TMSCA MIDDLE SCHOOL MATHEMATICS

TEST #2 ©

OCTOBER 31, 2015

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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2015 – 2016 TMSCA Middle School Mathematics Test #2

1. Brandon has a one-hundred dollar bill. He plans to buy a shirt that costs $32.68, a snack that costs $8.73 and a drink that costs $2.38. If there is no tax on any item, how much change will Brandon have after purchasing the items?
A. $67.31   B. $58.51   C. $64.91   D. $56.91   E. $56.21

2. Leonard wants to find the sum of 54,600 and 8,986. What will Leonard's answer be if he were to round to the nearest hundred after totaling the given numbers?
A. 65,300   B. 63,600   C. 63,500   D. 63,590   E. 63,580

3. $8\frac{1}{3} \div 2\frac{1}{2} = $ _____
A. $4\frac{1}{6}$ B. $4\frac{5}{6}$ C. $3\frac{1}{4}$ D. $3\frac{1}{3}$ E. $3\frac{1}{2}$

4. $12.6 \times 2.7 = $ _____
A. 24.42   B. 24.13   C. 34.02   D. 34.42   E. 28.42

5. Let n be the digit in the hundred's place in the number 298,645. Find the value of ½ n + 3n.
A. 3   B. 6   C. 21   D. 24   E. 28

6. Michelle is buying a shirt costing $12.45 with a sales tax of 6%. To the nearest cent, how much tax will Michelle have to pay?
A. $0.75   B. $0.74 $0.73   D. $0.76   E. $0.72
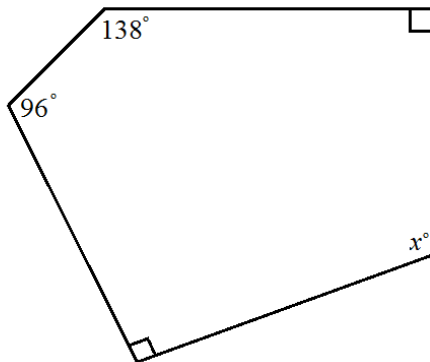
7. 726,000,000 milligrams = _____ decagrams.
A. 72,600,000   B. 7,260,000   C. 726,000   D. 72,600   E. 7,260

8. $-8 + 19 - 7 - (-3) + (-6) - 1 = $ _____
A. -14   B. 0   C. 1   D. -2   E. 22

9. Find the value of x in the picture below.

A. 126   B. 306   C. 154   D. 87   E. 146

10. Which of the following is an example of an integer?
A. -9.9   B. $\sqrt{25}$ C. 2.1^2 D. 4.1   E. ¼

11. What is the prime factorization of the number 248?
A. $2^4 \cdot 3^3 \cdot 7$ B. $2^3 \cdot 31$ C. $2^2 \cdot 62$ D. $2^3 \cdot 3 \cdot 29$ E. $2^4 \cdot 3 \cdot 7 \cdot 13$

12. How many diagonals can be drawn from one vertex of a regular polygon with seven sides?
A. 14   B. 7   C. 9   D. 4   E. 3

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13. Which property below can be illustrated by, "3 + (8 + 4) = 8 + (3 + 4)".
A. associative   B. commutative   C. transitive   D. distributive   E. reflexive

14. 1½ % = _____ (fraction)
A. $\frac{3}{200}$ B. $\frac{3}{2}$ C. $\frac{3}{20}$ D. 0.015   E. 1.5

15. The supplement of an angle measuring $23.71°$ is equal to _____°.
A. 136.59   B. 156.59   C. 156.29   D. 146.29   E. 146.59

16. $56.24 = 64 quarters + _____ dimes + 200 nickels + 24 pennies.
A. 3,000   B. 350   C. 200   D. 540   E. 300

17. If $A = (x^3 + 3x^2 + 17x - 200) + (4x^5 - 3x^4 - x^2 + 4x - 1)$, then what is the degree of A?
A. 8   B. 5   C. 12   D. 13   E. 18

18. 900 - 839 = _____ (Roman numeral)
A. *DXI*   B. *CVI*   C. *XCXI*   D. *XLI*   E. *LXI*

19. The set $\{m, a, t, h\}$ has how many subsets?
A. 4   B. 8   C. 16   D. 8   E. 24

20. Ralphio pays a one time $40 membership fee to join *Sky's the Limit Golf Club* and a $9.00 green fee for each time he golfs. What is the total cost for Ralphio to golf 15 times?
A. $150.00   B. $185.00   C. $225.00   D. $175.00   E. $135.00

21. What is the lateral surface area of a cylinder that has a diameter of 10 cm and a height of 24 cm (let $\pi = 3$)?
A. 720 cm^2 B. 870 cm^2 C. 1,440 cm^2 D. 810 cm^2 E. 2,040 cm^2

22. What is the twentieth term of the sequence? -13, -9, -5, -1, …
A. 63   B. 76   C. 67   D. 71   E. 75

23. A regular heptagon has _____ total degrees.
A. 900   B. 1,080   C. 1,160   D. 720   E. 540

24. What is the probability of drawing a prime number card from a standard deck of cards (in ratio form)?
A. 1:13   B. 3:13   C. 4:13   D. 7:52   E. 5:26

25. If $f(x) = 14 - 3x$, find the value of $f\left(\frac{16}{12}\right)$.
A. 10   B. 11.75   C. -8   D. -34   E. 18

26. What is the parent function of all linear functions?
A. $f(x) = x$ B. $f(x) = Ax + By$ C. $y - y_1 = m(x - x_1)$ D. $f(x) = mx + b$ E. $f(x) = x^2$

27. $\frac{1}{6^7}$ is equivalent to which of the following?
A. -6^7 B. 6^7 C. $6^{\frac{1}{7}}$ D. -6^{-7} E. 6^{-7}

28. The legs of a right triangle measure 10 cm and 24 cm. What is the length of the hypotenuse?
A. 26 cm   B. 28 cm   C. 34 cm   D. 32 cm   E. 14 cm

29. Change the number 76,000,000,000 into scientific notation.
A. 76×10^9 B. 76×10^{10} C. 7.6×10^9 D. 7.6×10^{10} E. 0.76×10^{11}

30. If the probability of it raining today is 3:7, what are the odds of it not raining today?
A. 4:3   B. 4:7   C. 3:4   D. 7:3   E. 7:4

31. What type of function is modeled by the table below?

x	-2	-1	0	1	2
y	-5	-3	-1	1	3

A. linear   B. quadratic   C. exponential   D. cubic   E. radical

32. Which line below is parallel to the line with the equation $y = \frac{1}{2}x - 7$?
A. $y = 2x + 9$ B. $y = x$ C. $y = -\frac{1}{2}x + 2$ D. $y = \frac{1}{2}x + 1$ E. $y = -2x - 2$

33. Which quadratic function below is in vertex form?
A. $y = (x - 3)^2$ B. $y = x^2 + 2x - 1$ C. $y = x^2$ D. $y = (x - 1)(x + 2)$ E. $y = 7$

34. $\sqrt{8} + \sqrt{32} =$ _____
A. $6\sqrt{2}$ B. $2\sqrt{10}$ C. $18\sqrt{2}$ D. $\sqrt{40}$ E. $6\sqrt{10}$

35. What is the simple interest accumulated after depositing $1,000 for 4 years at 5%?
A. $100   B. $240   C. $250   D. $150   E. $200

36. $67_{10} =$ _____ $_6$
A. 151   B. 215   C. 115   D. 155   E. 131

37. Use the examples below to find the value of w.

| -7 | 9 | | 10 | -14 | | 23 | -5 | | -11 | 34 |
| 40 | | 114 | | 534 | | w |

A. 852   B. 87   C. 755   D. 79   E. 1,156

38. $30^{\circ} =$ _____ (radians)
A. $\frac{\pi}{4}$ B. $\frac{\pi}{6}$ C. 30π D. 3π E. $\frac{\pi}{30}$

39. The area of an equilateral triangle with a side length of 6 inches is equal to _____ inches^2.
A. $9\sqrt{3}$ B. $6\sqrt{3}$ C. $12\sqrt{3}$ D. $15\sqrt{3}$ E. $3\sqrt{3}$

40. A line has a slope of 5 and passes through the point (3, 7). What is the equation of this line in point-slope form?
A. $y - 7 = 3(x - 5)$ B. $y + 7 = 5(x + 3)$ C. $y - 7 = 5(x - 3)$ D. $y - 5 = 3(x - 7)$ E. $y - 5 = 7(x - 3)$

41. What is the volume of a rectangular prism that measure 8 cm high, 11 cm long and 14 cm wide?
A. 708 cm^3 B. 1,232 cm^3 C. 1,320 cm^3 D. 1,416 cm^3 E. 1,432 cm^2

42. If $A = \begin{bmatrix} -3 & 6 \\ 7 & -10 \end{bmatrix}$ and $B = \begin{bmatrix} -4 & 7 \\ -4 & 5 \end{bmatrix}$, find $A + B$.

A. $\begin{bmatrix} 12 & 42 \\ -28 & -50 \end{bmatrix}$ B. $\begin{bmatrix} -7 & 13 \\ 3 & 5 \end{bmatrix}$ C. $\begin{bmatrix} 7 & 3 \\ 4 & -9 \end{bmatrix}$ D. $\begin{bmatrix} 7 & 13 \\ -3 & 5 \end{bmatrix}$ E. $\begin{bmatrix} -7 & 13 \\ 3 & -5 \end{bmatrix}$

43. The solution to the system of linear equations below is equal to (a, b). Find the value of $3a + 11b$.

$$\begin{cases} x - 6y = -16 \\ \dfrac{1}{2}x + 3y = 4 \end{cases}$$

A. 10   B. -24   C. 2   D. -2   E. -8

44. $\log_7 343 = 3$ can be rewritten as which of the following?

A. $3^7 = 343$ B. $343^3 = 7$ C. $\log_3 343 = 7$ D. $\log_{343} 7 = 3$ E. $7^3 = 343$

45. Using the picture below, what is the measure of $\overline{AC}$?
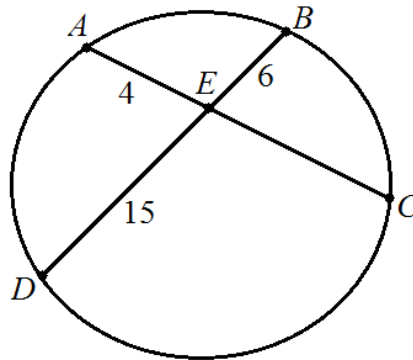
A. 17 units   B. 21 units   C. 22.5 units   D. 26.5 units   E. 30.5 units

46. If $(x - 8)(x + 7) = x^2 + Bx - 56$, what is the value of $3B - 11$?

A. -12   B. -56   C. -3   D. -14   E. -8

47. What is the square root of the sum of one-fourth of five hundred added to one hundred?

A. 15   B. 141   C. 18   D. $5\sqrt{6}$ E. $5\sqrt{5}$

48. The sum of three consecutive integers is -138. What is the value of one-half the middle integer?

A. -24   B. -23.5   C. -23   D. -22.5   E. -22

49. Which point below is not a solution to the system of linear inequalities? $\begin{cases} 3x - y > 5 \\ y < 2x - 1 \end{cases}$

A. (0, -12)   B. (1, -1)   C. (3, 1)   D. (15, -3)   E. (-1, -100)

50. Simplify: $\left(\dfrac{x^3 (x^{-4})^2}{x^5 \cdot x^{-13}} \right)^2$

A. $\dfrac{1}{x^5}$ B. $\dfrac{1}{x^6}$ C. x^5 D. x^6 E. x^3

2015 – 2016 TMSCA Middle School Mathematics Test #2 Answer Key

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

3. $8\frac{1}{3} \div 2\frac{1}{2} = \frac{25}{3} \div \frac{5}{2} = \frac{25}{3} \cdot \frac{2}{5} = \frac{50}{15} = \frac{10}{3} = 3\frac{1}{3}$.

19. The total number of subsets of a set is equal to 2^n, where n is equal to the number of elements in the set. We are given the set {m, a, t, h}, which has four elements. Therefore, the set {m, a, t, h} has $2^4 = 16$ subsets.

37. Using the examples below we are asked to find the value of w.

-7	9
40	

10	-14
114	

23	-5
534	

-11	34
w	

Set up another box as

A	B
C	

.

From this we can manipulate the numbers to find a pattern The pattern that works is $A^2 + B = C$. So, letting A = -11 and B = 34, we have $(-11)^2 + 34 = 155 = w$.

38. $30^\circ = 30 \cdot \frac{\pi}{180} = \frac{30\pi}{180} = \frac{\pi}{6}$ radians.

48. Is three consecutive integers total -138, we can create an equation. Let x be our first integer, then $x + 1$ is our second and $x + 2$ is our third. We create the equation $x + x + 1 + x + 2 = -138$, or $3x + 3 = -138$. We subtract 3 from both sides and $3x = -141$. Dividing by 3 gives us $x = -47$. Our three integers are now, -47, -46 and -45. ½ the middle term is ½ of -46 = -23.