



**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #7 ©
JANUARY 16 , 2016**

GENERAL DIRECTIONS

1. About this test:
 - A. You will be given 40 minutes to take this test.
 - B. There are 50 problems on this test.
2. All answers must be written on the answer sheet/Scantron form/Chatsworth card provided. If you are using an answer sheet be sure to use **BLOCK CAPITAL LETTERS**. Clean erasures are necessary for accurate grading.
3. If using a scantron answer form be sure to correctly denote the number of problems not attempted.
4. You may write anywhere on the test itself. You must write only answers on the answer sheet.
5. You may use additional scratch paper provided by the contest director.
6. All problems have **ONE** and **ONLY ONE** correct [BEST] answer. There is a penalty for all incorrect answers.
7. Calculators **MAY NOT** be used on this test.
8. All problems answered correctly are worth **FIVE** points. **TWO** points will be deducted for all problems answered incorrectly. No points will be added or subtracted for problems not answered.
9. In case of ties, percent accuracy will be used as a tie breaker.

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1. Micaela bought different kinds of nuts weighing 34.8 ounces, 13.4 ounces, 16.7 ounces and 24.9 ounces. In total, how many ounces of nuts did Micaela buy?

- A. 78.8 ounces B. 88.9 ounces C. 89.8 ounces D. 88.8 ounces E. 78.9 ounces

2. $1,001,000 - 9,090 =$ _____

- A. 991,910 B. 999,190 C. 991,190 D. 991,091 E. 991,090

3. Find the product of $10\frac{1}{3}$ and $7\frac{1}{2}$.

- A. $70\frac{1}{6}$ B. $70\frac{2}{5}$ C. $77\frac{2}{5}$ D. $77\frac{1}{6}$ E. $77\frac{1}{2}$

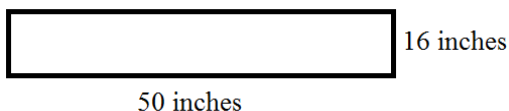
4. What is the quotient when $14\frac{4}{5}$ is divided by $\frac{2}{5}$?

- A. 5.92 B. 15.2 C. 14.4 D. 32 E. 37

5. Solve for x : $\frac{x}{3} = -19 - 37$

- A. -168 B. -56 C. -18.7 D. $-18.\bar{6}$ E. 54

6. What is the perimeter of the rectangle below?



- A. 11 ft B. 132 ft C. 66 ft D. 800 ft E. 9.6 ft

7. Clint is buying a shirt that costs \$14.50. If tax is 8.4%, how much will the purchase cost Clint after tax?

- A. \$15.76 B. \$15.72 C. \$15.74 D. \$15.80 E. \$15.68

8. 1,560 minutes = _____ hours

- A. 34 B. 32 C. 28 D. 26 E. 22

9. $2^4 \cdot 11^2$ is the prime factorization of which number?

- A. 1,948 B. 1,876 C. 1,936 D. 1,894 E. 1,918

10. What is the measure of the supplement to an angle measuring 61.29° ?

- A. 118.71° B. 28.71° C. 108.81° D. 128.81° E. 128.71°

11. Simplify: $5(2x - 4) - (-7x + 6)$

- A. $3x - 14$ B. $17x - 26$ C. $17x - 14$ D. $3x - 15$ E. -26

12. $111^2 + 79 =$ _____

- A. 12,400 B. 12,479 C. 12,321 D. 12,300 E. 12,200

13. What is the area of a rhombus with diagonals measuring 14 cm and 34 cm?

- A. 476 cm^2 B. 357 cm^2 C. 278 cm^2 D. 246 cm^2 E. 238 cm^2

14. Find the next term in the sequence. 0, 2, 5, 7, 14, 26, 47, 87, ...

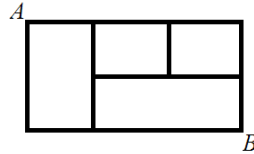
- A. 160 B. 157 C. 177 D. 180 E. 154

15. If Mary bought nine tickets and her total was \$114.75. What was the unit rate per ticket?

- A. \$12.50 B. \$12.75 C. \$13.25 D. \$13.50 E. \$13.75

16. $\frac{1}{20} + \frac{1}{30} + \frac{1}{42} =$ _____
 A. $\frac{3}{20}$ B. $\frac{3}{32}$ C. $\frac{3}{28}$ D. $\frac{1}{18}$ E. $\frac{1}{8}$

17. Moving only to the right or down, how many different paths are there from *A* to *B* in the picture below?



- A. 3 B. 4 C. 5 D. 6 E. 8

18. 4.25×10^{-4} is the scientific notation for which of the following numbers?
 A. 425,000 B. 42,500 C. 0.00425 D. 0.0425 E. 0.000425

19. What is the product of 35 and 16 as a Roman numeral?
 A. *DLX* B. *MCX* C. *LXI* D. *CLX* E. *DXL*

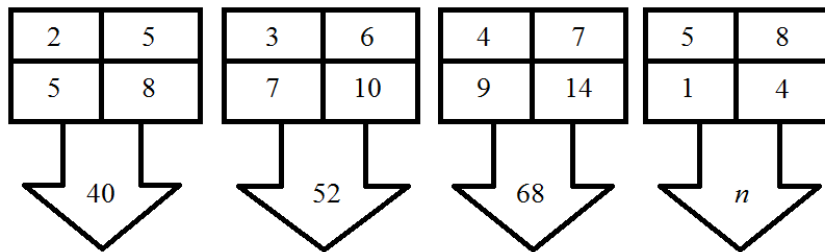
20. In terms of π , calculate the non-lateral surface area of a cylinder with a height of 10 meters and a diameter of 8 meters.
 A. $16\pi \text{ m}^2$ B. $80\pi \text{ m}^2$ C. $64\pi \text{ m}^2$ D. $32\pi \text{ m}^2$ E. $128\pi \text{ m}^2$

21. What is the sum of the LCM of the numbers 16 and 24 and the GCF of the numbers 96 and 72?
 A. 48 B. 24 C. 112 D. 224 E. 72

22. $27^{\frac{4}{3}}$ = _____
 A. 729 B. 19,683 C. 54 D. 81 E. 243

23. An isometry in which all points turn through a constant angle about a fixed point is called a(n) _____.
 A. reflection B. rotation C. translation D. glide reflection E. flip

24. Use the examples below to find the value of *n*.



- A. 42 B. 64 C. 38 D. 52 E. 36

25. A regular pentagon has a side length of $2n + 7$. The pentagon is dilated by a scale factor of 3. If $n = 4$, what is the perimeter of the dilated pentagon?
 A. 75 units B. 65 units C. 145 units D. 225 units E. 300 units

26. Find the inter-quartile range of the set of numbers 120, 70, 96, 74, 82, 70, 62.
 A. 58 B. 26 C. 70 D. 0 E. 140

27. $\{A, B, C, 1, 2, 3\} \cup \{1, C, 3, B\}$ has _____ proper subsets.
 A. 128 B. 127 C. 63 D. 64 E. 1,024

28. What is the probability of drawing a queen from a standard deck of cards and then replacing it and drawing a five on the second draw, in ratio form?

- A. 1:13 B. 1:169 C. 1:663 D. 1:78 E. 2:13

29. If $f(x) = x^3 - 2$, find the value of $3f(3)$.

- A. 214 B. 25 C. 63 D. 727 E. 75

30. Simplify: $\left(\frac{2}{3}m^6n^{11}\right)\left(\frac{3}{2}m^{-4}n^3\right)$

- A. m^2n^{14} B. m^2n^{33} C. $m^{10}n^{14}$ D. $\frac{3}{4}m^2n^{14}$ E. $\frac{3}{2}m^{10}n^{14}$

31. Change the linear equation $3x - 12y = 24$ into slope-intercept form.

- A. $y = -\frac{1}{4}x + 2$ B. $y = \frac{1}{4}x + 2$ C. $y = -\frac{1}{4}x - 2$ D. $y = \frac{1}{4}x - 2$ E. $y = \frac{1}{2}x + 8$

32. Let $a = 6$. What is the slope of the line that passes through the points $(a, 4)$ and $(2, 2a)$?

- A. -2 B. 2 C. $\frac{1}{2}$ D. $-\frac{1}{2}$ E. 1

33. Find the unit's digit of 8^6 .

- A. 2 B. 6 C. 4 D. 0 E. 8

34. $65_8 + 43_7 = \underline{\hspace{2cm}}_{10}$

- A. 108 B. 92 C. 84 D. 72 E. 68

35. What type of function can be modeled by the table below?

x	-2	-1	0	1	2
y	64	32	16	8	4

- A. radical B. quadratics C. exponential D. absolute value E. linear

36. $310^\circ = \underline{\hspace{2cm}}$ (radians)

- A. $\frac{31\pi}{18}$ B. $\frac{31\pi}{15}$ C. 3.1π D. $\frac{23\pi}{17}$ E. $\frac{49\pi}{31}$

37. Find the rate of decay of the exponential decay function $y = 5(0.06)^x$.

- A. 94% B. 6% C. 5% D. 500% E. 96%

38. What is the sum of the roots of the quadratic equation $0 = 4x^2 + 32x - 12$?

- A. -3 B. $-\frac{1}{3}$ C. 8 D. -8 E. $\frac{1}{8}$

39. Calculate the circumference of the circle with an equation of $(x - 9)^2 + (y + 11)^2 = 196$, in terms of π .

- A. 14π units B. 28π units C. 196π units D. 98π units E. 56π units

40. If $\log_8 A + \log_8 B = \log_8 AB$, which of the following is equivalent to $\log_6 5 + \log_6 7$?

- A. $\log_{10} 35$ B. $\log_6 12$ C. $\log_6 2$ D. $\log_{10} 72$ E. $\log_6 35$

41. If $\begin{bmatrix} 23 & 19 \\ -17 & -4 \end{bmatrix} - \begin{bmatrix} -11 & 17 \\ -9 & 1 \end{bmatrix} + \begin{bmatrix} -14 & -6 \\ 16 & 8 \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then find the value of $a + b - c + ad$.

- A. 68 B. -544 C. -176 D. -54 E. 112

42. How many combinations can be made from eight items taken six at a time?

- A. 48 B. 24 C. 28 D. 32 E. 36

43. Factor completely: $x^4 + x^2 - 2$

- A. $(x^2 + 2)(x^2 - 1)$ B. $(x^2 - 2)(x + 1)(x - 1)$ C. $(x^2 + 2)(x^2 - 2)$ D. $(x^2 + 2)(x + 1)(x - 1)$ E. $(x^2 - 2)(x^2 + 1)$

44. (a, b) is the solution to the system of linear equations below. Find the value of $a^2 + b^2 + ab$.

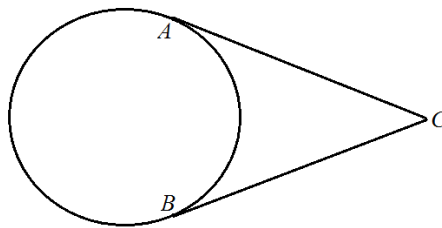
$$\begin{cases} x - 18 = -2y \\ 2x + y = 6 \end{cases}$$

- A. 68 B. 72 C. 124 D. -18 E. 84

45. It takes Luke six hours to mow and rake his yard. It takes Tony four hours to mow and rake the same yard.. If Luke and Tony work together, how long will it take them both to mow the yard?

- A. 2.4 hours B. 2.5 hours C. 2.8 hours D. 3 hours E. 3.2 hours

46. In the circle below, minor arc $AB = 98^\circ$, major arc $AB = 262^\circ$, and both \overline{AC} and \overline{BC} are tangent to the circle. What is the measure of $\angle ACB$?



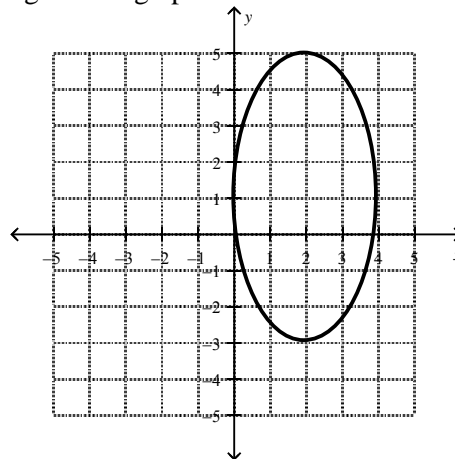
- A. 82° B. 49° C. 131° D. 60.5° E. 65°

47. If $m = 22$, simplify the following.

$$\frac{(2m-2)!}{(m+18)!}$$

- A. 1,748 B. 462 C. 1,763 D. 1,640 E. 1,722

48. Using interval notation, identify the range of the graph below.



- A. $[0, 4]$ B. $(0, 4)$ C. $[-3, 5]$ D. $(-3, 5)$ E. $(-\infty, 4)$

49. The graphs of each of the quadratic equations below have their vertex lie on the x -axis except which of the following?

- I. $y = x^2 + 10x + 25$ II. $y = x^2 - 12x + 36$ III. $y = x^2 + 20x + 64$ IV. $y = 2x^2 + 8x + 8$ V. $y = x^2 - 9$

- A. I and II B. II and IV C. I and V D. III and IV E. III and V

50. $(\sqrt{24} + \sqrt{54})(3 + \sqrt{6}) =$ _____

- A. $45\sqrt{6}$ B. $30 + 15\sqrt{6}$ C. $15 + 30\sqrt{6}$ D. $15\sqrt{3} + 30\sqrt{6}$ E. $30\sqrt{3} + 15\sqrt{6}$

2015 – 2016 TMSCA Middle School Mathematics Test #7 Answer Key

1. C	18. E	35. C
2. A	19. A	36. A
3. E	20. D	37. A
4. E	21. E	38. D
5. A	22. D	39. B
6. A	23. B	40. E
7. B	24. E	41. A
8. D	25. D	42. C
9. C	26. B	43. D
10. A	27. C	44. E
11. B	28. B	45. A
12. A	29. E	46. A
13. E	30. A	47. E
14. A	31. D	48. C
15. B	32. A	49. E
16. C	33. C	50. B
17. C	34. C	

2015 – 2016 TMSCA Middle School Mathematics Test #7 Selected Answers

4. $14\frac{4}{5}$ is divided by $\frac{2}{5} \rightarrow 14\frac{4}{5} \div \frac{2}{5} \rightarrow \frac{74}{5} \div \frac{2}{5} \rightarrow \frac{74}{\cancel{5}} \cdot \frac{\cancel{5}}{2} = \frac{74}{2} = 37$.

26. First, order the list of numbers from least to greatest.

$$120, 70, 96, 74, 82, 70, 62 \rightarrow 62, 70, 70, 74, 82, 96, 120$$

The upper quartile, or Q_3 , is the median of the upper half of the data and the lower quartile, or Q_1 , is the median of the lower half of the data. Since 74 is the median, that makes $Q_1 = 70$ and $Q_3 = 96$. To find the inter-quartile range, simply subtract Q_1 from Q_3 . Thus, our inter-quartile range is $Q_3 - Q_1 = 96 - 70 = 26$.

27. To find the number of proper subsets, use $2^n - 1$, where n equals the number of elements in the set. $\{A, B, C, 1, 2, 3\} \cup \{1, C, 3, B\} = \{A, B, C, 1, 2, 3\}$ and this gives $n = 6$. So, the number of proper subsets of the set is $2^6 - 1 = 64 - 1 = 63$ subsets.

37. To find the rate of decay in an exponential function in the form $y = a \cdot b^x$, subtract b from 1 and then multiply the difference by 100. We are given the exponential decay function $y = 5(0.06)^x$. Our b is 0.06. Our rate is then $1 - 0.06 = 0.94 \cdot 100 = 94\%$ as our rate of decay.

40. If $\log_8 A + \log_8 B = \log_8 AB$, then $\log_6 5 + \log_6 7 = \log_6(5 \cdot 7) = \log_6 35$.