

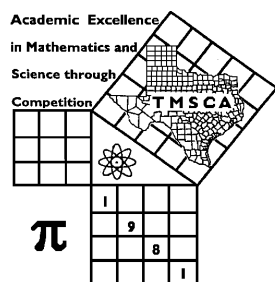
|                  |                  |                  |                                   |
|------------------|------------------|------------------|-----------------------------------|
| 1st Score: _____ | 2nd Score: _____ | 3rd Score: _____ | _____. ____<br><b>Final Score</b> |
| S & G _____      | S & G _____      | S & G _____      |                                   |
| Grader: _____    | Grader: _____    | Grader: _____    |                                   |

## PLACE LABEL BELOW

Name: \_\_\_\_\_ School: \_\_\_\_\_

SS/ID Number: \_\_\_\_\_ City: \_\_\_\_\_

Grade: 4 5 6 7 8                      Classification: 1A 2A 3A 4A 5A 6A



## TMSCA MIDDLE SCHOOL CALCULATOR

### REGIONAL TEST ©

MARCH 4, 2023

#### GENERAL DIRECTIONS

- I. About this test:
  - A. You will be given 30 minutes to take this test. There are 80 problems on this test.
- II. **Calculators limited to the types specified by UIL. Calculators are no longer required to be cleared.**
- III. How to write the answers:
  - A. For all problems except stated problem as noted below write three significant digits.
    1. Examples (\* means correct, but not recommended)  
 Correct: 12.3, 123, 123.\*, 1.23x10\*, 1.23x10<sup>0\*</sup>, 1.23x10<sup>1</sup>, 1.23x10<sup>01</sup>, .0190, 1.90x10<sup>-2</sup>  
 Incorrect: 12.30, 123.0, 1.23(10)<sup>2</sup>, 1.23·10<sup>2</sup>, 1.230x10<sup>2</sup>, 1.23\*10<sup>2</sup>, 0.19, 1.9x10<sup>-2</sup>, 19.0x10<sup>-3</sup>, 1.90E-02
    2. Plus or minus one digit error in the third significant digit is permitted.
  - B. For stated problems:
    1. Except for integer, dollar sign, and significant digit problems, as detailed below, answers to stated problems should be written with three significant digits.
    2. Integer problems are indicated by (integer) in the answer blank. Integer problems answers must be exact, no plus or minus one digit, no decimal point or scientific notation.
    3. Dollar sign (\$) problems should be answered to the exact cent, but plus or minus one cent error is permitted. The decimal point and cents are required for exact dollar answers.
- IV. Some symbols used on the test.
  - A. Angle measure: rad means radians; deg means degrees.
  - B. Inverse trigonometric functions: arcsin for inverse sine, etc.
  - C. Special numbers:  $\pi$  for 3.14159 . . . ; e for 2.71828.
  - D. Logarithms: Log means common (base 10); Ln means natural (base e).
- V. Scoring:
  - A. All problems answered correctly are worth FIVE points. FOUR points will be deducted for all problems answered incorrectly or skipped before the last problem attempted.

**2022 – 2023 TMSCA Middle School Calculator Regional Qualifier**

1.  $3940 - 1780$  ----- 1= \_\_\_\_\_
2.  $6 + 21 - 30$  ----- 2= \_\_\_\_\_
3.  $8130 + 7650 - 4530$  ----- 3= \_\_\_\_\_
4.  $16 + 18 + \pi + 8$  ----- 4= \_\_\_\_\_
5.  $164 + 134 - 99 - 66$  ----- 5= \_\_\_\_\_
6.  $250 + 250 - 244 - 290 - 245$  ----- 6= \_\_\_\_\_
7.  $0.898 - 0.274 + 1.76 - 0.688 - 0.667$  ----- 7= \_\_\_\_\_
8.  $\pi + 1.69 + 0.401 + 1.97 + 1.78$  ----- 8= \_\_\_\_\_
9.  $112 \times 180 \times 37.2$  ----- 9= \_\_\_\_\_
10.  $1020 \times 3780 \times 4150 \times 406$  ----- 10= \_\_\_\_\_
11. June collected coins for a school project. She had 2 \$1 coins, 8 half dollars, 72 quarters, 151 dimes, 204 nickels, and 522 pennies. Calculate the average number of each coin she had. ----- 11= \_\_\_\_\_
12. Using the coins in problem 11, calculate the value of the coins that June collected. ----- 12= \$ \_\_\_\_\_
13. The angles in a pentagon are in the ratio of 5:3:8:2:4. Calculate the degree measure of the smallest angle. ----- 13= \_\_\_\_\_<sup>o</sup>

14.  $(99)[45 \times 71/85]$  ----- 14= \_\_\_\_\_

15.  $(-497)[541 \times 479 \times 288]$  ----- 15= \_\_\_\_\_

16.  $\left[\frac{127}{125}\right][(238/72) - 2.9]$  ----- 16= \_\_\_\_\_

17.  $\left[\frac{260}{170}\right] [(84/452) + 0.142]$  ----- 17= \_\_\_\_\_

18.  $\frac{[1.65/(1.91)]/0.0051}{(0.108 \times 0.105)(0.00112)}$  ----- 18= \_\_\_\_\_

19.  $\left[\frac{(2760/2680) - (6190/1880)}{29.6/28.7}\right]$  ----- 19= \_\_\_\_\_

20.  $\frac{242}{(157 - 285)} - \frac{(180 - 133)}{116}$  ----- 20= \_\_\_\_\_

21.  $(0.54)[592/437 \times 426/684] - 0.381$  ----- 21= \_\_\_\_\_

22.  $\frac{(0.791 + 0.834 - 0.389)}{\{(1.7 - 0.859)/(87)\}}$  ----- 22= \_\_\_\_\_

23.  $\frac{(\pi)(95/310)(57/117)}{(109/140)}$  ----- 23= \_\_\_\_\_

24. The perimeter of a right isosceles triangle is 246.5 ft. Calculate the area of the triangle. ----- 24= \_\_\_\_\_ ft.

25. Calculate the additive inverse of the reciprocal of  $e^{50}$ . ----- 25= \_\_\_\_\_

26. The perimeter of a square and a circle are equal. If the side of the square is 41.14, calculate the area of the circle. ----- 26= \_\_\_\_\_

27.  $(146)[(196/219)(27.3/14.5)]$  ----- 27= \_\_\_\_\_

28.  $\frac{(0.00676 - 0.00821)(0.162 + 0.269)}{(5.27 \times 10^{10})}$  ----- 28= \_\_\_\_\_

29.  $(0.0277)[(121/55.9)(0.348 + 2.69)]$  ----- 29= \_\_\_\_\_

30.  $[0.12] \left[ \frac{1/3370}{1/2930} \right]$  ----- 30= \_\_\_\_\_

31.  $\frac{1}{7170} + \frac{1}{(9390 - 7090)}$  ----- 31= \_\_\_\_\_

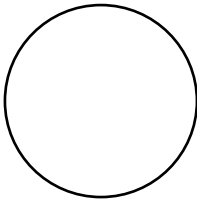
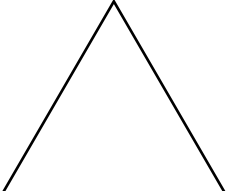
32.  $\frac{1}{0.0142} + \frac{1}{(\pi)(0.292 - 0.261)}$  ----- 32= \_\_\_\_\_

33.  $\frac{1}{49.3} - \frac{1}{269} + \frac{1}{160}$  ----- 33= \_\_\_\_\_

34.  $\frac{1}{454} - \frac{1}{(480 + 303)}$  ----- 34= \_\_\_\_\_

35. Workers R&S can complete the job in 8 days. S&T can complete it in 10 days. R&T can complete it in 5 days. Calculate the number of days to complete the job if all 3 work together. ----- 35= \_\_\_\_\_ days

36. A bag of 210 quarters and nickels have a value of \$20.50. Calculate how many more nickels there are than quarters. ----- 36= \_\_\_\_\_ INT.

|   |  |
|---|--|
| <p>37. CIRCLE</p> <p>Circumference = <math>5.91 \times 10^8</math></p>  <p>Area = ?</p> <p>37= _____</p> | <p>38. EQUILATERAL TRIANGLE</p> <p>Area = 721.1</p>  <p>Perimeter = ?</p> <p>38= _____</p> |
|---|--|

39.  $\left[\frac{4.4}{2510}\right](3370 + 3720)^4$  ----- 39= \_\_\_\_\_

40.  $(1.81 + 2.2)^2(0.0749 + 0.125)^2$  ----- 40= \_\_\_\_\_

41.  $(2.5 + 3.79 + 6.48)^2(0.292 + 0.135)^2$  ----- 41= \_\_\_\_\_

42.  $(326)\sqrt{97.6 + 70.3 + 21.8}$  ----- 42= \_\_\_\_\_

43.  $\sqrt{57.9} + \sqrt{172 + 92.4} - (\pi)\sqrt{173}$  ----- 43= \_\_\_\_\_

44.  $(1/(0.00419))(60000 - 28000)^2$  ----- 44= \_\_\_\_\_

45.  $\frac{(4230 + 23100)^{1/4}}{(23000 - 13400)^{1/3}}$  ----- 45= \_\_\_\_\_

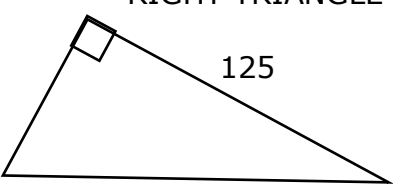
46.  $\frac{1}{\sqrt{67.3 + 145 + 123}} + \left(\frac{1}{\sqrt{16.6}}\right)^2$  ----- 46= \_\_\_\_\_

47. A doughnut shop makes 100 pounds of batter. A certain doughnut takes 4 ounces of batter to make. Calculate the number of dozen of these doughnuts the batter will make. ----- 47= \_\_\_\_\_ dz.

48. Calculate the total surface area of a regular octahedron with edge equal to pi. ----- 48= \_\_\_\_\_

49.

RIGHT TRIANGLE

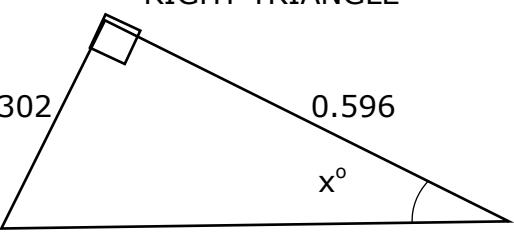


Perimeter = ?

49= \_\_\_\_\_

50.

RIGHT TRIANGLE



$x^\circ = ?$

50= \_\_\_\_\_

51.  $\left[ \frac{\sqrt{\sqrt{0.0974 - 0.0313}}}{-(2.4 - 5.37)} \right]^2 [57400 + 56900]$  ----- 51= \_\_\_\_\_

52.  $\left[ \frac{6890 + 2230 + \sqrt{4.38 \times 10^7 + 5.01 \times 10^7}}{2540/3320} \right]^3$  ----- 52= \_\_\_\_\_

53.  $\sqrt{\frac{0.299}{(65500)(4.3)}} + \frac{(105 - 121)}{(2780 + 11700)}$  ----- 53= \_\_\_\_\_

54.  $(16.9)^2 \sqrt{(12.1)/(16.4)} - (52 + 185)$  ----- 54= \_\_\_\_\_

55.  $6480 + \sqrt{(9720)(11200)} - (8930 + 2630)$  ----- 55= \_\_\_\_\_

56.  $\sqrt{\frac{1/(28.5 - 17.3)}{(6.43)(66.1 + 537)^5}}$  ----- 56= \_\_\_\_\_

57.  $(\text{deg}) \tan(2860^\circ) + (297/202)$  ----- 57= \_\_\_\_\_

58.  $\sqrt{\frac{(131)(168)}{(1.51) + (1.24)}} + 1/(0.0112)^1$  ----- 58= \_\_\_\_\_

59. Martin and Mary are 320 miles apart on a straight highway. Martin starts towards Mary at a rate of 57 mph at 10 am. Mary starts towards Martin 1 hour later and they meet at 1:30 pm. Calculate Marys' speed. ----- 59= \_\_\_\_\_ mph

60. In a class there are 10 boys and 10 girls. Three students are selected at random. Calculate the probability that 2 girls and one boy are selected. ----- 60= \_\_\_\_\_

61. EQUILATERAL TRIANGULAR PRISM

Volume =  $3.64 \times 10^5$   
 $x = ?$

61= \_\_\_\_\_

62. RHOMBUS AND RECTANGLE

Shaded Area = ?

62= \_\_\_\_\_

63.  $\frac{15!}{13!} + 5!$  ----- 63= \_\_\_\_\_

64. (deg)  $(0.554 + 0.994)\tan(207^\circ)$  ----- 64= \_\_\_\_\_

65.  $(428 - \pi)e^{0.503}$  ----- 65= \_\_\_\_\_

66. (deg)  $(9.54 - 5.47)\tan(88.4^\circ) + 83.1$  ----- 66= \_\_\_\_\_

67. (rad)  $\frac{\sin(11.5)}{2370/1340}$  ----- 67= \_\_\_\_\_

68. (rad)  $(17100)\sin(6.39)$  ----- 68= \_\_\_\_\_

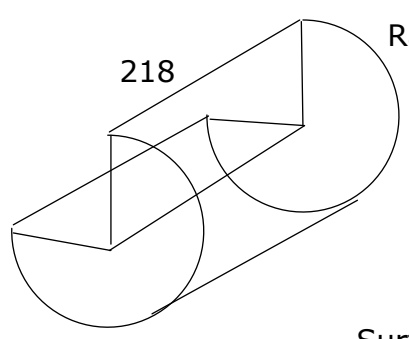
69. (deg)  $\frac{\sin(69.9^\circ) - \tan(69.9^\circ)}{\sin(69.9^\circ)}$  ----- 69= \_\_\_\_\_

70.  $(7.39 - 11.9)e^\pi - 0.714$  ----- 70= \_\_\_\_\_

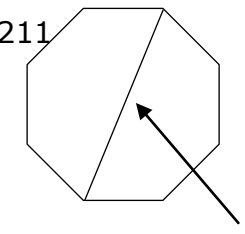
71. Calculate the sum of the interior angles in a regular tetradecagon. 71= \_\_\_\_\_°

72. There was a 25% increase in attendance from the 2022 gala to the 2023 gala. Calculate the attendance in 2022 if the attendance in 2023 was 15,455. ----- 72= \_\_\_\_\_ INT.

73.  $\frac{3}{4}$  CYLINDER  
 Radius = 73  
 218  
 Surface Area = ?  
 73= \_\_\_\_\_



74. REGULAR OCTAGON  
 52211  
 Longest diagonal = ?  
 74= \_\_\_\_\_



75.  $\frac{(2.98)^{0.884}(8.44)^{0.597}}{(0.488 - 0.221)^{-4}}$  ----- 75= \_\_\_\_\_

76.  $\frac{\text{Log}(350 + 258)}{350 - 143}$  ----- 76= \_\_\_\_\_

77.  $\frac{16000 - 33600}{\text{Log}(624 + 228)}$  ----- 77= \_\_\_\_\_

78.  $\frac{\text{Log}[15200 + (6.38)(2760)]}{0.602 + \text{Log}[475 + 185]}$  ----- 78= \_\_\_\_\_

79.  $1 + 3 + 5 + \dots + 423$  ----- 79= \_\_\_\_\_

80.  $1 + 0.449 + (0.449)^2 + \frac{(0.449)^4}{8} - \frac{(0.449)^5}{15}$  ----- 80= \_\_\_\_\_



## 2022 – 2023 TMSCA Middle School Calculator Regional Qualifier Answer Key

| Page 1                             | Page 2                                 | Page 3                                   | Page 4                                |
|------------------------------------|--|--|---------------------------------------|
| 1 = 2160<br>= $2.16 \times 10^3$   | 14 = 3720<br>= $3.72 \times 10^3$      | 27 = 246<br>= $2.46 \times 10^2$         | 39 = $4.43 \times 10^{12}$            |
| 2 = -3.00<br>= $-3.00 \times 10^0$ | 15 = $-3.71 \times 10^{10}$            | 28 = $-1.19 \times 10^{-14}$             | 40 = 0.643<br>= $6.43 \times 10^{-1}$ |
| 3 = 11300<br>= $1.13 \times 10^4$  | 16 = 0.412<br>= $4.12 \times 10^{-1}$  | 29 = 0.182<br>= $1.82 \times 10^{-1}$    | 41 = 29.7<br>= $2.97 \times 10^1$     |
| 4 = 45.1<br>= $4.51 \times 10^1$   | 17 = 0.501<br>= $5.01 \times 10^{-1}$  | 30 = 0.104<br>= $1.04 \times 10^{-1}$    | 42 = 4490<br>= $4.49 \times 10^3$     |
| 5 = 133<br>= $1.33 \times 10^2$    | 18 = $1.33 \times 10^7$                | 31 = 0.000574<br>= $5.74 \times 10^{-4}$ | 43 = -17.5<br>= $-1.75 \times 10^1$   |
| 6 = -279<br>= $-2.79 \times 10^2$  | 19 = -2.19<br>= $-2.19 \times 10^0$    | 32 = 80.7<br>= $8.07 \times 10^1$        | 44 = $2.44 \times 10^{11}$            |
| 7 = 1.03<br>= $1.03 \times 10^0$   | 20 = -2.30<br>= $-2.30 \times 10^0$    | 33 = 0.0228<br>= $2.28 \times 10^{-2}$   | 45 = 0.605<br>= $6.05 \times 10^{-1}$ |
| 8 = 8.98<br>= $8.98 \times 10^0$   | 21 = 0.0746<br>= $7.46 \times 10^{-2}$ | 34 = 0.000926<br>= $9.26 \times 10^{-4}$ | 46 = 0.115<br>= $1.15 \times 10^{-1}$ |
| 9 = 750000<br>= $7.50 \times 10^5$ | 22 = 128<br>= $1.28 \times 10^2$       | 35 = 4.71<br>= $4.71 \times 10^0$        | 47 = 33.3<br>= $3.33 \times 10^1$     |
| 10 = $6.50 \times 10^{12}$         | 23 = 0.602<br>= $6.02 \times 10^{-1}$  | 36 = 110 INT.                            | 48 = 34.2<br>= $3.42 \times 10^1$     |
| 11 = 160<br>= $1.60 \times 10^2$   | 24 = 2610<br>= $2.61 \times 10^3$      | 37 = $2.78 \times 10^{16}$               | 49 = 355<br>= $3.55 \times 10^2$      |
| 12 = \$54.52                       | 25 = $-1.93 \times 10^{-22}$           | 38 = 122<br>= $1.22 \times 10^2$         | 50 = 26.9<br>= $2.69 \times 10^1$     |
| 13 = 49.1<br>= $4.91 \times 10^1$  | 26 = 2150<br>= $2.15 \times 10^3$      |  |                                       |

## 2022 – 2023 TMSCA Middle School Calculator Regional Qualifier Answer Key

### Page 5

$$51 = 3330 \\ = 3.33 \times 10^3$$

$$52 = 1.49 \times 10^{13}$$

$$53 = -7.46 \times 10^{-5}$$

$$54 = 8.33 \\ = 8.33 \times 10^0$$

$$55 = 5350 \\ = 5.35 \times 10^3$$

$$56 = 1.32 \times 10^{-8}$$

$$57 = 1.11 \\ = 1.11 \times 10^0$$

$$58 = 179 \\ = 1.79 \times 10^2$$

$$59 = 48.2 \\ = 4.82 \times 10^1$$

$$60 = 0.395 \\ = 3.95 \times 10^{-1}$$

### Page 6

$$61 = 121 \\ = 1.21 \times 10^2$$

$$62 = 1810 \\ = 1.81 \times 10^3$$

$$63 = 330 \\ = 3.30 \times 10^2$$

$$64 = 0.789 \\ = 7.89 \times 10^{-1}$$

$$65 = 703 \\ = 7.03 \times 10^2$$

$$66 = 229 \\ = 2.29 \times 10^2$$

$$67 = -0.495 \\ = -4.95 \times 10^{-1}$$

$$68 = 1820 \\ = 1.82 \times 10^3$$

$$69 = -1.91 \\ = -1.91 \times 10^0$$

$$70 = -51.1 \\ = -5.11 \times 10^1$$

$$71 = 2160 \\ = 2.16 \times 10^3$$

$$72 = 12,364 \text{ INT.}$$

### Page 7

$$73 = 132000 \\ = 1.32 \times 10^5$$

$$74 = 136000 \\ = 1.36 \times 10^5$$

$$75 = 0.0477 \\ = 4.77 \times 10^{-2}$$

$$76 = 0.0134 \\ = 1.34 \times 10^{-2}$$

$$77 = -6010 \\ = -6.01 \times 10^3$$

$$78 = 1.32 \\ = 1.32 \times 10^0$$

$$79 = 44900 \\ = 4.49 \times 10^4$$

$$80 = 1.65 \\ = 1.65 \times 10^0$$

TMSCA 2022-2023 MS CA Regional Test Solutions to Word and Geometry Problems

11.  $\frac{2+8+72+151+204+522}{6}$

12.  $2 + 8(.5) + 72(.25) + 151(.1) + 204(.05) + 5.22$

13. Degrees in a pentagon:  
 $180(5 - 2) = 540$   
 $5x + 3x + 8x + 2x + 4x = 540$   
 $x = \frac{540}{22}$

Smallest angle is  $2\left(\frac{540}{22}\right)$

24.  $2x + x\sqrt{2} = 246.5$   
 $x(2 + \sqrt{2}) = 246.5$   
 $x = \frac{246.5}{2 + \sqrt{2}} = \text{one leg}$   
 $A = \frac{\text{leg}^2}{2} = \frac{\left(\frac{246.5}{2 + \sqrt{2}}\right)^2}{2}$

25.  $-\frac{1}{e^{50}}$

26. Square perimeter =  $41.14(4)$   
 Circle:  $2\pi r = 41.14(4)$   
 $r = \frac{41.14(4)}{2\pi}$   
 Area =  $\pi\left(\frac{41.14(4)}{2\pi}\right)^2$

35.  $\begin{cases} 8(R + S) = 1 \\ 10(S + T) = 1 \\ 5(R + T) = 1 \end{cases}$   
 $\begin{cases} 40(R + S) = 5 \\ 40(S + T) = 4 \\ 40(R + T) = 8 \end{cases}$   
 $80R + 80S + 80T = 17$   
 $\frac{80}{17}(R + S + T) = 1$

Time it takes working together is  $\frac{80}{17}$

36.  $\begin{cases} q + n = 210 \\ 25q + 5n = 2050 \end{cases}$   
 $\begin{cases} -5q - 5n = -1050 \\ 25q + 5n = 2050 \end{cases}$   
 $20q = 1000$   
 $q = 50; n = 210 - 50 = 160$   
 $n - q = 160 - 50$

37.  $2\pi r = 5.91 \times 10^8$   
 $r = \frac{5.91 \times 10^8}{2\pi}$   
 Area:  $\pi r^2 = \pi\left(\frac{5.91 \times 10^8}{2\pi}\right)^2$

38.  $A = \frac{\text{side}^2\sqrt{3}}{4} = 721.1$   
 $\text{side} = \sqrt{\frac{721.1(4)}{\sqrt{3}}}$   
 $\text{Perimeter} = 3\left(\sqrt{\frac{721.1(4)}{\sqrt{3}}}\right)$

47. 100 lbs. = 1600 oz.  
 $\frac{1600}{4} = 400 \text{ doughnuts}$   
 $\frac{400}{12} = \text{dozens}$

48. 8 equilateral triangles  
 $8\left(\frac{\text{side}^2\sqrt{3}}{4}\right) = 8\left(\frac{\pi^2\sqrt{3}}{4}\right)$

49. Short leg:  $\sqrt{149^2 - 125^2}$   
 Perimeter:  $\sqrt{149^2 - 125^2} + 149 + 125$

50.  $x = \text{atan}\left(\frac{.302}{.596}\right)$

59.  $rt = d$

|        | $r$ | $t$ | $d$    |
|--------|-----|-----|--------|
| Martin | 57  | 3.5 | 199.5  |
| Mary   | $x$ | 2.5 | $2.5x$ |

$199.5 + 2.5x = 320$   
 $320 - 199.5$   
 $x = \frac{120.5}{2.5}$

60. Total number of ways to select 3 students from 20 is  
 $\frac{20!}{3!17!} = 1140$

Ways to select 2 girls from 10:  
 $\frac{10!}{2!8!}$

Ways to select 1 boy from 10:  
 $\frac{10!}{1!9!}$

Ways to select 2 girls and 1 boy:  
 $\left(\frac{10!}{2!8!}\right)\left(\frac{10!}{1!9!}\right) = 450$

Probability of selecting 2 girls and 1 boy:  
 $\frac{450}{1140}$

61.  $\left(\frac{\text{side}^2\sqrt{3}}{3}\right) x = \text{Volume}$   
 $\left(\frac{72.1^2\sqrt{3}}{3}\right) x = 3.64 \times 10^5$   
 $x = \frac{(3.64 \times 10^5)3}{72.1^2\sqrt{3}}$

62. Rectangle minus rhombus  
 $49.6(72.8) - \frac{49.6(72.8)}{2}$   
 Notice that the shaded area is half of the rectangle.

71. A tetradecagon has 14 sides.  $180(14 - 2)$

$$72. 1.25x = 15455$$
$$x = \frac{15455}{1.25}$$

73. The 2 base areas

$$\text{combined: } 2 \left[ \pi(73^2) \left( \frac{3}{4} \right) \right]$$

Surface area of  $\frac{3}{4}$  of cylinder =

$$\frac{3}{4} \{ 2\pi(73)(218) \}$$

2 rectangles:  $2[218(73)]$

Add all of these amounts.

74. Longest diagonal when  
the polygon has an even

number of sides:  $\frac{\text{side}}{\sin\left(\frac{180}{n}\right)}$

$$d = \frac{52211}{\sin\left(\frac{180}{8}\right)}$$