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

M A T H E M A T I C S

T E S T # 3 ©

N O V E M B E R 7 , 2 0 1 5

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 #3

1. Klay wants to round 345,678.129 to the nearest hundredth. What will his answer be?
A. 345,700 B. 345,680 C. 345,678.13 D. 345,678.1 E. 350,000

2. 468 + 892 + 109 = _____
A. 1,469 B. 1,486 C. 1,429 D. 1,497 E. 1,459

3. 68 – 129 = _____
A. -61 B. 69 C. -197 D. -59 E. -198

4. $45.63 \times 1.19 =$ _____ (nearest tenth)
A. 54.29 B. 54.28 C. 54.2 D. 54.3 E. 54.1

5. $5\frac{1}{7} \div 4$ = _____
A. $1\frac{1}{7}$ B. $1\frac{2}{7}$ C. $1\frac{3}{7}$ D. $2\frac{1}{7}$ E. $1\frac{5}{7}$

6. If $n = 1.5$, what is the perimeter of a rectangle with a length of $4n + 2$ and a width of $2n - 1$?
A. 16 units B. 18 units C. 20 units D. 22 units E. 24 units

7. 56 hectograms = _____ decigrams
A. 560 B. 5,600 C. 56,000 D. 560,000 E. 5,600,000

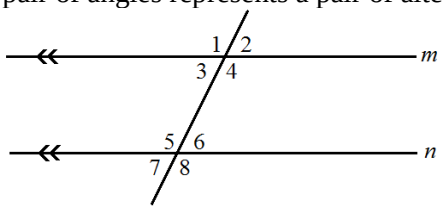
8. What is 62% of 3,400?
A. 2,804 B. 1,684 C. 1,898 D. 2,228 E. 2,108

9. *XLIX* = _____ (Arabic number)
A. 49 B. 69 C. 94 D. 99 E. 75

10. Which of the following numbers below is an irrational number?
A. $\frac{5}{9}$ B. $9.\overline{4}$ C. $\sqrt{36}$ D. $-7\frac{2}{5}$ E. $2\sqrt{7}$

11. Nadia randomly pulled out a marble from a bag consisting of red, blue and green marbles, recorded its color and then replaced it. After 20 tries, Nadia recorded 7 red, 8 blue and 5 green marbles. Using Nadia's data, what is the experimental probability of drawing a blue marble on the next turn?
A. 40% B. 35% C. 25% D. 45% E. 80%

12. Using the picture below, choose which pair of angles represents a pair of alternate exterior angles.



A. $\angle 1$ & $\angle 7$ B. $\angle 2$ & $\angle 7$ C. $\angle 3$ & $\angle 7$ D. $\angle 4$ & $\angle 6$ E. $\angle 4$ & $\angle 7$

13. $1{,}200{,}000{,}000 \div 2$ = _____ (scientific notation)
A. 6×10^8 B. 6×10^7 C. 6×10^9 D. 6×10^{-6} E. 6×10^{-7}

14. If $-5n + \frac{1}{2} = 70.5$, then $\frac{1}{2}n + 10$ = _____.
A. 2.9 B. 17 C. 3 D. -7 E. -2

15. The point (4, -3) was translated to get the new coordinates (-2, 1). Which algebraic representation represents this translation?

A. $(x, y) \rightarrow (x - 2, y - 2)$ B. $(x, y) \rightarrow (x - 6, y - 2)$ C. $(x, y) \rightarrow (x + 6, y + 3)$ D. $(x, y) \rightarrow (x - 6, y + 4)$ E. $(x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$

16. Simplify: $(5 - 12)^2 - (6 - 14) - 2^4$

A. 41 B. 25 C. 85 D. 57 E. 73

17. What is the surface area of a cube with a side length of 4 mm?

A. 576 mm^2 B. 144 mm^2 C. 128 mm^2 D. 96 mm^2 E. 64 mm^2

18. 960 acres = _____ square miles

A. 1 B. 1.5 C. 2 D. 2.5 E. 3

19. Find the next term in the sequence. 99, 89, 80, 72, 65, 59, …

A. 55 B. 54 C. 53 D. 52 E. 49

20. Simplify: $5m \cdot m^6 \cdot 2m^3 \cdot m \cdot m \cdot m^3 \cdot 3m$

A. $15m^{17}$ B. $13m^{18}$ C. $30m^{17}$ D. $30m^{18}$ E. $10m^{16}$

21. "$a + 0 = a$" illustrates the _____ Property of Addition.

A. Commutative B. Associative C. Inverse D. Zero E. Identity

22. How many subsets can be created using the set {2, 4, 6, 8, 10}?

A. 32 B. 10 C. 30 D. 31 E. 64

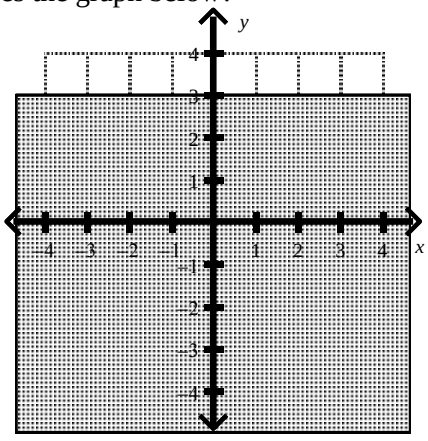
23. Find the range of the function $g(x) = 4x - 7$, when the domain is {-5, 3}?

A. {-13, -19} B. {-13, -5} C. {-13, 5} D. {-27, 0} E. {-27, 5}

24. Simplify: $\left(7\sqrt{3}\right)^2$

A. $49\sqrt{3}$ B. 42 C. 126 D. $14\sqrt{3}$ E. 147

25. What is the linear inequality that matches the graph below?



A. $x < 3$ B. $x \leq 3$ C. $y < 3$ D. $y \leq 3$ E. $y \leq x + 3$

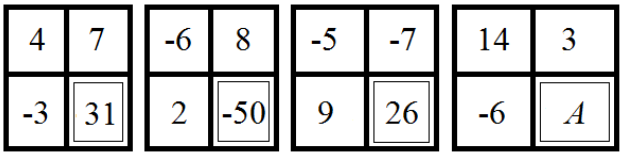
26. 54_7 = _____$_{10}$

A. 41 B. 38 C. 51 D. 39 E. 34

27. Madeline wants to ride her bike for a total of 180 miles this month. So far, she has ridden 36 miles. If there are 16 days left in the month, on average, how many miles does Madeline need to ride each day?

A. 14 miles B. 12 miles C. 9 miles D. 8 miles E. 11 miles

28. Use the examples below to find the value of *A*.



A. 48 B. 36 C. 120 D. -52 E. 54

29. Parallelogram *ABCD* has vertices at (-2, 0), (0, 3) and (7, 0). If the fourth vertex of parallelogram *ABCD* lies in the first quadrant, what are its coordinates?

A. (3, 9) B. (12, 3) C. (9, 3) D. (9, -3) E. (-12, -3)

30. What is the midpoint between the points (-14, 9) and (22, 5)?

A. (8, 14) B. (-8, 7) C. (11, 3) D. (4, 2) E. (4, 7)

31. Solve the equation $A = \frac{1}{2}bh$ for h.

A. $h = \frac{\frac{1}{2}A}{b}$ B. $h = \frac{2A}{b}$ C. $h = \frac{b}{2A}$ D. $h = \frac{2b}{A}$ E. $h = \frac{A}{2b}$

32. Two gross increased by a baker's dozen is equal to what value?

A. 156 B. 157 C. 300 D. 67 E. 301

33. How much simple interest will there be after depositing $200 at 4% for 5 years?

A. $30.00 B. $40.00 C. $50.00 D. $20.00 E. $70.00

34. The sum of four consecutive positive integers is 198. What is the value of the smallest integer?

A. 46 B. 47 C. 48 D. 52 E. 53

35. What is the percent of increase when the value 20 changes to 36?

A. 40% B. 16% C. 60% D. 80% E. 76%

36. 40° = _____ (radians)

A. $\frac{\pi}{4}$ B. $\frac{2\pi}{9}$ C. 30π D. 3π E. $\frac{\pi}{30}$

37. Which of the following points does not lie on the line with the equation $3x + y = -5$?

A. (1, -8) B. $\left(\frac{1}{3}, -6\right)$ C. (-5, 10) D. (0, -5) E. (7, -24)

38. $(4n + 9)(4n - 9)$ = _____

A. $16n^2 - 81$ B. $8n^2 - 18$ C. $16n^2 - 18n - 81$ D. $8n^2$ E. $16n^2$

39. What is the slope of a line parallel to the line with the equation $3x - y = -7$?

A. ⅓ B. -⅓ C. 3 D. -3 E. -0.3

40. What is the growth factor in the exponential growth function $y = 9(2.3)^x$?

A. 9 B. 2.3 C. 11.3 D. 1.3 E. 130

41. Which type of function is represented by the table below?

x	-2	-1	0	1	2
y	4	1	0	1	4

A. linear B. quadratic C. cubic D. absolute value E. exponential

42. Let A be the solution point to the system of linear equations below. If A is translated four units to the right, what are the new coordinates of A?

$$\begin{cases} y = x + 1 \\ y = 5x - 3 \end{cases}$$

A. (-1, 2) B. (1, 2) C. (-3, 2) D. (5, 2) E. (1, 6)

43. What is the prime factorization of the number 3,840?

A. $2^8 \cdot 3 \cdot 5$ B. $2^6 \cdot 3 \cdot 5 \cdot 11$ C. $2^4 \cdot 3^2 \cdot 5 \cdot 11$ D. $2^6 \cdot 3^3 \cdot 5$ E. $2^5 \cdot 3^3 \cdot 5$

44. If $\pi = 3$, what is the diameter of a circle with an area of 192 units^2?

A. 38 units B. 64 units C. 8 units D. 16 units E. 32 units

45. What is the y-coordinate of the vertex of the quadratic equation f(x)= $x^2 - 6x + 1$?

A. -8 B. 3 C. -5 D. 6 E. 1

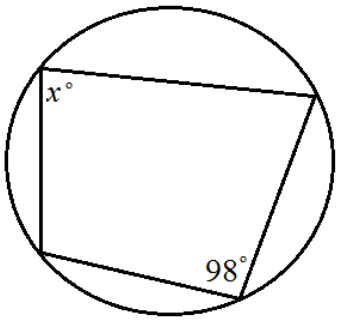
46. Solve the compound inequality: $6 < 3x \leq 33$

A. $2 < x < 11$ B. $2 < x < 30$ C. $3 < x \leq 11$ D. $3 < x \leq 30$ E. $2 < x \leq 11$

47. Find x, if $\log_3 81 = x$.

A. 4 B. 78 C. 5 D. 9 E. 27

48. What is the value of x in the picture below?



A. 102 B. 92 C. 82 D. 72 E. 88

49. How many 3-inch cubes can fit inside a rectangular prism measuring $18\ in \times 6\ in \times 10\ in$?

A. 36 B. 40 C. 1,080 D. 48 E. 60

50. If $A = \begin{bmatrix} 8 & -9 \\ -7 & 13 \end{bmatrix}$ and $B = \begin{bmatrix} -6 & 5 \\ 1 & 6 \end{bmatrix}$, find $B - A$.

A. $\begin{bmatrix} 14 & -14 \\ -8 & 7 \end{bmatrix}$ B. $\begin{bmatrix} 2 & -4 \\ -6 & 7 \end{bmatrix}$ C. $\begin{bmatrix} -14 & -4 \\ -8 & 7 \end{bmatrix}$ D. $\begin{bmatrix} -14 & 14 \\ 8 & -7 \end{bmatrix}$ E. $\begin{bmatrix} 2 & 14 \\ -8 & -7 \end{bmatrix}$

2015 – 2016 TMSCA Middle School Mathematics Test #3 Answer Key

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

D

2015 – 2016 TMSCA Middle School Mathematics Test #3 Selected Answers

21. "$a + 0 = a$" illustrates the Identity Property of Addition.

24. $\left(7\sqrt{3}\right)^2 = \left(7\sqrt{3}\right)\left(7\sqrt{3}\right) = (7 \cdot 7)\left(\sqrt{3} \cdot \sqrt{3}\right) = 49 \cdot 3 = 147.$

32. First, you must know that a baker's dozen is equal to the amount of 13 and a gross is equal to the amount of 144. Now, two gross increased by a baker's dozen is equal to $2(144) + 13 = 301.$

38. $(4n + 9)(4n - 9) = 4n(4n) - 4n(9) + 9(4n) + 9(-9) = 16n^2 - 36n + 36n - 81.$ The $-36n$ and $36n$ form a zero pair, so we are left with $16n^2 - 81$. This is a special product of polynomials called a difference of squares.

47. If $\log_3 81 = x$, then $3^x = 81$. Change 81 to a number with a base of 3. $81 = 9 \cdot 9$, so $81 = 3^2 \cdot 3^2$, making $81 = 3^4$. Now we can see that $3^x = 3^4$, and therefore, $x = 4$.

49. First, we need to find the volume of the rectangular prism measuring $18\ in \times 6\ in \times 10\ in$. To find that volume we need to multiply all the dimensions together. So, the volume of the large rectangular prism is $18 \times 6 \times 10 = 1{,}080$ in^3. Now, we need to find the volume of the small cubes with a side length of 3 inches. To find the volume of a cube, simply cube the side length. SO, the volume of the small cubes is $3^3 = 27$ in^3. Finally, we must divide the volume of the rectangular prism by that of the cube. Thus, $1080 \div 27 = 40$. So, 40 small subes can fit inside the larger rectangular prism.