

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 #10 ©**

**FEBRUARY 3, 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.

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**2017-2018 TMSCA Middle School Calculator Test #10**

1.  $560 + 654$  ----- 1= \_\_\_\_\_
2.  $5 + 2.1 + 1.7$  ----- 2= \_\_\_\_\_
3.  $459 - 580 - 646$  ----- 3= \_\_\_\_\_
4.  $24 - 35 - 34 + 23$  ----- 4= \_\_\_\_\_
5.  $326 - 261 + 75 - 249$  ----- 5= \_\_\_\_\_
6.  $135 + 54.3 - 107 - 181 - 170$  ----- 6= \_\_\_\_\_
7.  $-0.954 + 1.42 + 0.477 + 1.72 + 0.97$  ----- 7= \_\_\_\_\_
8.  $(5.71 + 3.64 - \pi) - (6.68 + 5.16)$  ----- 8= \_\_\_\_\_
9.  $135 \times 117 \times 48.4$  ----- 9= \_\_\_\_\_
10.  $1700 \times 496 \times 181 \times 20.1$  ----- 10= \_\_\_\_\_
11. Calculate the arithmetic mean of the boiling point of water in  $^{\circ}\text{F}$ , the freezing point of water in  $^{\circ}\text{F}$ , the number of ounces in a gallon, and the number of feet in a mile. ----- 11= \_\_\_\_\_
12. The most popular model train scale in the world is the HO scale at 1:87. If an engine is 52 feet  $\frac{1}{2}$  inches long, calculate the length in HO scale. ----- 12= \_\_\_\_\_ in.
13. The width of a rectangle is one foot more than  $\frac{1}{2}$  its length. The perimeter of the rectangle is 288 inches. Calculate the width of the rectangle in inches. ----- 13= \_\_\_\_\_ in.

14.  $(-195/227)[339 - 167]$  ----- 14=\_\_\_\_\_

15.  $(24)[158 \times 112/128]$  ----- 15=\_\_\_\_\_

16.  $\{(98)(195 - 111)(162)\} - 1.06 \times 10^6$  ----- 16=\_\_\_\_\_

17.  $(91 + 178)[142 - 41 - 136]$  ----- 17=\_\_\_\_\_

18.  $\frac{(198/80) + (157/266)}{(26.1 - 24.9)}$  ----- 18=\_\_\_\_\_

19.  $\left[ \frac{(2750/1280) - (2490/1750)}{0.019/0.0224} \right]$  ----- 19=\_\_\_\_\_

20.  $\frac{0.0747 + 0.0696 + 0.0569}{(572)(2.66)(37.7)}$  ----- 20=\_\_\_\_\_

21.  $(\pi)[405/267 \times 330/244] - 3.18$  ----- 21=\_\_\_\_\_

22.  $\frac{(4920 \times 3300)/5450}{(2970 \times 722) + 5.85 \times 10^5}$  ----- 22=\_\_\_\_\_

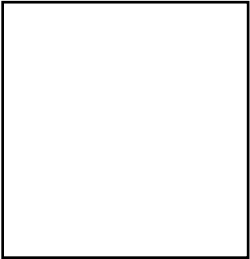
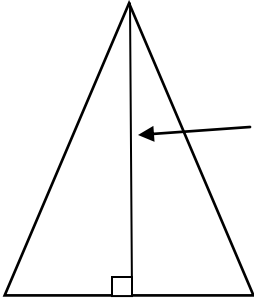
23.  $\left[ \frac{2210 + 1050}{778 - 479} \right] \left[ \frac{903}{2090} \right]$  ----- 23=\_\_\_\_\_

24. Calculate the area of a circle with a circumference of  $3.89 \times 10^8$  inches. ----- 24=\_\_\_\_\_ in<sup>2</sup>.

25. Calculate the number of square feet in 10 square miles. ----- 25=\_\_\_\_\_ ft<sup>2</sup>.

26. Marc took a TMSCA calculator test. He completed every problem on the test. He missed only 1 "number cruncher" and 5 of the "stated and geometry" problems. Calculate his score. ----- 26=\_\_\_\_\_ INT.

27.  $(0.00145)[(0.896/3.31)(0.0965/0.259)]$  ----- 27=\_\_\_\_\_
28.  $\frac{(25.2 + 18)(0.0155 + 0.0179)}{(5.63 \times 10^{12})}$  ----- 28=\_\_\_\_\_
29.  $\frac{(194 - 362)(2.36 + 1.63)}{(5.66 \times 10^{10})}$  ----- 29=\_\_\_\_\_
30.  $\frac{1}{-0.612} + \frac{1}{(\pi)(0.844 - 1.35)}$  ----- 30=\_\_\_\_\_
31.  $\frac{(0.012 + 0.0107)}{(1.68 \times 10^{11})}$  ----- 31=\_\_\_\_\_
32.  $[0.363] \left[ \frac{1/42.1}{1/25.8} \right]$  ----- 32=\_\_\_\_\_
33.  $\frac{1}{91.8} - \frac{1}{30.8} + \frac{1}{65.4}$  ----- 33=\_\_\_\_\_
34.  $\frac{1}{138} - \frac{1}{(576 + 209)}$  ----- 34=\_\_\_\_\_
35. If Set A has 12 elements, calculate the total number of subsets of Set A. ----- 35=\_\_\_\_\_INT.
36. If  $h(x) = 7x^2 + 5x - 2$  and  $t(x) = 16x^2 + 4x - 8$ . Calculate  $h(t(4))$ . ----- 36=\_\_\_\_\_

SQUARE	ISOSCELES TRIANGLE
	
<p>Area = 27172</p> <p>Diagonal = ?</p>	<p>Area = ?</p>
<p>37=_____</p>	<p>38=_____</p>

39.  $\left[\frac{0.53}{0.519}\right](215 + 50)^3$  ----- 39=\_\_\_\_\_

40.  $\frac{(8740 + 6250)^2}{(0.108 - 0.125)^3}$  ----- 40=\_\_\_\_\_

41.  $(0.0553 + 0.103)^2(309 + 214)^2$  ----- 41=\_\_\_\_\_

42.  $\sqrt{83.8} + \sqrt{105 + 128} - (\pi)\sqrt{167}$  ----- 42=\_\_\_\_\_

43.  $\sqrt{177 - 78.4 + 33.2} - \sqrt{29.7}$  ----- 43=\_\_\_\_\_

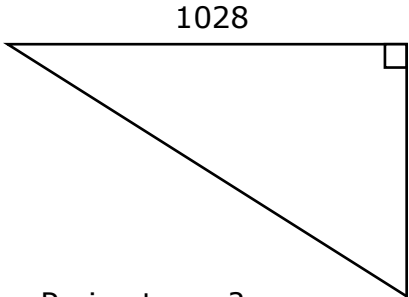
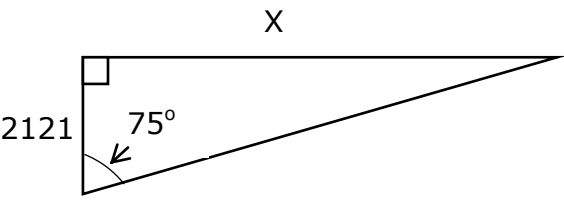
44.  $(14300)\sqrt{238 + 338 + 990}$  ----- 44=\_\_\_\_\_

45.  $\left[4\sqrt{(47.3/63.5)(0.705)}\right]^2$  ----- 45=\_\_\_\_\_

46.  $\frac{(3.08 + 7.47)^{1/5}}{(681 - 640)^{1/3}}$  ----- 46=\_\_\_\_\_

47. Two supplementary angles have the measures  $(3x+1)^\circ$  and  $(2x+10)^\circ$   
Calculate the measure of the smaller angle in degrees. ----- 47=\_\_\_\_\_°

48. Calculate the number of cubic inches in a two liter bottle. ----- 48=\_\_\_\_\_in<sup>3</sup>

RIGHT TRIANGLE	RIGHT TRIANGLE
 <p style="margin-top: 20px;">Perimeter = ?</p>	 <p style="margin-top: 20px;">X = ?</p>
49=_____	50=_____

$$51. \frac{\sqrt{68.9 + \pi + 15.6}}{(0.196 - 0.505 + 0.224)^2} \text{ ----- } 51 = \underline{\hspace{2cm}}$$

$$52. \sqrt{\frac{1.24 \times 10^{19}}{(397)(3.26 \times 10^5)}} + \frac{(1.05 \times 10^5 - 65400)}{(0.0494 + 0.0261)} \text{ ----- } 52 = \underline{\hspace{2cm}}$$

$$53. \left[ \frac{\sqrt{\sqrt{11.8 - 9.23}}}{-(0.0795 - 0.0748)} \right]^2 [38.8 + 221] \text{ ----- } 53 = \underline{\hspace{2cm}}$$

$$54. 6220 + \sqrt{(10900)(18700)} - (5370 + 16600) \text{ ----- } 54 = \underline{\hspace{2cm}}$$

$$55. 0.312 + \sqrt{(178)/(578)} - (0.344 + 0.227)^2 \text{ ----- } 55 = \underline{\hspace{2cm}}$$

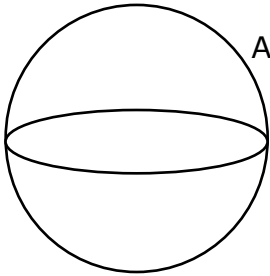
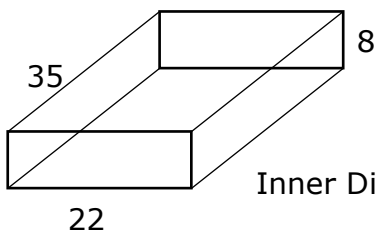
$$56. \sqrt{\frac{1/(7.58 - 4.09)}{(8.02)(322 + 289)^6}} \text{ ----- } 56 = \underline{\hspace{2cm}}$$

$$57. \sqrt{\frac{(3.58)(690)}{(1030) + (870)}} - 4.86 \text{ ----- } 57 = \underline{\hspace{2cm}}$$

$$58. \sqrt{\frac{1/(714 - 75.3)}{(1300)(41.5 + 215)^4}} \text{ ----- } 58 = \underline{\hspace{2cm}}$$

59. 60 ml of a 40% acid solution is evaporated down to 52 ml.  
Assuming only water is evaporated from the original mixture,  
calculate the acid percentage of the new solution. ----- 59 =                      %

60. Calculate the number of triangles that can be formed using 12  
non-collinear points on a plane. ----- 60 =                      INT.

SPHERE	RECTANGULAR PRISM
 <p style="margin-top: 10px;">Area of Great Circle = 51208</p> <p style="margin-top: 10px;">Surface Area = ?</p>	 <p style="margin-top: 10px;">Inner Diagonal = ?</p>
61=_____	62=_____

63.  $\frac{26!}{28!}$  ----- 63=\_\_\_\_\_

64. (deg)  $(44.1 + 36.4)\tan(34.7^\circ)$  ----- 64=\_\_\_\_\_

65.  $(8.72 \times 10^8 - 9.73 \times 10^8)^{-7}(1.13 \times 10^5)$  ----- 65=\_\_\_\_\_

66. (rad)  $\sin\left[\frac{(0.241)(\pi)}{(37.7)(16.6)}\right]$  ----- 66=\_\_\_\_\_

67. (rad)  $\frac{\sin(29.4)}{114/143}$  ----- 67=\_\_\_\_\_

68. (deg)  $\frac{\sin(0.639^\circ) - \tan(0.639^\circ)}{\sin(0.639^\circ)}$  ----- 68=\_\_\_\_\_

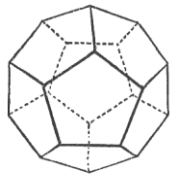
69. (rad)  $\cos[(3.1 - 3.17)(7.27)]$  ----- 69=\_\_\_\_\_

70.  $\left[(324)\left(\frac{118}{(26.9)(\pi)}\right)\right]^{3/2}$  ----- 70=\_\_\_\_\_

71. Tickets to the Museum of Nature and Science are \$20 for adults and \$13 for youth 2 – 17 years of age. In a weekend, 1428 total tickets were sold for a total revenue of \$22,113. Calculate the number of Youth tickets sold. ----- 71=\_\_\_\_\_INT.

72. A jar contains marbles, 4 blue, 5 red, 1 green and 2 black. A marble is chosen at random and then replaced. Calculate the probability of drawing a green and then a red marble. ----- 72=\_\_\_\_\_

REGULAR DODECAHEDRON



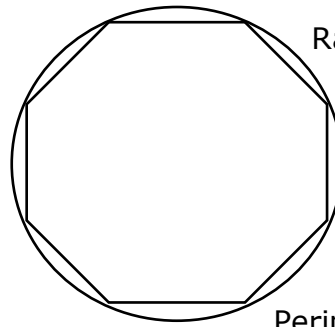
Dodecahedron.

Edge = 2175

Surface Area = ?

73= \_\_\_\_\_

REGULAR OCTAGON AND CIRCLE



Radius of Circle = 15.8

Perimeter of Octagon = ?

74= \_\_\_\_\_

75.  $\frac{\pi + \sqrt{(0.621)(4.05) + (1.6)(2.61)}}{\sqrt{\sqrt{0.105 + 0.319}}}$  ----- 75= \_\_\_\_\_

76.  $\ln\left[\frac{72.6 + 84.4 + 42.6}{278 + 583 - 522}\right]$  ----- 76= \_\_\_\_\_

77.  $\frac{506 - 679}{\log(12700 + 1780)}$  ----- 77= \_\_\_\_\_

78.  $\ln\left[\frac{69 + 42.7 + 68.1}{35.2 - 9.85 - 17.1}\right]$  ----- 78= \_\_\_\_\_

79.  $4 + 6 + 8 + \dots + 158$  ----- 79= \_\_\_\_\_

80.  $1 + (0.74) + \frac{(0.74)^2}{2} + \frac{(0.74)^3}{6} + \frac{(0.74)^4}{24}$  ----- 80= \_\_\_\_\_



# 2017-2018 TMSCA Middle School Calculator Test 10 Answer Key

Page 1	Page 2	Page 3	Page 4
1 = 1210 = $1.21 \times 10^3$	14 = -148 = $-1.48 \times 10^2$	27 = 0.000146 = $1.46 \times 10^{-4}$	39 = $1.90 \times 10^7$
2 = 8.80 = $8.80 \times 10^0$	15 = 3320 = $3.32 \times 10^3$	28 = $2.56 \times 10^{-13}$	40 = $-4.57 \times 10^{13}$
3 = -767 = $-7.67 \times 10^2$	16 = 274000 = $2.74 \times 10^5$	29 = $-1.18 \times 10^{-8}$	41 = 6850 = $6.85 \times 10^3$
4 = -22.0 = $-2.20 \times 10^1$	17 = -9420 = $-9.42 \times 10^3$	30 = -2.26 = $-2.26 \times 10^0$	42 = -16.2 = $-1.62 \times 10^1$
5 = -109 = $-1.09 \times 10^2$	18 = 2.55 = $2.55 \times 10^0$	31 = $1.35 \times 10^{-13}$	43 = 6.03 = $6.03 \times 10^0$
6 = -269 = $-2.69 \times 10^2$	19 = 0.855 = $8.55 \times 10^{-1}$	32 = 0.222 = $2.22 \times 10^{-1}$	44 = 566000 = $5.66 \times 10^5$
7 = 3.63 = $3.63 \times 10^0$	20 = $3.51 \times 10^{-6}$	33 = -0.00628 = $-6.28 \times 10^{-3}$	45 = 0.725 = $7.25 \times 10^{-1}$
8 = -5.63 = $-5.63 \times 10^0$	21 = 3.26 = $3.26 \times 10^0$	34 = 0.00597 = $5.97 \times 10^{-3}$	46 = 0.465 = $4.65 \times 10^{-1}$
9 = 764000 = $7.64 \times 10^5$	22 = 0.00109 = $1.09 \times 10^{-3}$		
10 = $3.07 \times 10^9$	23 = 4.71 = $4.71 \times 10^0$		
		35 = 4096 INT.	47 = 77.6 = $7.76 \times 10^1$
11 = 1410 = $1.41 \times 10^3$	24 = $1.20 \times 10^{16}$	36 = 489000 = $4.89 \times 10^5$	48 = 122 = $1.22 \times 10^2$
12 = 7.18 = $7.18 \times 10^0$	25 = $2.79 \times 10^8$	37 = 233 = $2.33 \times 10^2$	49 = 3170 = $3.17 \times 10^3$
13 = 56.0 = $5.60 \times 10^1$	26 = 346 INT.	38 = 514000 = $5.14 \times 10^5$	50 = 7920 = $7.92 \times 10^3$

# 2017-2018 TMSCA Middle School Calculator Test 10 Answer Key

## Page 5

$$\begin{aligned} 51 &= 1300 \\ &= 1.30 \times 10^3 \\ 52 &= 834000 \\ &= 8.34 \times 10^5 \\ 53 &= 1.89 \times 10^7 \\ 54 &= -1470 \\ &= -1.47 \times 10^3 \\ 55 &= 0.541 \\ &= 5.41 \times 10^{-1} \\ 56 &= 8.29 \times 10^{-10} \\ 57 &= -3.72 \\ &= -3.72 \times 10^0 \\ 58 &= 1.67 \times 10^{-8} \\ 59 &= 46.2 \\ &= 4.62 \times 10^1 \\ 60 &= 220 \text{ INT.} \end{aligned}$$

## Page 6

$$\begin{aligned} 61 &= 205000 \\ &= 2.05 \times 10^5 \\ 62 &= 42.1 \\ &= 4.21 \times 10^1 \\ 63 &= 0.00132 \\ &= 1.32 \times 10^{-3} \\ 64 &= 55.7 \\ &= 5.57 \times 10^1 \\ 65 &= -1.05 \times 10^{-51} \\ 66 &= 0.00121 \\ &= 1.21 \times 10^{-3} \\ 67 &= -1.13 \\ &= -1.13 \times 10^0 \\ 68 &= -6.22 \times 10^{-5} \\ 69 &= 0.873 \\ &= 8.73 \times 10^{-1} \\ 70 &= 9620 \\ &= 9.62 \times 10^3 \\ 71 &= 921 \text{ INT.} \\ 72 &= 0.0347 \\ &= 3.47 \times 10^{-2} \end{aligned}$$

## Page 7

$$\begin{aligned} 73 &= 9.77 \times 10^7 \\ 74 &= 96.7 \\ &= 9.67 \times 10^1 \\ 75 &= 11.0 \\ &= 1.10 \times 10^1 \\ 76 &= -0.530 \\ &= -5.30 \times 10^{-1} \\ 77 &= -41.6 \\ &= -4.16 \times 10^1 \\ 78 &= 3.08 \\ &= 3.08 \times 10^0 \\ 79 &= 6320 \\ &= 6.32 \times 10^3 \\ 80 &= 2.09 \\ &= 2.09 \times 10^0 \end{aligned}$$

MSCA 17-18 MS CA Test #10 Solutions to Word and Geometry Problems

<p><b>11.</b> <math>\frac{212+32+128+5280}{4}</math></p> <p><b>12.</b> Change 52 feet <math>\frac{1}{2}</math> inch to inches. <math>52(12) + \frac{1}{2}</math>  <math display="block">\frac{1}{87} = \frac{x}{52(12) + \frac{1}{2}}</math> <math display="block">x = \frac{52(12) + \frac{1}{2}}{87}</math></p> <p><b>13.</b> L = Length; <math>\frac{1}{2}L + 12</math> = Width  <math>2L + 2(\frac{1}{2}L + 12) = 288</math>. L = 88.0 so  Width = <math>\frac{1}{2}(88) + 12 = 56.0</math></p> <p><b>24.</b> <math>C = 2\pi r, r = \frac{c}{2\pi} =</math>  <math>\frac{3.89 \times 10^8}{2\pi}</math>; <math>A = \pi r^2 =</math>  <math>\pi \left( \frac{3.89 \times 10^8}{2\pi} \right)^2</math></p> <p><b>25.</b> <math>10(5280)^2</math></p> <p><b>26.</b> <math>400 - 6(9)</math></p> <p><b>35.</b> <math>2^{12}</math></p> <p><b>36.</b> <math>t(4) = 16(4)^2 + 4(4) - 8</math>  <math>= 264</math>  <math>h(264) = 7(264)^2 + 5(264)</math>  <math>- 2</math></p> <p><b>37.</b> side = <math>\sqrt{27172}</math>  Diagonal = <math>(\sqrt{27172})(\sqrt{2})</math></p> <p><b>38.</b> <math>\frac{1}{2}(1254 \times 819)</math></p> <p><b>47.</b> <math>3x + 1 + 2x + 10 = 180</math>  <math>x = 33.8</math>; smaller angle = <math>2x + 10</math>  <math>= 2(33.8) + 10 = 77.6</math></p>	<p><b>48.</b> There are 231 cubic inches in 1 gallon. Convert Liters to gallons (most calculators have a key to convert). Then multiply by 231.</p> <p><b>49.</b> <math>\sqrt{1028^2 + 827^2} + 1028 + 827</math></p> <p><b>50.</b> <math>\frac{\tan 75}{1} = \frac{x}{2121}</math></p> <p><b>59.</b> 40% of 60 = 24 ml of pure acid. If only water evaporates and leaves 24 ml of acid then % of acid is found with <math>\frac{24}{52} = \frac{x}{100}</math></p> <p><b>60.</b> <math>\frac{12!}{9!3!}</math></p> <p><b>61.</b> <math>A = \pi r^2</math>; <math>S = 4A = \pi r^2</math>  <math>4(51208)</math></p>	<p><b>62.</b> <math>\sqrt{22^2 + 8^2 + 35^2}</math></p> <p><b>71.</b> <math display="block">\begin{cases} a + y = 1428 \\ 20a + 13y = 22113 \\ -20a - 20y = -28560 \\ 20a + 13y = 22113 \end{cases}</math>  <math display="block">\begin{aligned} -7y &amp;= -6447 \\ y &amp;= 921 \end{aligned}</math></p> <p><b>72.</b> <math>\left(\frac{1}{12}\right)\left(\frac{5}{12}\right)</math></p> <p><b>73.</b> <math>12 \left[ \frac{(2175 \times 5)^2}{\left(\tan \frac{180}{5}\right)^{20}} \right]</math></p> <p><b>74.</b> The interior angle of an octagon is <math>135^\circ</math> from <math>\frac{180(8-2)}{8}</math>.  Cut the octagon into 8 triangles and focus on one of those. The base angles of each of those are <math>\frac{135}{2} = 67.5</math>  <math display="block">\frac{\cos 67.5}{1} = \frac{x}{15.8}</math>  <math>x</math> = half of one side of the octagon. Multiply by 16.</p>
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