

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



TMSCA MIDDLE SCHOOL CALCULATOR REGIONAL TEST © MARCH 27, 2021

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*, 1.23x10⁰*, 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.

2020 – 2021 TMSCA Middle School Calculator Regional Qualifier

1. $1320 - 1310$ ----- 1= _____
2. $44 + 12 - 38$ ----- 2= _____
3. $160 + 143 - 403$ ----- 3= _____
4. $61 - 53 - 51 + 26$ ----- 4= _____
5. $2320 + 1100 - 1930 - 667$ ----- 5= _____
6. $175 - 306 - 246 - 64.2 + 241$ ----- 6= _____
7. $0.787 + 1.28 - 0.834 + 0.569 + 0.792$ ----- 7= _____
8. $(1.93 + 3.95 - \pi) - (2.83 + 2.5)$ ----- 8= _____
9. $484 \times 123 \times 111$ ----- 9= _____
10. $1130 \times 415 \times 2250 \times 101$ ----- 10= _____
11. The area of a square is 8.22×10^9 . Calculate the perimeter of the square. ----- 11= _____
12. One hundred million is what percent of thirty-two billion? ----- 12= _____ %
13. Adrian is looking at getting a new car. The prices of the cars he is looking at are \$23,988.00, \$31,459.00, \$25,679.00, and \$19,475.00. Calculate the mid-range of the car prices. ----- 13= \$ _____

14. $(156)[153 \times 642 \times 192]$ ----- 14=_____
15. $(-163/178)[98 - 74]$ ----- 15=_____
16. $\{184/35\}\left[\frac{84}{189 + 217}\right]$ ----- 16=_____
17. $\left[\frac{93}{610}\right] [(170/447) + 0.109]$ ----- 17=_____
18. $\left[\frac{265/262}{175/305}\right] \{0.863 + 0.226 - 0.846\}$ ----- 18=_____
19. $\frac{[45.1/(29.3)]/24.5}{(0.754 \times 1.3)(0.581)}$ ----- 19=_____
20. $\frac{(0.0208)(0.00648)}{0.0931} (0.00142 - 0.00149)$ ----- 20=_____
21. $\frac{(\pi)(9/6)(3/7)}{71}$ ----- 21=_____
22. $\frac{(\pi + 4.43 - 3.71)}{\{(121 - 985)/(1.31)\}}$ ----- 22=_____
23. $\frac{[-(1240 + 1330)(1840 - 490)]}{(0.00953/(1.27))}$ ----- 23=_____
24. The sticker price of a car is \$35,000. You make a down payment of \$9,000 and your trade-in value is \$8,000. You are asked to make 60 monthly payments of \$398. Calculate the amount you will actually pay for the car after making those 60 monthly payments. ----- 24=\$_____
25. If $f(x) = x^{1/4} - 8x + 5$ and $g(x) = 2x^4 + 5x - 13$, calculate the value of $f(g(6))$. ----- 25=_____
26. Calculate the slope of the line $x = 5y + 2$. ----- 26=_____

27. $\frac{(637 - 159)(0.0106 + 0.0648)}{(7.69 \times 10^{12})}$ ----- 27=_____

28. $\frac{(1.69 + \pi)(88.2 + 193)}{(2.74 \times 10^{12})}$ ----- 28=_____

29. $(0.00152)[[148/(66.5)][0.0508/(0.0376)]]$ ----- 29=_____

30. $\frac{(\pi + 1.25)}{(3.74 \times 10^{11})}$ ----- 30=_____

31. $(64.7)\left[\frac{0.175}{(2.47 \times 10^8)}\right]$ ----- 31=_____

32. $[195]\left[\frac{1/2.59}{1/(1.4)}\right]$ ----- 32=_____

33. $\left[\frac{1/556}{1/383}\right] + [0.612]$ ----- 33=_____

34. $\left[\frac{1/785}{1/639}\right] [1.47 \times 10^5]$ ----- 34=_____

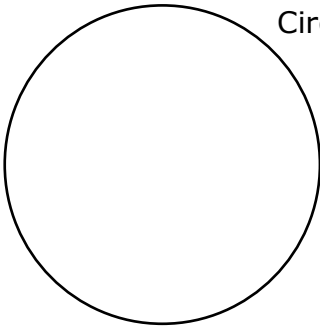
35. A long ton is 240 pounds more than a ton. Calculate the number of ounces in a long ton. ----- 35=_____oz.

36. The volume of a sphere is calculated using pi and then using 22/7. Calculate the percent change in the answer from using pi and then 22/7. ----- 36=_____%

37.

CIRCLE

Circumference = 5.78×10^{-8}

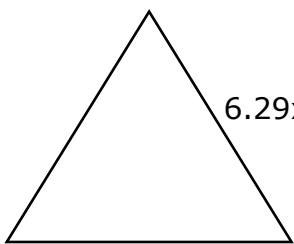


Area = ?

37=_____

38.

EQUILATERAL TRINAGLE



Height = ?

38=_____

39. $(1.78 + 0.442)^2(80.4 + 493)^2$ ----- 39=_____

40. $(13.8 + 12.3 + 7.23)^2(0.267 + 0.0905)^2$ ----- 40=_____

41. $\left[\frac{1400}{32.6}\right](238 + 129)^4$ ----- 41=_____

42. $(1/(0.0583))(38400 - 18000)^2$ ----- 42=_____

43. $\sqrt{27000 - 21900 + 19900} - \sqrt{26300}$ ----- 43=_____

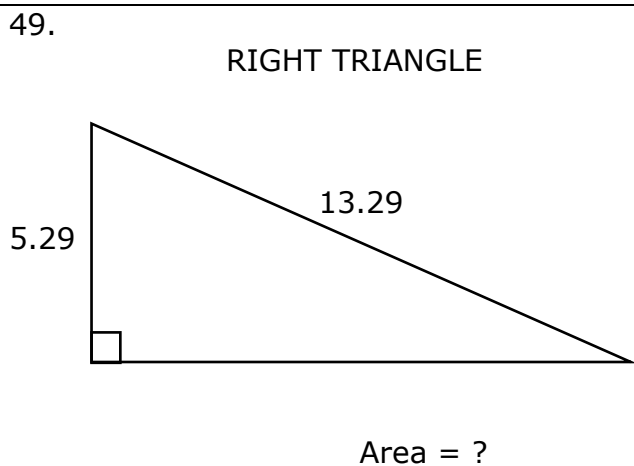
44. $(1/\pi)^4 \sqrt[4]{\frac{2.31 + 1.25}{0.345 - 0.316}}$ ----- 44=_____

45. $\frac{(185 + 20.1)^{1/3}}{(1060 - 728)^{1/5}}$ ----- 45=_____

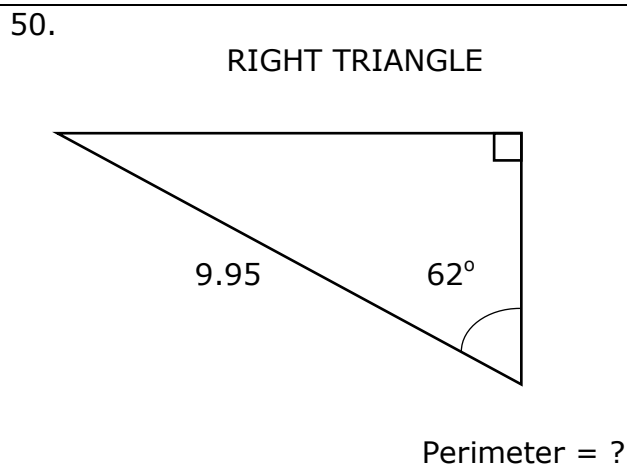
46. $\left[4\sqrt[4]{(16400/63100)(946)}\right]^5$ ----- 46=_____

47. Calculate 648^{3571} . ----- 47=_____

48. According to Boyle's Law, pressure varies inversely as volume. If an unknown gas has an initial pressure of 155 kPa and a volume of .75 L. If the volume is increased to 2.25 L, calculate what the pressure be now? ----- 48=_____kPa



49=_____



50=_____

51. $\frac{\sqrt{0.426 + \pi + 2.35}}{(18.2 - 51.5 + 23.2)^2}$ ----- 51=_____

52. $\sqrt{\frac{3.93 \times 10^{-19}}{(0.0817)(0.0133)}} + \frac{(0.0104 - 0.00531)}{(1.49 \times 10^5 + 59400)}$ ----- 52=_____

53. $\left[\frac{84.1 + 25.4 + \sqrt{4030 + 7580}}{34600/10300} \right]^4$ ----- 53=_____

54. $\sqrt{\frac{(1.46 \times 10^5)(3.13 \times 10^5)}{(1.47 \times 10^5)(32400)}} - 0.726 + 3.07$ ----- 54=_____

55. $0.0899 + \sqrt{(251)/(316)} - (0.473 + 0.903)^2$ ----- 55=_____

56. $(10.1)^2 \sqrt{(2.22)/(153)} - (6.22 + 3.28)$ ----- 56=_____

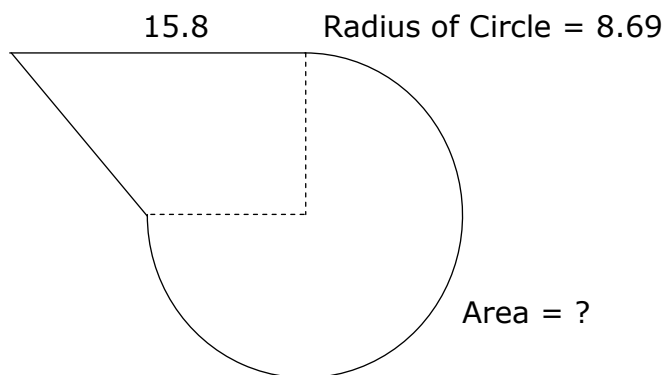
57. $\sqrt{\frac{(4.4)(1450)}{(311) + (448)}} + 1/(0.808)^5$ ----- 57=_____

58. $\sqrt{\frac{(107)(2010)}{(370) + (1060)}} - 76.7$ ----- 58=_____

59. Chelsie bought new flooring for her home. The carpet cost \$2.28 per square yard and the luxury vinyl cost \$4.59 per square yard. She bought 20 more square yards of carpet than vinyl and her total purchase cost \$265.44. Calculate the number of square yards of vinyl she purchased. ----- 59=_____yds².

60. The volume of a right equilateral triangular prism is 4.21×10^6 in³. The height of the prism is 1.87×10^2 in. Calculate the height of the equilateral triangle in inches. ----- 60=_____in.

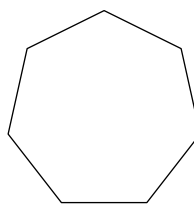
61. THREE-QUARTER CIRCLE, SQUARE, TRIANGLE



61= _____

62.

REGULAR SEPTAGON



Perimeter = 721.88

Area = ?

62= _____

63. $\frac{16!}{13!} + 7!$ ----- 63= _____

64. (deg) $(293 - 253)\cos(311^\circ)$ ----- 64= _____

65. $(178 - \pi)e^{0.904}$ ----- 65= _____

66. (rad) $\tan\left[\frac{(388)(\pi)}{(1.63)(2.42)}\right]$ ----- 66= _____

67. (deg) $\sin(47.7^\circ - 35.5^\circ) + 0.0505$ ----- 67= _____

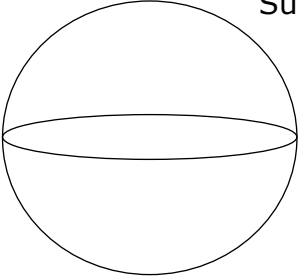

68. (rad) $\sin[(5 - 10.1)(7.92)]$ ----- 68= _____

69. (deg) $\frac{\tan(43.3^\circ)}{64.7 + 51.2}$ ----- 69= _____

70. $(109 - 39.3)^{0.103} - 0.089$ ----- 70= _____

71. The numbers 1 to 100 inclusive are put into a pot. Calculate the probability of drawing out a prime number. ----- 71= _____

72. The inner diagonal of a cube is 2.79×10^6 cm. Calculate the length of the diagonal of a face of a cube in cm. ----- 72= _____ cm

<p>73.</p> <p style="text-align: center;">SPHERE</p> <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: right;"> <p>Surface Area = 9991</p> <p>Volume = ?</p> </div> </div> <p>73= _____</p>	<p>74.</p> <p style="text-align: center;">CYLINDER</p> <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: right;"> <p>Volume = 1.22×10^8</p> <p>Diameter = x</p> <p>Height = 6.5x</p> <p>X = ?</p> </div> </div> <p>74= _____</p>
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75. $\frac{(26.5)^{0.846}(1.41)^{0.211}}{(6.43 - 4.28)^{-11}}$ ----- 75= _____

76. $\frac{\text{Log}(19.3 + 43.4)}{69.9 - 20.7}$ ----- 76= _____

77. $\frac{6480 - 1360}{\text{Log}(7890 + 3850)}$ ----- 77= _____

78. $\frac{\text{Log}[476 + (1630)(1.23)]}{0.279 + \text{Log}[35.9 + 118]}$ ----- 78= _____

79. $4 + 6 + 8 + \dots + 640$ ----- 79= _____

80. $\frac{1}{(0.37)} + \frac{1}{3(0.37)^3} + \frac{1}{5(0.37)^5} + \frac{1}{7(0.37)^7}$ ----- 80= _____

2020 – 2021 TMSCA Middle School Calculator Regional Qualifier Answer Key

Page 1	Page 2	Page 3	Page 4
1 = 10.0 = 1.00×10^1	14 = 2.94×10^9	27 = 4.69×10^{-12}	39 = 1.62×10^6
2 = 18.0 = 1.80×10^1	15 = -22.0 = -2.20×10^1	28 = 4.96×10^{-10}	40 = 142 = 1.42×10^2
3 = -100 = -1.00×10^2	16 = 1.09 = 1.09×10^0	29 = 0.00457 = 4.57×10^{-3}	41 = 7.79×10^{11}
4 = -17.0 = -1.70×10^1	17 = 0.0746 = 7.46×10^{-2}	30 = 1.17×10^{-11}	42 = 7.14×10^9
5 = 823 = 8.23×10^2	18 = 0.428 = 4.28×10^{-1}	31 = 4.58×10^{-8}	43 = -4.06 = -4.06×10^0
6 = -200 = -2.00×10^2	19 = 0.110 = 1.10×10^{-1}	32 = 105 = 1.05×10^2	44 = 1.06 = 1.06×10^0
7 = 2.59 = 2.59×10^0	20 = -1.01×10^{-7}	33 = 1.30 = 1.30×10^0	45 = 1.85 = 1.85×10^0
8 = -2.59 = -2.59×10^0	21 = 0.0284 = 2.84×10^{-2}	34 = 120000 = 1.20×10^5	46 = 974 = 9.74×10^2
9 = 6.61×10^6	22 = -0.00585 = -5.85×10^{-3}		
10 = 1.07×10^{11}	23 = -4.62×10^8		
		35 = 35800 = 3.58×10^4	47 = 1.36×10^{10040}
11 = 363000 = 3.63×10^5	24 = \$40,880.00	36 = 0.0402 = 4.02×10^{-2}	48 = 51.7 = 5.17×10^1
12 = 0.313 = 3.13×10^{-1}	25 = -20900 = -2.09×10^4	37 = 2.66×10^{-16}	49 = 32.2 = 3.22×10^1
13 = \$25,467.00	26 = 0.200 = 2.00×10^{-1}	38 = 5.45×10^6	50 = 23.4 = 2.34×10^1

2020 – 2021 TMSCA Middle School Calculator Regional Qualifier Answer Key

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$$51 = 0.0238$$
$$= 2.38 \times 10^{-2}$$

$$52 = 4.34 \times 10^{-8}$$

$$53 = 1.75 \times 10^7$$

$$54 = 5.44$$
$$= 5.44 \times 10^0$$

$$55 = -0.912$$
$$= -9.12 \times 10^{-1}$$

$$56 = 2.79$$
$$= 2.79 \times 10^0$$

$$57 = 5.80$$
$$= 5.80 \times 10^0$$

$$58 = -64.4$$
$$= -6.44 \times 10^1$$

$$59 = 32.0$$
$$= 3.20 \times 10^1$$

$$60 = 197$$
$$= 1.97 \times 10^2$$

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$$61 = 284$$
$$= 2.84 \times 10^2$$

$$62 = 38600$$
$$= 3.86 \times 10^4$$

$$63 = 8400$$
$$= 8.40 \times 10^3$$

$$64 = 26.2$$
$$= 2.62 \times 10^1$$

$$65 = 432$$
$$= 4.32 \times 10^2$$

$$66 = 2.17$$
$$= 2.17 \times 10^0$$

$$67 = 0.262$$
$$= 2.62 \times 10^{-1}$$

$$68 = -0.434$$
$$= -4.34 \times 10^{-1}$$

$$69 = 0.00813$$
$$= 8.13 \times 10^{-3}$$

$$70 = 1.06$$
$$= 1.06 \times 10^0$$

$$71 = 0.250$$
$$= 2.50 \times 10^{-1}$$

$$72 = 2.28 \times 10^6$$

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$$73 = 93900$$
$$= 9.39 \times 10^4$$

$$74 = 288$$
$$= 2.88 \times 10^2$$

$$75 = 78100$$
$$= 7.81 \times 10^4$$

$$76 = 0.0365$$
$$= 3.65 \times 10^{-2}$$

$$77 = 1260$$
$$= 1.26 \times 10^3$$

$$78 = 1.38$$
$$= 1.38 \times 10^0$$

$$79 = 103000$$
$$= 1.03 \times 10^5$$

$$80 = 189$$
$$= 1.89 \times 10^2$$

TMSCA 2020-2021 MS CA Regional Test Solutions to Word and Geometry Problems

11. $4(\sqrt{8.22 \times 10^9})$

12. $\frac{x}{100} = \frac{100,000,000}{32,000,000,000}$

13. Mid-range is the average of the high and low values.

$$\frac{31459 + 19475}{2}$$

24. $9000 + 8000 + 398(60)$

25.

$$g(6) = 2(6^4) + 5(6) - 13 = 2609$$

$$f(2609) = 2609^{\frac{1}{4}} - 8(2609) + 5$$

26. $\frac{1}{5}$

35. A long ton is 2240 lbs.

$$2240(16)$$

36. $V = \frac{4}{3}\pi r^3$ using π

$$V = \frac{4}{3}\left(\frac{22}{7}\right)r^3$$

The percent change is

$$\frac{\frac{22}{7} - \frac{22}{7}}{\frac{22}{7}} \cdot 100$$

Or some calculators have a % change key.

37. $2\pi r = 5.78 \times 10^{-8}$

$$r = \frac{5.78 \times 10^{-8}}{2\pi}$$

$$\text{Area} = \pi r^2 = \pi \left(\frac{5.78 \times 10^{-8}}{2\pi} \right)^2$$

38. height = $\frac{\text{side}\sqrt{3}}{2} =$

$$\frac{(6.29 \times 10^6)\sqrt{3}}{2}$$

47. 3571 ENTER 648 log

x SHOW (Look at the digits to the left of the decimal. This gives 10040 for the exponent. Write down 10^{10040} .) Then punch 10040 - 10^x (This gives 1.36 E0 which is the first part of your answer. The answer is 1.36×10^{10040}). This is done on the HP RPN calculator.

48. $P_1V_1 = P_2V_2$

$$155(.75) = 2.25(P)$$

$$P = \frac{155(.75)}{2.25}$$

49. Long leg =

$$\sqrt{13.29^2 - 5.29^2}$$

$$\text{Area} = \frac{5.29(\sqrt{13.29^2 - 5.29^2})}{2}$$

50. short leg: $x = 9.95(\cos 62)$
 long leg: $y = 9.95(\sin 62)$
 Perimeter: $9.95 + x + y$

59. $C = V + 20$

$$2.28C + 4.59V = 265.44$$

$$2.28(V + 20) + 4.95V = 265.44$$

$$V = \frac{265.44 - 45.6}{2.28 + 4.59}$$

60. Area of equilateral triangle with height $h =$

$$\frac{h^2\sqrt{3}}{3}$$

60. contd.

$$V = \left(\frac{h^2\sqrt{3}}{3} \right) (1.87 \times 10^2) = 4.21 \times 10^6$$

$$h = \sqrt{\frac{(4.21 \times 10^6)(3)}{(1.87 \times 10^2)(\sqrt{3})}}$$

61. $\frac{3}{4}$ of circle = $\frac{3}{4}\pi(8.69)^2$
 Trapezoid = $\frac{1}{2}(15.8 + 8.69)(8.69)$
 Total area: Add these two values.

62. $A = \frac{p^2}{\left(\tan \frac{180}{n}\right)(4n)} =$

$$\frac{(721.88)^2}{\left(\tan \frac{180}{7}\right)(28)}$$

71. There are 25 primes less than 100. $\frac{25}{100}$

72. edge = $\frac{2.79 \times 10^6}{\sqrt{3}}$
 Diagonal of face = edge $\sqrt{2}$

$$\left(\frac{2.79 \times 10^6}{\sqrt{3}} \right) (\sqrt{2})$$

73. $SA = 4\pi r^2 = 9991$

$$r = \sqrt{\frac{9991}{4\pi}}$$

$$V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi \left(\sqrt{\frac{9991}{4\pi}} \right)^3 =$$

74. $V = \pi r^2 h$

$$1.22 \times 10^8 = \pi \left(\frac{x}{2} \right)^2 6.5x$$

$$1.22 \times 10^8 = \frac{x^3}{4} \pi (6.5)$$

$$x = \sqrt[3]{\frac{(1.22 \times 10^8)4}{6.5\pi}}$$

