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 # 4 ©

N O V E M B E R 1 5 , 2 0 1 4

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.

2014-2015 TMSCA Middle School Mathematics Test #4

1. -11 + 78 = _____

A. 89 B. 858 C. -89 D. -858 E. 67

2. 724 – 1,009 = _____

A. -285 B. 1,733 C. -1,733 D. 285 E. -258

3. $-7 \cdot (-72) =$ _____

A. -504 B. -79 C. -63 D. 189 E. 504

4. $-12{,}456 \div (-3) =$ _____(nearest hundred)

A. 4,000 B. 4,152 C. 4,150 D. 4,100 E. 4,200

5. Find the median for the set of numbers 1, 6, 1, 1, 2, 2, 1, 1, 52, 1, 1, 1, 6, 7, 8, 4, 32, 1, 1, 19.

A. 1 B. 1.5 C. 2 D. 4.5 E. 5.5

6. 44% of 525 = _____

A. 231 B. 228 C. 237 D. 233 E. 235

7. If one die is rolled, what are the odds of getting a prime number?

A. 1:1 B. 1:2 C. 5:6 D. 2:1 E. 2:3

8. What number divided by eighteen gives a quotient of two with a remainder of nine?

A. 39 B. 42 C. 38 D. 45 E. 36

9. The number of total degrees in an obtuse scalene triangle equals _____°.

A. 90 B. 360 C. 160 D. 180 E. 270

10. $41^2 – 37^2$ = _____ (Roman numeral)

A. CCDIXII B. CCDXII C. CCCXII D. MMMXII E. CCCVII

11. What is the largest prime divisor of the number 936?

A. 9 B. 72 C. 19 D. 13 E. 17

12. How many minutes are there in 1.5 days?

A. 1,440 B. 2,160 C. 1,800 D. 2,520 E. 129,600

13. Evaluate $\frac{3a-4b}{5c}$, for a = 6, b = -½ and c = 4.

A. 1 B. 0.25 C. 0.5 D. -0.25 E. -1

14. When plotted on a coordinate grid, which coordinate pair below is not plotted in the second quadrant?

A. (-3.5, 9) B. (-0.0003, 1) C. (0, 8) D. (-2, 2) E. (-1, 320)

15. The complement of $\angle A$ is 37°. What is the supplement of $\angle A$?
A. 53° B. 143° C. 164° D. 127° E. 74°

16. Which of the following is the correct prime factorization of 324?
A. $2^2 \cdot 3^3 \cdot 7$ B. $2^3 \cdot 3^5$ C. $2^2 \cdot 3^4$ D. $2^2 \cdot 3^2 \cdot 7$ E. $2 \cdot 3^3 \cdot 6$

17. How many numbers between 1 and 100 contain the digit 7 only once?
A. 19 B. 20 C. 21 D. 18 E. 17

18. The _____ absolute deviation of a set of data is the average distance between each data value and the mean.
A. total B. mean C. median D. summative E. comparative

19. What is the sum of the domain of the relation {(4, 5), (19, 10), (-7, 8), (11, 9)}
A. 32 B. 59 C. 27 D. 35 E. 40

20. Sasha has a twenty dollar bill and wants to buy 56¢ stamps. What is the greatest amount of stamps she can buy?
A. 42 B. 38 C. 35 D. 17 E. 27

21. Which of the following numbers below is the prime twin of the number 11?
A. 7 B. 13 C. 17 D. 12 E. 10

22. To make twelve cupcakes, Kathryn needs 1 cup of sugar, ½ cup of milk, ½ cup of water and 3 ½ cups of flour. If Kathryn wanted to make three dozen cupcakes, how many cups of ingredients will she need?
A. 8.5 cups B. 198 cups C. 36 cups D. 16.5 cups E. 36.5 cups

23. Kalhil rode his mountain bike 17 ½ miles through an off-road path in 1¼ hours. What was Kalhil's average speed?
A. 14 mph B. 16 mph C. 12.5 mph D. 15.5 mph E. 16.25 mph

24. Shiela is needs to buy one cubic yard of mulch. The mulch store only sells mulch in cubic feet. How many cubic feet of mulch does Shiela need?
A. 18 ft^3 B. 27 ft^3 C. 1,728 ft^3 D. 81 ft^3 E. 9 ft^3

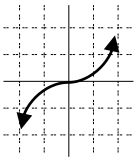
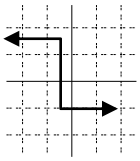
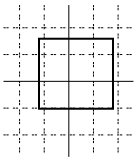
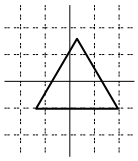
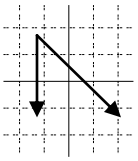
25. Find the value of n if $4! = 2^n \cdot 3$.
A. 4 B. 3 C. 2 D. 1 E. 0

26. At the local convenience store, Marco paid $24.95 for a new hat and $0.65 each for thirty pieces of candy. What was Marco's total bill, excluding tax, for the hat and candy?
A. $44.45 B. $25.60 C. $19.50 D. $63.95 E. $35.20

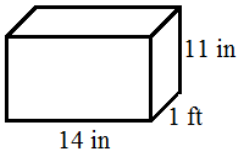
27. Find the percent of decrease when a $64 shirt is marked down to $48.
A. 40% B. 25% C. 35% D. 16% E. 20%

28. What is the upper, or third, quartile of the data set 12, 18, 20, 20, 34, 42, 54 and 32?
A. 48 B. 26 C. 42 D. 54 E. 96

29. Which graph below shows a function?

A.  B.  C.  D.  E. 

30. What is the total volume of the rectangular prism below?



A. 154 in^3 B. 1,848 in^3 C. 908 in^3 D. 1,816 in^3 E. 572 in^3

31. Simplify: $\sqrt[3]{16}$

A. 4 B. $8\sqrt{2}$ C. $8\sqrt[3]{2}$ D. $\sqrt[3]{4}$ E. $2\sqrt[3]{2}$

32. What is the value of the disciminant of the quadratic equation $12 = 4x^2 - 3x + 8$?

A. 73 B. -55 C. -64 D. 64 E. 41

33. Using the Fibonacci sequence 1, 1, 2, 3, 5, 8, 13, …, find the 12th term of the sequence.

A. 55 B. 89 C. 92 D. 136 E. 144

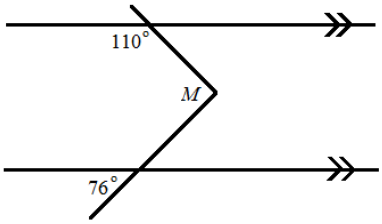
34. The sum of three negative integers is -147. What is the value of the smallest number?

A. -39 B. -41 C. -47 D. -49 E. -50

35. Choose the inequality statement that matches the graph below.

A. $x < 5$ B. $x > -1$ C. $-1 \leq x \leq 5$ D. $-1 < x < 5$ E. $-1 \leq x < 5$

36. Using the picture below, the measure of $\angle M$ below is equal to _____°.



A. 76 B. 104 C. 70 D. 146 E. 110

37. If $h(x) = 4x + 5$ and $g(x) = 10 - 3x$, find the value of $g(h(6))$.

A. -8 B. -27 C. -77 D. 97 E. 107

38. What is the area of an equilateral triangle with a side length of 6 inches?

A. $36\sqrt{3}$ in^2 B. 36 in^2 C. $9\sqrt{3}$ in^2 D. $4\sqrt{3}$ in^2 E. 4 in^2

39. Multiply: $3(2x + 1)^2$

A. $4x^2 + 4x + 1$ B. $12x^2 + 4x + 1$ C. $12x^2 + 12x + 3$ D. $36x^2 + 36x + 9$ E. $36x^2 + 36x + 6$

40. What is the length of the diameter of a circle with an equation $(x + ½)^2 + (y - ¼)^2 = \frac{9}{16}$?

A. 1.25 units B. 1.5 units C. 1.75 units D. 2.0 units E. 2.25 units

41. Identify the growth factor in the exponential growth function $f(x) = 3(2.3)^x$.

A. 3 B. 3.23 C. 130 D. 30 E. 2.3

42. Simplify: $(-2(3m^3n)^2)^2$

A. $324m^7n^4$ B. $1{,}296m^7n^4$ C. $-81m^{12}n^4$ D. $324m^{12}n^4$ E. $-162m^{36}n^4$

43. Mr. Gi has four boxes. In each box, Mr. Gi is placing five sack lunches. In each lunch, there is a sandwich, a pack of raisins, a fruit and a drink box. About 60% of the lunches contain a peanut butter and jelly sandwich. Which of the following is closest to the number of lunches that contain a peanut butter and jelly sandwich?

A. 3 B. 30 C. 12 D. 16 E. 20

44. A rhombus has a side length of 8 ½ cm. The rhombus is dilated by a scale factor of ¾ to create a new rhombus. What is the side length of the new rhombus?

A. 5.5 cm B. 17 ½ cm C. 34 cm D. 6.375 cm E. 7 ¾ cm

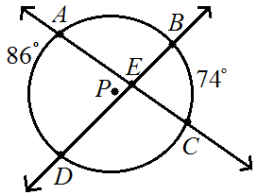
45. What is the *x*-intercept of the linear equation $y = ¾\,x + 12$?

A. -12 B. 12 C. 9 D. -16 E. 24

46. Solve the equation $4m - 2n = 5m + 3n$ for n.

A. $n = \frac{1}{5}m$ B. $n = -5m$ C. $n = -\frac{1}{5}m$ D. $n = \frac{m+3n}{2}$ E. $n = \frac{m-3n}{2}$

47. In the circle below, $\widehat{AD} = 86^\circ$ and $\widehat{BC} = 74^\circ$. What is the measure of $\angle BEC$?



A. 37° B. 43° C. 112° D. 74° E. 80°

48. What is the sum of the roots of the quadratic equation $6 = 3x^2 - 30x + 17$?

A. 11 B. $\frac{1}{10}$ C. ½ D. 10 E. 2

49. Solve for x: $3^{2x+1} = \frac{1}{9}$

A. $x = -1.5$ B. $x = 2.5$ C. $x = -2$ D. $x = 3$ E. $x = -0.5$

50. Rationalize the denominator: $\frac{4}{\sqrt{6}}$

A. $\frac{2\sqrt{6}}{3}$ B. $4\sqrt{6}$ C. $\frac{2}{\sqrt{3}}$ D. $\frac{\sqrt{6}}{6}$ E. $2\sqrt{3}$

2014-2015 TMSCA Middle School Mathematics Test #4 Answer Key

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

2014-2015 TMSCA Middle School Mathematics Test #4 Selected Answers

15. Since the complement of $\angle A$ is 37°, then $\angle A = 90 - 37 = 53^\circ$. To find the supplement of $\angle A$, we must subtract it from 180, so therefore, the supplement of $\angle A$ is equal to $180 - 53 = 127^\circ$.

18. The mean absolute deviation of a set of data is the average distance between each data value and the mean.

28. To find the upper quartile of the set of numbers 12, 18, 20, 20, 34, 42, 54 and 32, first arrange the numbers from least to greatest. 12, 18, 20, 20, 34, 42, 54 and 32 = 12, 18, 20, 20, 32, 34, 42 and 54. Now, find the median, which is 26. The median splits the set of number into two groups, all the numbers less than the median and all the numbers larger than the median. Let's use *A* = the set 12, 18, 20 and 20 and use *B* = the set 32, 34, 42, and 54. Now, the upper quartile is the median of *B*. The median, or upper quartile, of *B* ends up being the average of 34 and 42, which equals 38.

40. A circle with an equation $(x + ½)^2 + (y - ¼)^2 = \frac{9}{16}$ has a radius of $\sqrt{\frac{9}{16}} = \frac{3}{4}$. If the radius is ¾ , the diameter of the circle is double the radius and we have 2(¾) = $\frac{3}{2}$ =1.5 units.

42. To simplify $(-2(3m^3n)^2)^2$, we must use the order of operations and exponent rules .
$(-2(3m^3n)^2)^2 = (-2(9m^6n^2))^2 = (-18m^6n^2)^2 = 324m^{12}n^4$.

45. To find the *x*-intercept of the linear equation $y = ¾\,x + 12$, substitute 0 in for *y* and solve for *x*. Therefore we have $0 = ¾\,x + 12$. First subtract 12 from both sides and we have $-12 = ¾\,x$. To undo multiplying by ¾, you need to multiply by its reciprocal, which is $\frac{4}{3}$. So, $-12 \cdot \frac{4}{3} = -16$ and $x = -16$.