

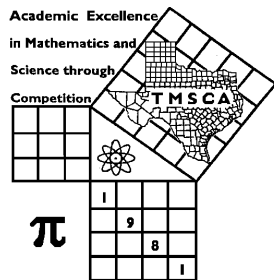
8 1st Score: _____	2nd Score: _____	3rd Score: _____	_____. ____ <b>Final Score</b>
S & G _____	S & G _____	S & G _____	
Grader: _____	Grader: _____	Grader: _____	

## 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

TEST #12 ©

FEBRUARY 17, 2018

### 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:  $\pi$  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.

**2017-2018 TMSCA Middle School Calculator Test 12**

1.  $3290 + 729$  ----- 1= \_\_\_\_\_

2.  $-44 - 44 - 17$  ----- 2= \_\_\_\_\_

3.  $428 + 92.4 + 213$  ----- 3= \_\_\_\_\_

4.  $27 - 37 - 66 + 17$  ----- 4= \_\_\_\_\_

5.  $87 - 20 - 87 + 86$  ----- 5= \_\_\_\_\_

6.  $27.8 + 87.7 - 116 - 179 - 53$  ----- 6= \_\_\_\_\_

7.  $1.21 + 1.21 - 1.26 + 0.234 + 0.552$  ----- 7= \_\_\_\_\_

8.  $1.47 - 1.32 + 1.27 - 0.994 - 1.17$  ----- 8= \_\_\_\_\_

9.  $245 \times 59.9 \times 175$  ----- 9= \_\_\_\_\_

10.  $2280 \times 1010 \times 2510 \times 150$  ----- 10= \_\_\_\_\_

11. Terry worked all of the problems on her TMSCA Calculator test. She got a score of 256. Calculate how many problems she got wrong. ----- 11= \_\_\_\_\_ INT.

12. An isosceles right triangle has a hypotenuse length of 7.38 inches. Calculate the perimeter of the triangle in inches. ----- 12= \_\_\_\_\_ in.

13. An attosecond is  $1 \times 10^{-18}$  of a second. Calculate the number of attoseconds in an hour. ----- 13= \_\_\_\_\_ as

14.  $(210/46)[167 - 174]$  ----- 14= \_\_\_\_\_

15.  $(26)[24 \times 25/94]$  ----- 15= \_\_\_\_\_

16.  $\left[\frac{53}{78}\right] [(124/122) + 0.38]$  ----- 16= \_\_\_\_\_

17.  $\{91/82\} \left[\frac{18}{82 + 80}\right]$  ----- 17= \_\_\_\_\_

18.  $\frac{(57/180) + (238/368)}{(1.35 - 2.19)}$  ----- 18= \_\_\_\_\_

19.  $\left[\frac{38/90}{264/80}\right] \{\pi + 0.44 - 2.48\}$  ----- 19= \_\_\_\_\_

20.  $\frac{96}{(40 - 73)} - \frac{(59 - 22)}{100}$  ----- 20= \_\_\_\_\_

21.  $\frac{1850 + 2250 + 828}{(0.0126)(1600)(2.77 \times 10^5)}$  ----- 21= \_\_\_\_\_

22.  $\left[\frac{1340 + 733}{1410 - 1180}\right] \left[\frac{658}{623}\right]$  ----- 22= \_\_\_\_\_

23.  $\frac{[-(6160 + 3270)(5670 - 4620)]}{(533/(8.71 \times 10^5))}$  ----- 23= \_\_\_\_\_

24. Calculate the geometric mean of the first ten prime numbers. --- 24= \_\_\_\_\_

25. Mary got an employee discount of 30% on her purchase. Her purchase cost her \$327.67 without tax. Calculate the cost of her purchase without her discount. ----- 25=\$ \_\_\_\_\_

26. Calculate one-third of 80% of one million, one. ----- 26= \_\_\_\_\_

27.  $\frac{(1.07 \times 10^8) + (1.49 \times 10^8)}{(-0.76)(0.597) - 0.246}$  ----- 27= \_\_\_\_\_

28.  $(0.00545)[(1.63/1.41)(0.00331/0.0124)]$  ----- 28= \_\_\_\_\_

29.  $\frac{(0.00906 - 0.0132)(0.193 + 0.162)}{(7.87 \times 10^{12})}$  ----- 29= \_\_\_\_\_

30.  $\frac{(0.00944 + 0.0146)}{(3.06 \times 10^{11})}$  ----- 30= \_\_\_\_\_

31.  $[7.22] \left[ \frac{1/93.2}{1/60.3} \right]$  ----- 31= \_\_\_\_\_

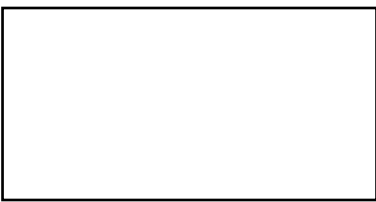
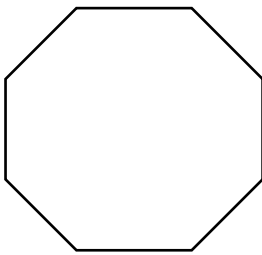
32.  $(25.6) \left[ \frac{0.0194}{(1.19 \times 10^{10})} \right]$  ----- 32= \_\_\_\_\_

33.  $1/(0.404 - 0.259) - 1/(0.136)$  ----- 33= \_\_\_\_\_

34.  $\left[ \frac{1/5090}{1/1570} \right] [7.07 \times 10^6]$  ----- 34= \_\_\_\_\_

35. The volume of a cube is 3241 cubic inches. Calculate the volume of the cube if the length of an edge is cut in half. ----- 35= \_\_\_\_\_ in<sup>3</sup>.

36. Calculate the percent change from ten to one trillion. ----- 26= \_\_\_\_\_ %

<p style="text-align: center;"><b>RECTANGLE</b></p> <div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 20px;"> <p>Area = 22639820</p> <p>Perimeter = ?</p> <p>37= _____</p> </div> </div>	<p style="text-align: center;"><b>REGULAR OCTAGON</b></p> <div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 20px;"> <p>Side Length = 52.7</p> <p>Length of longest diagonal = ?</p> <p>38= _____</p> </div> </div>
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39.  $(140 + 194 + 383)^2(2.36 + 2.84)^2$  ----- 39= \_\_\_\_\_

40.  $\left[\frac{0.928}{32.3}\right](0.921 + 0.798)^3$  ----- 40= \_\_\_\_\_

41.  $(0.552 + 0.803)^2(0.134 + 0.112)^2$  ----- 41= \_\_\_\_\_

42.  $(52600)\sqrt{97.9 + 79.3 + 123}$  ----- 42= \_\_\_\_\_

43.  $\sqrt{1630 - 878 + 1240} - \sqrt{799}$  ----- 43= \_\_\_\_\_

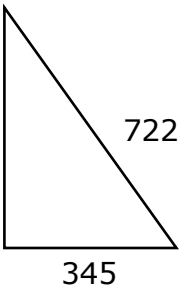
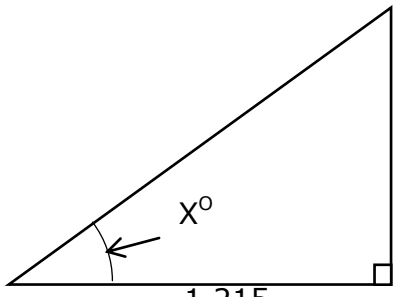
44.  $\sqrt{(1.84/8.61) + 0.205 - 0.0289}$  ----- 44= \_\_\_\_\_

45.  $\left[4\sqrt{(0.644/1.01)(5290)}\right]^5$  ----- 45= \_\_\_\_\_

46.  $\sqrt{0.154 - 471/3100} + 1/\sqrt{1.66 \times 10^5 + 1.91 \times 10^5}$  ----- 46= \_\_\_\_\_

47. Max started for home on Spring Break. The first 150 miles he averaged 72 mph. He had to stop and rest and refuel. The break lasted 20 minutes. He got back on the road and completed the last 300 miles at an average speed of 75 mph. Calculate his average speed for the complete trip. ----- 47= \_\_\_\_\_ mph.

48. Calculate the product of the roots of the quadratic equation  $5x - 2x^2 = 8$  ----- 48= \_\_\_\_\_

<p style="text-align: center;"><b>RIGHT TRIANGLE</b></p>  <p style="text-align: center;">Area = ?</p> <p>49= _____</p>	<p style="text-align: center;"><b>RIGHT TRIANGLE</b></p>  <p style="text-align: center;"><math>X^\circ = ?</math></p> <p>50= _____</p>
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51.  $\left[ \frac{\sqrt{\sqrt{4.33 \times 10^5 - 2.09 \times 10^5}}}{-(0.18 - 0.503)} \right]^2 [157 + 75]$  ----- 51= \_\_\_\_\_

52.  $\left[ \frac{529 + 415 + \sqrt{6.28 \times 10^5 + 3.65 \times 10^5}}{7110/7310} \right]^2$  ----- 52= \_\_\_\_\_

53.  $\frac{(0.00595 + 0.00417 - 0.00791)^4}{\sqrt{24.7 + 6.75 + 14.8}}$  ----- 53= \_\_\_\_\_

54.  $(159)^2 \sqrt{(22.4)/(92.9)} - (3920 + 11000)$  ----- 54= \_\_\_\_\_

55.  $\sqrt{\frac{1/(723 - 293)}{(106)(54.5 + 40.1)^5}}$  ----- 55= \_\_\_\_\_

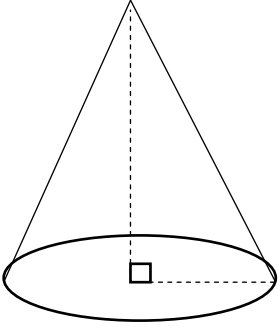
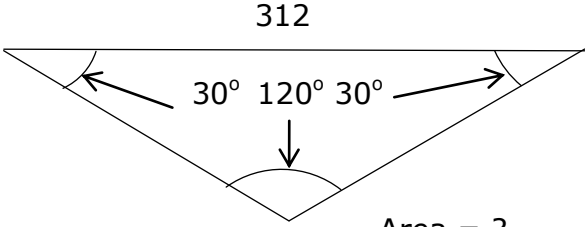
56.  $(0.247)(1.47 \times 10^{10})^{1/2} - [(19100)(42300)]^{1/2}$  ----- 56= \_\_\_\_\_

57.  $\sqrt{\frac{(37.3)(14.7)}{(42.2) + (61)}} + 1/(0.846)^5$  ----- 57= \_\_\_\_\_

58.  $\sqrt{\frac{1/(44.2 - 33.7)}{(111)(135 + 136)^{-3}}}$  ----- 58= \_\_\_\_\_

59. A tank in the shape of a right circular cylinder has a radius of 5 feet and a height of 25 feet. Calculate the number of gallons this tank will hold. ----- 59= \_\_\_\_\_ gal.

60. Calculate the odds of rolling an odd sum on a standard pair of dice. ----- 60= \_\_\_\_\_

<p style="text-align: center;"><b>CONE</b></p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Radius = 611</p> <p>Height = 1372</p> <p>Total Surface Area = ?</p> </div> </div> <p>61= _____</p>	<p style="text-align: center;"><b>ISOSCELES TRIANGLE</b></p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>Area = ?</p> </div> </div> <p>62= _____</p>
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63.  $\frac{47! - 45!}{32!}$  ----- 63= \_\_\_\_\_

64.  $(142 - \pi)e^{0.389}$  ----- 64= \_\_\_\_\_

65.  $(2.15 \times 10^5 - 4.61 \times 10^5)^9 (1.35 \times 10^5)$  ----- 65= \_\_\_\_\_

66.  $(\text{deg}) [17.2] \cos(121^\circ - 145^\circ)$  ----- 66= \_\_\_\_\_

67.  $(\text{rad}) \sin \left[ \frac{(0.218)(\pi)}{(2.21)(17.2)} \right]$  ----- 67= \_\_\_\_\_

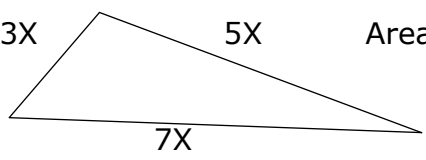
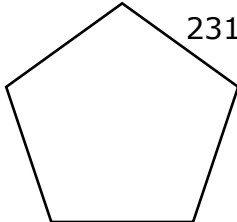
68.  $(\text{deg}) \frac{\sin(18^\circ)}{\tan(18^\circ)} [175]$  ----- 68= \_\_\_\_\_

69.  $(\text{rad}) (26100) \sin(37.4)$  ----- 69= \_\_\_\_\_

70.  $(6660 - 5730 + 3010)^{5/3}$  ----- 70= \_\_\_\_\_

71. Calculate how many different two digit numbers that can be created from the single digit odd numbers if repetition can be allowed. ----- 71= \_\_\_\_\_ INT.

72. Calculate the final temperature when 2.29 grams of water at 48.9° C mixes with 3.65 grams of water at 36.1° C ----- 72= \_\_\_\_\_ °C

SCALENE TRIANGLE	REGULAR PENTAGON
 <p style="text-align: right; margin-right: 50px;">Area = 0.0768</p> <p style="text-align: right; margin-right: 50px;">Longest Side = ?</p> <p>73= _____</p>	 <p style="text-align: right; margin-right: 50px;">Length of longest diagonal = ?</p> <p>74= _____</p>

75.  $\frac{\text{Log}(3.72 \times 10^9 + 1.24 \times 10^9)}{12}$  ----- 75= \_\_\_\_\_

76.  $\frac{\text{Log}(2520 + 3290)}{15600 - 15100}$  ----- 76= \_\_\_\_\_

77.  $\text{Log} \sqrt{\frac{2.38 - 1.99}{(1.69)(4.68)}}$  ----- 77= \_\_\_\_\_

78.  $\frac{(e^{0.718})(e^{0.296})(e^{0.494})}{\text{Ln}(3.32 + 5.21)}$  ----- 78= \_\_\_\_\_

79.  $1 + 2 + 3 + \dots + 181$  ----- 79= \_\_\_\_\_

80.  $(0.24) - \frac{(0.24)^2}{2} + \frac{(0.24)^3}{3} - \frac{(0.24)^4}{4}$  ----- 80= \_\_\_\_\_



## 2017-2018 TMSCA Middle School Calculator Test 12 Answer Key

Page 1	Page 2	Page 3	Page 4
1 = 4020 = $4.02 \times 10^3$	14 = -32.0 = $-3.20 \times 10^1$	27 = $-3.66 \times 10^8$	39 = $1.39 \times 10^7$
2 = -105 = $-1.05 \times 10^2$	15 = 166 = $1.66 \times 10^2$	28 = 0.00168 = $1.68 \times 10^{-3}$	40 = 0.146 = $1.46 \times 10^{-1}$
3 = 733 = $7.33 \times 10^2$	16 = 0.949 = $9.49 \times 10^{-1}$	29 = $-1.87 \times 10^{-16}$	41 = 0.111 = $1.11 \times 10^{-1}$
4 = -59.0 = $-5.90 \times 10^1$	17 = 0.123 = $1.23 \times 10^{-1}$	30 = $7.86 \times 10^{-14}$	42 = 911000 = $9.11 \times 10^5$
5 = 66.0 = $6.60 \times 10^1$	18 = -1.15 = $-1.15 \times 10^0$	31 = 4.67 = $4.67 \times 10^0$	43 = 16.4 = $1.64 \times 10^1$
6 = -233 = $-2.33 \times 10^2$	19 = 0.141 = $1.41 \times 10^{-1}$	32 = $4.17 \times 10^{-11}$	44 = 0.624 = $6.24 \times 10^{-1}$
7 = 1.95 = $1.95 \times 10^0$	20 = -3.28 = $-3.28 \times 10^0$	33 = -0.456 = $-4.56 \times 10^{-1}$	45 = 25700 = $2.57 \times 10^4$
8 = -0.744 = $-7.44 \times 10^{-1}$	21 = 0.000882 = $8.82 \times 10^{-4}$	34 = $2.18 \times 10^6$	46 = 0.0471 = $4.71 \times 10^{-2}$
9 = $2.57 \times 10^6$	22 = 9.52 = $9.52 \times 10^0$	35 = 405 = $4.05 \times 10^2$	47 = 70.1 = $7.01 \times 10^1$
10 = $8.67 \times 10^{11}$	23 = $-1.62 \times 10^{10}$	36 = $1.00 \times 10^{13}$	48 = 4.00 = $4.00 \times 10^0$
11 = 16 INT.	24 = 9.57 = $9.57 \times 10^0$	37 = 20800 = $2.08 \times 10^4$	49 = 109000 = $1.09 \times 10^5$
12 = 17.8 = $1.78 \times 10^1$	25 = \$468.10	38 = 138 = $1.38 \times 10^2$	50 = 35.6 = $3.56 \times 10^1$
13 = $3.60 \times 10^{21}$	26 = 267000 = $2.67 \times 10^5$		

## 2017-2018 TMSCA Middle School Calculator Test 12 Answer Key

### Page 5

$$51 = 1.05 \times 10^6$$

$$52 = 3.98 \times 10^6$$

$$53 = 3.51 \times 10^{-12}$$

$$54 = -2510$$
$$= -2.51 \times 10^3$$

$$55 = 5.38 \times 10^{-8}$$

$$56 = 1520$$
$$= 1.52 \times 10^3$$

$$57 = 4.61$$
$$= 4.61 \times 10^0$$

$$58 = 131$$
$$= 1.31 \times 10^2$$

$$59 = 14700$$
$$= 1.47 \times 10^4$$

$$60 = 1.00$$
$$= 1.00 \times 10^0$$

### Page 6

$$61 = 4060000$$
$$= 4.06 \times 10^6$$

$$62 = 14100$$
$$= 1.41 \times 10^4$$

$$63 = 9.82 \times 10^{23}$$

$$64 = 205$$
$$= 2.05 \times 10^2$$

$$65 = -4.45 \times 10^{53}$$

$$66 = 15.7$$
$$= 1.57 \times 10^1$$

$$67 = 0.0180$$
$$= 1.80 \times 10^{-2}$$

$$68 = 166$$
$$= 1.66 \times 10^2$$

$$69 = -7690$$
$$= -7.69 \times 10^3$$

$$70 = 983000$$
$$= 9.83 \times 10^5$$

$$71 = 25 \text{ INT.}$$

$$72 = 41.0$$
$$= 4.10 \times 10^1$$

### Page 7

$$73 = 0.761$$
$$= 7.61 \times 10^{-1}$$

$$74 = 374$$
$$= 3.74 \times 10^2$$

$$75 = 0.808$$
$$= 8.08 \times 10^{-1}$$

$$76 = 0.00753$$
$$= 7.53 \times 10^{-3}$$

$$77 = -0.654$$
$$= -6.54 \times 10^{-1}$$

$$78 = 2.11$$
$$= 2.11 \times 10^0$$

$$79 = 16500$$
$$= 1.65 \times 10^4$$

$$80 = 0.215$$
$$= 2.15 \times 10^{-1}$$

MSCA 17-18 MS CA Test #12 Solutions to Word and Geometry Problems

**11.**  $400 - 9x = 256$

$$x = \frac{256-400}{-9}$$

**12.** One leg =  $\frac{7.38}{\sqrt{2}}$  so Perimeter =

$$2\left(\frac{7.38}{\sqrt{2}}\right) + 7.38$$

**13.**

$$(1 \text{ hr}) \left(\frac{3600 \text{ sec}}{1 \text{ hr}}\right) \left(\frac{1 \text{ attos}}{1 \times 10^{-18} \text{ sec}}\right)$$

**24.** Take the 10<sup>th</sup> root of

$$2 \cdot 3 \cdot 5 \cdot 7 \cdot 11 \cdot 13 \cdot 17 \cdot 19 \cdot 23 \cdot 29$$

**25.**  $.7x = 327.67$  so

$$x = \frac{327.67}{.7}$$

**26.**  $\frac{1}{3}(.8)(1,000,001)$

**35.** Since each edge is cut in half,

the volume is  $\left(\frac{1}{2}\right)^3$  as large.  $\frac{3241}{8}$

**36.** On HP calculator punch 10, enter, 1000000000000, % change.

On other calculators,

$$\left(\frac{1000000000000 - 10}{10}\right)(100)$$

**37.** Width =  $\frac{22639820}{7268}$ ;

Perimeter

$$= 2\left(\frac{22639820}{7268} + 7268\right)$$

**38.** Handy formula to learn:

With even number of sides the

longest diagonal is  $\frac{\text{side}}{\sin \frac{180}{n}}$

**38.** contd.  $\frac{52.7}{\sin \frac{180}{8}}$

**47.**  $\frac{\text{total distance}}{\text{total time}} = \frac{150+300}{\frac{150}{72} + \frac{1}{3} + \frac{300}{75}}$

**48.**  $-2x^2 + 5x - 8 = 0$ ;

A = -2, B = 5, C = -8. The product of

the roots is  $C/A = \frac{-8}{-2}$

**49.**  $\frac{(\sqrt{722^2 - 345^2})(345)}{2}$

**50.**  $\frac{\tan x}{1} = \frac{.871}{1.215}$  so

$$x = \text{atan}\left(\frac{.871}{1.215}\right)$$

**59.** There are 231 cu. Inches in a

gallon, so find volume in cu.

Inches. Then divide by 231.

$$\frac{\pi(5 \times 12)^2(25 \times 12)}{231}$$

**60.** 18 rolls are odd; 18 rolls are even. The odds of rolling an odd sum = 18:18 or 1:1

**61.**  $\pi r l + \pi r^2 = \text{where}$

$$l = \sqrt{611^2 + 1372^2}$$

$$SA = \pi(611)(l) + \pi(611)^2$$

**62.** Draw an altitude from the 312 side to the 120<sup>o</sup> angle. This forms two 30-60-90<sup>o</sup> triangles.

$\frac{312}{2} = 156 = \text{half of the base. The}$

altitude is  $\frac{156}{\sqrt{3}}$  so  $A =$

$$\left(\frac{156}{\sqrt{3}}\right)(156)$$

**71.** There are 5 single digit odd numbers (1,3,5,7,9)

5 x 5 possibilities.

**72.**  $\frac{(2.29)(48.9) + (3.65)(36.1)}{2.29 + 3.65}$

**73.**

$$\sqrt{s(s-a)(s-b)(s-c)}$$

where s = half the perimeter and a,b,c are the sides.

$$s = 7.5x \quad \text{Area} = .0768$$

$$\sqrt{7.5x(4.5x)(.5x)(2.5x)} \\ .0768^2 = 7.5(4.5)(.5)(2.5)x^4$$

$$x = \sqrt[4]{\frac{.0768^2}{7.5(4.5)(.5)(2.5)}}$$

Longest side is 7 times this amount.

**74.** With an odd number of sides

the longest diagonal is  $\frac{\text{side}}{2\sin \frac{90}{n}}$

$$\frac{231}{2\sin\left(\frac{90}{5}\right)}$$