Answer Key

1. $\frac{25}{2}$
   $12\times2 + 1 = 25$
2. $\frac{7}{2}$
   $3\times10 + 5 = 35$
3. $\frac{32}{3}$
   $10\times3 + 2 = 32$
4. $\frac{11}{4}$
   $2\times4 + 3 = 11$
5. $\frac{29}{3}$
   $9\times3 + 2 = 29$
6. $\frac{41}{4}$
   $10\times4 + 1 = 41$
7. $\frac{31}{5}$
   $6\times5 + 1 = 31$
8. $\frac{31}{6}$
   $5\times6 + 1 = 31$
9. $\frac{64}{7}$
   $9\times7 + 1 = 64$
10. $\frac{27}{8}$
    $3\times8 + 3 = 27$
11. 5 R 2
12. 6 R 1
13. 9 R 2
14. 8 R 1
15. 8 R 1
16. 5 R 6
17. 6 R 1
18. 8 R 1
19. 6 R 6
20. 9 R 1
21. $5\frac{5}{6}$
    $35\div6 = 5\ r\ 5$
22. $6\frac{5}{6}$
    $41\div6 = 6\ r\ 5$
23. $9\frac{1}{6}$
    $55\div6 = 9\ r\ 1$
24. $4\frac{2}{7}$
    $30\div7 = 4\ r\ 2$
25. $4\frac{7}{8}$
    $39\div8 = 4\ r\ 7$
26. $5\frac{1}{8}$
    $41\div8 = 5\ r\ 1$
27. $2\frac{5}{8}$
    $21\div8 = 2\ r\ 5$
28. $3\frac{7}{9}$
    $34\div9 = 3\ r\ 7$
29. $3\frac{8}{9}$
    $35\div9 = 3\ r\ 8$
30. $4\frac{2}{9}$
    $38\div9 = 4\ r\ 2$
31. {1, 3, 23, 69}
32. {1, 2, 29, 58}
33. {1, 2, 37, 74}
34. {1, 5, 13, 65}
35. {1, 3, 7, 9, 21, 63}
36. {1, 2, 4, 17, 34, 68}
37. {1, 2, 5, 7, 10, 14, 35, 70}
38. {1, 2, 3, 6, 11, 22, 33, 66}
39. {1, 2, 4, 8, 16, 32, 64}
40. { 23, 29, 31, 37 }
41. 600
42. 11.1
43. 256
44. 200
45. 18
46. 450
47. 132
48. 30
49. 64
50. 21
51. 20
52. 200
53. 7
54. 480
55. 64
56. 30
57. 25
58. 340

MAP 230 (T2) Issue 8

59. 4900
60. 248
61. $1\frac{4}{10}$
62. $\frac{1}{8}$
63. $1\frac{5}{10}$
64. $1\frac{2}{3}$
65. $\frac{2}{6}$
66. $1\frac{4}{9}$
67. $\frac{3}{5}$
68. $1\frac{5}{10}$
69. $\frac{4}{5}$
70. $1\frac{3}{9}$
71. 5×7 - 32 = 3
72. (5 ft 5 in)×3 = 15 ft 15 in = 16 ft & 3 in
73. 41
74. 20÷5 = 4
    4×8 = $32
75. 24 - 8 = 16
    $\frac{16}{24} = \frac{2}{3}$ = 2/3
76. E
77. $\frac{2}{3}$×48 = 32
    $\frac{3}{4}$×32 = 24 pounds
78. $\frac{1}{3} + \frac{1}{6} = \frac{1}{2}$
    1 - $\frac{1}{2}$ = $\boxed{\frac{1}{2} = 1/2}$
79. 2007- 11 = 1996
    1996 + 2 = 1998
80. 5 - 1.6 = 2.4
    2.4÷3 = 0.8
    5×0.8 = 4
    5 - 4 = $1.00 (left)
81. $\frac{1}{2}$×60 = 30
    $\frac{1}{4}$×60 = 15
    60 - 30 - 15 = $15
82. 1 (one)
83. 52
84. 8
85. 81
86. 12÷4 = 3
    3×30 = 90¢
87. 28÷7 = 4
    4×3×4 = 48 miles
88. 5 (Divide by 1, divide by 2, divide by 3, etc.)
89. 91÷2 = 45.5
    45 + $\boxed{46}$ = 91
90. 900÷25 = $36

Answer Key

1. 2
   20
   2
   200
2. 3
   30
   3
   300
3. 5
   50
   5
   500
4. 7
   70
   7
   70
5. 2
   20
   2
   20
6. 2
7. 6
8. 0.4
9. 0.8
10. 9
11. 3
12. 0.2
13. 5
14. 0.3
15. 7
16. 7
17. 3
18. 0.08
19. 0.4
20. 0.2
21. 0.05
22. 0.5
23. 0.06
24. 0.4
25. 9
26. 10
27. 6
28. 180
29. 350
30. 8
31. 4.5
32. 3.6
33. 0.12
34. 2.4
35. 0.16
36. $\frac{1}{2}$
37. $\frac{1}{3}$
38. $\frac{1}{5}$
39. $\frac{3}{5}$
40. $\frac{2}{5}$
41. $\frac{2}{3}$
42. $\frac{4}{5}$
43. $\frac{2}{7}$
44. $\frac{3}{7}$
45. $\frac{5}{7}$
46. $\frac{3}{8}$
47. $\frac{2}{9}$
48. $\frac{6}{7}$
49. $\frac{7}{8}$
50. $\frac{8}{9}$
51. $1\frac{7}{9}$
52. $\frac{1}{2}$
53. .004
54. 7
55. 600
56. 900
57. 30
58. 2500
59. 250000
60. 2
61. 9,000
62. 4000
63. .09
64. 49
65. 560
66. 2.5

MAP 240 (T2) Issue 8

67. $36 = 2^2 \times 3^2$
68. $1 \times 2 \times 3 \times 4 \times 5 = 120$
69. 25
70. 20
71. 12
72. D
73. 1000 (inches) = 20×50
74. 10 (inches)
    50 ÷ 2 = 25
    25 – 15 = 10
75. 16
    60÷15 = 4
    40÷10 = 4
    4×4 = 16
76. A
77. C
78. D
79. C
80. C
81. B
82. B
83. A
84. B
    8×6 = 48 < 54
    8×7 = 56 > 54
    So, 7 boxes will be enough.
85. D
    21.87 ≒ 22
    22×7 = 154
86. B
87. A
    36 – 5 = 31
    24 + 5 = 29
    31 – 29 = 2
88. A
89. A
90. D
91. 15×20 = 300
    300÷(15 – 3) = 25 days
92. $24\frac{1}{2} - 12\frac{5}{8} = 11\frac{7}{8}$
    $4 \times 11\frac{7}{8} = 44\frac{7}{2}$= $47.50
93. $\frac{1}{3} \times 18 = 6$
94. $18 \div \frac{3}{4} = 24$
    18 + 6 = 24
95. B
    2×2 = 4
    3×4 + 2 = 14
    4×14 = 56
96. 3/8
97. 0.6÷4 = 0.15
    0.15×50 = $7.50
98. 33×0.15 = $4.95
    Ans = 33 minutes
99. $91 \div 35 = \frac{91}{35} = \frac{13}{5}$= 2.6 hours = 2 hr & 36 min
100. $\frac{5000-4000}{5000} = 0.2 = 20\%$
101. 27÷3 = 9
    8, 9, 10
    8×9×10 = 720
102. 3/2

Answer Key

1. $4\frac{7}{10}$
2. 6
3. 77/120
4. 12/35
5. 2/5
6. $\left(\frac{21}{2}\right)\left(\frac{10}{7}\right) = 15$
7. $\left(\frac{20}{3}\right)\left(\frac{15}{4}\right) = 25$
8. 14
9. 72
10. 27
11. 10
12. 3
13. 50
14. 42
15. 42
16. 91
17. 36
18. 38
19. 20%
20. 25%
21. 90%
22. 75%
23. 80%
24. 40
25. 50
26. 8
27. 300
28. 27
29. 800
30. 162
31. 0.2
32. 49
33. 5
34. 14
35. 0.003
36. 0.56
37. 0.004
38. 0.0042
39. 0.0009
40. 0.24
41. 800
42. 36
43. 6000
44. 40000
45. 70
46. 0.18
47. 3000
48. 72000
49. 50000
50. 3.2
51. 5%
52. 2.5%
53. 1.25%
54. 2%
55. 15%
56. 35%
57. 17.5%
58. 27.5%
59. 22%
60. 14%
61. 16 bacteria, 64 bacteria
    1 hour 20 min = 4×(20 min)
    2^4 = 16 bacteria.
    2 hours = 6×(20 min)
    2^6 = 64 bacteria
62. 2794
63. Dave's saving is more.

    Charles' saving:
    1 – 50% = 0.5 (saving)
    100×(1 – 50%) = 100×0.5 = $50.00

    Dave's saving:
    1 – 20% = 0.8
    1 – 30% = 0.7
    100×0.8×0.7 = $56.00
64. $35y = 700$
    $y = 20$
    $5x = 20$
    $x = 4$
65. left : used
    = 15% : 85%
    = 3 : 17
    = 6 ft : 34 ft
    Ans = 34 ft (used)
66. 0.2×150 = 30
67. $\frac{50-32}{50} = \frac{18}{50} = \frac{36}{100} = 36\%$

MAP 250 (T2) Issue 8

68. $160 \div 8 = 20$
$320 \div 20 = 16$ hr

69. $1000 \div 12 = 83.3\frac{1}{3}$ (dimes) = \$8.33

70. (a) $40 \times 3 = 120$
(b) $240 \div 40 = 6$

71. $\frac{1}{2}(30) = 15$ (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)
$5 \times 10 = 50$ ft^2 (area)

72. $10 \div 2 = 5$
$5 \times 16 = 80$ bottles

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

74. $240 \times (1 - 12\% - 18\%) = 168$

75. $10\pi = 31.4$ cm (circumference)
$31.4 \times 5 = 157$ (cm)

76. $3 \times 4 + 20 = 32$ (leftover books if 3 students take none)
$32 \times 1 = 32$ (number of students who take 5 books)
$32 + 3 = 35$ (total number of students)

77. $48 \times \frac{3}{4} =$ \$36

78. $144 = 2^4 \times 3^2$
Ans = 2 (p) & 4 (m) & 3 (q) & 2 (n)

79. $20^2\pi = 400(3.14) = 1256$ cm^2
$10^2\pi = 100(3.14) = 314$ cm^2
$1256 - 314 = 942$ cm^2

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

81. $\frac{85+43}{2} = 64$
$85 - 64 = 21$

82. $240 \div 3 = 80$
Chloe should paid \$40 more.
Sam is fine.
Maya should get \$40 back.

83. $\frac{150+90}{2} = 120$
$(150 - 120) \div 5 = 6$ (bricks)

84. $30\% \times 200 \div 2 = 30$ (marbles)

85. Jordan: 60
Taylor: 30

86. Sold : Unsold : Total
5 : 3 : 8
45 : 27: 72
start: 72 cupcakes
sold: 45 cupcakes

87. spent : saved : totoal
2 : 3 : 5
48 : 72 : 120
Allowance: \$120
Headphones: \$48

88. $54 \div 0.9 = 60$
$60 \div \frac{3}{4} = 80$ (marbles)

89. $\frac{1}{2} - \frac{3}{8} = \frac{1}{8}$
$15 \times 8 = 120$ (gallons)

90. $35 \div (1 - \frac{4}{9}) = 63$
$63 \times \frac{4}{9} = 28$ (liters)

91. $88 \times 4 = 352$
$90 \times 5 = 450$
$450 - 352 = 98$

92. $8 \times 15 = 120$
$9 \times 20 = 180$
$180 - 120 = 60$ (home runs)

93. $10 \times 5{,}000 = 50{,}000$
$5 \times 3000 = 15{,}000$
$4 \times 6000 = 24{,}000$
$50{,}000 - 39{,}000 =$ \$11,000

94. $6 \times 5.5 = 33$
$3 \times 5 = 15$
$2 \times 4 = 8$
$33 - 15 - 8 = 10$

95. $65 \times 6 = 390$
$390 - 50 = 340$
$340 \div 5 = 68$

96. $24 - 4 = 20$
$20 \div 4 \times 3 = 15$
$15 + 4 = 19$ (pounds)

97. $300 \div 5 = 60$
$300 - 60 = 240$
$240 \div 2 = 120$
$120 + 60 = 180$ (pounds)

98. tank : water : total
1 : 3 : 4
1 : 1.5 : 2.5

$\frac{2.5}{4} = \frac{5}{8}$

$80 \times \frac{5}{8} = 50$ (kg)

99. $43 - 25 = 18$
$18 \times 2 = 36$
$36 \div 3 = 12$
$18 - 12 = 6$
$25 - 6 = 19$ (pounds)

100. $120 - 100 = 20$
$20 \div \left(\frac{1}{2} - \frac{1}{3}\right) = 120$ (full water weight)
$120 \times (\frac{3}{4} - \frac{1}{2}) = 30$
$120 + 30 = 150$ (grams)

Answer Key

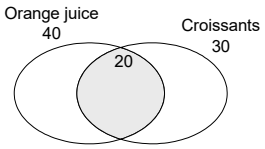
1. $\frac{1}{3}$
2. $\frac{1}{2}$
3. P(a 2 or a 1) = $\frac{1}{3} + \frac{1}{6} = \frac{1}{2}$
4. P(a 2 or a 3) = $\frac{1}{3} + \frac{1}{2} = \frac{5}{6}$
5. $\frac{1}{9}$
   P(two 2's) = P([2, 2]) = P(a 2)×P(a 2) = $\frac{1}{3}\times\frac{1}{3} = \frac{1}{9}$
6. $\frac{1}{4}$
   P(two 3's) = P([3,3]) = P(a 3) × P(a 3) = $\frac{1}{2}\times\frac{1}{2} = \frac{1}{4}$
7. $\frac{1}{3}$
   P([2, 3] or [3, 2]) = P([2, 3]) + P([3, 2]). We know that P([2, 3])=P([3, 2]) = $\frac{1}{3}\times\frac{1}{2} = \frac{1}{6}$. Thus, the P([2, 3] or [3, 2]) = $2\times\frac{1}{6} = \frac{1}{3}$
8. $\frac{4}{9}$
   P(both are odd numbers) = P([1,1]) + P([1,3]) + P([3,1]) + P([3,3]) = $\frac{1}{6}\times\frac{1}{6} + 2\times\frac{1}{6}\times\frac{1}{2} + \frac{1}{2}\times\frac{1}{2} = \frac{4}{9}$
9. P(the first favors Alex)×P(the second favors Bryan)×P(the third favors Charlie) = $\frac{50}{150}\times\frac{65}{149}\times\frac{20}{148} = \frac{325}{16539}$.
10. P(the first two has no opinion)×P(the third favors Charlie) = $\frac{15}{150}\times\frac{14}{149}\times\frac{20}{148} = \frac{7}{5513}$.
11. P(no one favors Charlie) = $\frac{130}{150}\times\frac{129}{149}\times\frac{128}{148}$ = .648
12. P(All three favor Alex) = $\frac{50}{150}\times\frac{49}{149}\times\frac{48}{148} = \frac{196}{5513}$
13. P(red, yellow, and then white) = $\frac{8}{25}\times\frac{12}{24}\times\frac{5}{23} = \frac{4}{115}$
14. P(first red, second red, and third red) = $\frac{8}{25}\times\frac{7}{24}\times\frac{6}{23} = \frac{14}{575}$
15. P(first not red, second not red, and third not red) = $\frac{17}{25}\times\frac{16}{24}\times\frac{15}{24} = \frac{34}{115}$.
16. P(at least one is red) = 1 - P(all are not red) = 1 - $\frac{34}{115} = \frac{79}{115}$.
17. The failing rate of selling the car is 0.6, thus the odds against selling the car is 0.6:0.4 = 3:2.
18. P(getting a teaching position) = $\frac{success}{failre+success} = \frac{9}{2+9} = \frac{9}{11}$
19. 3:5
20. 1:4
21. 40
22. 90
23. 115%
24. 130%
25. 40%
26. 8
27. 50
28. 246
29. 1
30. 20%
31. 25.8
32. $\frac{7}{16}$
33. $\frac{3}{4}$
34. $1\frac{1}{3}$
35. 30
36. 2
37. 200 – 100 = 100
    199 – 99 = 100
    …
    101 – 1 = 100
    100 + 100 + … + 100 = 100×100 = 10000
38. 75%
39. 133%
40. $\frac{2}{3}$
41. 120÷5 = 24 mi/gal
42. D
43. 1.44
44. a) 75% = $\frac{3}{4}$
    b) $58\frac{1}{3}\% = \frac{175}{300} = \frac{7}{12}$
45. 10 ft = 120 in
    120÷3 = 40 (tiles each side)
    40×4 – **4** = 156 tiles (around)
    Note: We need to deduct **4** tiles from corners.
46. 12÷3 = 4
    4×4 = $16
47. $\frac{2}{3} = 66\frac{2}{3}\%$ (precise percent)
48. 2×10,000 = 20,000
49. 144÷8 = 18 goldfish
50. 144÷12 = 12 catfish
51. LCM(8, 12) = 24, which mean every 24th customer received both a goldfish and a catfish.
    144÷24 = 6 customers
52. 300×(1 + 5%) = 300 + 15 = $315
53. 20÷4 = $5 per hour
54. 130÷6.5 = 20 mi/gal
55. $6\times2\frac{1}{4}\times2 = 27$

MAP 260 (T2) Issue 8

56. $\frac{1}{3}\times 30 = 10$ (girls)
$30 - 10 = 20$ (boys)
$10 + 2 = 12$
$20 - 2 = 18$ (boys)
$\frac{18}{30} = \frac{3}{5} = 60\%$

57. D
In the first 6 numbers, only two will stay: 1 and 5.
$20\div 6 = 3$ (rem 2)
$3\times 2 = 6$
(1, 5) (7, 11) (13, 17) (19)
(Don't forget 19)
$6 + 1 = 7$

58. $30 + 40 = 70$
$70 - 50 = 20$



59. 1 gallon = 16 cups
$16\div \frac{4}{3} = 16\times \frac{3}{4} = 12$ pies

60. Let the middle length be x cm, so the longest one be $3x$.
The shortest one then is $3x - 23$ (cm).
The total length = $x + 3x + 3x - 23 = 40$
$7x = 63$
$x = 9$
$3x - 23 = 4$ cm

61. $5\frac{1}{2} = 5\ 1/2$

62. $3\frac{7}{12} = 3\ 7/12$

63. 1.2

64. 6.4

65. $2\frac{1}{4}$ lb = $2\frac{1}{4}\times 16$ oz = 36 oz.

66. 105 min = 1 hr and 45 min = $1\frac{3}{4} = 1\ 3/4$ hr

67. 240,000

68. 3120000

69. $x = 9$

70. $1\frac{1}{2}\times 2\frac{2}{3} = \frac{3}{2}\times\frac{8}{3}=4$

71. $\frac{1}{96}$

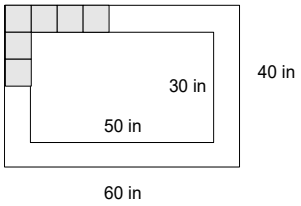
72. 135%

73. 10
$79\div 8=9R7$

74. $7.5\div 3 = 2.5$
$2.5\times 140 = 350$ miles

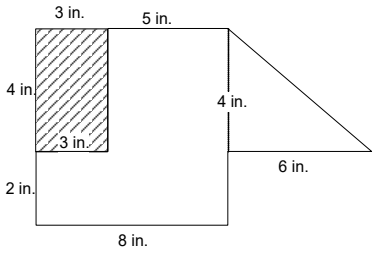
75. The sum is 36.
Dan is 24 and Anna is 12.
D – A = 12

76. $40\times 60 - 1500 = 900$ in^2

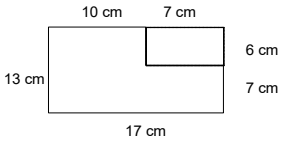


77. $1 - \frac{1}{3} - \frac{1}{2}\times\frac{2}{3} = \frac{1}{3}$ (unsold)
$1 - \frac{1}{3} = \frac{2}{3}$ (sold)
$50\times 2 = 100$

78. $8\times 6 - 3\times 4 + \frac{1}{2}(4\times 6) = 48 - 12 + 12 = 48$



79. $P = 2\times(13+17) = 60$ (cm)



80. $1 + 20\% = 1.2$
$1.2\times 12 = \$14.40$

Answer Key

1. True
2. $4\times256 = \underline{1024}$
3. 162
4. $2\times2\frac{1}{4} = 4\frac{1}{2} = 4\ 1/2$
5. 0.42
   $0.1\times0.2 = 0.02$
   $0.2\times0.3 = 0.06$
   $0.3\times0.4 = 0.12$
   $04.\times0.5 = 0.2$
   …
   $0.6\times0.7 = 0.42$
6. -4
   $50 - 9\times6 = -4$
7. 625
8. 1224
9. 4221
10. 0.0121
11. 1331000
12. 1.4641
13. $2^4 = 2\text{^}4$
14. 35
15. 1/2
16. 32
17. 39
18. $3\times5\times7 = 105$
19. 12
20. $33\times2^6 - (2^3)^2 = (33 - 1)\times2^6 = 2^5\times2^6 = 2^{11}$
21. With no digit of 0:
    $9\times8\times5 = 360$
    With a digit of zero:
    $9\times4 = 36$
    With four digits of zero:
    $9\times1 = 9$
    The total number cases is $360 + 36 + 9 = 405$
22. 12
    There are two different ways of making the trip. Clockwise: (A→B)×2(B→C) = 6) The other is counter-clockwise, so 6 different ways again. Thus, there are 12 different ways.
23. B
24. A
25. C
    The probability of getting queen card = 4/52 The probability of getting club card = 13/52 The club card contains already a queen card, therefore required probability is, 4/52 + 13/52 – 1/52 = 16/52 = 4/13
26. A
27. B
    Daniel and Sherin will contradict each other when one speaks truth and other speaks lies. Probability of Daniel speak truth and Sherin lies =2/5*3/7 =6/35 Probability of Sherin speak truth and Daniel lies =4/7*3/5 =12/35 The two probabilities are mutually exclusive. Hence, probabilities that Daniel and Sherin contradict each other: =6/35 +12/35 =18/35
28. D
    (4/10)(3/9) = 2/15
29. B
    (3/10)(10/25) = 2/10 = 1/5
30. C
31. C
32. B
33. B
34. C
    52 – 5 = 47
35. B
36. C
    56, 56, 66
37. B
38. C
    4, 6, 8, 9, 10, and 12 are the composite numbers.
39. D
    1/8 + 1/8 = ¼
    1 – ¼ = ¾
40. C
    There are 25 primes from 2 to 97.
41. $35\div(1 - 30\%) = 35\div0.7 = \$50$
42. $0.8\times\mathbf{3000} = 2400$
    or
    $2400\div0.8 = \$3{,}000$
43. $\frac{5000-4000}{5000} = 0.2 = 20\%$
44. $80\times30\% = 80\times0.3 = \$24$
45. $1 - 80\% = 20\%$
46. $60\times0.3 = \$18.00$

MAP 270 (T2) Issue 8

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

48. 6÷15% = 6÷0.15 = 600÷15 = 40 ft

49. 31.5 – 30 = $1.50

50. 1.5 ÷ 30 = 0.05 = 5%

51. 1 – 20% = 1- 0.2 = 0.8
    200×0.8 = 160

52. 2×(1 + 25%)
    = 2×1.25
    = 2.5 gal
    = 2 gal 4 pints

53. 200×(1 + 20%)
    = 200×1.2
    = $240

54. 200×(1 + 15%)
    = 200×1.15
    = 2×115
    = 230

55. 240×(1 – 12% – 18%) = 168

56. $48\times\frac{3}{4}$ = $36

57. 32×25% = 8
    8 + 32 = $40.00

58. 48 – 32 = 16
    16 ÷ 32 = 50%

59. 20×1.08 = $21.60

60. 21×70% = 21×0.7 = $14.70

61. $4^6 = (4\times4)^3 = 16^3$
    Ans = 3

62. 4/3

63. $0.5x + 1 = 0.2x + 10$
    $0.3x = 9$
    $x = 30$

64. 17÷25 = 0.68 = 68%

65. 4 lb 6 oz = $4\frac{6}{16} = 4\frac{3}{8}$lb
    $0.4\times4\frac{3}{8}$ = $1.75

66. 60÷2 = 30
    60 – 20= 10 (width)
    old area = 20×10 = 200
    Since each has the same increase,
    40÷4 = 10.
    new length = 20+10 = 30
    new width = 10+10 = 20
    new area = 30×20 = 600
    the increase of area is 600 = 200 = 400 in^2

67. 485 + 55 = 540
    540÷9 = $60.00

68. 120×4 = $480 (regular)
    2,400 – 480 = $1,920 (balcony)
    1920÷8 = 240 (balcony seats)

69. 3½×5 = 17.5
    20-17.5 = 2½ = 2 1/2 in

70. ½(20^2 – 10^2)π
    = ½×300π
    = 300×1.57
    = 471 cm^2

71. $(x - ½)^2 = 16$
    $x - ½ = \pm4$
    x = ½ ±4 = 4½ or -3½
    Ans = -3.5 & 4.5 (in increasing order)

72. A

73. 60/(½+¾) = 48 mph

74. 12 + 18 = 30
    25% + 15% = 40%
    40%×30 = 12
    12 – 3 = 9 more hits

75. 5 ft 4 in = 5⅓ ft
    5⅓:6 = 16:18 = 8:9

76. 4×100 + 7×20 = $540

77. Each side of Square A is 36 = 6×6, its perimeter is 4×6 = 24. The perimeter of Square B is 24 – 12 = 12, each side is 12 ÷ 4 = 3 in, the area is 3×3 = 9 in^2.

78. 4×5 = 20

79. 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)π = 200π = 200 pi

80. (1, 1), (1, 2), (2, 1), and (2, 2)
    $\frac{4}{36}$ = ⅑ = 1/9

Answer Key

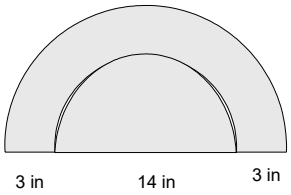
1. *P*(heads or 3) = $\frac{7}{12}$ = 7/12

	1	2	3	4	5	6
H	H1	H2	H3	H4	H5	H6
T	T1	T2	T3	T4	T5	T6

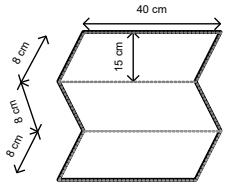
2. $\frac{1}{2}\times\frac{1}{6} = \frac{1}{12}$ = 1/12
3. 4!×2×2 = 96
4. 9000
5. 4500
6. 9×10×10×2 = 1800
7. 4×5×5×5 = 500
8. 9×10×10×9 = 8100
9. 9×9×9×9 = 6561
10. $\frac{6}{12}\times\frac{5}{14} = \frac{1}{2}\times\frac{5}{14} = \frac{5}{28}$ = 5/28
11. 150×0.4 = 60
12. $4\times0.4\times0.6^3 = 0.3456$
13. $1 - 0.6^4 = 0.8704$
14. 78 + 24 = 102
    $\frac{1}{3}$(102) = 34 yellows
15. $\frac{1}{52}\times\frac{1}{51} = \frac{1}{2652}$ = 1/2652
16. $\frac{13}{52}\times\frac{12}{51} = \frac{1}{17}$ = 1/17
17. C
18. D
19. Let's list all the events on an event table.

		the first die					
		1	2	3	4	5	6
the second die	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12

    The events of a sum = 10 are shaded in the above table. Therefore, the probability of throwing a sum of 10 is $\frac{3}{36}$ = 1/12
20. $(\frac{3}{7})^2 = \frac{9}{49}$ = 9/49
21. $(\frac{4}{7})^2 = \frac{16}{49}$ = 16/49
22. *P*(at least one non-defect)
    = 1 - *P*(all defect)
    = 1 - $\frac{9}{49} = \frac{40}{49}$ = 40/49
23. *P*(at least one defect)
    = 1 - *P*(all non-defect)
    = 1 - $(\frac{4}{7})^2 = \frac{33}{49}$ = 33/49
24. D
25. Fill the extra semi-circle to the empty place.
    14 + 3 + 3 = 20 (diameter)
    20÷2 = 10 (radius)
    $\frac{1}{2}(10^2\pi)$ = 314÷2 = $\boxed{157\ (in^2)}$

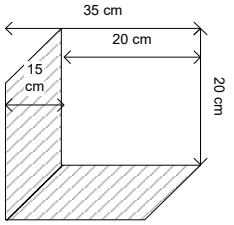


26. $3\times3\times3 = 27\ in^3$
27. $3\times3\times6 = 54\ in^2$
28. 12×3 = 36 in
29. 12 edges
30. 4×÷2 = 2 (radius)
    3.14×2×2 = 12.56 sq. ft.
31. The length of the parallelogram is 40 cm since (128-24×2)÷2=40. The area of a parallelogram is 15×40=600 cm^2. The total area should be 3(600)=1800 cm^2.



32. 8×6÷2 = 24
33. (8+5)×4÷2 = 26
34. 24+26 = 50
35. 24 - 2×2 = 20 (glass length)
    20×10 = 200 in^2 (glass area)
    10 + 2×2 = 14 in (table width)
    24×14 = 336 in^2 (table area)
    336 - 200 = 136 in^2 (uncovered portion)
36. $10\times5\times8 = 400\ in^3$
37. $2(10\times5 + 5\times8 + 8\times10) = 2(50 + 40 + 80) = 340\ in^2$
38. B=(10, -3)
39. C=(-4, -3)
40. D=(-4, 7)

41. Divide it into two parallelograms. Each one has height of 15 cm and base of 20 cm. Thus, the area of each parallelogram is 20×15=300 cm². The total area is 2(300)=600 cm².



42. 5×25 = 125
125 + 125 = 250
5×5 = 25 (overlapping square)
250 - 25 = 225

43. 25 - 5 = 20
4(10 + 5 + 10) = $\boxed{100 \text{ cm}}$

44. C

45. D

46. A
$10j + 25(j + 5)$
$= 35j + 125$

47. B

48. $\frac{2}{3}\times\frac{3/5}{6/5} = \frac{2}{3}\times\frac{1}{2} = \boxed{\frac{1}{3}}$

49. B

50. D
100÷10 = 10
1000÷10 = 100
100 – 10 + 1 = 91

51. C

52. D

53. B
$40\div\frac{5}{8} = 64$

54. D

55. $35\div3\frac{1}{2}\times5\frac{1}{5} = \boxed{52 \text{ ft}}$

56. B

57. B

58. A
90%×9 = 8.1
9%×90 = 8.1

59. C
Let x = one angle, $90 - x$ = the other.
$x - (90 - x) = 50$
$2x - 90 = 50$
$2x = 140$
$x = 70$

60. D

61. 2

62. B
112÷2 = 56
$56 = \frac{1}{2}(8)(AC)$
AC = 14 (cm)

63. D

64. C
The slope is 1.

65. B

66. C

67. C
100÷(1- 0.2) = 125

68. B

69. B
525÷1500 = 0.35 = 35%

70. A
$(x + 1)^2 - x^2 = 15$
$2x + 1 = 15$
$x = 7$

71. C

72. A
1152÷3600 = 0.32 = 32%

73. C
Let x = width; $x + 2$ = the length. Therefore, we have
$x(x + 2) = 195$
$x^2 + 2x - 195 = 0$
$(x - 13)(x + 15) = 0$
$x = 13$ (-15 is ridiculed)
The length is $x + 2 = 15$.

74. C

75. D
Let x be the number of hours worked by Carl, hence $2x + 3$ be that worked by Cindy. Now that
$x + 2x + 3 \le 48$
$3x \le 45$
$x \le 15$

76. D

77. D
1,800,000 – 1,440,000 = 360,000
percent of increase = $\frac{\text{increase}}{\text{original}}$ = 360,000 ÷ 1,440,000 = 36 ÷ 144 = ¼ = 25%

78. C
45 + 55 = 100
100×6% = 6

79. D
450÷0.09
$= 45\times10^{1}\div(9\times10^{-2})$
$= (45\div9)(10 \div 10^{-2})$
$= 5\times10^{3} = 5000$

80. D

81. B
    $10 - 4(8 - 3) + 1 = -9$
82. D
83. A
84. 385
85. C
86. 9
87. $(x + \frac{1}{x})^2 = x^2+2+\frac{1}{x^2} = 9$
    $x + \frac{1}{x} = \sqrt{7}$
    $x^2 - 1 + \frac{1}{x^2} = 6$
    $x^3 + \frac{1}{x^3} = \left(x + \frac{1}{x}\right)(x^2 - 1 + \frac{1}{x^2}) = 6\sqrt{7}$
88. Method I)
    Let $a = 2019$
    $2021 = a + 2$
    $(a + 2)^3 = a^3 + 6a^2 + 12a + 8$
    $2021^3 - a^3 = 6a^2 + 12a + 8$
    $(6a^2 + 12a + 8 - 2) \div 6 = a^2 + 2a + 1 = (a + 1)^2$
    $\sqrt{\frac{x-2}{6}} = a + 1 = 2020$

    Method II)
    Let $a = 2021$
    $b = 2019$
    $x = a^3 - b^3 = (a-b)(a^2 + ab + b^2) = (a-b)^3 + 3ab(a-b)$
    $a - b = 2$
    $x - 2 = 8 + 3ab(2) - 2 = 6ab + 6 = 6(ab + 1)$
    $\frac{x-2}{6} = ab + 1$
    $a = 2020 + 1$
    $b = 2020 - 1$
    $ab + 1 = 2020^2 - 1 + 1 = 2020^2$
    $\sqrt{\frac{x-2}{6}} = 2020$