8

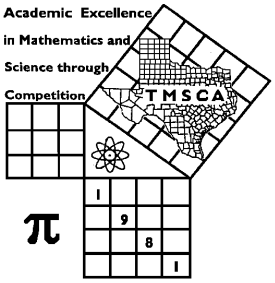
1st Score: _____	2nd Score: _____	3rd Score: _____	
S & G _____	S & G _____	S & G _____	_____. _____
Grader: _____	Grader: _____	Grader: _____	**Final Score**

PLACE LABEL BELOW

Name:_____ School:_____

SS/ID Number:_____ City:_____

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



T M S C A M I D D L E S C H O O L

C A L C U L A T O R

R E G I O N A L T E S T ©

M A R C H 7 , 2 0 2 0

GENERAL DIRECTIONS

I. About this test:
- A. You will be given 30 minutes to take this test. There are 80 problems on this test.
- **B. ALL calculators must be cleared. HP Prime and Casio Prizm calculators are NOT permitted.**

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*, $1.23x10^{0}$*, $1.23x10^{1}$, $1.23x10^{01}$, .0190, $1.90x10^{-2}$
     Incorrect: 12.30, 123.0, $1.23(10)^{2}$, $1.23\cdot10^{2}$, $1.230x10^{2}$, $1.23*10^{2}$, 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.

2019-2020 TMSCA Middle School Calculator Regional Qualifier

1. $-754 - 1020$ ---------- 1=_____

2. $40 + 13 - 76$ ---------- 2=_____

3. $5030 + 8660 - 2930$ ---------- 3=_____

4. $\pi + 12 - 21 - 31$ ---------- 4=_____

5. $159 + 169 - 84 - 173$ ---------- 5=_____

6. $147 + 62.2 - 113 - 117 + 107$ ---------- 6=_____

7. $1.6 - 1.76 + 1.26 - 0.512 - 1.71$ ---------- 7=_____

8. $(1.85 - 1.91) + (0.598 - 0.965 - 1.85)$ ---------- 8=_____

9. $99.5 \times 32.9 \times 173$ ---------- 9=_____

10. $2490 \times 4370 \times 3220 \times 2470$ ---------- 10=_____

11. Jimbo is looking at the cost of new tires for his truck. He has priced 5 different tire shops. Cost for the tires he wants range from \$98 to \$154 per tire. Calculate the mid-range of the tire prices. ---------- 11=\$_____

12. One hundred-thousandths is one percent of what number? ------ 12=_____

13. The area of a square is 9.77×10^8 cm^2. Calculate the length of the diagonal of the square in cm. ---------- 13=_____cm

14. $(-192)[259 \times 68 \times 100]$ ---------- 14=_____

15. $(-917/567)[433 - 820]$ ---------- 15=_____

16. $\left[\frac{662}{297}\right][(668/143) + 0.49]$ ---------- 16=_____

17. $\{366/155\}\left[\frac{536}{571 + 285}\right]$ ---------- 17=_____

18. $\frac{(97/80) + (34/61)}{(32.5 - 29.5)}$ ---------- 18=_____

19. $\left[\frac{(999/407) - (1360/1020)}{0.0453/(0.0525)}\right]$ ---------- 19=_____

20. $\frac{(0.00968)(0.00155)}{0.0245}(182 - 72.6)$ ---------- 20=_____

21. $\frac{(\pi)(31/14)(33/31)}{257}$ ---------- 21=_____

22. $\frac{(317 \times 887)/2660}{(2490 \times 0.1) + 163}$ ---------- 22=_____

23. $\frac{[-(2420 + 3120)(1050 - 968)]}{(12.3/(6970))}$ ---------- 23=_____

24. Alex purchased a new vehicle. It is listed for $25,985.89. She got $11,459.00 for her trade in and a dealer incentive of $500.00 off. She then had 8.75% sales tax added to this total. Then a $34.22 document fee, $250.00 destination fee, and a $55 licensing fee were added. Calculate the total she will have to pay for the car. 24=$_____

25. If $f(x) = x^7 - 2x^4 + 3x$ and $g(x) = \frac{1}{2}x^5 + 7x^3 - 6x$ calculate the value of $g(f(5))$. ---------- 25=_____

26. Calculate the slope of the line parallel to $5x + 2y = 22$. ---------- 26=_____

27. $(0.671)[(0.0983/0.0239)(0.349 + 0.626)]$ ---------- 27=_____

28. $\dfrac{(0.00433 + 0.00432)(23.9 + 35.7)}{(1.41\text{x}10^{12})}$ ---------- 28=_____

29. $[2860 - (3630 + 2290)] + [(1.58)(473 - 2010)]$ -------- 29=_____

30. $\dfrac{1}{67.9} + \dfrac{1}{(\pi)(92.5 - 53.5)}$ ---------- 30=_____

31. $(6.5)\left[\dfrac{6.63}{(1.56\text{x}10^{12})}\right]$ ---------- 31=_____

32. $\dfrac{(34.1 + 52.7)}{(6.86\text{x}10^{11})}$ ---------- 32=_____

33. $1/(0.00141 - 8.82\text{x}10^{-4}) - 1/(4.22\text{x}10^{-4})$ ---------- 33=_____

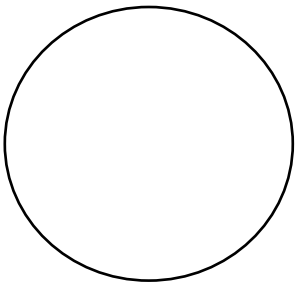
34. $\left[\dfrac{1/133}{1/38.5}\right][1.05\text{x}10^{6}]$ ---------- 34=_____

35. A long ton is 240 pounds more than a regular or short ton. Calculate the percent difference between a long ton and a short ton. ---------- 35=_____%

36. A spheres' diameter and a cubes' diagonal are equal. Calculate how many times larger the surface area of the sphere is than the surface area of the cube. ---------- 36=_____

CIRCLE

Area = $3.91\text{x}10^{-5}$

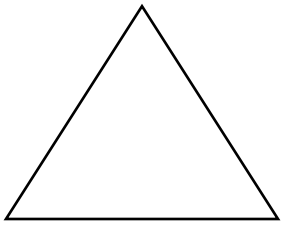


Circumference = ?

37=_____

EQUILATERAL TRIANGLE

Height = $6.59\text{x}10^{7}$



Perimeter = ?

38=_____

39. $\sqrt[3]{\frac{4.82 + 6.74}{7.17 - 4.51}}$ ---------- 39=_____

40. $\left[\frac{144}{1530}\right](0.38 + 0.317)^4$ ---------- 40=_____

41. $\left[\frac{15500 + (1/(5.09\text{x}10^{-5}))}{(12400/16000) - 0.0975}\right]^2$ ---------- 41=_____

42. $\sqrt{385} + \sqrt{585 + 876} - (\pi)\sqrt{507}$ ---------- 42=_____

43. $(1/\pi)\sqrt[4]{\frac{0.478 + 0.656}{2.78 - 2.57}}$ ---------- 43=_____

44. $(1/(0.0502))(10600 - 7230)^2$ ---------- 44=_____

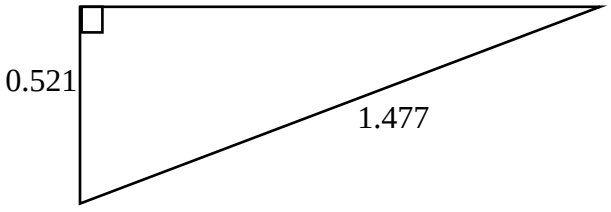
45. $\left[\sqrt[3]{(0.434/1.97)(473)}\right]^2$ ---------- 45=_____

46. $\frac{(281 + 67.2)^{1/3}}{(388 - 167)^{1/4}}$ ---------- 46=_____

47. Calculate 7675^{5789}. ---------- 47=_____

48. When the phlebotomist drew blood on the donations bus, she noticed that 34% of the people winced and the rest had no reaction. If 3,300 people have had no reaction, calculate the total number of people she has drawn blood from. ---------- 48=_____INT.

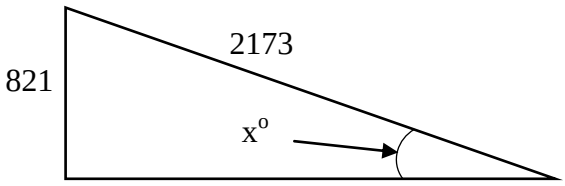
RIGHT TRIANGLE



Area = ?

49=_____

RIGHT TRIANGLE



x^o = ?

50=_____

51. $\left[\dfrac{12900 + 14500 + \sqrt{5.40\text{x}10^{8} + 2.70\text{x}10^{8}}}{533/625}\right]^{3}$ ---------- 51=_____

52. $\left[\dfrac{1020 - 801 + \sqrt{1.02\text{x}10^{7}/235}}{-24.1 + 28.4}\right]^{4}$ ---------- 52=_____

53. $\dfrac{(271 + 205 - 266)^{3}}{\sqrt{0.0275 + 0.0709 + 0.0547}}$ ---------- 53=_____

54. $\sqrt{\dfrac{(1.36\text{x}10^{5})(1.03\text{x}10^{5})}{(3.92\text{x}10^{5})(28600)}} - 0.293 + 0.816$ ---------- 54=_____

55. $\sqrt{\dfrac{1/(27 - 10.6)}{(8.66)(79.6 + 119)^{6}}}$ ---------- 55=_____

56. $1590 + \sqrt{(320)(1150)} - (1570 + 1300)$ ---------- 56=_____

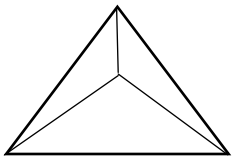
57. (deg) $\cos(87.3^{\circ}) + (104/256)$ ---------- 57=_____

58. $\sqrt{\dfrac{(18.1)(347)}{(77.4) + (188)}} + 1/(1.7)^{-3}$ ---------- 58=_____

59. Mr. Tilly found four consecutive integers such that five times the sum of the second and third is six less than seven times the first. Calculate the sum of the four integers. ---------- 59=_____INT.

60. The height of an equilateral triangle is 5.82 inches. Its area is $a\sqrt{3}$ in^2. Calculate the value of a. ---------- 60=_____

REGULAR TETRAHEDRON

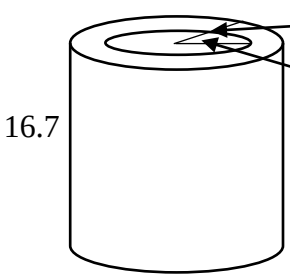


Edge = 512

Surface Area = ?

61=_____

HOLLOW CYLINDER



Volume = ?

62=_____

63. $\frac{24! + 25!}{26!}$ ---------- 63=_____

64. $(1.81 \times 10^5 - 88000)^4 (3.01 \times 10^6)$ ---------- 64=_____

65. (deg) $(6520 + 7070)\tan(73.5°)$ ---------- 65=_____

66. (deg) $\sin(0.642° - 0.705°) + 0.00108$ ---------- 66=_____

67. (rad) $\tan\left[\frac{(5.72)(\pi)}{(9.79)(399)}\right]$ ---------- 67=_____

68. (deg) $\frac{\tan(111°)}{798 + 3430}$ ---------- 68=_____

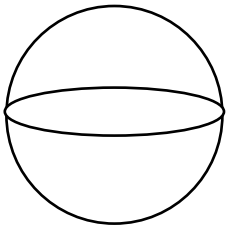
69. (deg) $\frac{\sin(896°)}{\tan(896°)}[6.34]$ ---------- 69=_____

70. $\left[(123)\left(\frac{6110}{(502)(\pi)}\right)\right]^{5/2}$ ---------- 70=_____

71. The numbers zero to one hundred inclusive are put into a box. Calculate the odds of drawing out a number which is a two-digit palindrome. ---------- 71=_____

72. There are 2 pints in a quart, 8 quarts in a peck and 4 pecks in a bushel. Calculate how many pints are in 12 bushels. ---------- 72=_____bu.

SPHERE

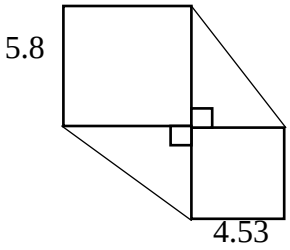


Volume = 7302

Surface Area = ?

73=_____

SQUARES AND RIGHT TRIANGLES



Area of figure = ?

74=_____

75. $\text{Ln}\left[\frac{112 + 48.8 + 125}{206 + 200 - 99.6}\right]$ ---------- 75=_____

76. $\frac{(18)^{0.173}(4.31)^{0.57}}{(2.99 - 2.76)^{-10}}$ ---------- 76=_____

77. $(21100)10^{(0.981)(1.2)}$ ---------- 77=_____

78. $(135)^{\pi}(9.51)^{3}(7.11 - 4.25)^{5}$ ---------- 78=_____

79. $2 + 4 + 6 + \ldots + 174$ ---------- 79=_____

80. $1 + (0.24) + \frac{(0.24)^2}{2} + \frac{(0.24)^3}{6} + \frac{(0.24)^4}{24}$ ---------- 80=_____

2019-2020 TMSCA Middle School Calculator Regional Qualifier Answer Key

Page 1

1 = -1770
= -1.77×10^{3}

2 = -23.0
= -2.30×10^{1}

3 = 10800
= 1.08×10^{4}

4 = -36.9
= -3.69×10^{1}

5 = 71.0
= 7.10×10^{1}

6 = 86.2
= 8.62×10^{1}

7 = -1.12
= -1.12×10^{0}

8 = -2.28
= -2.28×10^{0}

9 = 566000
= 5.66×10^{5}

10 = 8.65×10^{13}

11 = $126.00

12 = 0.00100
= 1.00×10^{-3}

13 = 44200
= 4.42×10^{4}

Page 2

14 = -3.38×10^{8}

15 = 626
= 6.26×10^{2}

16 = 11.5
= 1.15×10^{1}

17 = 1.48
= 1.48×10^{0}

18 = 0.590
= 5.90×10^{-1}

19 = 1.30
= 1.30×10^{0}

20 = 0.0670
= 6.70×10^{-2}

21 = 0.0288
= 2.88×10^{-2}

22 = 0.257
= 2.57×10^{-1}

23 = -2.57×10^{8}

24 = $15,593.46

25 = 1.34×10^{24}

26 = -2.50
= -2.50×10^{0}

Page 3

27 = 2.69
= 2.69×10^{0}

28 = 3.66×10^{-13}

29 = -5490
= -5.49×10^{3}

30 = 0.0229
= 2.29×10^{-2}

31 = 2.76×10^{-11}

32 = 1.27×10^{-10}

33 = -476
= -4.76×10^{2}

34 = 304000
= 3.04×10^{5}

35 = -10.7
= -1.07×10^{1}

36 = 1.57
= 1.57×10^{0}

37 = 0.0222
= 2.22×10^{-2}

38 = 2.28×10^{8}

Page 4

39 = 1.63
= 1.63×10^{0}

40 = 0.0222
= 2.22×10^{-2}

41 = 2.69×10^{9}

42 = -12.9
= -1.29×10^{1}

43 = 0.485
= 4.85×10^{-1}

44 = 2.26×10^{8}

45 = 22.1
= 2.21×10^{1}

46 = 1.82
= 1.82×10^{0}

47 = 5.23×10^{22490}

48 = 5000 INT.

49 = 0.360
= 3.60×10^{-1}

50 = 22.2
= 2.22×10^{1}

2019-2020 TMSCA Middle School Calculator Regional Qualifier Answer Key

Page 5

51 = 2.81×10^{14}

52 = 9.75×10^{7}

53 = 2.37×10^{7}

54 = 1.64
= 1.64×10^{0}

55 = 1.07×10^{-8}

56 = -673
= -6.73×10^{2}

57 = 0.453
= 4.53×10^{-1}

58 = 9.78
= 9.78×10^{0}

59 = -22 INT.

60 = 11.3
= 1.13×10^{1}

Page 6

61 = 454000
= 4.54×10^{5}

62 = 443
= 4.43×10^{2}

63 = 0.0400
= 4.00×10^{-2}

64 = 2.25×10^{26}

65 = 45900
= 4.59×10^{4}

66 = -1.96×10^{-5}

67 = 0.00460
= 4.60×10^{-3}

68 = -0.000616
= -6.16×10^{-4}

69 = -6.32
= -6.32×10^{0}

70 = 4.96×10^{6}

71 = 0.0978
= 9.78×10^{-2}

72 = 768
= 7.68×10^{2}

Page 7

73 = 1820
= 1.82×10^{3}

74 = 80.4
= 8.04×10^{1}

75 = -0.0696
= -6.96×10^{-2}

76 = 1.57×10^{-6}

77 = 317000
= 3.17×10^{5}

78 = 8.11×10^{11}

79 = 7660
= 7.66×10^{3}

80 = 1.27
= 1.27×10^{0}

TMSCA 19-20 MS CA Regional Test Solutions to Word and Geometry Problems

11.
$\frac{98+154}{2}$

12. $\frac{1}{100{,}000} = .01x$

$x = \frac{1}{100{,}000} \div .01$

13. $\sqrt{9.77\ x\ 10^8}\left(\sqrt{2}\right)$

24. $(25985.89 - 11459 - 500)$
Multiply above by 1.0875. Then add 34.22 + 250 + 55.

25. $5^7 - 2(5)^4 + 3(5) = 76890$

$\frac{1}{2}(76890)^5 + 7(76890)^3 - 6(76890)$

26. $-\frac{5}{2}$

35. On HP RPN calculator
2240 (enter) 2000 (%change)
Without RPN

$$\frac{2000 - 2240}{2240}\ (100)$$

36. Surface area of sphere =
$4\pi r^2 = 4\pi\left(\frac{diameter}{2}\right)^2$
SA of a cube = $2(diagonal)^2$
Ratio of these: $\frac{4\pi\left(\frac{d}{2}\right)^2}{2(d)^2} = \frac{\pi d^2}{2d^2} = \frac{\pi}{2}$

37. $\pi r^2 = 3.91\ x\ 10^{-5}$

$r = \sqrt{\frac{3.91\ x\ 10^{-5}}{\pi}}$

C = $2\pi\left(\sqrt{\frac{3.91\ x\ 10^{-5}}{\pi}}\right)$

38. side = $\left(\frac{6.59\ x\ 10^7}{\sqrt{3}}\right)(2)$
Perimeter =

$$3\left[\left(\frac{6.59\ x\ 10^7}{\sqrt{3}}\right)(2)\right]$$

47. 7675^{5789}
5789 [ENTER] 7675 [log] [x] [SHOW] *(Look at the digits to the left of the decimal. This gives 22490 for the exponent. Write down 10^{22490}.) Then punch*
22490 [−] [10^x]
(This gives 5.23 E0 which is the first part of your answer.
The answer is **5.23 x 10^{22490}**). *This is done on the HP RPN calculator.*

48. $\frac{3300}{66} = \frac{x}{100}$;

$x = \frac{3300(100)}{66}$

49. long leg =
$\sqrt{(1.477)^2 - (.521)^2}$

Area = $\frac{\left[\sqrt{(1.477)^2 - (.521)^2}\right][.521]}{2}$

50. $\frac{\sin x}{1} = \frac{821}{2173}$

$x = \sin^{-1}\left(\frac{821}{2173}\right)$

59. The four numbers are represented by
$n, n+1, n+2, n+3$
$5(n+1+n+2) = 7n - 6$
Solve for n. $n = -7$
The sum of the four numbers is $-7 + (-6) + (-5) + (-4)$

60. A = $\frac{ht^2\sqrt{3}}{3} = \frac{5.82^2\sqrt{3}}{3} =$
$a\sqrt{3}$ so $a = \frac{5.82^2}{3} =$

61. 4 equilateral triangles

$$4\left(\frac{512^2\sqrt{3}}{4}\right)$$

62. $\pi R^2 h - \pi r^2 h$
$\pi(5.19)^2(16.7) - \pi(4.3)^2(16.7)$

71. The two-digit palindromes are 11,22,33…99
There are 9 of those and 101-9 = 92 that are not palindromes

$$\frac{9}{92}$$

72. 2(8)(4)(12)

73. Volume = $\frac{4}{3}\pi r^3 = 7302$

$r = \sqrt[3]{\frac{7302(3)}{4\pi}}$

SA = $4\pi r^2 = 4\pi\left(\sqrt[3]{\frac{7302(3)}{4\pi}}\right)^2$

74. $5.8^2 + 4.53^2 + (5.8)(4.53)$