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 # 1 3 ©

M A R C H 1 , 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.

2013-2014 TMSCA Middle School Mathematics Test #13

1. 99,999 + 8,989 + 7,676 = _____ (rounded to nearest ten)

A. 116,664 B. 116,000 C. 117,000 D. 116,700 E. 116,660

2. $41\frac{2}{5} - 11\frac{7}{10} - 6\frac{3}{5} =$ _____ (decimal)

A. 23.1 B. 24.1 C. 23.2 D. 23.3 E. 24.2

3. $43.5 \div 0.5 \div 0.2 =$ _____

A. 455 B. 4.35 C. 435 D. 45.5 E. 465

4. $-5^2 \cdot 6^2 =$ _____

A. 900 B. 450 C. 121 D. -121 E. -900

5. $0.4\overline{5} =$ _____ (fraction)

A. $\frac{1}{2}$ B. $\frac{1}{22}$ C. $\frac{41}{90}$ D. $\frac{41}{99}$ E. $\frac{5}{11}$

6. What is the unit rate if one baker's dozen donuts cost $8.97?

A. $0.79 B. $0.75 C. $0.76 D. $0.69 E. $0.70

7. How many hours will it take to drive 270 miles driving at average speed of 45 mi/hr?

A. 5 B. 6 C. 7 D. 4.5 E. 5.5

8. What is the sum of the GCF of 65 and 26 and the LCM of 80 and 45?

A. 707 B. 133 C. 733 D. 720 E. 746

9. Sharon did a science project in which she recorded data every day. One day she recorded a data entry of 0.000045 grams. On that day, she expected her recording to be one-half of what was actually recorded. What was her expected recording in scientific notation?

A. 2.25×10^{-5} B. 2.25×10^{-6} C. 9×10^{-5} D. 9×10^{-4} E. 2.25×10^{5}

10. Simplify: $|11 - 60| - (-6 + (-17)) + (-62)$

A. 10 B. -2 C. 134 D. 122 E. 2

11. $\sqrt{1{,}240}$ is between which pair of integers?

A. 33 & 34 B. 34 & 35 C. 35 & 36 D. 36 & 37 E. 37 & 38

12. _____$^\circ F = 35^\circ C$

A. 105 B. 95 C. 80 D. 90 E. 85

13. Another name for a quadrilateral is a(n) _____.

A. Tetragon B. Quadragon C. Quadromial D. Dual-twice-gon E. Helix

14. How many edges does a pentagonal prism have?

A. 10 B. 5 C. 20 D. 15 E. 25

15. What is the area of a rhombus with a diagonal of 10 inches and a second diagonal of 25 inches?

A. 250 in^2 B. 35 in^2 C. 150 in^2 D. 145 in^2 E. 125 in^2

16. $2 + 4 + 6 + \ldots + 24 + 26 =$ _____

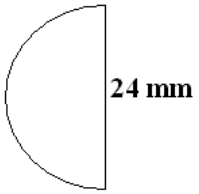
A. 174 B. 176 C. 182 D. 184 E. 188

17. What type of function is represented by the table below?

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

A. Linear B. Quadratic C. Cubic D. Absolute Value E. Inverse

18. In terms of π, the perimeter of the shape below is equal to _____ mm.



A. 36π B. $36\pi + 12$ C. $24\pi + 24$ D. $24\pi + 12$ E. $12\pi + 24$

19. $43^2 =$ _____ (Roman numeral)

A. MDCCCXLIX B. DCCCXLIX C. MDCCCXLXI D. MDCCCXLIV E. MDCCCXLVI

20. In how many different ways can a student randomly guess a complete set of answers to a five question multiple choice quiz, if there are four choices per question?

A. 625 B. 425 C. 256 D. 1,024 E. 20

21. What are the odds of drawing an ace or a queen from a standard deck of cards?

A. 2:13 B. 4:21 C. 2:11 D. 3:26 E. 3:23

22. Solve for x: $3x + 2x - 9 = 5 - 74$

A. -10 B. -12 C. -15 D. 15 E. 14

23. If $g(x) = x^3 - x^2 + x$, find the value of $g(-2)$.

A. -2 B. -10 C. 10 D. -14 E. -8

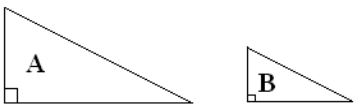
24. $76^2 =$ _____

A. 5,676 B. 5,776 C. 5,476 D. 5,866 E. 5,586

25. 5 pegs will cover one square inch. If a floor measures 2 ft by 4 ft, how many pegs will it take to cover the floor?

A. 11,520 B. 2,880 C. 4,320 D. 6,480 E. 5,760

26. Triangle **A** is similar to triangle **B** below by a scale factor of 2.5. If the base of **B** is 16 inches, what is the measure of the base of **A**?



A. 6.4 inches B. 44 inches C. 18.5 inches D. 40 inches E. 32 inches

27. What is the probability of rolling a pair of dice and getting a sum of 7 or 9 facing up, in ratio form?

A. 1:6 B. 5:13 C. 1:3 D. 1:54 E. 5:18

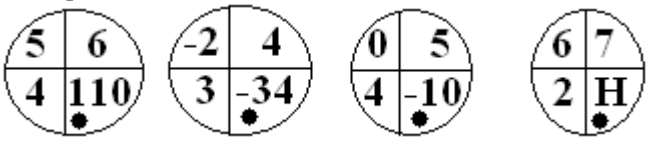
28. Four consecutive integers sum to 94. What is the median of these four integers?
A. 22 B. 22.5 C. 23 D. 23.5 E. 24

29. What is the slope of any line perpendicular to the line with the equation $4x + 2y = 5$?
A. ½ B. -½ C. 2 D. -2 E. 2.5

30. The hypotenuse of a 30-60-90 triangle is 12 cm. What is the area of the triangle?
A. $36\sqrt{3}$ cm^2 B. $18\sqrt{3}$ cm^2 C. $24\sqrt{3}$ cm^2 D. $72\sqrt{3}$ cm^2 E. $144\sqrt{3}$ cm^2

31. How many positive integers less than 35, but greater than 10, are relatively prime to 35?
A. 24 B. 21 C. 19 D. 17 E. 11

32. Use the picture below to find a pattern and then find the value of **H**.



A. 74 B. 42 C. 108 D. 124 E. 110

33. Find the value of the interquartile range of the data in the stem-and-leaf plot below.

1	1 2 2
2	6
3	5 6 7 9
4	4 5

$key: 2|6 = 26$

A. 35.5 B. 36 C. 39 D. 27 E. 29

34. A regular pentagon has a side length of 16 inches. If the perimeter of the pentagon is equal to the perimeter of a square, what is the area of the square?
A. 256 in^2 B. 64 in^2 C. 512 in^2 D. 400 in^2 E. 172 in^2

35. If the graph of the linear equation $4x - 3y = 15$ is translated up seven units, what are the coordinates of the new y-intercept?
A. (7, 0) B. (0, 7) C. (0, 2) D. (0, 22) E. (25, 0)

36. What is the sum of all the positive integers that satisfy $-5 < x \le 8$?
A. 31 B. 26 C. 36 D. 37 E. 46

37. Let m equal the number of regions in a plane that are determined by nine lines, no two are parallel and no three are concurrent. Find the value of m^2.
A. 2,016 B. 2,116 C. 2,224 D. 2,115 E. 2,024

38. $52_6 \times 12_6 = \_\_\_\_\_{}_6$
A. 1201 B. 1202 C. 1140 D. 1142 E. 1104

39. What is the growth rate in the exponential growth function $y = 6 \cdot \left(\frac{5}{4}\right)^x$?
A. 125% B. 625% C. 62.5% D. 12.5% E. 25%

40. Brenden draws a triangle on graph paper with vertices (2, 18), (-4, 2) and (0, 16). If Brenden colors one-fourth of the area of the triangle blue, what is the area of the non-blue colored area?
A. 7.5 units^2 B. 2.5 units^2 C. 5 units^2 D. 4.5 units^2 E. 6 units^2

41. The point *A* with coordinates (20, 21) is graphed on a Cartesian plane. What is the distance from point *A* to the origin?
A. 23 units B. 41 units C. 29 units D. 28 units E. 25 units

42. Simplify: $5i^3 - 4i^{10} + 7i - 9i^{13} - 4i$
A. $-5 + 12i$ B. $4 + 12i$ C. $-4 - 12i$ D. $-4 - 11i$ E. $4 - 11i$

43. Jamie is challenging his friends. He tells them he is thinking of two numbers whose sum is 163 and whose difference is 33. Jamie wants his friends to find the product of the numbers he is thinking of. If correct, what will Jamie's friends say as their answer?
A. 6,730 B. 6, 540 C. 6,280 D. 6,660 E. 6,370

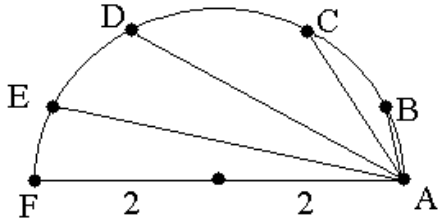
44. Point *C* is the midpoint of $\overline{AB}$. Point *A* has coordinates (16, 4) and point *C* has coordinates (6, 5). What is the sum of the coordinates of point *B*?
A. -4 B. 6 C. -10 D. -15.5 E. 2

45. In a geometric sequence, if the first term is 10,000 and the common ratio is ¼ , what is the 4th term?
A. 2,500 B. 625 C. 225 D. 156.25 E. 125.25

46. What is the sum of the coordinates of the vertex of the quadratic equation $x^2 + 6x - 4 = y$?
A. -16 B. -5 C. -9 D. -10 E. 68

47. Solve: $x^3 - 4x = 0$
A. {-2, 0} B. {0, 2} C. {-2, 2} D. $\{\pm 2\}$ E. {-2, 0, 2}

48. Points *A, B, C, D, E* and *F* are spaced evenly along a semicircle, in alphabetical order, with *AF* being the diameter of the semicircle. The radius of the circle is 2 units. The value of $|AB|^2 + |AC|^2 + |AD|^2 + |AE|^2$ is equal to which of the following values?



A. 8 B. 16 C. 32 D. 12 E. 24

49. If $\begin{bmatrix} 3 & 4 \\ 2 & -2 \end{bmatrix} \cdot \begin{bmatrix} -1 & -6 \\ 1 & 4 \end{bmatrix} = A$, then find the value of the determinant of *A*.
A. 32 B. -30 C. -12 D. -28 E. -13

50. How many real factors will the expression $3n^{16} - 3$ have, once factored completely?
A. 2 B. 3 C. 5 D. 6 E. 7

2013-2014 TMSCA Middle School Mathematics Test #13 Answer Key

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

2013-2014 TMSCA Middle School Mathematics Test #13 Selected Solutions

25. 5 pegs will cover one square inch. If a floor measures 2 ft by 4 ft, then the area of the floor is $4 \times 2 = 8$ squared feet. Since 1 squared foot is equal to 144 squared inches, 8 squared feet = $8 \times 144 = 1{,}152$ total squared inches and $1152 \times 5 = 5{,}760$ pegs that are needed.

26. Triangle **A** is similar to triangle **B** by a scale factor of 2.5. The base of **B** is 16 inches, so the base of **A** = $16(2.5) = 40$ inches.

32. Create a rule to go along with the picture below.

$ABC - 10 = D$.

Check to make sure it works:
$5 \cdot 6 \cdot 4 = 120 - 10 = 110; -2 \cdot 4 \cdot 3 = -24 - 10 = -34; 0 \cdot 5 \cdot 4 = 0 - 10 = -10$. So, using our rule we see that, $6 \cdot 7 \cdot 2 = 84 - 10 = 74$.

36. The positive integers that satisfy $-5 < x \le 8$ are 1, 2, 3, 4, 5, 6, 7 and 8. Thus, 1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 = 36.

47. $x^3 - 4x = x(x^2 - 4) = x(x+2)(x-2) = 0$. Each factor must be rewritten equal to 0 and then solved. $x = 0; x + 2 = 0 \rightarrow x = -2; x - 2 = 0 \rightarrow x = 2$. Therefore, our solutions of $x^3 - 4x = 0$ are -2, 0 and 2, or {-2, 0, 2}.

49. $\begin{bmatrix} 3 & 4 \\ 2 & -2 \end{bmatrix} \cdot \begin{bmatrix} -1 & -6 \\ 1 & 4 \end{bmatrix} = A = \begin{bmatrix} 3(-1)+4(1) & 3(-6)+4(4) \\ 2(-1)+-2(1) & 2(-6)+-2(4) \end{bmatrix} = \begin{bmatrix} 1 & -2 \\ -4 & -20 \end{bmatrix}$. The determinant of $A = 1(-20) - (-2)(-4) = -28$.