2)}{(x-1)(5x-2)}$
    $=\frac{-5x^2-14x}{(x-1)(5x-2)}$
    $=\frac{-x(5x+14)}{(x-1)(5x-2)}$
25. $\frac{(x+3)(x-2)+4x-3+(x-1)(x+10)}{(x+10)(x-2)}$
    $=\frac{x^2+x-6+4x+x^2+9x-10}{(x+10)(x-2)}$
    $=\frac{2x^2+14x-16}{(x+10)(x-2)}$
    $=\frac{2(x+8)(x-1)}{(x+10)(x-2)}$

26. $\frac{2n^2}{(n^2-4)(n^2+4)} - \frac{n(n^2+4)}{(n^2-4)(n^2+4)} + \frac{(n-2)(n^2+4)}{(n+2)(n-2)(n^2+4)}$
$= \frac{2n^2-n^3-4n+n^3-2n^2+4n-8}{(n+2)(n-2)(n^2+4)}$
$= \frac{-8}{(n+2)(n-2)(n^2+4)}$

27. $\frac{3(x-1)+(x+5)(x+1)-3(x+1)}{(x+1)(x-1)}$
$= \frac{x^2+6x-1}{(x+1)(x-1)}$

28. $\frac{7-10(y-2)-3(y+8)}{y^2+6y-16} = \frac{7-10y+20-3y-24}{y^2+6y-16}$
$= \frac{3-13y}{y^2+6y-16}$

29. $\frac{4y(x-y)(x+3y)}{6xy(3x+y)(x-y)} = \frac{2(x+3y)}{3x(3x+y)}$

30. The numerator :
$xy + ay + bx + ab$
$= y(x + a) + b(x + a)$
$= (x + a)(y + b)$

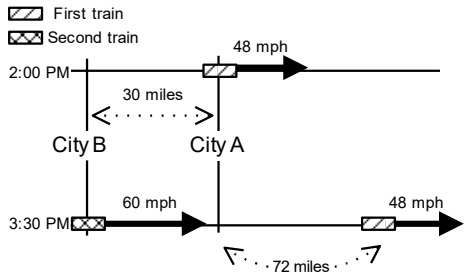
The denominator :
$xy + ay + cx + ac$
$= x(y + c) + a(y + c)$
$= (y + c)(x + a)$

$\frac{xy+ay+bx+ab}{xy+ay+cx+ac} = \frac{y+b}{y+c}$

31. $\frac{8}{7}$
32. $\frac{8}{3}$
33. $\frac{7}{9}$
34. $\frac{6}{7}$
35. $\frac{7}{9}$
36. $\frac{7}{3}$
37. $\frac{6}{7}$
38. $\frac{9}{8}$
39. $\frac{9}{7}$
40. $\frac{9}{2}$
41. $(2a+9b)(2a-9b)$
42. $(1+2n)(1-2n)$
43. $(2+3n)(2-3n)$
44. $5(x+2)(x-2)$
45. $7(x+1)(x-1)$
46. $8(x^2+4)$
47. $12(x^2 - 5)$
48. $2(x+3y)(x-3y)$
49. $(7y+8x)(7y-8x)$
50. $(6a+5b)(6a-5b)$
51. $36x^4y^2z^2$
52. $80x^5y^4z^6$
53. $2z^2$
54. $8x^4z^3$
55. $7\frac{1}{2}xy^4z^2$
56. $\frac{4}{3}x^2y^4z^2$
57. $3\frac{3}{4}\frac{x^2}{z}$
58. $3xy^2$
59. xz^3
60. $\frac{3}{4}yz^2$
61. 10
62. $10\sqrt{2}$
63. $5\sqrt{10}$
64. $x^5\sqrt{x}$
65. $x^{49}\sqrt{x}$
66. $x^5y^4\sqrt{y}$
67. x^5
68. $x^{50}y^{45}$
69. $10x^5y^4\sqrt{y}$
70. x^{45}
71. $10x^5y^4\sqrt{2x}$
72. $10x^9$
73. x^4
74. $\frac{5\sqrt{2}x^9}{y^5}$
75. $4x^{10}$
76. $\frac{4x^{15}\sqrt{xy}}{5y^6}$
77. $4x^2y^3\sqrt{x}$
78. $3x^2y^3\sqrt[3]{xy^2}$
79. $3\sqrt[5]{3}x^3y^2$
80. $3(x+1)^2$
81. -1
82. Let $\frac{a+b}{3} = \frac{b+c}{4} = \frac{c+a}{5} = t$. Therefore, $a + b = 3t$, $b + c = 4t$, and $c + a = 5t$. $a + b + c = 6t \Rightarrow c = 3t$, $a = 2t$ and $b = t$ or $a:b:c = 2:1:3$. We conclude that $\frac{3a+4b}{2b+5c} = \frac{10}{17}$.
83.
$f(1) = a + b + c = 3$
-
$f(-1) = a - b + c = 9$

$2b = -6 \Rightarrow b = -3$

84. 12 midnight
In the diagram below, two trains departed at two different times. The first train got a head start. At the time the second train set off, the first train was 72 miles away from City A or 102 (30+72) miles ahead. However, since the second train traveled faster by 12 miles per hour, it could overtake the first train. How long did it take?
$\frac{\text{distance}}{\text{difference of two speeds}} = \frac{102}{12} = 8.5$= 8 hr and 30 min.
Thus, the overtaking would take place at 3:30 + 8 hr 30 min = 12:00 midnight.



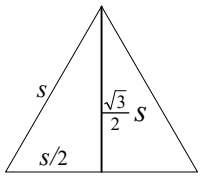
85. 5

86. D
$7x^2+x=x(7x+1)=0 \Rightarrow x=0$ or $x=-\frac{1}{7}$.

87. $a^{\frac{2}{3}}$ or $\sqrt[3]{a^2}$
$\frac{a}{b} = c \Rightarrow (\frac{a}{b})^2 = c^2 = b$
$b^3 = a^2 \Rightarrow b=a^{\frac{2}{3}}$

88. $\frac{1}{2}n(n\text{-}1)$
Since every pair of lines yields an intersection point, we have C_2^n or $\binom{n}{2} = \frac{1}{2}n(n\text{-}1)$ pairs of lines.

89. Since the height of regular triangle is $\frac{\sqrt{3}}{2}s$, the area of the triangle is $\frac{1}{2}(s)(\frac{\sqrt{3}}{2}s) = \frac{\sqrt{3}}{4}s^2$.



90. $1+2+3+\ldots+n = \frac{1}{2}n(n+1)$

91. Since a:b = 3:2, b:c = 2:5, therefore, a:b:c = 3:2:5.

92. -15
You have to solve the system of linear equations, so you get $x = 3$ and $y = 4 \Rightarrow 3x - 6y = -15$

93. Note that $a^2+b^2 = 25$ by Pythagorean theorem.
$3^{a^2} \cdot 3^{b^2} = 3^{a^2+b^2} = 3^{a^2+b^2} = 3^{25}$

94. $\frac{d}{x+y}$

95. The amount of the job is m×10, so the same amount done by 10 men would take $\frac{10m}{5} = 2m$

96. $x = \frac{3}{8}$

97. 7^9

98. $\sqrt{\frac{32}{8-2\sqrt{15}}} = \sqrt{\frac{4^2\times 2}{(\sqrt{5}-\sqrt{3})^2}} = \frac{4}{\sqrt{5}-\sqrt{3}}\sqrt{2} =$
$2\sqrt{2}(\sqrt{5}+\sqrt{3}) = 2\sqrt{10}+2\sqrt{6}$

99. $\frac{a+b}{ab} = \frac{1}{11}$
$11(a+b) = ab$
If $11 \mid a$, so let $a = 11k$, where k is an integer.
$11k + b = kb$
$11k = (k-1)b$
$k = 12$
$b = 12$

100. $\sqrt{3\times 3^7} = 3^4$