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 # 6 ©

D E C E M B E R 7 , 2 0 1 3

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 #6

1. 31^2 = _____

A. 62 B. 991 C. 961 D. 1,011 E. 181

2. $6.5 \div 1.5$ = _____

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

3. $-5^2 + 8 - 7^0$ = _____

A. -18 B. 32 C. 26 D. -24 E. -34

4. 909 – 282 – 464 + 191 = _____

A. 534 B. 435 C. 453 D. 354 E. 345

5. 24^2 = _____

A. 564 B. 524 C. 586 D. 584 E. 576

6. What number is five more than the largest prime number less than 80?

A. 84 B. 88 C. 79 D. 78 E. 81

7. 1! + 2! + 3! + 4! = _____

A. 10! B. 33 C. 28 D. 36 E. 35

8. 50 cm + 1,000 mm + 200 dcm = _____ m

A. 21.5 B. 20.15 C. 20.51 D. 12.5 E. 20.15

9. $212^\circ F$ = _____$^\circ C$

A. 10 B. 125 C. 50 D. 75 E. 100

10. Solve for n: $3n - n - 8 = 5n - 32$

A. $n = 8$ B. no solution C. all real numbers D. $n = 4$ E. $n = -2$

11. $\frac{11}{9}$ = _____ (decimal)

A. $1.\overline{23}$ B. 1.2 C. 1.22 D. 1.23 E. $1.\overline{2}$

12. Clay is buying a shirt that is on clearance for 65% off. If the shirt originally cost $24.50, to the nearest cent, how much will Clay be saving?

A. $15.93 B. $8.58 C. $15.82 D. $8.82 E. $15.58

13. Overlapping a square and a rectangle can produce at most how many points of intersection?

A. 6 B. 10 C. 12 D. 8 E. 4

14. Us the boxes below to look for a pattern to help find the value of *m*.

4	7	53

-3	5	22

-6	-7	43

19	-6	m

A. 55 B. 37 C. 62 D. 48 E. 67

15. What is the degree of the linear monomial $45a^3b^2c^5de^4$?
A. 9 B. 45 C. 14 D. 15 E. 120

16. If the expression $5m - 2$ is an odd integer, $5m$ is which of the following?
A. an odd integer B. a positive integer C. an odd or even integer D. prime E. zero

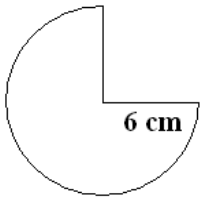
17. A(n) _____ angle is an angle in a circle with its vertex on the circle itself.
A. Inscribed B. Central C. Vertical D. Diameter E. Radial

18. $(\{1,3,5,7,9\} \cup \{2,4,6,8\}) \cap (\{1,2,3,4,5\} \cap \{3,4,5,6,7\})$ has _____ elements.
A. 16 B. 12 C. 9 D. 5 E. 3

19. 1,460 days = _____ years
A. 7 B. 6 C. 5 D. 4 E. 3

20. The factors of 48 are written on separate pieces of paper and placed in a bag. If one piece of paper is drawn from the bag, what is the probability of getting a multiple of 4, as a percentage?
A. 50% B. 55% C. 60% D. 70% E. 80%

21. Find the perimeter of the shape below, assume $\pi = 3$.



A. 36 cm B. 27 cm C. 39 cm D. 30 cm E. 33 cm

22. MDXI – XCIX = _____(Arabic number)
A. MCDXII B. CDXII C. DCLXII D. MDCIXII E. MCDIXII

23. A triangle has sides measuring 4, 9 and n units. What is the smallest integral value of n?
A. 5 units B. 3 units C. 8 units D. 6 units E. 4 units

24. The length of a rectangle is 4 inches. If the width of the rectangle is the square of the length, what is the area of the rectangle?
A. 32 in^2 B. 64 in^2 C. 256 in^2 D. 128 in^2 E. 40 in^2

25. Which of the following choices is an example of a quadratic binomial?
A. $3x^2$ B. $11ab - 6$ C. $3c^2 - 3c + 6$ D. $7n^3 - n$ E. $-9xyz$

26. ½ of ¼ of ½ of 600 = _____
A. 37.5 B. 18.75 C. 75 D. 9.375 E. 150

27. "$a(bc) = (ab)c$" is an example of the _____ Property of Multiplication.
A. Commutative B. Associative C. Reflexive D. Transitive E. Symmetric

28. If the point (8, -3) is translated nine units left and ten units up, what are its new coordinates?
A. (17, -13) B. (17, -7) C. (1, -7) D. (-1, -13) E. (-1, 7)

29. If it takes nine eggs to make five dozen mini-cakes, how many eggs would be need to make forty mini-cakes?
A. 12 B. 18 B. 3 D. 6 E. 72

30. Sean can mow a yard that measures 30 ft by 50 ft in 45 minutes. How long will is take Sean to mow a yard that measures 40 ft by 40 ft?
A. 50 min B. 65 min C. 54 min D. 52 min E. 48 min

31. $2102_3 =$ _____$_9$
A. 81 B. 72 C. 21 D. 23 E. 57

32. How many regions in a plane are determined by five lines, no two are parallel and only three are concurrent?
A. 15 B. 16 C. 20 D. 18 E. 21

33. Which of the following pairs of numbers are relatively prime?
A. 8 & 15 B. 2 & 36 C. 14 & 18 D. 24 & 26 E. 17 & 51

34. What is the midpoint between the two points (16.8, 9.7) and (12.7, 11.2)?
A. (14.75, 10.75) B. (29.5, 20.9) C. (13.25, 11.95) D. (14.5, 11.95) E. (14.75, 10.45)

35. If the interior angle of a polygon is equal to 108°, then the polygon has how many sides?
A. 8 B. 7 C. 6 D. 5 E. 9

36. The arithmetic mean of *A*, *B* and *C* is 30. If *C* = 38, what is the arithmetic mean of *A* and *B*?
A. 12 B. 22 C. 26 D. 24 E. 18

37. Find the slope of the line with the linear equation $3x - y = 39$.
A. -12 B. 3 C. 12 D. -3 E. $\frac{1}{3}$

38. Find the distance between the two points (2, -8) and (-6, 7).
A. 15 B. 16 C. 17 D. 23 E. 19

39. What is the value of the diameter of a circle with the equation $(x-1)^2 + (y+8)^2 = 64$?
A. 32 B. 16 C. 8 D. 128 E. 48

40. Simplify: $8i^2 - 17$
A. $-8i - 17$ B. $17 - 8i$ C. 25 D. $-25i$ E. -25

41. If the side length of a cube is doubled, by how many times greater is the new volume of the cube?
A. 2 B. 4 C. 6 D. 8 E. 12

42. Simplify: $5\left(\sqrt{12}-2\sqrt{3}\right)$

A. $-10\sqrt{15}$ B. -1 C. $\sqrt{3}$ D. $5\sqrt{3}$ E. 0

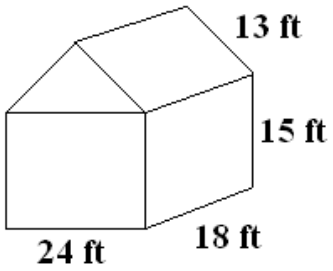
43. Find the coordinates of the vertex of the graph of the quadratic equation $4x^2 + 48x + 21 = 0$.

A. (-6, 19) B. (6, -19) C. (6, 123) D. (-6, -123) E. (-6, -453)

44. The solution to the system $\begin{cases} 2x-2y=22 \\ -4x=y-4 \end{cases}$ is (a, b). Find the value of $a^2 + b^2$.

A. -10 B. 22 C. 73 D. 58 E. 80

45. Calculate the volume of the figure below.



A. 6,480 ft^3 B. 6,540 ft^3 C. 7,560 ft^3 D. 8,640 ft^3 E. 8,480 ft^3

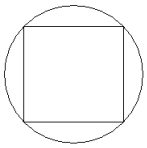
46. Find the value of P, if $\log_2 32 = P$.

A. 5 B. 16 C. 64 D. 128 E. 4

47. $16^{3/2} + 9^{1/2} =$_____

A. 11 B. 67 C. 145 D. 259 E. 83

48. In the picture below, a square is inscribed in a circle. If the length of the diagonal of the square is $\frac{6}{\pi}$, what is the circumference of the circle?



A. $3\pi^2$ units B. $9\pi^2$ units C. 9 units D. 3 units E. 6 units

49. If $\sqrt{x}-4+5x=y$ and $x = 9$, what is the value of $|x-y|$?

A. -35 B. 44 C. -44 D. 35 E. 54

50. If $f(x)=x^2-x$, then find $f(a+2)$.

A. $a^2 + 3a + 2$ B. $a^2 + 3a - 2$ C. $a^2 - a + 2$ D. $a^2 - a + 6$ E. $a^2 + 4a + 4$

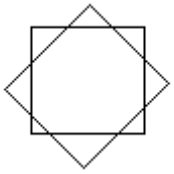
2013-2014 TMSCA Middle School Mathematics Test #6 Answer Key

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

2013-2014 TMSCA Middle School Mathematics Test #6 Selected Solutions

11. $\frac{11}{9} = 9\overline{)11} = 1.222222... = 1.\overline{2}$

13. To solve this problem, create a drawing like the one below.



From the picture, we can see there are at most 8 points of intersection.

15. To find the degree of a monomial, add the exponents of all the variables. $45a^3b^2c^5de^4$ has a degree of 3 + 2 + 5 + 1 + 4 = 15.

25. $11ab - 6$ is the quadratic binomial because it has two terms and has a degree of two.

36. If $\frac{A+B+38}{3} = 30$, then $A + B + 38 = 90$ and $A + B = 52$. Now find the average of $A + B$. $\frac{A+B}{2} = \frac{52}{2} = 26$.

38. The distance between two points, (x_1, y_1) and (x_2, y_2), can be found using the formula $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$. Substitute using the points given and we have $d = \sqrt{(2-(-6)^2 + (-8-7)^2} = \sqrt{8^2 + (-15)^2} = \sqrt{64 + 225} = \sqrt{289} = 17$.

50. If $f(x) = x^2 - x$, then $f(a+2) = (a+2)^2 - (a+2) = a^2 + 4a + 4 - a - 2 = a^2 + 3a + 2$