

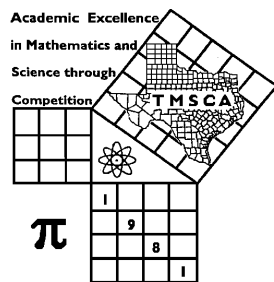
| | | | |
|-----------------------|------------------|------------------|-----------------------------------|
| 8 1st Score: _____ | 2nd Score: _____ | 3rd Score: _____ | _____. ____ Final Score |
| S & G _____ | S & G _____ | S & G _____ | |
| Grader: _____ | Grader: _____ | Grader: _____ | |

PLACE LABEL BELOW

Name: _____ School: _____

SS/ID Number: _____ City: _____

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



TMSCA MIDDLE SCHOOL CALCULATOR STATE TEST © APRIL 1, 2023

GENERAL DIRECTIONS

- I. About this test:
 - A. You will be given 30 minutes to take this test. There are 80 problems on this test.
- II. **Calculators limited to the types specified by UIL. Calculators are no longer required to be cleared.**
- III. 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.
- IV. 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).
- V. 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.

2022 – 2023 TMSCA Middle School Calculator State Meet

1. $376 - 1610$ ----- 1= _____

2. $43 + 36 + 32$ ----- 2= _____

3. $127 - 177 - 604$ ----- 3= _____

4. $22 + 21 - 15 - \pi$ ----- 4= _____

5. $4360 - 949 + 1250 - 2340$ ----- 5= _____

6. $418 + 327 - 264 - 285 - 387$ ----- 6= _____

7. $1.18 + 1.87 + 0.806 + 0.877 + 0.204$ ----- 7= _____

8. $(2.53 + 5.6 - 2.46) - (2.81 + 4.14)$ ----- 8= _____

9. $196 \times 80.8 \times 138$ ----- 9= _____

10. $1260 \times 88.9 \times 300 \times 1450$ ----- 10= _____

11. Calculate the sum of the number of ounces in a pound, the number of feet in a mile and the number of cubic inches in a gallon. ----- 11= _____ INT.

12. Calculate the volume of a cube with edge length of 6.159 inches in cubic centimeters. ----- 12= _____ cm^3

13. A nautical mile is 6,080 feet. Calculate what percent more a nautical mile is in feet than a road mile. ----- 13= _____ %

14. $(176)[754 \times 333/741]$ ----- 14= _____

15. $-356/[652 \times 381 \times 470]$ ----- 15= _____

16. $\left[\frac{185}{92}\right] [(35/137) - 0.172]$ ----- 16= _____

17. $(129 + 170)[318 - 434 - 567]$ ----- 17= _____

18. $\left[\frac{124/134}{182/193}\right] \{0.119 + 0.112 - 0.059\}$ ----- 18= _____

19. $\frac{(101/188) + (77/144)}{(0.266 - 0.588)}$ ----- 19= _____

20. $\frac{(0.133)(30.8)}{5.02 \times 10^{-5}} (1800 - 1050)$ ----- 20= _____

21. $(0.0559)[309/295 \times 50/290] - 0.00406$ ----- 21= _____

22. $\frac{(\pi)(153/52)(54/159)}{(119/185)}$ ----- 22= _____

23. $\frac{[-(425 + 2110)(1040 - 980)]}{(9.64 \times 10^{-5} / (0.0589))}$ ----- 23= _____

24. Thomas made a purchase with a \$100 bill. He received \$11.73 in change. Calculate the cost of his purchase without tax if the tax rate is 6.25%. ----- 24=\$ _____

25. In a group of 70 students, 28 liked chocolate milk and 51 liked orange juice for breakfast. Each student likes at least one of these two drinks. Calculate the number of students that liked both chocolate milk and OJ. ----- 25= _____ INT.

26. The sum of three consecutive odd integers is forty more than the smallest of the integers. Calculate the largest of the integers. --- 26= _____ INT.

27. $\frac{(5.75 \times 10^6) + (9.97 \times 10^6)}{(-23.3)(12.3) - 214}$ ----- 27 = _____

28. $\frac{(0.00978 + 0.00483)(408 + 122)}{(1.08 \times 10^{12})}$ ----- 28 = _____

29. $\frac{(0.0902 - 0.249)(0.0164 + 0.00531)}{(6.86 \times 10^{12})}$ ----- 29 = _____

30. $\frac{(443 + 531)}{(3.80 \times 10^{12})}$ ----- 30 = _____

31. $(34.4) \left[\frac{0.163}{(6.94 \times 10^{-8})} \right]$ ----- 31 = _____

32. $[28.3] \left[\frac{1/73.7}{1/301} \right]$ ----- 32 = _____

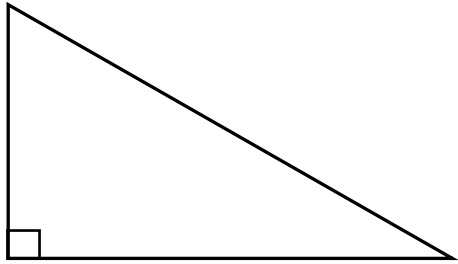
33. $\left[\frac{1/2600}{1/2830} \right] [7.48 \times 10^5]$ ----- 33 = _____

34. $\frac{1}{444} - \frac{1}{(535 + 131)}$ ----- 34 = _____

35. Karen completes the task in 22 minutes, Adam in 35 minutes and Bri in X minutes. If they all work together, they can complete the task in 10.5 minutes. Calculate how long it takes Bri to complete the task on her own. ----- 35 = _____

36. Calculate the value of 122334 Base 5 in Base 10. ----- 36 = _____ INT.

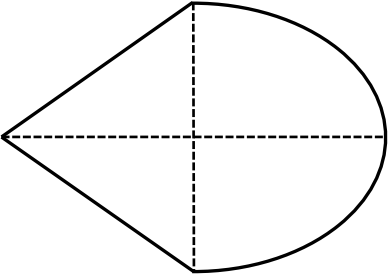
37. 30-60-90 TRIANGLE



Perimeter = ?

37 = _____

38. SEMI RHOMBUS AND SEMI ELLIPSE



Long diagonal = 327
Short diagonal = 245

Area = ?

38 = _____

39. $(2320 + 4020 + 2800)^2(0.143 + 0.258)^2$ ----- 39= _____

40. $\frac{(38000 + 37900)^2}{(0.0144 - 0.0279)^3}$ ----- 40= _____

41. $\left[\frac{1.3}{4.09}\right](11.8 + 14.4)^3$ ----- 41= _____

42. $(207)\sqrt{3370 + 2820 + 1620}$ ----- 42= _____

43. $(1/\pi)^3\sqrt{\frac{1.63 + 1.43}{0.855 - 0.62}}$ ----- 43= _____

44. $(1/(0.00652))(51200 - 10900)^3$ ----- 44= _____

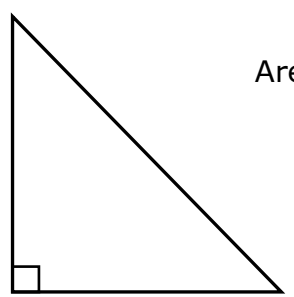
45. $\left[4\sqrt{(17.9/19.6)(3160)}\right]^2$ ----- 45= _____

46. $(2790)\sqrt[3]{690 + 4150 - 1470}$ ----- 46= _____

47. If M holds 30% more than N and R holds 42% more than N, then calculate what percent R holds more than M. ----- 47= _____ %

48. Calculate the product of the y-intercept and x-intercept of the line $y=7x+7$. ----- 48= _____

49. RIGHT TRIANGLE



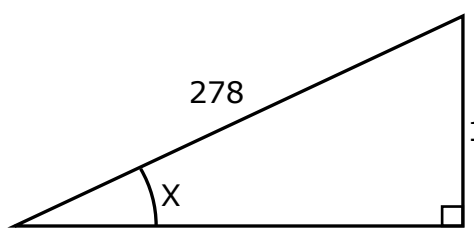
Area = 21,895

231

Perimeter = ?

49= _____

50. RIGHT TRIANGLE



278

111

Angle X in radians = ?

50= _____

51. $\sqrt{\frac{7.10 \times 10^{-4}}{(0.149)(254)} + \frac{(0.22 - 0.159)}{(7.86 + 5.71)}}$ ----- 51= _____

52. $\frac{\sqrt{6.03 + \pi + 5.15}}{(8.3 - 7.24 + 1.68)^2}$ ----- 52= _____

53. $\left[\frac{\sqrt{\sqrt{0.0668 - 0.0122}}}{-(0.115 - 0.138)} \right]^3 [4.69 + 3.45]$ ----- 53= _____

54. $1.9 + \sqrt{(3880)/(538)} - (1.13 + 1.22)^2$ ----- 54= _____

55. $(733)^2 \sqrt{(196)/(107)} - (2.53 \times 10^5 + 7.17 \times 10^5)$ ----- 55= _____

56. $537 + \sqrt{(1970)(1260)} - (1440 + 1330)$ ----- 56= _____

57. $\sqrt{\frac{(56.6)(57.7)}{(55.3) + (23.4)}} - 19.4$ ----- 57= _____

58. $\sqrt{\frac{(449)(1.21)}{(26.5) + (10.2)}} + 1/(1.4)^{-4}$ ----- 58= _____

59. A polygon has six hundred sixty-five distinct diagonals. Calculate the number of sides the polygon has. ----- 59= _____ INT.

60. Onalisa has a bag of marbles that contains 12 blue, 8 red, 15 yellow, and 8 black. Calculate the probability of drawing 3 yellow marbles. After drawing a marble, it is not replaced. ----- 60= _____

61. FRUSTUM OF A CONE

10.66

7.22

8.55

Volume = ?

61= _____

62. REGULAR OCTAHEDRON

Edge = 715

Volume = ?

62= _____

63. $\frac{20!/15!}{27! + 25!}$ ----- 63= _____

64. (deg) $(86.8 + 22.6)\sin(6.89^\circ)$ ----- 64= _____

65. (deg) $\frac{\cos(9.12^\circ)}{157}$ ----- 65= _____

66. (deg) $(1350 - 457)\tan(1.31^\circ) + 8.64$ ----- 66= _____

67. (deg) $[4.51]\sin(7.21^\circ - 17.9^\circ)$ ----- 67= _____

68. (deg) $\frac{\tan(10.1^\circ)}{188 + 216}$ ----- 68= _____

69. (deg) $\frac{\sin(12.8^\circ) - \tan(12.8^\circ)}{\sin(12.8^\circ)}$ ----- 69= _____

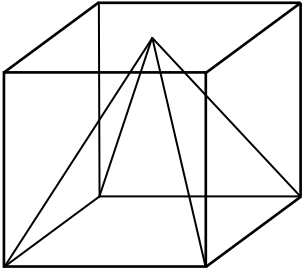
70. $(2820 - 1690 + 3000)^{4/3}$ ----- 70= _____

71. Calculate the number of ways the letters in the word SEASHELL can be arranged. ----- 71= _____ INT.

72. A quart of 50° C water is mixed with a gallon of 98° C water and then a pint of 2° C water is added. Calculate the resulting temperature of the water in Celsius. ----- 72= _____ °C

73. CUBE WITH A PYRAMID CAVITY

Edge of cube = 12.21

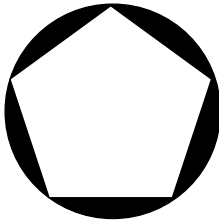


Volume of cube remaining = ?

73= _____

74. REGULAR PENTAGON INSCRIBED IN A CIRCLE

Radius = 52.8



Shaded Area = ?

74= _____

75. $\frac{\text{Log}(15.3 + 20.6)}{25100 - 23500}$ ----- 75= _____

76. $\frac{(3.04)^{0.439}(1.49)^{0.189}}{(1.55 - 1.46)^{-6}}$ ----- 76= _____

77. $2\text{Log}\sqrt{\frac{(0.764)(8.18)}{123 + 138}}$ ----- 77= _____

78. $\text{Ln}\left[\frac{481 + 97.2 + 211}{704 - 385 - 119}\right]$ ----- 78= _____

79. $2 + 4 + 6 + \dots + 776$ ----- 79= _____

80. $1 + (0.92) + \frac{(0.92)^2}{2} + \frac{(0.92)^3}{6} + \frac{(0.92)^4}{24}$ ----- 80= _____

2022 – 2023 TMSCA Middle School Calculator State Meet Answer Key

| Page 1 | Page 2 | Page 3 | Page 4 |
|------------------------------------|---|--|---------------------------------------|
| 1 = -1230 = -1.23×10^3 | 14 = 59600 = 5.96×10^4 | 27 = -31400 = -3.14×10^4 | 39 = 1.34×10^7 |
| 2 = 111 = 1.11×10^2 | 15 = -3.05×10^{-6} | 28 = 7.17×10^{-12} | 40 = -2.34×10^{15} |
| 3 = -654 = -6.54×10^2 | 16 = 0.168 = 1.68×10^{-1} | 29 = -5.03×10^{-16} | 41 = 5720 = 5.72×10^3 |
| 4 = 24.9 = 2.49×10^1 | 17 = -204000 = -2.04×10^5 | 30 = 2.56×10^{-10} | 42 = 18300 = 1.83×10^4 |
| 5 = 2320 = 2.32×10^3 | 18 = 0.169 = 1.69×10^{-1} | 31 = 8.08×10^7 | 43 = 0.749 = 7.49×10^{-1} |
| 6 = -191 = -1.91×10^2 | 19 = -3.33 = -3.33×10^0 | 32 = 116 = 1.16×10^2 | 44 = 1.00×10^{16} |
| 7 = 4.94 = 4.94×10^0 | 20 = 6.12×10^7 | 33 = 814000 = 8.14×10^5 | 45 = 53.7 = 5.37×10^1 |
| 8 = -1.28 = -1.28×10^0 | 21 = 0.00604 = 6.04×10^{-3} | 34 = 0.000751 = 7.51×10^{-4} | 46 = 41800 = 4.18×10^4 |
| 9 = 2.19×10^6 | 22 = 4.88 = 4.88×10^0 | 35 = 47.1 = 4.71×10^1 | 47 = 9.23 = 9.23×10^0 |
| 10 = 4.87×10^{10} | 23 = -9.29×10^7 | 36 = 4719 INT. | 48 = -7.00 = -7.00×10^0 |
| 11 = 5527 INT. | 24 = \$83.08 | 37 = 762 = 7.62×10^2 | 49 = 719 = 7.19×10^2 |
| 12 = 3830 = 3.83×10^3 | 25 = 9 INT. | 38 = 51500 = 5.15×10^4 | 50 = 0.411 = 4.11×10^{-1} |
| 13 = 15.2 = 1.52×10^1 | 26 = 21 INT. | | |

2022 – 2023 TMSCA Middle School Calculator State Meet Answer Key

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$$51 = 0.00883 \\ = 8.83 \times 10^{-3}$$

$$52 = 0.504 \\ = 5.04 \times 10^{-1}$$

$$53 = 75600 \\ = 7.56 \times 10^4$$

$$54 = -0.937 \\ = -9.37 \times 10^{-1}$$

$$55 = -243000 \\ = -2.43 \times 10^5$$

$$56 = -658 \\ = -6.58 \times 10^2$$

$$57 = -13.0 \\ = -1.30 \times 10^1$$

$$58 = 7.69 \\ = 7.69 \times 10^0$$

$$59 = 38 \text{ INT.}$$

$$60 = 0.0369 \\ = 3.69 \times 10^{-2}$$

Page 6

$$61 = 2090 \\ = 2.09 \times 10^3$$

$$62 = 1.72 \times 10^8$$

$$63 = 1.71 \times 10^{-22}$$

$$64 = 13.1 \\ = 1.31 \times 10^1$$

$$65 = 0.00629 \\ = 6.29 \times 10^{-3}$$

$$66 = 29.1 \\ = 2.91 \times 10^1$$

$$67 = -0.837 \\ = -8.37 \times 10^{-1}$$

$$68 = 0.000441 \\ = 4.41 \times 10^{-4}$$

$$69 = -0.0255 \\ = -2.55 \times 10^{-2}$$

$$70 = 66300 \\ = 6.63 \times 10^4$$

$$71 = 5040 \text{ INT.}$$

$$72 = 80.5 \\ = 8.05 \times 10^1$$

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$$73 = 1210 \\ = 1.21 \times 10^3$$

$$74 = 2130 \\ = 2.13 \times 10^3$$

$$75 = 0.000972 \\ = 9.72 \times 10^{-4}$$

$$76 = 9.34 \times 10^{-7}$$

$$77 = -1.62 \\ = -1.62 \times 10^0$$

$$78 = 1.37 \\ = 1.37 \times 10^0$$

$$79 = 151000 \\ = 1.51 \times 10^5$$

$$80 = 2.50 \\ = 2.50 \times 10^0$$

11. $16 + 5280 + 231$

12. $[6.159(2.54)]^3$

13. If your calculator has a % change key, enter 5280. Then punch 6080 followed by the %chg key. Otherwise:

$$\frac{6080 - 5280}{5280} (100)$$

24. $1.0625x = 100 - 11.73$

$$x = \frac{100 - 11.73}{1.0625}$$

25. $x = \#$ who liked both

$28 - x =$ liked chocolate only

$51 - x =$ liked OJ only

$$(28 - x) + (51 - x) + x = 70$$

$$79 - x = 70; x = 9$$

26. $x =$ smallest number

$x + 2 =$ middle number

$x + 4 =$ largest

$$3x + 6 = x + 40$$

$$2x = 34; x = 17$$

Largest = $x + 4 = 17 + 4$

35. Work rate is the fraction of job that can be completed in one hour. $10.5 = 21/2$

rate x time = part of job done

| | WR | T | Part done |
|---|------|------|-----------------------------------|
| K | 1/22 | 21/2 | $\frac{1}{22} \cdot \frac{21}{2}$ |
| A | 1/35 | 21/2 | $\frac{1}{35} \cdot \frac{21}{2}$ |
| B | 1/x | 21/2 | $\frac{1}{x} \cdot \frac{21}{2}$ |

Contd. In 2nd column

35. contd.

$$\frac{21}{44} + \frac{21}{70} + \frac{21}{2x} = 1 \text{ whole job}$$

Multiply by 220x which is the LCM of 44, 70, 2x

$$105x + 66x + 2310 = 220x$$

$$2310 = 49x; x = \frac{2310}{49}$$

36.

$$1(5^5) + 2(5^4) + 2(5^3) + 3(5^2) + 3(5) + 4$$

37. Hypotenuse: 161(2)

Long Leg: $161\sqrt{3}$

Perimeter:

$$161 + 2(161) + 161\sqrt{3}$$

38. Semi-rhombus:

$$\frac{1}{2} \left[\frac{327(245)}{2} \right]$$

Semi-ellipse: $\frac{1}{2} \left[\pi \left(\frac{327}{2} \right) \left(\frac{245}{2} \right) \right]$

Add these together to get total area.

47. Let N= 100, M=130, R=142

$$\frac{142 - 130}{130} (100)$$

Or use the % change key if available.

48. x-intercept, let y=0

y-intercept, let x = 0

(-1,0) and (0,7)

Multiply (-1)(7)

49. $A = \frac{1}{2}bh$

$$21895 = \frac{1}{2}b(231)$$

$$b = \frac{2(21895)}{231}$$

Hypotenuse: $\sqrt{231^2 + \left[\frac{2(21895)}{231} \right]^2}$

Perimeter: 231+ b + Hyp

50. $\text{asin}\left(\frac{111}{278}\right)$ Be sure to use the radian mode.

59. $\frac{n(n-3)}{2} = 665$

$$n(n - 3) = 665(2)$$

$$n^2 - 3n - 1330 = 0$$

$$(n - 38)(n + 35) = 0$$

$$n = 38$$

In trying to think of factors, you could try $\sqrt{1330} \sim 36.4$ which would be close. Since 1330 ends in 0, it was easy to think of 35 as a factor.

You could also use the quadratic formula.

60. $\frac{15}{43} \left(\frac{14}{42} \right) \left(\frac{13}{41} \right)$

61. $V = \frac{1\pi}{3}h[R^2 + rR + r^2]$

$$\frac{1}{3}\pi(10.66)[(8.55)^2$$

$$+ (8.55)(7.22)$$

$$+ (7.22)^2]$$

62. $V = \frac{\sqrt{2}}{3}(e^3)$

$$V = \frac{\sqrt{2}}{3}(715)^3$$

71. $\frac{8!}{2!2!2!}$

72. 1 Qt. = 2 pints

1 gal. = 8 pints

$$\frac{50(2)+98(8)+2(1)}{11 \text{ pints}}$$

11 pints

73. Vol of cube minus vol of pyramid = $\frac{2}{3}$ volume of cube

$$\frac{2}{3}(12.21)^3$$

74. Area of circle minus area of pentagon

Each central angle is $360/5$ degrees (72). Make a right triangle by drawing the apothem. That divides the 72 degree angle in half so use the 36° .

Length of apothem = height of triangle

$$y = (\cos 36)(52.8)$$

$$\frac{1}{2} \text{ of base} = (\sin 36)(52.8)$$

Area of pentagon:

$$5[(\sin 36)(52.8)] \text{ times}$$

$$[(\cos 36)(52.8)]$$

$$\text{Circle: } \pi(52.8)^2$$

Subtract pentagon from circle.