

# Answer Key

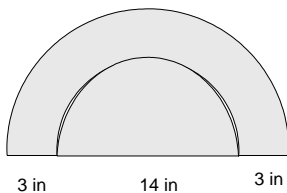
1.  $10^9 = 1000,000,000$
2.  $14^2 = 196$
3.  $1.2^2 = 1.44$
4.  $10^3 = 1000$
5. 2.1
6. 6
7.  $28^2 = 784$
8.  $2.6^2 = 6.76$
9. 25
10.  $7^3 = 7 \times 7 \times 7 = 343$
11.  $12^2 = 144$
12.  $1^2 = 1$
13.  $8^3 = 512$
14. 19
15.  $1^{100} = 1$
16.  $20^2 = 400$
17.  $1.8^2 = 3.24$
18.  $0.6^3 = 0.216$
19. 27
20.  $6^4 = 1296$
21.  $b = 3$
22.  $u = -1$
23.  $a = -1$
24.  $z = 3$
25.  $t = 2$
26.  $t = 2$
27.  $s = 4$
28.  $x = 4$
29.  $t = 2$
30.  $u = 2$
31. D

32. Fill the extra semi-circle to the empty place.

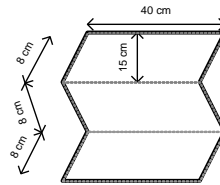
$$14 + 3 + 3 = 20 \text{ (diameter)}$$

$$20 \div 2 = 10 \text{ (radius)}$$

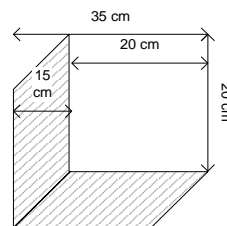
$$\frac{1}{2}(10^2\pi) = 314 \div 2 = \boxed{157 \text{ (in}^2\text{)}}$$



33.  $3 \times 3 \times 3 = 27 \text{ in}^3$
34.  $3 \times 3 \times 6 = 54 \text{ in}^2$
35.  $12 \times 3 = 36 \text{ in}$
36. 12 edges
37.  $4 \times \div 2 = 2$  (radius)  
 $3.14 \times 2 \times 2 = 12.56 \text{ sq. ft.}$
38. The length of the parallelogram is 40 cm since  $(128 - 24 \times 2) \div 2 = 40$ . The area of a parallelogram is  $15 \times 40 = 600 \text{ cm}^2$ . The total area should be  $3(600) = 1800 \text{ cm}^2$ .

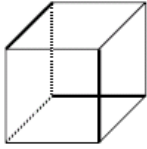


39.  $8 \times 6 \div 2 = 24$
40.  $(8 + 5) \times 4 \div 2 = 26$
41.  $24 + 26 = 50$
42.  $24 - 2 \times 2 = 20$  (glass length)  
 $20 \times 10 = 200 \text{ in}^2$  (glass area)  
 $10 + 2 \times 2 = 14 \text{ in}$  (table width)  
 $24 \times 14 = 336 \text{ in}^2$  (table area)  
 $336 - 200 = 136 \text{ in}^2$  (uncovered portion)
43.  $10 \times 5 \times 8 = 400 \text{ in}^3$
44.  $2(10 \times 5 + 5 \times 8 + 8 \times 10) = 2(50 + 40 + 80) = 340 \text{ in}^2$
45.  $B = (10, -3)$
46.  $C = (-4, -3)$
47.  $D = (-4, 7)$
48. Divide it into two parallelograms. Each one has height of 15 cm and base of 20 cm. Thus, the area of each parallelogram is  $20 \times 15 = 300 \text{ cm}^2$ . The total area is  $2(300) = 600 \text{ cm}^2$ .



49.  $5 \times 25 = 125$   
 $125 + 125 = 250$

# M 270 (Spring, 2024) Issue 1

- $5 \times 5 = 25$  (overlapping square)  
 $250 - 25 = 225$
50.  $25 - 5 = 20$   
 $4(10 + 5 + 10) = \boxed{100 \text{ cm}}$
51.  $P = 2R$   
 $R = 3S$   
 $P:R:S = 6:3:1$   
 $(P+S):R = 7:3$   
 $R = \frac{3}{7} \times 140 = \$60.00$
52. C  
 $3 + 5 = 8$   
 $8 \div 3 = 2\frac{2}{3}$   
 $3 - 2\frac{2}{3} = \frac{1}{3}$  (contribution from the first fisherman)  
 $5 - 2\frac{2}{3} = 2\frac{1}{3}$  (contribution from the second fisherman)  
 $\frac{1}{3} : 2\frac{1}{3} = 1:7$   
 \$1 to the first, and \$7 to the second fisherman.
53.  $20\% = \frac{1}{5} = 1 : 5$   
 boys : girls = 1:5  
 boys =  $\frac{1}{6}$   
 girls =  $\frac{5}{6}$   
 $\frac{5}{6}(30) = 25$  (girls)
54.  $72 \div 3 = 24$   
 $96 \div 24 = 4$  (gal)  
 $18 \times \frac{4}{5} = \$14.40$
55.  $3.25 \div 0.25 = 13$   
 $13 \times 50 = 650 = 10 \text{ min } 50 \text{ sec}$
56. 1 foot = 12 inches  
 8 feet = 96 inches  
 $96 \div 10 = 9.6$  (hr)  
 $8 \div 3 = 2R2$   
 $30 \times 2 = 60 \text{ min} = 1 \text{ hr}$  (Charlie rests twice.)  
 $9.6 + 1 = 10.6 = 10 \text{ hr } 36 \text{ min}$
57.  $\frac{3}{4} \times 72 = 54$  (one way)  
 $54 \times 2 = 108$  (round trip)  
 $\frac{108}{2\frac{1}{4}} = \underline{48 \text{ mph}}$
58. 1 foot = 12 inches  
 8 feet = 96 inches  
 $96 \div 10 = 9.6$  (hr)  
 $8 \div 3 = 2R2$   
 $30 \times 2 = 60 \text{ min} = 1 \text{ hr}$  (Charlie rests twice.)  
 $9.6 + 1 = 10.6 \text{ hr} = 10 \text{ hr } 36 \text{ min}$
59. In each minute,  
 Roboprint (fastest) prints 120 pages  
 Voltronn prints 30 pages  
 Vantek Plus prints 80 pages  
 DLS Pro prints 100 pages
60.  $1\frac{1}{3} = \frac{4}{3}$   
 $(\frac{4}{3})^3 = \frac{64}{27}$
61. A  
 $5 + 3 = 8$  (points won by Mary)
- $8 \div 2 = 4$  (games won by Mary)  
 $4 + 3 = 7$  (total games)
62. D  
 $1 + 2 + 1 = 4 = 2^2$   
 $1 + 2 + 3 + 2 + 1 = 9 = 3^2$   
 $1 + 2 + 3 + 4 + 5 + \dots + 15 + 14 + 13 + \dots + 3 + 2 + 1 = 15^2$
63. See the table below.
- | Sleep         | School        | Home work     | Activities     |
|---------------|---------------|---------------|----------------|
| 8             | 6             | 3             | 7              |
| $\frac{1}{3}$ | $\frac{1}{4}$ | $\frac{1}{8}$ | $\frac{7}{24}$ |
| 33.3%         | 25%           | 12.5%         | 29.2%          |
64. B  
 If the heavy black lines represent the color red, every face will have exactly one red edge. So the smallest number of red edges is 3.
- 
65.  $25^2 = 20^2 + 15^2$
66.  $6 \times 5 \div 2 = 15$  chords
67. C  
 $1 - 20\% = 0.8$   
 $2^{\text{nd}} \text{ time: } 0.8 \times 0.8 = 0.64$   
 $3^{\text{rd}} \text{ time: } 0.8 \times 0.64 = 0.512$   
 $4^{\text{th}} \text{ time: } 0.8 \times 0.512 = 0.4096$
68.  $60 + 60 \times 5\% = 60 + 3 = \boxed{\$63}$
69.  $\frac{500000}{100} \times 0.36 \times 5$   
 $= 5000 \times 0.36 \times 5$  (cancellation)  
 $= 50 \times 36 \times 5$  (moving decimal)  
 $= 10 \times 180 \times 5$   
 $= 1800 \times 5$   
 $= \$9000$
70. (a)  $0.2 \times 12,000 = 2,400$   
 (b)  $12,000 + 2,400 = 14,400$
71.  $0.5^3 \times 0.6^3 = (0.5 \times 0.6)^3 = 0.3^3 = \boxed{0.027}$
72.  $80 \div 2 = 40$   
 $40 \div 4 = 10$  (width)  
 $40 - 10 = 30$  (length)  
 $10 \times 30 = \boxed{300 \text{ cm}^2}$
73.  $9 \times 3 = 27$   
 $27 - 5 - 11 = 11 \text{ yrs old}$  (Charles)
74.  $108 \div 3 = 36$   
 $36 = 6^2$   
 each side = 6 cm  
 $2(18+6) = \boxed{48 \text{ cm}}$  (perimeter)
75.  $3000 \times 12 = 36000$   
 $36000 - 14000 - 17000$   
 $= \boxed{\$5000}$

## M 270 (Spring, 2024) Issue 1

76. 72
77.  $21 \div 2 = 10.5$   
 $10.5 - 8.5 = 2$  (width)  
 $2 \times 8.5 = \boxed{17 \text{ sq. ft}}$
78.  $5(x - 2) = 4(x + 6)$   
 $5x - 10 = 4x + 24$   
 $x = 34$
79.  $16\pi - 4\pi = \boxed{12\pi}$
80. The radius of a small circle is 2, so each circle has an area of  $4\pi$ , therefore, four circles have an
- combined area of  $16\pi$ . (Amazingly, the area is the same as the previous problem.) The area of the shaded region is  $\boxed{64 - 16\pi}$ .
81.  $\angle A + \angle B = 2(180^\circ - 140^\circ) = 80$   
 $\angle C = 180 - 80 = \boxed{100^\circ}$
82.  $14.4 \div 8 = 1.8$   
 $1.8 \div 12 = \boxed{\$0.15}$
83. 50

# Answer Key

1.  $0.25=25\%=\frac{1}{4} = 1/4$
2.  $0.4=40\%=\frac{2}{5} = 2/5$
3.  $0.5=50\%=\frac{1}{2} = 1/2$
4.  $0.35=35\%=\frac{7}{20} = 7/20$
5.  $1.25=125\%=1\frac{1}{4} = 1 1/4$
6.  $2.36=236\%=2\frac{9}{25} = 2 9/25$
7.  $3.20=320\%=3\frac{1}{5} = 3 1/5$
8.  $4.25=425\%=4\frac{1}{4} = 4 1/4$
9.  $5.50=550\%=5\frac{1}{2} = 5 1/2$
10.  $10.75=1075\%=10\frac{3}{4} = 10 3/4$
11. 18
12. 3
13. 42
14. 7
15. 32
16. 12
17. 0
18. 96
19. 17
20. -3
21. 900
22. 121
23. 8000
24. 64000
25.  $121/100$
26. 2
27.  $2/3$
28.  $2/5$
29.  $2/11$
30.  $-1/2$
31. -1
32. -1
33.  $9/4$
34.  $4/5$
35. 5
36. 4
37.  $7/3$
38.  $17/2$
39.  $5/4$
40.  $6/5$
41. 1225 sq meters
42. 30 sq meters
43. 80 meters
44. 6 feet
45. 196 sq feet
46. 576 sq inches
47. 120 meters
48. 60 meters
49. 8 sq inches
50. 11 sq yards
51.  $5.00 \times 8.5 \times 4 \times 3 = 510$
52.  $30 \times (1 - 40\%) = 18$
53.  $(36 \times 3 + 36 / 6 \times 5) / 6 = 23$
54.  $\frac{1}{8} \times 16 \times 14 = 28$  ounces
55.  $96 / 3 \times 2 = 64$
56.  $32 \times (1 - 3/8) = 20$
57.  $63 \times (1 - 6/7) = 9$
58.  $3.5 \times 2.00 + 5 \times 3.40 = 24$
59.  $56 / (1 - 1/5) = 70$
60.  $5280 \times (1 - 1/6) = 4400$
61.  $\frac{3}{4} \times 144 = 108$
62. 1.44
63. 0.2
64.  $\frac{24}{35} = 24/35$
65. .49
66.  $1 \frac{3}{7}$
67.  $\frac{8}{3} \times \frac{15}{4} = 10$
68. 2
69.  $\frac{1}{3}(n - \frac{2}{3}) = -2$   
 $n - \frac{2}{3} = -6$   
 $n = -5\frac{1}{3} = -5 1/3$
70.  $5(x + 3) = 30$   
 $x + 3 = 6$   
 $x = 3$
71.  $\frac{1}{4} = 1/4$
72.  $7 + 2=9$   
 $9 + 6=15$   
 $15 + 2=17$   
 $17 + 6=23$   
 $23 + 2=25$
73.  $5 - 3\frac{4}{5} = 1\frac{1}{5} = 1 1/5$
74.  $9^4 \times 3^3 = 3^{11}$   
 $\square = 11$
75.  $90^\circ$
76. C
77.  $I(3, -4.5)$

## MAP 280 (Spring, 2024) Issue 2

78. 12

80. 3 in (A) & 8 in (B) & 2 in (C) & 4 in (D)

79. 2 in (A) & 6 in (B) & 7 in (C) & 5 in (D)

# Answer Key

1. 6
2. 63
3. 120
4. 165
5. 20
6. -4
7. 17
8. 0
9. -2
10. 6
11. 961
12. 1681
13. 2601
14. 3721
15. 5041
16. P=(12, 0)
17. Q=(9, -9)
18. R=(-6, -9)
19. S=(-12, 0)
20. T=(0, 12)
21.  $\frac{1}{2}(12 \times 16) = \boxed{96 \text{ in}^2}$
22. 12 : 16 : \_\_\_  
= 3 : 4 : 5  
The length of the diagonal is  $\boxed{20 \text{ in}}$  by proportion.
23.  $96 \times 2 \div 20 = \boxed{9.6 \text{ in}}$
24.  $40 \div 5 = 8$   
 $8 \times 4 = 32$   
 $32 - 4 = 28$  (smaller squares)
25.  $40 - 2 \times 5 = 30$   
The uncovered square is 30 by 30.  
 $30 \times 30 = \boxed{900 \text{ in}^2}$
26.  $9.25 \times 5 \times 4 \times 2 = 370$
27.  $30 \times (1 - 70\%) = 9$
28.  $(36 \times 3 + 36 \div 9 \times 8) \div 20 = 7$
29.  $12 \div ((16 \div 8) \times 1) = 6$
30.  $114 \div 6 \times 5 = 95$
31.  $1 \times 12 \times (1 - 3/4) = 3$
32.  $50 - 12 \times (3 + 1/6) = 12$
33.  $15 \times (1 - 1/5) = 12$
34.  $70 \div (1 - 2/7) = 98$
35.  $15 \div (2 - 1) \times 1 = 15$
36. 1/2
37. 1/2
38. 256
39. 1/2
40. 1/2
41.  $x^2 + 5x - 6$
42.  $x^2 + 8x - 9$
43.  $x^2 + 7x - 8$
44.  $x^2 + x - 2$
45.  $x^2 + 3x - 4$
46. -0.027
47. 1
48.  $4/3 = 1 \frac{1}{3}$
49. .007
50. 0.00032
51. 25/36
52. 132
53.  $3.14 \times .03 = .0942$
54.  $2(x - 1) + 3(x + 1) = 6$   
 $5x + 1 = 6$   
 $x = 1$
55.  $(1 + \frac{1}{2})(1 + \frac{1}{3})(1 + \frac{1}{4})(1 + \frac{1}{5})(1 + \frac{1}{6}) = \frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \frac{6}{5} \times \frac{7}{6} = \frac{7}{2} = 7/2$
56. 8
57. 0.0025
58. 12
59.  $7 \frac{7}{10} = 7 \frac{7}{10}$
60.  $80 \times 70\% = 80 \times 0.7 = \$56$
61.  $25^2 = 20^2 + 15^2$   
Ans = 20
62.  $\frac{1}{2}(12) = 6 \text{ in}$
63.  $20 \times 1.5 = 30$   
 $12 \times 30 = \$360$
64.  $22 \times 14 \times 12 \div 231 = 16$   
Note  $231 = 11 \times 21$
65.  $273 \div 3 = 91$   
 $91 \div 7 = 13$   
 $273 = 3 \times 7 \times 13$   
Ans = { 3, 7, 13 }
66. -24
67.  $\frac{8}{9} = 8/9$
68.  $\frac{1}{10} = 1/10$
69. .009

## MAP 280 (Spring, 2024) Issue 3

70.  $10 \text{ yd} = 30 \text{ ft} = 360 \text{ in}$
71. 20000
72.  $-20 \times 30 \times -40 \times \frac{1}{2} \times \frac{1}{3} \times \frac{1}{4}$   
 $= 20 \times 30 \times 40 \times \frac{1}{2} \times \frac{1}{3} \times \frac{1}{4}$   
 $= (20 \times \frac{1}{2}) \times (30 \times \frac{1}{3}) \times (40 \times \frac{1}{4})$   
 $= 1000$   
Note: Simplify before multiply.
73.  $20/3 = 6 \frac{2}{3}$
74. 6
75.  $\frac{3}{5} = 3/5$
76. 280
77. 321%
78.  $8^3 \times 3 - 7^2 - 10 = 1477$
79. 400
80.  $1.18 \times 5 = \$5.90$
81. Note that shaded area  
 $= \frac{1}{4}(\text{circle}) - \Delta$   
 $= \frac{1}{4} \times (400\pi) - \frac{1}{2}(400)$   
 $= 100\pi - 200 = 314 - 200 = 114$
82.  $(8+12) \times 20 \div 2 = 200$
83.  $90 \times 0.7 = \$63.00$
84.  $12 \div 2 = 6$   
 $12 \times 6 = 72 \text{ in}^2$
85.  $(3 \times 8/4) \times \frac{1}{3} = 2 \text{ (cups)}$
86. 3 in (A) & 9 in (B) & 6 in (C) & 5 in (D)
87. 6 in (A) & 8 in (B) & 3 in (C) & 8 in (D)
88. 7 in (A) & 10 in (B) & 7 in (C) & 6 in (D)
89. 3 in (A) & 10 in (B) & 3 in (C) & 8 in (D)
90. 7 in (A) & 5 in (B) & 8 in (C) & 7 in (D)

# Answer Key

- |  |  |
|--|--|
| 1. 550%                                      | 45. $\frac{4}{5}$  |
| 2. 35%                                       | 46. $\frac{4}{9}$  |
| 3. 125%                                      | 47. 5  |
| 4. 236%                                      | 48. $\frac{5}{7}$  |
| 5. 320%                                      | 49. $\frac{5}{9}$  |
| 6. 425%                                      | 50. $\frac{5}{16}$   |
| 7. 350%                                      | 51. $\frac{31}{5}$   |
| 8. .162                                      | 52. $\frac{9}{19}$   |
| 9. .72                                       | 53. $\frac{21}{10}$  |
| 10. .495                                     | 54. -1   |
| 11. 6  | 55. -1   |
| 12. 63                                       | 56. -1   |
| 13. 120                                      | 57. -2   |
| 14. 165                                      | 58. -1   |
| 15. 20                                       | 59. $\frac{10}{11}$  |
| 16. -4                                       | 60. $\frac{9}{8}$  |
| 17. 17                                       | 61. 2 in (A) & 4 in (B) & 6 in (C) & 6 in (D)  |
| 18. 0  | 62. 2 in (A) & 7 in (B) & 6 in (C) & 6 in (D)  |
| 19. -2                                       | 63. 7 in (A) & 7 in (B) & 4 in (C) & 4 in (D)  |
| 20. 6  | 64. 6 in (A) & 10 in (B) & 7 in (C) & 5 in (D)   |
| 21. 6.25 sq feet                             | 65. 2 in (A) & 9 in (B) & 7 in (C) & 7 in (D)  |
| 22. 180 feet                                 | 66. $(\frac{1}{2})^2 - (\frac{1}{3})^3 = \frac{1}{4} - \frac{1}{27} = \frac{23}{108} = 23/108$           |
| 23. 2025 sq inches                           | 67. $1\frac{9}{16}$  |
| 24. 361 sq yards                             | 68. 0.9  |
| 25. 729 sq feet                              | 69. $\frac{28}{25}$  |
| 26. 529 sq meters                            | 70. 12.5   |
| 27. 4225 sq cm                               | 71. $1\frac{2}{3} \times 60 = 100$ min   |
| 28. 256 sq yards                             | 72. 3  |
| 29. 54 meters                                | 73. -2   |
| 30. 80 feet                                  | 74. $t = 6$  |
| 31. $12.50 \times 4 \times 3 \times 2 = 300$ | 75. 9  |
| 32. $20 \times (1 - 45\%) = 11$              | 76. $\frac{1}{2} = 1/2$  |
| 33. $(36 \times 3 + 36/9 \times 1)/8 = 14$   | 77. $91 = 7 \times 13$<br>Ans = 7 & 13   |
| 34. $32 / ((16/2) \times 1) = 4$             | 78. $5 \times 12 = 60$<br>$\frac{1}{3} \times 12 = 4$<br>$60 + 4 = 64$                                   |
| 35. $36/4 \times 1 = 9$                      | 79. $80 \times 70\% = 80 \times .7 = \$56$   |
| 36. $36 \times (1 - 1/9) = 32$               | 80. $5 \times 12 \div 6 = 10$ pieces of tile<br>$6 \times 12 \div 6 = 12$<br>$10 \times 12 = 120$ pieces |
| 37. $58 - 12 \times (4 + 1/2) = 4$           |  |
| 38. $10 \times (1 - 1/2) = 5$                |  |
| 39. $45 / (1 - 2/5) = 75$                    |  |
| 40. $5280 \times (1 - 5/6) = 880$            |  |
| 41. $17/2$                                   |  |
| 42. $4/3$                                    |  |
| 43. $7/3$                                    |  |
| 44. 4  |  |



## MAP 280 (Spring, 2024) Issue 4

81. Let's split 12 into 3 parts: 2 for the tens digit, and 1 for the ones digit. So, tens digit is 8 and ones digit is 4.  
Ans = 84
82. F(6, 4)
83. -1.25
84.  $\frac{1}{2}x - \frac{1}{3}x = 6$   
 $\frac{1}{6}x = 6$   
 $x = 36$
85.  $180 \div 250 = 72\%$
86.  $x^2 + 7x - 18$
87.  $x^2 - 3x + 2$
88.  $x^2 + 2x - 8$
89.  $x^2 + 4x - 12$
90.  $x^2 - x - 2$
91.  $x^2 + x - 6$
92.  $3x^2 - 31x + 36$
93.  $9x^2 + 9x + 2$
94.  $8x^2 + 26x - 7$
95.  $4x^2 - 8x + 3$