

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

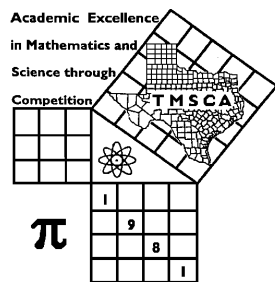
PLACE LABEL BELOW

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 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^{0*}, 1.23x10¹, 1.23x10⁰¹, .0190, 1.90x10⁻²
 Incorrect: 12.30, 123.0, 1.23(10)², 1.23·10², 1.230x10², 1.23*10², 0.19, 1.9x10⁻², 19.0x10⁻³, 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.

2017-2018 TMSCA Middle School Calculator Regional Qualifier

1. $-1700 + 1390$ ----- 1= _____

2. $35 + 69 - 17$ ----- 2= _____

3. $380 - 188 + 330$ ----- 3= _____

4. $\pi - 2 - 1 - 10$ ----- 4= _____

5. $-2180 + 1830 + 1600 + 2990$ ----- 5= _____

6. $102 + 122 - 125 - 177 - 117$ ----- 6= _____

7. $1.46 + 0.995 - 0.394 + 0.405 + 1.79$ ----- 7= _____

8. $(2.15 + 2.24 - 2.43) - (1.24 + 1.11)$ ----- 8= _____

9. $282 \times 62.7 \times 242$ ----- 9= _____

10. $576 \times 1700 \times 668 \times 127$ ----- 10= _____

11. The area of a square is $7.92 \times 10^8 \text{ m}^2$. Calculate the perimeter of the square. ----- 11= _____ m

12. One million is two percent of what number? ----- 12= _____

13. Cell phones at the store that Joy was looking at cost \$85, \$110, \$250 and \$550. Calculate the mid-range of the cell phone prices. ---- 13=\$ _____

14. $(201/164)[65 - 163]$ ----- 14= _____

15. $54/[197 \times 77 \times 212]$ ----- 15= _____

16. $(-230 + 620)[236 - 475 - 120]$ ----- 16= _____

17. $\left[\frac{57}{25}\right] [(44/78) + 0.265]$ ----- 17= _____

18. $\frac{(167/60) + (102/122)}{(0.991 - 1.41)}$ ----- 18= _____

19. $\left[\frac{398/157}{162/716}\right] \{167 + 260 - 92.3\}$ ----- 19= _____

20. $\frac{0.243 + 0.218 + 0.352}{(3410)(525)(1260)}$ ----- 20= _____

21. $\frac{(0.82)(3.50 \times 10^{-4})}{34.7} (0.0701 - 0.0316)$ ----- 21= _____

22. $\left[\frac{399 + 568}{416 - 207}\right] \left[\frac{778}{1180}\right]$ ----- 22= _____

23. $\frac{[-(2010 + 1580)(2030 - 1160)]}{(0.0126/(7.47))}$ ----- 23= _____

24. Judy purchased a new vehicle for \$23,472.98. She received \$7,822.78 for her trade-in. There was a \$28.75 document fee, a \$150 origination fee, and a \$35 license fee added to the cost of the car. With an 8.75% sales tax, how much did Judy pay for the car? ----- 24=\$ _____

25. If $f(x) = x^{1/2} + 5x - 28$ and $g(x) = 3x^5 - 2x + 16$, calculate $f(g(7))$. ----- 25= _____

26. Calculate the slope of the line $5x - 2y = 3$. ----- 26= _____

27. $\frac{(7.24 + 3.44)(\pi + 11.6)}{(2.54 \times 10^{12})}$ ----- 27= _____

28. $\frac{(1.03 \times 10^7) + (1.23 \times 10^7)}{(-\pi)(0.993) - 1.66}$ ----- 28= _____

29. $\frac{(0.191 - 0.425)(1.85 + 2.41)}{(3.87 \times 10^{12})}$ ----- 29= _____

30. $(0.219) \left[\frac{0.0282}{(5.33 \times 10^{11})} \right]$ ----- 30= _____

31. $\frac{1}{-1.81} + \frac{1}{(\pi)(1.36 - 2.31)}$ ----- 31= _____

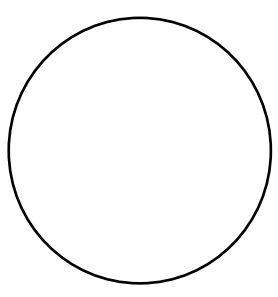

32. $[3.59] \left[\frac{1/25}{1/26.7} \right]$ ----- 32= _____

33. $\frac{1}{302} - \frac{1}{(298 + 351)}$ ----- 33= _____

34. $\frac{1}{81.5} - \frac{1}{21.4} + \frac{1}{86.5}$ ----- 34= _____

35. A nautical mile is 800 feet longer than a land or regular mile.
 Calculate the number of inches in a nautical mile. ----- 35= _____ in.

36. A sphere and cube have the same surface area. Calculate the
 percent change between the radius of the sphere and the edge
 of the cube. ----- 36= _____ %

CIRCLE	EQUILATERAL TRIANGLE
	
Circumference = 2.98×10^{-7}	2.73×10^5
Area = ?	Height = ?
37= _____	38= _____

39. $\frac{(28400 + 13500)^3}{(0.063 - 0.122)^2}$ ----- 39= _____

40. $\left[\frac{2110 + (1/(2.32 \times 10^{-4}))}{(5180/6500) - 0.336} \right]^2$ ----- 40= _____

41. $\left[\frac{878}{702} \right] (0.216 + 0.309)^2$ ----- 41= _____

42. $\sqrt{114 - 64.9 + 110} - \sqrt{112}$ ----- 42= _____

43. $(391)\sqrt{2240 + 5630 + 2340}$ ----- 43= _____

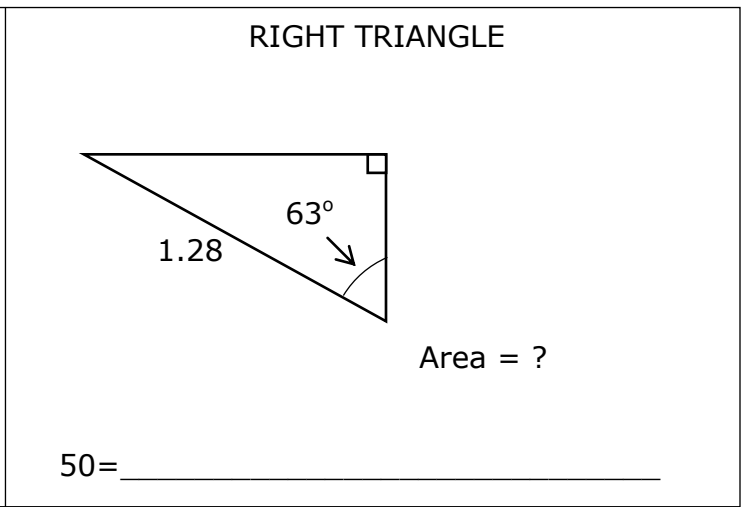
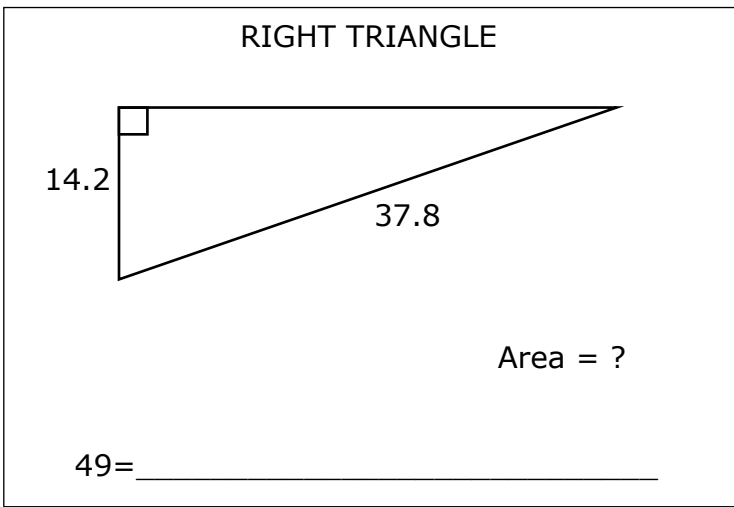
44. $(1/(0.00689))(11400 - 10700)^3$ ----- 44= _____

45. $\frac{(16500 + 16000)^{1/5}}{(3300 - 1400)^{1/4}}$ ----- 45= _____

46. $\sqrt[3]{10.3 - 1190/1130} + 1/\sqrt{0.00119 + 2.75 \times 10^{-4}}$ ----- 46= _____

47. Calculate 231^{1995} . ----- 47= _____

48. A ball is dropped from 24 feet and rebounds off the floor to 20 feet.
Calculate to what height it will rebound after four bounces. ----- 48= _____ ft.



51. $\sqrt{\frac{113}{(0.00385)(27)} + \frac{(51400 - 43300)}{(20.2 + 124)}} \dots\dots\dots 51 = \underline{\hspace{2cm}}$

52. $\frac{\sqrt{0.674 + \pi + 0.196}}{(5.16 - 2.21 + 9.16)^3} \dots\dots\dots 52 = \underline{\hspace{2cm}}$

53. $\left[\frac{50000 + 38200 + \sqrt{1.98 \times 10^9 + 4.38 \times 10^9}}{16.9/21.4} \right]^3 \dots\dots\dots 53 = \underline{\hspace{2cm}}$

54. $320 + \sqrt{(298)(292)} - (702 + 350) \dots\dots\dots 54 = \underline{\hspace{2cm}}$

55. $\sqrt{\frac{(11200)(5.40 \times 10^5)}{(19400)(81800)}} - 0.976 + 0.594 \dots\dots\dots 55 = \underline{\hspace{2cm}}$

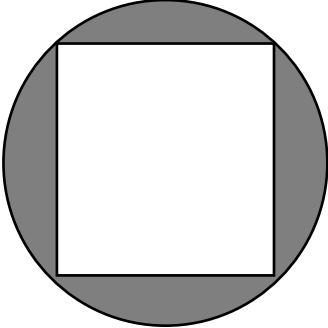
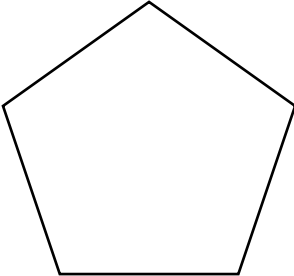
56. $0.0635 + \sqrt{(38.1)/(394)} - (0.479 + 0.457)^2 \dots\dots\dots 56 = \underline{\hspace{2cm}}$

57. $\sqrt{\frac{(109)(9.2)}{(618) + (925)}} + 1/(1.11)^2 \dots\dots\dots 57 = \underline{\hspace{2cm}}$

58. $(\text{deg}) \sin(4400^\circ) + (3.02/2.32) \dots\dots\dots 58 = \underline{\hspace{2cm}}$

59. Charlie purchased regular gas at \$2.659 per gallon and diesel at \$3.359 per gallon. His total purchase cost \$261.02. He bought 15 more gallons of diesel than gas. Calculate the number of gallons of diesel he purchased. $\dots\dots\dots 59 = \underline{\hspace{2cm}}$ gal.

60. The volume of a right isosceles triangular prism is 91.5 m^3 . The height of the prism is 23.83 m. Calculate the length of a leg of the triangular base. $\dots\dots\dots 60 = \underline{\hspace{2cm}}$ m

CIRCLE AND INSCRIBED SQUARE	REGULAR PENTAGON
	
Area of Circle = 312.8	Perimeter = 551.7
Shaded Area = ?	Area = ?
61 = _____	62 = _____

63. $\frac{28! + 29!}{22!}$ ----- 63 = _____

64. (deg) $\frac{\cos(46.4^\circ)}{116}$ ----- 64 = _____

65. $(100 - \pi)e^{0.797}$ ----- 65 = _____

66. (deg) $(351 - 400)\sin(22.7^\circ) + 14.7$ ----- 66 = _____

67. (rad) $\frac{\sin(90.8)}{315/103}$ ----- 67 = _____

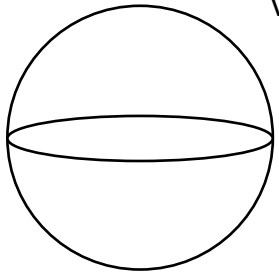
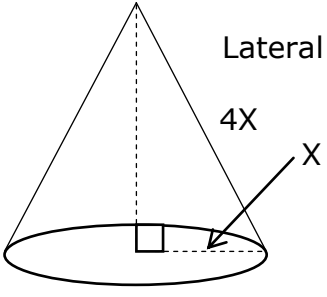
68. (rad) $(8850)\tan(108)$ ----- 68 = _____

69. (deg) $\frac{\sin(19.2^\circ)}{\tan(19.2^\circ)}[46.5]$ ----- 69 = _____

70. $\left[(263) \left(\frac{72.6}{(256)(\pi)} \right) \right]^{3/2}$ ----- 70 = _____

71. The numbers 0 to 50 inclusive are put into a box. Calculate the odds of drawing out a prime number. ----- 71 = _____

72. The inner diagonal of a cube measures 1.82×10^4 in. Calculate the length of the diagonal of a face of the cube. ----- 72 = _____ in.

<p>SPHERE</p>  <p>Volume = 2159</p> <p>Surface Area = ?</p> <p>73= _____</p>	<p>CONE</p>  <p>Lateral Surface Area = 1275</p> <p>X = ?</p> <p>74= _____</p>
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75. $\ln\left[\frac{248 + 165 + 244}{316 + 541 - 537}\right]$ ----- 75= _____

76. $\frac{\text{Log}(2.51 \times 10^5 + 1.05 \times 10^6)}{31.5}$ ----- 76= _____

77. $(2150)10^{(0.775)(3.98)}$ ----- 77= _____

78. $\frac{\text{Log}[17900 + (4810)(4.11)]}{0.551 + \text{Log}[123 + 181]}$ ----- 78= _____

79. $1 + 2 + 3 + \dots + 416$ ----- 79= _____

80. $1 + (0.86) + \frac{(0.86)^2}{2} + \frac{(0.86)^3}{6} + \frac{(0.86)^4}{24}$ ----- 80= _____

2017-2018 TMSCA Middle School Calculator Regional Qualifier Answer Key

Page 1	Page 2	Page 3	Page 4
1 = -310 = -3.10×10^2	14 = -120 = -1.20×10^2	27 = 6.20×10^{-11}	39 = 2.11×10^{16}
2 = 87.0 = 8.70×10^1	15 = 1.68×10^{-5}	28 = -4.73×10^6	40 = 1.94×10^8
3 = 522 = 5.22×10^2	16 = -140000 = -1.40×10^5	29 = -2.58×10^{-13}	41 = 0.345 = 3.45×10^{-1}
4 = -9.86 = -9.86×10^0	17 = 1.89 = 1.89×10^0	30 = 1.16×10^{-14}	42 = 2.03 = 2.03×10^0
5 = 4240 = 4.24×10^3	18 = -8.64 = -8.64×10^0	31 = -0.888 = -8.88×10^{-1}	43 = 39500 = 3.95×10^4
6 = -195 = -1.95×10^2	19 = 3750 = 3.75×10^3	32 = 3.83 = 3.83×10^0	44 = 4.98×10^{10}
7 = 4.26 = 4.26×10^0	20 = 3.60×10^{-10}	33 = 0.00177 = 1.77×10^{-3}	45 = 1.21 = 1.21×10^0
8 = -0.390 = -3.90×10^{-1}	21 = 3.18×10^{-7}	34 = -0.0229 = -2.29×10^{-2}	46 = 28.2 = 2.82×10^1
9 = 4.28×10^6	22 = 3.05 = 3.05×10^0		
10 = 8.31×10^{10}	23 = -1.85×10^9	35 = 73000 = 7.30×10^4	47 = 2.55×10^{4715}
11 = 113000 = 1.13×10^5	24 = \$17,252.05	36 = 44.7 = 4.47×10^1	48 = 11.6 = 1.16×10^1
12 = 5.00×10^7	25 = 252000 = 2.52×10^5	37 = 7.07×10^{-15}	49 = 249 = 2.49×10^2
13 = \$317.50	26 = 2.50 = 2.50×10^0	38 = 236000 = 2.36×10^5	50 = 0.331 = 3.31×10^{-1}

2017-2018 TMSCA Middle School Calculator Regional Qualifier Answer Key

Page 5

$$51 = 89.1 \\ = 8.91 \times 10^1$$

$$52 = 0.00113 \\ = 1.13 \times 10^{-3}$$

$$53 = 9.62 \times 10^{15}$$

$$54 = -437 \\ = -4.37 \times 10^2$$

$$55 = 1.57 \\ = 1.57 \times 10^0$$

$$56 = -0.502 \\ = -5.02 \times 10^{-1}$$

$$57 = 1.62 \\ = 1.62 \times 10^0$$

$$58 = 2.29 \\ = 2.29 \times 10^0$$

$$59 = 50.0 \\ = 5.00 \times 10^1$$

$$60 = 2.77 \\ = 2.77 \times 10^0$$

Page 6

$$61 = 114 \\ = 1.14 \times 10^2$$

$$62 = 20900 \\ = 2.09 \times 10^4$$

$$63 = 8.14 \times 10^9$$

$$64 = 0.00594 \\ = 5.94 \times 10^{-3}$$

$$65 = 215 \\ = 2.15 \times 10^2$$

$$66 = -4.21 \\ = -4.21 \times 10^0$$

$$67 = 0.0986 \\ = 9.86 \times 10^{-2}$$

$$68 = 21800 \\ = 2.18 \times 10^4$$

$$69 = 43.9 \\ = 4.39 \times 10^1$$

$$70 = 116 \\ = 1.16 \times 10^2$$

$$71 = 0.417 \\ = 4.17 \times 10^{-1}$$

$$72 = 14900 \\ = 1.49 \times 10^4$$

Page 7

$$73 = 808 \\ = 8.08 \times 10^2$$

$$74 = 10.1 \\ = 1.01 \times 10^1$$

$$75 = 0.719 \\ = 7.19 \times 10^{-1}$$

$$76 = 0.194 \\ = 1.94 \times 10^{-1}$$

$$77 = 2.61 \times 10^6$$

$$78 = 1.51 \\ = 1.51 \times 10^0$$

$$79 = 86700 \\ = 8.67 \times 10^4$$

$$80 = 2.36 \\ = 2.36 \times 10^0$$

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

11. $4(\sqrt{7.92 \times 10^8})$

12. $\frac{2}{100} = \frac{1,000,000}{x}$ so
 $x = \frac{(1,000,000)(100)}{2}$

13. Mid range is the average of the low and high costs.

$$\frac{550 + 85}{2}$$

24. Cost before tax

$$23472.98 - 7822.78 + 28.75 + 150 + 35 = 15863.95$$

Including tax:

$$(15863.95)(1.0875)$$

25. $g(7) = 3(7^5) - 2(7) + 16$

$$g(7) = 50423$$

$$f(50423) =$$

$$\sqrt{50423} + 5(50423) - 28$$

26. Slope of line $ax + by = c$ is $-\frac{a}{b}$.

For $5x - 2y = 3$, the slope is $-\frac{5}{-2}$

35. $(5280 + 800)12$

36. The percent change is the same regardless of the Surface Area so allow $SA = 1$.

SA of sphere = $4\pi r^2 = 1$ so

$$r = \sqrt{\frac{1}{4\pi}}$$
 The surface area of a

$$\text{cube} = 6e^2 = 1 \text{ so } e = \sqrt{\frac{1}{6}}$$

On HP calculator, enter radius, then punch edge followed by % change key.

37. $C = 2\pi r = 2.98 \times 10^{-7}$

$$\text{So } r = \frac{2.98 \times 10^{-7}}{2\pi}$$

$$\text{Area} = \pi r^2 = \pi \left(\frac{2.98 \times 10^{-7}}{2\pi} \right)^2$$

38. An equilateral triangle can be seen as two 30-60-90 triangles.

Half of the side = short leg. The height is $\sqrt{3}$ times as big.

$$h = \left(\frac{2.73 \times 10^5}{2} \right) \sqrt{3}$$

47. 231 ¹⁹⁹⁵ 1995
 231

(Look at the digits to the left of the decimal. This gives 4715 for the exponent. Write down 4715.)

4715

(This gives 2.55 E0 which is the first part of your answer.

The answer is 2.55 x 10⁴⁷¹⁵). This is done on the HP RPN calculator.

48. $24 \left(\frac{5}{6} \right)^4$

49. $\frac{(\sqrt{37.8^2 - 14.2^2})(14.2)}{2}$

50. $ht = x$; $\text{base} = y$

$$\frac{\cos 63}{1} = \frac{x}{1.28}$$

$$x = (1.28)(\cos 63)$$

$$\frac{\sin 63}{1} = \frac{y}{1.28}$$

$$y = (1.28)(\sin 63)$$

$$A = \frac{xy}{2} = \frac{[(1.28)(\cos 63)][(1.28)(\sin 63)]}{2}$$

59. D = gallons of diesel; D-15 = gallons of gas

$$2.659(D - 15) + 3.359D = 261.02$$

Solve for D.

60. $x = \text{leg of triangular base}$

$$\frac{x^2}{2} (23.83) = 91.5$$

$$x = \sqrt{\frac{(91.5)(2)}{23.83}}$$

61. Circle A = $312.8 = \pi r^2$

$$r = \sqrt{\frac{312.8}{\pi}}$$

$$\text{Square A} = \frac{\text{diagonal}^2}{2} = \frac{(2r)^2}{2} = 2r^2$$

$$A(Sq) = 2 \left(\frac{312.8}{\pi} \right)$$

Subtract Area of square from Area of Circle $312.8 - 2 \left(\frac{312.8}{\pi} \right)$

62. $\frac{\text{Perimeter}^2}{(\tan \frac{180}{n}) 4n} = \text{Area of a regular polygon.}$

$$\frac{(551.7 \times 5)^2}{(\tan \frac{180}{5}) 20}$$

71. Primes:

2,3,5,7,11,13,17,19,23,29,31,37,41,43,47 so there are 15 prime numbers and 36 not prime.

Odds: $\frac{15}{36}$

72. The edge of a cube is inner diagonal $\div \sqrt{3}$. The diagonal of the face is $e\sqrt{2}$. $\left(\frac{1.82 \times 10^4}{\sqrt{3}} \right) \sqrt{2}$

73. $V = \frac{4}{3}\pi r^3 = 2159$

$$r = \sqrt[3]{\frac{(2159)(3)}{4\pi}}$$

$$SA = 4\pi r^2 = 4\pi \left(\sqrt[3]{\frac{(2159)(3)}{4\pi}} \right)^2$$

74. $LSA = 1275 = \pi r s$ where $s = \text{slant height.}$

$$1275 = \pi(x)(4x) = \pi 4x^2$$

$$x = \sqrt{\frac{1275}{4\pi}}$$