

Answer Key

1. 17
2. 13
3. 37
4. 41
5. 31
6. {1, 2, 3, 4, 6, 9, 12, 18, 36}
7. {1, 2, 3, 4, 6, 8, 12, 16, 24, 48}
8. {1, 2, 5, 10, 25, 50}
9. {1, 2, 4, 8, 16, 32, 64}
10. {1, 2, 3, 6, 11, 22, 33, 66}
11. {1, 3, 5, 15, 25, 75}
12. {1, 3, 9, 27, 81}
13. {1, 3, 6, 14, 28, 84}
14. {1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120}
15. {53, 59, 61, 67}
16. 3 R 3
17. 3 R 5
18. 4 R 5
19. 4 R 7
20. 5 R 1
21. 7 R 4
22. 7 R 6
23. 7 R 7
24. 8 R 6
25. 9 R 1
26. $9\frac{5}{6}$
 $59 \div 6 = 9 \text{ r } 5$
27. $4\frac{1}{12}$
 $49 \div 12 = 4 \text{ r } 1$
28. $9\frac{1}{7}$
 $64 \div 7 = 9 \text{ r } 1$
29. $4\frac{3}{8}$
 $35 \div 8 = 4 \text{ r } 3$
30. $7\frac{1}{8}$
 $57 \div 8 = 7 \text{ r } 1$
31. $2\frac{8}{9}$
 $26 \div 9 = 2 \text{ r } 8$
32. $3\frac{2}{9}$
 $29 \div 9 = 3 \text{ r } 2$
33. $7\frac{2}{9}$
 $65 \div 9 = 7 \text{ r } 2$
34. $5\frac{1}{11}$
 $56 \div 11 = 5 \text{ r } 1$
35. $5\frac{1}{12}$
 $61 \div 12 = 5 \text{ r } 1$
36. $\frac{3}{5}$
37. $\frac{8}{6} = 1\frac{2}{6}$
38. $\frac{4}{3} = 1\frac{1}{3}$
39. $\frac{14}{5} = 2\frac{4}{5}$
40. $\frac{1}{4}$
41. $\frac{6}{5} = 1\frac{1}{5}$
42. $\frac{13}{8} = 1\frac{5}{8}$
43. $\frac{11}{6} = 1\frac{5}{6}$
44. $\frac{12}{7} = 1\frac{5}{7}$
45. $\frac{4}{3} = 1\frac{1}{3}$
46. 12 & 2 (Remainder)
47. 480
48. 1 & 8 (Remainder)
49. 98
50. 43.2
51. 48
52. 51
53. 270
54. 96
55. 115
56. 7 & 1 (Remainder)
57. 105
58. 17.5
59. 5
60. 66
61. 37 & 4 (Remainder)
62. 4
63. 210
64. 5
65. 74.7
66. $85 - 10 - 40 = 35$ red marbles
67. $5 - 1.20 - 0.35 = \underline{\$3.45}$
68. $5 \times 3 + 2 \times 10 = 35$ miles

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69. $20 - 10 = 10$

$10 \div 2 = 5$

$5 + 10 = 15$

70. $105 + 80 + 120 + 95 = 400$

$400 \div 4 = 100 \text{ min}$

71. \$2.49

72. $60 \div 2 = 30$

$60 \div 3 = 20$

$60 + 30 + 20 = 110$

73. $2005 - 1929 = 76 \text{ years old}$

74. $2005 - 1945 = 60 = 6 \text{ decades}$

75. $5 \times 3 = 15$

$12 + 15 = \$27.00$

76. $1 - \frac{2}{3} = \frac{1}{3}$

$\frac{1}{3} \times 72 = 24$

77. Method I)

$3 \times 2 = \$6$

Method II)

$3 \times 2 \times 7 = 42$

$42 \div 7 = \$6$

78. $104 - 3 \times 32 = 8 \text{ ounces}$

79. $1988 - 100 = 1978$

$2010 - 1978 = \underline{32}$

80. 40 minutes

81. $1 - \frac{1}{4} = \frac{3}{4} \text{ (shared)}$

$24 \times \frac{3}{4} = 18$

$18 \div 9 = \underline{2 \text{ slices}}$

Answer Key

- | | |
|---------------------|----------------------|
| 1. $\frac{12}{35}$ | 39. 2.375 |
| 2. $\frac{17}{72}$ | 40. 5.125 |
| 3. $\frac{1}{56}$ | 41. $\frac{1}{11}$ |
| 4. $\frac{4}{21}$ | 42. 0.375 |
| 5. $\frac{3}{16}$ | 43. 0.36 |
| 6. $\frac{10}{63}$ | 44. .012 |
| 7. $\frac{3}{25}$ | 45. 840 |
| 8. $\frac{5}{54}$ | 46. 6 |
| 9. $\frac{1}{15}$ | 47. .08 |
| 10. $\frac{11}{24}$ | 48. 0.12 |
| 11. 1200 | 49. 20% |
| 12. 1600 | 50. 16% |
| 13. 100000 | 51. 8% |
| 14. 3 | 52. 120 |
| 15. 0.4 | 53. 50 |
| 16. 0.02 | 54. 500 |
| 17. 7 | 55. 5000 |
| 18. 1800 | 56. 100 |
| 19. 3 | 57. 20% |
| 20. 4000 | 58. 12 |
| 21. 0.08 | 59. $3^3 \times 5^2$ |
| 22. 27000 | 60. $\frac{2}{27}$ |
| 23. 0.02 | 61. D |
| 24. 160000 | 62. C |
| 25. 7 | 63. B |
| 26. 2000 | 64. B |
| 27. 3 | 65. B |
| 28. 15000 | 66. C |
| 29. 6 | 67. C |
| 30. 120000 | 68. B |
| 31. 2.1 | 69. D |
| 32. 5.6 | 70. 10 |
| 33. 3.6 | 71. $\frac{1}{3}$ |
| 34. 7.5 | 72. D |
| 35. 5.25 | A: $\frac{4}{8}$ |
| 36. 3.75 | B: $\frac{4}{8}$ |
| 37. 9.25 | C: $\frac{3}{8}$ |
| 38. .89 | D: $\frac{5}{8}$ |
| | 73. C |
| | 74. C |
| | 75. C |

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76. C

77. C

78. C

79. D

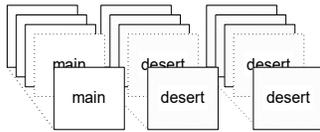
80. C

81. $\frac{39-30}{30} = 0.3 = 30\%$

82. $\frac{3}{8} \times 6 = \frac{3}{4} \times 3 = 2\frac{1}{4} = 2\frac{1}{4}$

83. 24 cards (main) & 48 cards (dessert)

In every 3 cards, there will be 1 card for main dish and 2 cards for dessert. Since there are 72 cards, there are 24 cards for main dish and 48 cards for dessert.



84. $1:30 + 4:00 + 3:00 = 8:30$ P.M.

85. $9:00 - 4:00 + 3:00 = 8:00$ P.M.

86. $1 + 1 + 2 = 4$ (shares)

$180^\circ \div 4 = 45^\circ$

Ans = 45° & 45° & 90°

87. C

88. D

$23 - 3 = 20$

$20 - 3 \times 4 = 8$

$8 \div 4 = 2$ (4-leg tables)

$1 + 4 = 5$ (3-leg tables)

89. $\frac{1}{2} \times 25 \times AB = 300$

$AB = 24$ cm

90. $3 + 6 = 9$

$9 \div 24 = \frac{3}{8} = 37.5\%$

91. $24 - 6 = 18$ hr

92.

They are grandma, mom, and daughter.

93. $240 \div 40 = 6$ hr

94. $1 - 20\% = 0.8$

$90 \times 0.8 = 72$ mph

95. $400 \times 75\% = 300$

or

$300 \div 75\% = 300 \times \frac{4}{3} = 400$

96. D

$60 \times \frac{2}{5} = 24$

$24 - 4 = 20$

$20 \div 2 = 10$

97. $\frac{32}{40} = \frac{4}{5} = 0.8 = 80\%$

98. $20\% = \frac{1}{5} = 1 : 5$

boys : girls = 1:5

boys = $\frac{1}{6}$

girls = $\frac{5}{6}$

$\frac{5}{6}(30) = 25$ (girls)

99. $2 \times 10 = 20$ (ones)

The carry to the tens is **2**.

$2 \times 9 = 18$ (tens)

$18 + 2 = 20$

The carry to the hundreds is **2**.

$2 \times 8 = 16$ (hundreds)

$16 + 2 = 18$

Ans = 8

100. $8 \times 2 = 17$, there is 1 in carry from the 1000th digit.

$9 \times 2 = 18$, $18 + 1 = 19$, Ans = 9

Answer Key

- | | |
|------------------------------------|---|
| 1. $\frac{17}{30}$ | 39. 0.96 |
| 2. $\frac{5}{4}$ | 40. 600 |
| 3. $\frac{37}{40}$ | 41. 42 |
| 4. $3\frac{2}{3}$ | 42. 18 |
| 5. $3\frac{3}{10}$ | 43. 14 |
| 6. $7\frac{11}{60}$ | 44. 48 |
| 7. $1\frac{1}{24}$ | 45. 44 |
| 8. $7\frac{41}{48}$ | 46. 15% |
| 9. $2\frac{8}{15}$ | 47. 25% |
| 10. $3\frac{23}{36}$ | 48. 40% |
| 11. $\frac{3}{8} = 0.375 = 37.5\%$ | 49. 60% |
| 12. 12% | 50. 40% |
| 13. 120% | 51. 70% |
| 14. $2\frac{1}{4} = 2.25 = 225\%$ | 52. 80% |
| 15. $3\frac{3}{4} = 3.75 = 375\%$ | 53. 16.2 |
| 16. $1\frac{1}{5} = 1.20 = 120\%$ | 54. 8.4 |
| 17. $5\frac{1}{2} = 5.50 = 550\%$ | 55. 60 |
| 18. 352.5% | 56. 120 |
| 19. 157.5% | 57. 192 |
| 20. 276.25% | 58. 48 |
| 21. 140 | 59. 80 |
| 22. 0.21 | 60. 96 |
| 23. 40 | 61. $5 \times 18 \times 3 = 270 = 4.5$ hrs |
| 24. 22.5 | 62. $2600 \div 4\frac{1}{3} = 600$ miles |
| 25. 0.2 | 63. $16:00 - 10:30 - 1:30 = 4$ hours
$4 \times 50 = 200$ miles |
| 26. 0.36 | 64. $\frac{36}{40} = 0.9$
$\frac{36}{60} = 0.6$
$0.9 + 0.6 = 1.5$ hrs |
| 27. 0.36 | 65. $\frac{360}{6} = 60$ mph
$\frac{360}{8} = 45$ mph
$60 - 45 = 15$ mph faster |
| 28. 4.5 | 66. $20\% \times 40 = 8$ (losses)
$8 \times 10 = 80$
$80 - 40 = 40$ (wins) |
| 29. 0.875 | 67. $40\% \times 50 = 20$ (losses)
$20 \div \frac{1}{4} = 80$
$80 - 50 = 30$ (wins) |
| 30. 1.75 | 68. $24 \times 25\% = 6$ (losses)
$6 \div 20\% = 30$
$30 - 24 = 6$ |
| 31. 1600 | |
| 32. 0.7 | |
| 33. 0.0125 | |
| 34. 0.08 | |
| 35. 2800 | |
| 36. 0.16 | |
| 37. 0.0225 | |
| 38. 0.3 | |

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69. $75\% \times 12 = 9$ (losses)
 $9 \div 50\% = 18$
 $18 - 12 = 6$ (wins)
70. $60 \times 30\% = 18$
 $18 \div 15\% = 120$
 $120 - 60 = 60$ (correct answers)
71. $\frac{80-64}{80} = 0.2 = 20\%$
72. $5 \times \square = 3.5$
 $\square = 3.5 \div 5 = \$0.70$
73. $54 \div 3 = \$18.00$ (each hour Friday, better)
 $60 \div 4 = \$15.00$ (each hour Saturday)
74. $-15 + 8 - 2 = -9$
75. $7.5 \times 36 = \$270$
76. $40 \times 8 + 5 \times 12$
 $= 320 + 60$
 $= \$380$
77. $550 - 40 \times 10 = 150$
 $150 \div 15 = 10$
 $10 + 40 = 50$
78. C
 B: 0.17
 J: $55\% = 0.55$
 N: 0.57
 U: $\frac{1}{5} = 0.2$
 Great Britain, United States, Japan, The Netherlands
79. Outbound: $210/60 = 3.5$ hours
 Inbound: $210/70 = 3$ hours
 $3.5 + 3 = 6.5$ hours
80. $150 \div 60 \times 10 = 150 \div 5 = 25$
81. $\frac{\# \text{correct questions}}{\# \text{total questions}} = \frac{12}{\# \text{total questions}} = 80\%$
 total = 15
82. 1 min = 60 sec = 3(20)
 $30 \times 3 = 90$ words (per min)
 $90 \times 10 = 900$ words
83. $5 \times 4 \times 3 \times 2 \times 1 = 120$ ways
84. $4.25 \times 4 = 17$ (books)
 $17 + 4.25 = 21.25$
 $21.25 + 7.35 = \$28.60$

85. $\frac{1}{2}(56^\circ) = 28^\circ$
86. $\frac{12.75}{3} \times 5 = \21.25
87. There are four places _____ to fill up. So, there are $26 \times 26 \times 10 \times 10 = 67600$ combinations.
88. B
 $\frac{5550}{5551} = 1 - \frac{1}{5551}$
 $\frac{9998}{9999} = 1 - \frac{1}{9999}$
 Since $\frac{1}{5551} > \frac{1}{9999}$,
 $A < B$

89. 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)

- $100 - 72 = 28$
 $28 \div 7 = 4$
 $20 - 4 = 16$ (questions right)
90. $20 \times 3 = 60$ (wheels if all tricycles)
 $68 - 60 = 8$ (falling short from reality)
 $8 \div (4 - 3) = 8$ (sedans)
 $20 - 8 = 12$ (tricycles)
91. B
92. A
93. $0.\overline{3}$
94. $0.\overline{6}$
95. $0.\overline{01}$
96. $0.\overline{04}$
97. $0.\overline{23}$
98. $0.\overline{466557}$
99. $0.\overline{36}$
100. $0.\overline{355446}$

Answer Key

1. $\frac{2}{3}$
2. $\frac{3}{11}$
3. $\frac{4}{23}$
4. $\frac{5}{37}$
5. $\frac{6}{11}$
6. $\frac{7}{51}$
7. $\frac{8}{25}$
8. $\frac{9}{55}$
9. $\frac{9}{25}$
10. 6
11. 12
12. 5
13. $4\frac{2}{15}$
14. $\frac{9}{49}$
15. $\left(\frac{10}{7}\right)\left(\frac{14}{5}\right) = 4$
16. $\left(\frac{16}{9}\right)\left(\frac{27}{8}\right) = 6$
17. $\left(\frac{15}{8}\right)\left(\frac{24}{5}\right) = 9$
18. $\left(\frac{10}{9}\right)\left(\frac{27}{5}\right) = 6$
19. $\left(\frac{8}{7}\right)\left(\frac{21}{2}\right) = 14$
20. 5
21. 9
22. 6
23. 9
24. 9
25. 8
26. $2^2 \times 3^0 \times 5^1 \times 7^0$
27. $2^0 \times 3^1 \times 5^1 \times 7^0$
28. $2^4 \times 3^0 \times 5^0 \times 7^0$
29. $2^2 \times 3^1 \times 5^0 \times 7^0$
30. $2^1 \times 3^0 \times 5^0 \times 7^1$
31. $2^1 \times 3^0 \times 5^1 \times 7^0$
32. $2^0 \times 3^0 \times 5^2 \times 7^0$
33. $2^0 \times 3^1 \times 5^0 \times 7^1$
34. $2^1 \times 3^2 \times 5^0 \times 7^0$
35. $2^3 \times 3^1 \times 5^0 \times 7^0$
36.
$$\begin{array}{r} 3x + 4 \\ +) 2x + 5 \\ \hline 5x + 9 \end{array}$$
37.
$$\begin{array}{r} 5x + 4 \\ -) 3x + 2 \\ \hline 2x + 2 \end{array}$$
38. $6x + 3 + 2x^2 + 4x + 3 = 2x^2 + 10x + 9$
39. $6x^2 + 3x + 2x^2 + 4x + 6 = 8x^2 + 7x + 6$
40. $x^5, x^3, x^2, x, 1$
41. 5
42. 36
43. -21
44. $-10 + 3x - 21x^2 + 36x^3 - \frac{1}{4}x^5$
45. $-\frac{1}{4}x^5 + 36x^3 - 21x^2 + 3x - 10$
46. $x^2 + 10x + 9$
47. $x^2 + 4x + 3$
48. $x^2 + 9x + 8$
49. $x^2 + 8x + 7$
50. $x^2 + 3x + 2$
51. $x^2 + 5x + 4$
52. $x^2 + 6x + 5$
53. $x^2 + 7x + 6$
54. $x^2 + 5x + 6$
55. $x^2 + 7x + 10$
56. $x^2 - 8x - 9$
57. $x^2 - 10x + 9$
58. $x^2 - 2x - 8$
59. $2x^2 + 9x + 7$
60. $x^2 - 10x + 21$
61. $2x^2 + 5x - 18$
62. $x^2 + 14x + 45$
63. $6x^2 - 4x - 32$
64. $8x^2 - 2x - 21$
65. $35x^2 + 12x + 1$
66. $75 \text{ sec} = 1 \text{ min } 15 \text{ sec} = 1\frac{1}{4} \text{ min}$

MAP 269+ (T2) Issue 11

67. A

Roboprint (fastest) prints 120 pages
 Voltronn prints 30 pages
 Vantek Plus prints 80 pages
 DLS Pro prints 100 pages

68. $40 \div 5 = 8$

$8 \times 2 = 16$

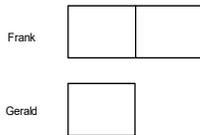
69. $6,000,000 \times 10\% = 6,000,000 \times 0.1 = \$600,000$

70. $16 \times \frac{3}{2} = 24$

71. $36 \div \frac{3}{5} = 60$

72. F: 26

G: 13



73. $99 \times 4 + 1 = 397$

74. (a) $(30+6) \div 2 = \$18$ (Carl)

(b) $(30-6) \div 2 = \$12$ (Dave)

75. B

$\frac{40}{60} \times 15$

$= \frac{2}{3} \times 15$

$= 10$ leaps

76. D

$1\frac{12}{60} \times 15$

$= 1\frac{1}{5} \times 15$

$= 15 + 3$

$= 18$ leaps

77. $85 \times \frac{1}{5} = 17$

$17 - 7\frac{1}{2} = \$9.50$

78. Monday: $25 - 5 = 20$

Tuesday: $20 \times 110\% = 22$

Wednesday:

$22 \times 80\% = 17.60$

79. $6 \times 2 = 12$ different outcomes

(1, H), (1, T),

(2, H), (2, T),

(3, H), (3, T),

(4, H), (4, T),

(5, H), (5, T),

(6, H), (6, T).

80. $160 \div 10 = 16$

$256 \div 16 = 16$ gal

81. $1 + 11 + 11 + 1 = 24$

$1 + 1 + 11 + 11 = 24$

$1 + 11 + 1 + 11 = 24$

$11 + 11 + 1 + 1 = 24$

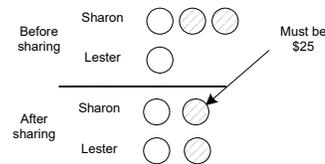
$11 + 1 + 11 + 1 = 24$

$11 + 1 + 1 + 11 = 24$

Ans = 6 ways

82. \$75 (Sharon) & \$25 (Lester)

(See the following figure.)



83. $20\pi = 62.8$ cm (circumference)

$62.8 \times 20 = 1256$ cm² (lateral surface)

84. $1 + 2 + 3 = 6$

$180 \div 6 = 30$

$30 \times 3 = 90$

Answer Key

1. $y = -7/30$
2. $x = 3$
3. $x = -2$
4. $x = -0.1$
5. 7
6. 20
7. 1.2
8. $1/2$
9. $x = 20$
10. 3.2
11. 5
12. 4
13. 7
14. 5
15. 5
16. 6
17. 3
18. 8
19. 4
20. $1/2$
21. $15 \times 2 = 30$
 $30 - 10 = 20$
 $20 \div 5 = 4$ wins
22. $25 - 10 = 15$
 $15 \div 3 = 5$ (miles)
23. $32 - 8 = 24$
 $24 \div 4 = 6$ Times
24. $9 \times 4 = 36$
 $36 - 20 = 16$
 $16 \div 2 = 8$ Coupons
25. $130 \div 10 = 13$
 $13 - 3 = 10$
 $10 \div 5 = 2$ Targets
26. $3x^2 + 4x + 1$
27. $x^2 + 13x + 36$
28. $x^2 - 12x + 35$
29. $x^2 + 5x - 24$
30. $2x^2 - 11x + 9$
31. $6x^2 + 2x - 28$
32. $2x^2 - 13x + 18$
33. $6x^2 - 9x - 27$
34. $36x^2 + 30x + 6$
35. $45x^2 + 14x + 1$
36. $(x - 9)(x + 1)$
37. $(x - 9)(x - 1)$
38. $(x - 4)(x + 2)$
39. $(x + 1)(2x + 7)$
40. $(x - 7)(x - 3)$
41. $x = 2$ or $x = -9/2$
42. $x = -5$ or $x = -9$
43. $x = 8/3$ or $x = -2$
44. $x = 7/4$ or $x = -3/2$
45. $x = -1/5$ or $x = -1/7$
46. 75%
47. $\frac{3}{4}$
48. 56%
49. 80%
50. 125%
51. 400
52. 40
53. 5
54. 12
55. 10
56. $8\frac{1}{12}$
57. $\frac{17}{49}$
58. 51
59. $\frac{1}{9}$
60. $\frac{1}{4}$
61. 9
62. 65
63. 12
64. 14
65. 14
66. $8(2x + 1)(4x + 3) = 0$
 $x = -1/2$ or $-3/4$
67. $(x + 6)(8x + 1) = 0$
 $x = -6$ or $-1/8$
68. $5(x + 2)(8x + 3) = 0$
 $x = -2$ or $-3/8$
69. $2(2x + 9)(4x + 1) = 0$
 $x = -9/2$ or $-1/4$
70. $(8x - 1)(x - 9) = 0$
 $x = 1/8$ or 9

MAP 279+ (T2) Issue 11

71. $4^6 = (4 \times 4)^3 = 16^3$
 Ans = 3
72. $4/3$
73. $0.5x + 1 = 0.2x + 10$
 $0.3x = 9$
 $x = 30$
74. $17 \div 25 = 0.68 = 68\%$
75. $4 \text{ lb } 6 \text{ oz} = 4 \frac{6}{16} = 4 \frac{3}{8} \text{ lb}$
 $0.4 \times 4 \frac{3}{8} = \1.75
76. $60 \div 2 = 30$
 $60 - 20 = 10$ (width)
 old area = $20 \times 10 = 200$
 Since each has the same increase,
 $40 \div 4 = 10$.
 new length = $20 + 10 = 30$
 new width = $10 + 10 = 20$
 new area = $30 \times 20 = 600$
 the increase of area is $600 - 200 = 400 \text{ in}^2$
77. $485 + 55 = 540$
 $540 \div 9 = \$60.00$
78. $120 \times 4 = \$480$ (regular)
 $2,400 - 480 = \$1,920$ (balcony)
 $1920 \div 8 = 240$ (balcony seats)
79. $3\frac{1}{2} \times 5 = 17.5$
 $20 - 17.5 = 2\frac{1}{2} = 2 \frac{1}{2} \text{ in}$
80. $\frac{1}{2}(20^2 - 10^2)\pi$
 $= \frac{1}{2} \times 300\pi$
 $= 300 \times 1.57$
 $= 471 \text{ cm}^2$
81. $(x - \frac{1}{2})^2 = 16$
 $x - \frac{1}{2} = \pm 4$
 $x = \frac{1}{2} \pm 4 = 4\frac{1}{2} \text{ or } -3\frac{1}{2}$
 Ans = -3.5 & 4.5 (in increasing order)
82. A
83. $60 / (\frac{1}{2} + \frac{3}{4}) = 48 \text{ mph}$
84. $12 + 18 = 30$
 $25\% + 15\% = 40\%$
 $40\% \times 30 = 12$
 $12 - 3 = 9$ more hits
85. $5 \text{ ft } 4 \text{ in} = 5\frac{1}{3} \text{ ft}$
 $5\frac{1}{3} : 6 = 16 : 18 = 8 : 9$
86. $4 \times 100 + 7 \times 20 = \540
87. Each side of Square A is $36 = 6 \times 6$, its perimeter is $4 \times 6 = 24$. The perimeter of Square B is $24 - 12 = 12$, each side is $12 \div 4 = 3 \text{ in}$, the area is $3 \times 3 = 9 \text{ in}^2$.
88. $4 \times 5 = 20$
89. In the rectangle, the length is twice the width, the width is 10 cm. The area of the two combined circles is $2(10^2)\pi = 200\pi = 200 \text{ pi}$
90. (1, 1), (1, 2), (2, 1), and (2, 2)
 $\frac{4}{36} = \frac{1}{9} = 1/9$

Answer Key

1. $2\sqrt{2}$
2. $9\sqrt{2}$
3. $9\sqrt{3}$
4. $7(2\sqrt{2}) - 5\sqrt{2} = (14 - 5)\sqrt{2} = 9\sqrt{2}$
5. $25\sqrt{2}$
6. 8
7. 1
8. 2
9. False
10. 4
11. 8
12. 3
13. -2
14. $\frac{1}{2}$
15. $\frac{1}{9}$
16. -3
17. $-\frac{1}{3}$
18. $\frac{1}{9}$
19. $4+4+6-8 = 6$
20. $27 + 3 - 9 = 21$
21. $4\sqrt{3}$
22. $5\sqrt{5}$
23. $3\sqrt{5}$
24. $6\sqrt{5}$
25. $4\sqrt{3}$
26. $5\sqrt{3}$
27. $22\sqrt{3}$
28. $15\sqrt{3}$
29. $11\sqrt{5}$
30. $5y\sqrt{3y}$
31. $\frac{5x^2z}{2y}$
32. $-\frac{4}{5}$
33. $\frac{3x}{(2x-5)(x-2)}(2x-5)$
 $= \frac{3x}{x-2}$
34. $\frac{3x^3}{4}$
35. $\frac{x}{2y^3}$
36. $\frac{9 \cdot 21 \cdot 10x^3y^4}{14 \cdot 15 \cdot 12x^2y^5} = \frac{9 \cdot 21 \cdot 10x}{14 \cdot 15 \cdot 12y} = \frac{3 \cdot 3 \cdot 2x}{2 \cdot 3 \cdot 4y} = \frac{3x}{4y}$
37. $\frac{3x}{x+2} \cdot \frac{x+2}{x-6}$
 $= \frac{3x}{x-6}$
38. $\frac{3a^2}{4bc} \cdot \frac{2c^3}{3ab} = \frac{ac^2}{2b^2}$
39. $\frac{2x}{3y^2} \cdot \frac{9}{8xy} = \frac{2x}{3y^2} \cdot \frac{8xy}{9} = \frac{16x^2}{27y}$
40. $\frac{3ab^3}{4c} \cdot \frac{12bc^3}{21ac} = \frac{3 \cdot 12ab^4c^3}{4 \cdot 21ac^2} = \frac{3b^4c}{7}$
41. $\frac{x-3}{3x}$
42. $\frac{2(x-1)}{5x(x-4)} \cdot \frac{x-4}{(2x+3)(x-1)}$
 $= \frac{2}{5x(2x+3)}$
43. $\frac{7xy}{x-2} \cdot \frac{x+2}{14y}$
 $= \frac{x(x+2)}{2(x-2)}$
44. $\frac{(x^2-5)(x^2+3)}{(2x^2-3)(x^2+3)}$
 $= \frac{x^2-5}{2x^2-3}$
45. $\frac{(2x+7)(x-3)}{(5x-1)(2x+7)}$
 $= \frac{x-3}{5x-1}$
46. $\frac{(5x-2)(x+4)}{(3x+1)(x+4)} = \frac{5x-2}{3x+1}$
47. $\frac{(5y+2)(y+4)}{(5y+2)(5y-2)} = \frac{y+4}{5y-2}$
48. $\frac{(x+2)(x+5)}{(x-9)(x+2)} = \frac{x+5}{x-9}$
49. $\frac{-(x+1)(2x-3)}{-(x+1)(x-2)} = \frac{2x-3}{x-2}$
50. $\frac{4y(x-y)(x+3y)}{6xy(3x+y)(x-y)}$
 $= \frac{2(x+3y)}{3x(3x+y)}$
51. a) $\frac{3}{5}$ b) $\frac{4}{5}$ c) $\frac{3}{4}$
d) $\frac{4}{5}$ e) $\frac{3}{5}$ f) $\frac{4}{3}$
52. a) $\frac{7}{25}$ b) $\frac{24}{25}$ c) $\frac{7}{24}$
d) $\frac{24}{25}$ e) $\frac{7}{25}$ f) $\frac{24}{7}$
53. BC = 20
 $\frac{1}{2}(20)(25) = 250$
54. $\frac{3}{5}$
55. $\frac{5}{13}$
56. $\frac{15}{8}$
57. $\frac{12}{37}$
58. $\frac{3}{4}$

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59. (a) 20
 (b) $4/5$
 (c) $3/4$
 (d) $3/5$
 (e) $4/5$
 (f) $4/3$
60. (a) 29
 (b) $21/29$
 (c) $20/21$
 (d) $20/29$
 (e) $21/29$
 (f) $21/20$

61. (a) 7
 (b) $7/25$
 (c) $24/25$
 (d) $24/25$
 (e) $7/25$
 (f) $7/24$

62. (a) 36
 (b) $5/13$
 (c) $12/13$
 (d) $12/13$
 (e) $5/13$
 (f) $5/12$

63. a) $\frac{5}{13}$
 b) $\frac{12}{13}$
 c) $\frac{12}{5}$

64. a) 8
 b) $\frac{8}{17}$
 c) $\frac{15}{8}$
 d) $28\frac{1}{3}$

65. a) $8\frac{3}{4}$
 b) $\frac{24}{25}$
 c) $6\frac{1}{4}$
 d) $31\frac{1}{4}$

66. c, d

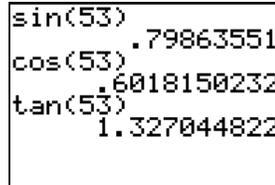
67. a, c, e

68. (a) $1/\sqrt{2}$ (b) $1/\sqrt{2}$ (c) 1

69. To get efficient answer from TI-83, we need to make the following mode setting. Press [MODE] you will see the following screen.



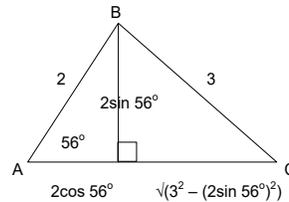
Choose Degree rather than Radian



Note: $\sin(A) = x/120 \Rightarrow x = 120 \cdot \sin(A) = 95.83$.



70. $a^\circ = \sin^{-1}(35/60) = 35.69^\circ$

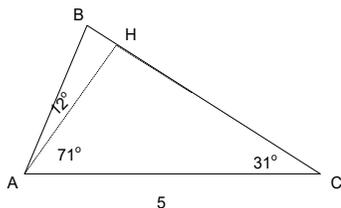


71. $\frac{1}{2}(2 \sin 56^\circ)(2 \cos 56^\circ + \sqrt{3^2 - (2 \cos 56^\circ)^2}) = 3.23$

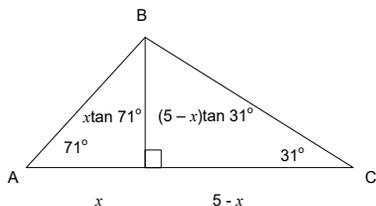
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72. Method I)

$$\text{area} = \frac{1}{2} AH \times BC = \frac{1}{2} (5 \sin 31^\circ)(5 \cos 31^\circ + 5 \sin 31^\circ \tan 12^\circ) = 6.23$$



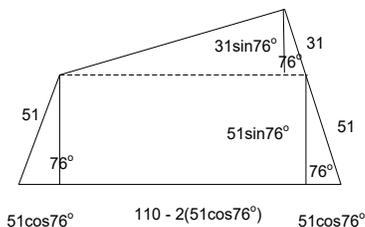
Method II)



$$\begin{aligned} x \tan 71^\circ &= (5 - x) \tan 31^\circ \\ x(\tan 71^\circ + \tan 31^\circ) &= 5 \tan 31^\circ \\ x &= \frac{5 \tan 31^\circ}{\tan 71^\circ + \tan 31^\circ} = 0.86 \\ \text{area} &= \frac{1}{2} (5)(0.86 \tan 71^\circ) = 6.24 \end{aligned}$$

73. area =

$$\left(\frac{31}{2} + 51\right) \sin 76^\circ \cdot (110 - 2 \cdot 51 \cos 76^\circ) + (51 \cos 76^\circ)(51 \sin 76^\circ) = 6116.04$$



74. $\angle BCD = \angle BAC =$

$$\tan^{-1} \frac{5}{12} \approx 22.619$$

75. We know $AB = 13$ by Pythagorean theorem. The area of $\triangle ABC = \frac{1}{2}(5 \times 12) = 30 = \frac{1}{2} CD \times AB \Rightarrow CD = 60/13$.

76. 144:25

77. $AB = \sqrt{a^2 + b^2}$. Note that $\triangle ABCD \approx \triangle CAD \approx \triangle BAC$. (The vertices order matters.) Therefore, $BC:BD = AB:BC \Rightarrow BC^2 = BD \times AB \Rightarrow BD = BC^2 / AB = a^2 / \sqrt{a^2 + b^2}$. Similarly, we have $AD = b^2 / \sqrt{a^2 + b^2}$.

78. $\frac{ab}{\sqrt{a^2 + b^2}}$

79. $b^2 : a^2$

80. Note that the area of $\triangle ABC = \frac{1}{2} ab$. Note also that $\triangle ACD$ and $\triangle BCD$ share the same height, the area ratio is $b^2 : a^2$. Thus, $\triangle ACD = \frac{b^2}{a^2 + b^2} (\frac{1}{2} ab) = \frac{ab^3}{2(a^2 + b^2)}$. Similarly, $\triangle BCD = \frac{a^3 b}{2(a^2 + b^2)}$.

81. $10 \cdot \sin 40^\circ \approx 6.427$.

82. $\frac{1}{2}(\text{height}) \times (\text{base}) \approx \frac{1}{2} 6.427 \times 12 \approx 38.567$.

83. $BH = BC - CH = 12 - 10 \cos 40^\circ \approx 4.340$.

84. $\angle ABC = \angle ABH = \tan^{-1} \frac{AH}{BH} \approx 55.970^\circ$

85. $AH \div \sin(\angle ABH) = 6.427 \div \sin(55.97) \approx 7.755$

86. $CD = 6 \sin 60^\circ \approx 5.20 \text{ cm}$

87. $\frac{1}{2}(\text{base}) \times (\text{height}) = \frac{1}{2}(8)(6 \sin 60^\circ) = 20.78 \text{ cm}^2$.

88. Use CD and BD as two legs to find the hypotenuse with Pythagorean theorem.

89. $BD = AB - AD = 8 - 6 \cos 60^\circ = 5 \text{ cm}$

90. Applying Pythagorean theorem, we have $BC^2 = CD^2 + BD^2 \Rightarrow BC = \sqrt{5.2^2 + 5^2} \approx 7.21 \text{ cm}$