

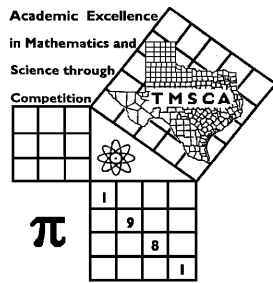
8 1st Score: _____	2nd Score: _____	3rd Score: _____	_____. ____ <b>Final Score</b>
S & G _____	S & G _____	S & G _____	
Grader: _____	Grader: _____	Grader: _____	

## PLACE LABEL BELOW

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

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

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



## TMSCA MIDDLE SCHOOL CALCULATOR REGIONAL TEST © MARCH 4, 2017 GENERAL DIRECTIONS

### I. About this test:

- A. You will be given 30 minutes to take this test.
- B. There are 80 problems on this test.

### II. 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.

### III. 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: π for 3.14159 . . . ; e for 2.71828.
- D. Logarithms: Log means common (base 10); Ln means natural (base e).

### IV. 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.

**2016-2017 TMSCA Middle School Calculator Regional Qualifier**

1.  $1310 + 1550$  ----- 1=\_\_\_\_\_
2.  $39 + 34 - 14$  ----- 2=\_\_\_\_\_
3.  $1880 - 1750 + 1300$  ----- 3=\_\_\_\_\_
4.  $16 + 41 - 56 - 25$  ----- 4=\_\_\_\_\_
5.  $153 + 41 + 69 + 120$  ----- 5=\_\_\_\_\_
6.  $85.4 + 137 - 45.6 - 32.8 - 37.2$  ----- 6=\_\_\_\_\_
7.  $0.586 + 1.45 + 0.8 + 0.354 + \pi$  ----- 7=\_\_\_\_\_
8.  $(0.609 + 2.16 - 0.819) - (\pi + 1.92)$  ----- 8=\_\_\_\_\_
9.  $81 \times 490 \times 145$  ----- 9=\_\_\_\_\_
10.  $831 \times 4710 \times 655 \times 95.3$  ----- 10=\_\_\_\_\_
11. The perimeter of a regular septagon is 452 in. Calculate the length of one side in inches. ----- 11=\_\_\_\_\_ in.
12. The ratio of quarters to dimes to nickels is 5:2:3. The total value of the coins is \$12.80. Calculate the number of quarters. ----- 12=\_\_\_\_\_ INT.
13. Pi is what percent of the boiling temperature in Celsius. ----- 13=\_\_\_\_\_ %

14.  $(333/395)[514 - 589]$  -----14= \_\_\_\_\_

15.  $(39)[55 \times 30/50]$  -----15= \_\_\_\_\_

16.  $\{(98)(68 - 187)(23)\} - 62500$  -----16= \_\_\_\_\_

17.  $\left[\frac{35}{149}\right] [(59/146) + 0.0933]$  -----17= \_\_\_\_\_

18.  $\frac{(37/21) + (85/137)}{(0.00477 - 0.00343)}$  -----18= \_\_\_\_\_

19.  $\frac{[171/(94.5)]/0.0079}{(42.3 \times 44)(17.6)}$  -----19= \_\_\_\_\_

20.  $\frac{(63.5)(6.79)}{(1.26 \times 10^{-4})} (71.4 - 26.1)$  -----20= \_\_\_\_\_

21.  $\frac{(\pi)(3/8)(2/16)}{174}$  -----21= \_\_\_\_\_

22.  $\left[\frac{158 + 378}{567 - 649}\right] \left[\frac{860}{524}\right]$  -----22= \_\_\_\_\_

23.  $\frac{(\pi)(84/312)(148/77)}{(317/250)}$  -----23= \_\_\_\_\_

24. The diameter of the moon is 2,159 miles. Calculate the volume of the moon in cubic miles. -----24= \_\_\_\_\_ cu. mi.

25. The area of an equilateral triangle and a circle are equal. The radius of the circle is 3.45 cm. Calculate the height of the equilateral triangle. -----25= \_\_\_\_\_ cm

26. Calculate the geometric mean of 12, 17, and 20. -----26= \_\_\_\_\_

27.  $\frac{(0.0234 - 0.0078)(39.4 + 21.6)}{(5.47 \times 10^{11})}$  -----27= \_\_\_\_\_

28.  $\frac{(1.34 \times 10^{11}) + (4.17 \times 10^{11})}{(-0.765)(0.961) - 0.466}$  -----28= \_\_\_\_\_

29.  $\frac{(0.0561 + 0.0216)(227 + 197)}{(1.04 \times 10^{11})}$  -----29= \_\_\_\_\_

30.  $[13.9] \left[ \frac{1/0.0188}{1/0.017} \right]$  -----30= \_\_\_\_\_

31.  $(0.444) \left[ \frac{0.0355}{(2.75 \times 10^7)} \right]$  -----31= \_\_\_\_\_

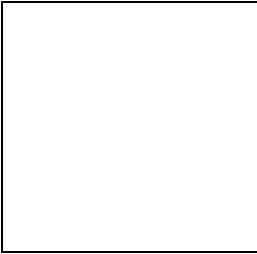
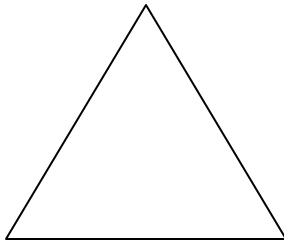
32.  $\frac{(7.65 + 4.74)}{(1.20 \times 10^{12})}$  -----32= \_\_\_\_\_

33.  $\frac{1}{25.2} - \frac{1}{58.7} + \frac{1}{150}$  -----33= \_\_\_\_\_

34.  $1/(0.00228 - 5.05 \times 10^{-4}) - 1/(0.0013)$  -----34= \_\_\_\_\_

35. Calculate the value of 12345 Base 6 in Base 10. -----35= \_\_\_\_\_ INT.

36. The pressure of a gas varies directly as the temperature. If the pressure of a gas is 50.6 kPa at 75° C, calculate the pressure at 115° C. -----36= \_\_\_\_\_ kPa

<p><b>SQUARE</b></p>  <p>Diagonal = 6275</p> <p>Perimeter = ?</p> <p>37= _____</p>	<p><b>EQUILATERAL TRIANGLE</b></p>  <p>Height = 3.33</p> <p>Perimeter = ?</p> <p>38= _____</p>
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39.  $(9.36 + 3.13)^2(0.161 + 0.0883)^2$  -----39= \_\_\_\_\_

40.  $\left[ \frac{6870 + (1/(1.69 \times 10^{-4}))}{(4550/14100) - 0.241} \right]^2$  -----40= \_\_\_\_\_

41.  $\frac{(4000 + 8110)^2}{(0.00988 - 0.0139)^3}$  -----41= \_\_\_\_\_

42.  $\sqrt{10.8} + \sqrt{13.6 + 46} - (\pi)\sqrt{18.5}$  -----42= \_\_\_\_\_

43.  $(1/(0.0127))(5.23 \times 10^5 - 87900)^3$  -----43= \_\_\_\_\_

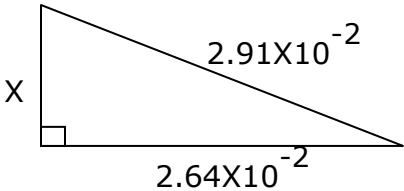
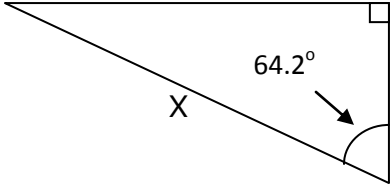
44.  $\sqrt{60 - 41.3 + 135} - \sqrt{103}$  -----44= \_\_\_\_\_

45.  $\frac{(2880 + 3830)^{1/2}}{(481 - 396)^{1/4}}$  -----45= \_\_\_\_\_

46.  $\frac{1}{\sqrt{158 + 34.9 + 192}} + \left(\frac{1}{\sqrt{3.8}}\right)^4$  -----46= \_\_\_\_\_

47. An angle is 20 less than 4 times its complement. Calculate the angle in degrees. -----47= \_\_\_\_\_°

48. Calculate the value of  $x - y$  if  $2x + 4 = 3y$  and  $3x + 2y = 7$ . -----48= \_\_\_\_\_

<p style="text-align: center;"><b>RIGHT TRIANGLE</b></p>  <p style="margin-left: 20px;"><math>2.91 \times 10^{-2}</math></p> <p style="margin-left: 20px;"><math>2.64 \times 10^{-2}</math></p> <p style="margin-left: 20px;"><math>X = ?</math></p> <p>49= _____</p>	<p style="text-align: center;"><b>RIGHT TRIANGLE</b></p>  <p style="margin-left: 20px;"><math>64.2^\circ</math></p> <p style="margin-left: 20px;">2311</p> <p style="margin-left: 20px;"><math>X</math></p> <p>50= _____</p>
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51.  $\frac{\sqrt{10.2 + \pi + 3.97}}{(52.9 - 47.9 + 135)^2}$  -----51=\_\_\_\_\_

52.  $\sqrt{\frac{3.62 \times 10^{-6}}{(0.122)(0.0346)}} + \frac{(0.003 - 0.0164)}{(0.0761 + 0.366)}$  -----52=\_\_\_\_\_

53.  $\left[ \frac{623 + 3020 + \sqrt{8.50 \times 10^6 + 3.21 \times 10^6}}{6030/1590} \right]^3$  -----53=\_\_\_\_\_

54.  $\sqrt{\frac{(30000)(2160)}{(1.38 \times 10^5)(2.62 \times 10^5)}} - 0.0145 + 0.0354$  -----54=\_\_\_\_\_

55.  $0.0889 + \sqrt{(57.6)/(161)} - (0.589 + 0.752)^2$  -----55=\_\_\_\_\_

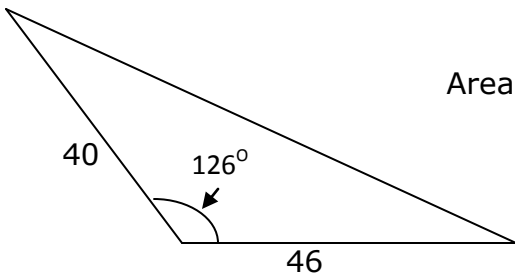
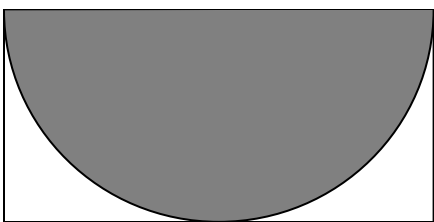
56.  $(129)(4.77 \times 10^9)^{1/4} - [(20500)(45000)]^{1/2}$  -----56=\_\_\_\_\_

57.  $(\text{deg}) \sin(387^\circ) + (21.9/23.4)$  -----57=\_\_\_\_\_

58.  $\sqrt{\frac{(491)(11.1)}{(2650) + (3040)}} + 1/(1.00)^5$  -----58=\_\_\_\_\_

59. Sid weighs 94 pounds and sits 7 ¼ ft. away from the fulcrum on a teeter totter. Alex weighs 115 pounds, calculate how far he should sit away from the fulcrum to balance the teeter totter. -----59=\_\_\_\_\_ ft.

60. A high speed train recorded a speed 302.8 mph. Calculate this speed in meters per second. -----60=\_\_\_\_\_ mps

<p style="text-align: center;"><b>SCALENE TRIANGLE</b></p>  <p style="text-align: right;">Area = ?</p> <p>61= _____</p>	<p style="text-align: center;"><b>RECTANGLE AND SEMI CIRCLE</b></p>  <p style="text-align: center;">Radius of Circle = 113.5 Unshaded Area = ?</p> <p>62= _____</p>
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63.  $\frac{21!}{14!} + 12!$  -----63= \_\_\_\_\_

64. (deg)  $(23.2 - 49.8)\tan(62.7^\circ)$  -----64= \_\_\_\_\_

65.  $(11.1 - \pi)e^{0.55}$  -----65= \_\_\_\_\_

66. (deg)  $(60.6 - 6.98)\tan(8.11^\circ) + 3.42$  -----66= \_\_\_\_\_

67. (deg)  $\cos(0.8^\circ - 0.881^\circ) + 0.406$  -----67= \_\_\_\_\_

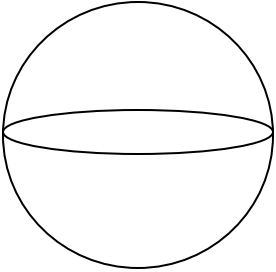
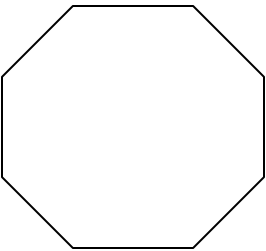
68. (rad)  $(5.18)\tan(200)$  -----68= \_\_\_\_\_

69. (deg)  $\frac{\sin(61.5^\circ)}{\tan(61.5^\circ)}[18]$  -----69= \_\_\_\_\_

70.  $(15.5 - 14.4)e^{\pi - 0.688}$  -----70= \_\_\_\_\_

71. Dad invested \$20,000 for 6 years at 2 ¼ %. If the interest is compounded quarterly, calculate the balance in the account after those 6 years. -----71=\$ \_\_\_\_\_

72. The odds of an event happening are 6:31. Calculate the probability the event will happen. -----72= \_\_\_\_\_

<p style="text-align: center;"><b>SPHERE</b></p> <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: right;"> <p>Surface Area = 12300</p> <p>Volume = ?</p> </div> </div> <p>73= _____</p>	<p style="text-align: center;"><b>REGULAR OCTAGON</b></p> <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: right;"> <p>Side = 25</p> <p>Apothem = ?</p> </div> </div> <p>74= _____</p>
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75.  $\frac{(70.1)^{0.769}(67.2)^{0.338}}{(5 - 3.29)^{-7}}$  -----75= \_\_\_\_\_

76.  $\frac{\text{Log}(25800 + 36400)}{0.737 - 0.397}$  -----76= \_\_\_\_\_

77.  $\frac{930 - 516}{\text{Log}(232 + 1660)}$  -----77= \_\_\_\_\_

78.  $(140)^\pi(81.5)^2(0.595 - 0.188)^2$  -----78= \_\_\_\_\_

79.  $4 + 6 + 8 + \dots + 952$  -----79= \_\_\_\_\_

80.  $(0.48) - \frac{(0.48)^2}{2} + \frac{(0.48)^3}{3} - \frac{(0.48)^4}{4}$  -----80= \_\_\_\_\_



## 2016-2017 TMSCA Middle School Calculator Regional Qualifier Answer Key

Page 1	Page 2	Page 3	Page 4
1 = 2860 = $2.86 \times 10^3$	14 = -63.2 = $-6.32 \times 10^1$	27 = $1.74 \times 10^{-12}$	39 = 9.70 = $9.70 \times 10^0$
2 = 59.0 = $5.90 \times 10^1$	15 = 1290 = $1.29 \times 10^3$	28 = $-4.59 \times 10^{11}$	40 = $2.45 \times 10^{10}$
3 = 1430 = $1.43 \times 10^3$	16 = -331000 = $-3.31 \times 10^5$	29 = $3.17 \times 10^{-10}$	41 = $-2.26 \times 10^{15}$
4 = -24.0 = $-2.40 \times 10^1$	17 = 0.117 = $1.17 \times 10^{-1}$	30 = 12.6 = $1.26 \times 10^1$	42 = -2.51 = $-2.51 \times 10^0$
5 = 383 = $3.83 \times 10^2$	18 = 1780 = $1.78 \times 10^3$	31 = $5.73 \times 10^{-10}$	43 = $6.49 \times 10^{18}$
6 = 107 = $1.07 \times 10^2$	19 = 0.00699 = $6.99 \times 10^{-3}$	32 = $1.03 \times 10^{-11}$	44 = 2.25 = $2.25 \times 10^0$
7 = 6.33 = $6.33 \times 10^0$	20 = $1.55 \times 10^8$	33 = 0.0293 = $2.93 \times 10^{-2}$	45 = 27.0 = $2.70 \times 10^1$
8 = -3.11 = $-3.11 \times 10^0$	21 = 0.000846 = $8.46 \times 10^{-4}$	34 = -206 = $-2.06 \times 10^2$	46 = 0.120 = $1.20 \times 10^{-1}$
9 = $5.76 \times 10^6$	22 = -10.7 = $-1.07 \times 10^1$	35 = 1865 INT.	47 = 68.0 = $6.80 \times 10^1$
10 = $2.44 \times 10^{11}$	23 = 1.28 = $1.28 \times 10^0$	36 = 77.6 = $7.76 \times 10^1$	48 = -1.00 = $-1.00 \times 10^0$
11 = 64.6 = $6.46 \times 10^1$	24 = $5.27 \times 10^9$	37 = 17700 = $1.77 \times 10^4$	49 = 0.0122 = $1.22 \times 10^{-2}$
12 = 40 INT.	25 = 8.05 = $8.05 \times 10^0$	38 = 11.5 = $1.15 \times 10^1$	50 = 5310 = $5.31 \times 10^3$

## 2016-2017 TMSCA Middle School Calculator Regional Qualifier Answer Key

### Page 5

$$51 = 0.000212 \\ = 2.12 \times 10^{-4}$$

$$52 = -0.00103 \\ = -1.03 \times 10^{-3}$$

$$53 = 6.47 \times 10^9$$

$$54 = 0.0632 \\ = 6.32 \times 10^{-2}$$

$$55 = -1.11 \\ = -1.11 \times 10^0$$

$$56 = 3530 \\ = 3.53 \times 10^3$$

$$57 = 1.39 \\ = 1.39 \times 10^0$$

$$58 = 1.98 \\ = 1.98 \times 10^0$$

$$59 = 5.93 \\ = 5.93 \times 10^0$$

$$60 = 135 \\ = 1.35 \times 10^2$$

### Page 6

$$61 = 744 \\ = 7.44 \times 10^2$$

$$62 = 5530 \\ = 5.53 \times 10^3$$

$$63 = 1.07 \times 10^9$$

$$64 = -51.5 \\ = -5.15 \times 10^1$$

$$65 = 13.8 \\ = 1.38 \times 10^1$$

$$66 = 11.1 \\ = 1.11 \times 10^1$$

$$67 = 1.41 \\ = 1.41 \times 10^0$$

$$68 = -9.29 \\ = -9.29 \times 10^0$$

$$69 = 8.59 \\ = 8.59 \times 10^0$$

$$70 = 12.8 \\ = 1.28 \times 10^1$$

$$71 = \$22882.08$$

$$72 = 0.162 \\ = 1.62 \times 10^{-1}$$

### Page 7

$$73 = 128000 \\ = 1.28 \times 10^5$$

$$74 = 30.2 \\ = 3.02 \times 10^1$$

$$75 = 4660 \\ = 4.66 \times 10^3$$

$$76 = 14.1 \\ = 1.41 \times 10^1$$

$$77 = 126 \\ = 1.26 \times 10^2$$

$$78 = 6.08 \times 10^9$$

$$79 = 227000 \\ = 2.27 \times 10^5$$

$$80 = 0.388 \\ = 3.88 \times 10^{-1}$$

TMSCA 16-17 MS CA Regional Solutions to Word and Geometry Problems

**11.** A 7-sided polygon is known as either a septagon or a heptagon.  $\frac{452}{7}$

**12.**  $5x =$  number of quarters  
 $2x =$  number of dimes  
 $3x =$  number of nickels  
 $.25(5x) + .1(2x) + .05(3x) = 12.80$   
 Solve for  $x$ . Then multiply by 5 to get the number of quarters.

**13.**  $\frac{\pi}{100^\circ} = \frac{n}{100}$

**24.**  $\frac{4}{3}\pi r^3 = V$   
 $\frac{4}{3}\pi \left(\frac{2159}{2}\right)^3$

**25.** Area of circle =  $\pi(3.45)^2$   
 Area of equilateral triangle =  $\frac{h^2\sqrt{3}}{3} = \pi(3.45)^2$   
 Solve for  $h$ .  $\sqrt{\frac{\pi(3.45)^2(3)}{\sqrt{3}}}$

**26.**  $\sqrt[3]{(12)(17)(20)}$

**35.**  $1(6)^4 + 2(6)^3 + 3(6)^2 + 4(6)^1 + 5(6)^0$   
 Look at SHOW key to get exact integral answer.

**36.**  $\frac{50.6}{75} = \frac{x}{115} \quad x = \frac{115(50.6)}{75}$

**37.** The side of the square is  $\frac{6275}{\sqrt{2}}$  Multiply by 4.

**38.**  $\left(\frac{3.33}{\sqrt{3}}\right)(2)$

**47.**  $x =$  angle;  
 $90-x =$  complement

$x = 4(90-x) - 20$

$5x = 340; \quad x = \frac{340}{5}$

**48.**  $\begin{cases} 2x - 3y = -4 \\ 3x + 2y = 7 \end{cases}$   
 $\begin{cases} 6x - 9y = -12 \\ -6x - 4y = -14 \end{cases}$   
 $-13y = -26, y = 2$

Substitute 2 for  $y$  in  
 $2x - 3y = -4; 2x - 6 = -4;$   
 $x = 1; \quad x - y = 1 - 2 = 1.00$

**49.**  $\sqrt{(2.91 \times 10^{-2})^2 - (2.64 \times 10^{-2})^2}$

**50.**  $\frac{\cos 64.2}{1} = \frac{2311}{x}$   
 $x = \frac{2311}{\cos 64.2}$

**59.**  $94(7.25) = 115x$   
 $x = \frac{94(7.25)}{115}$

**60.** Use RPN key to convert 1 mi to 1.6093 km or memorize 1 mile  $\approx$  1.61 km

$\left(\frac{302.8 \text{ mi}}{1 \text{ hr}}\right) \left(\frac{1.61 \text{ km}}{1 \text{ mi}}\right) \left(\frac{1000 \text{ m}}{1 \text{ km}}\right) \left(\frac{1 \text{ hr}}{3600 \text{ sec}}\right)$

**61.** Area of triangle when given two sides and the included angle  
 $= \frac{1}{2}ab\sin C = \frac{1}{2}(40)(46)\sin 126$

**62.** The rectangle has length of  $2r$  and width of  $r$  where  $r = 113.5$   
 $2(113.5)(113.5) - \frac{\pi(113.5)^2}{2}$

**71.**  $20000 \left(1 + \frac{.0225}{4}\right)^{(6 \times 4)}$   
 Look at SHOW key for \$ and cents.

**72.** 6 ways of event occurring; 6 + 31 total ways:  
 $\frac{6}{37}$

**73.** Surface Area:  
 $4\pi r^2 = 12300$   
 $r = \sqrt{\frac{12300}{4\pi}}$

Volume =  $\frac{4}{3}\pi r^3 = \frac{4}{3}\pi \left(\sqrt{\frac{12300}{4\pi}}\right)^3$

**74.** One interior angle of an octagon is  $135^\circ$  from  $\frac{180(n-2)}{n}$ .  
 Divide the octagon into 8 congruent triangles whose base angles are  $67.5^\circ$  (half of  $135^\circ$ ). The base of each of these triangles is 25. The apothem is the height of each triangle. Draw the apothem to form a right triangle with base 12.5, height "h" and base angle of  $67.5^\circ$ . Use the following:  $\frac{\tan 67.5}{1} = \frac{x}{12.5}$   
 $x = 12.5(\tan 67.5)$