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 # 7 ©

J A N U A R Y 1 8 , 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.

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2013-2014 TMSCA Middle School Mathematics Test #7

1. $\left(\sqrt{256}\right)^2$ = _____

A. 15 B. 16 C. 65,536 D. 25 E. 256

2. $4\frac{2}{3} \div 1.2$ = _____

A. $3.\overline{8}$ B. 5.6 C. 3.6 D. $5.\overline{3}$ E. $2.\overline{78}$

3. 9 + 0.9 + 0.99 + 0.999 + 9.9 = _____ (nearest integer)

A. 21.789 B. 21.8 C. 22 D. 23 E. 21

4. -5 – 8 – 13 – 17 + 43 = _____

A. 0 B. -1 C. 1 D. -86 E. -2

5. 24^3 = _____

A. 13,724 B. 13,624 C. 14,224 D. 13,824 E. 14,234

6. What number is 6 less than the largest prime number less than 200?

A. 205 B. 191 C. 193 D. 203 E. 187

7. (0!)(1!)(2!)(3!)(4!) = _____

A. 0 B. 1 C. 288 D. 576 E. 144

8. 12 gallons = _____ quarts

A. 48 B. 52 C. 3 D. 24 E. 164

9. How many degrees does an exterior angle of a regular hexagon have?

A. 108° B. 120° C. 60° D. 72° E. 54°

10. What is the value of 148 divided by ¼ ?

A. 74 B. 37 C. 296 D. 592 E. 370

11. Which symbol below is used to represent similar figures?

A. ≅ B. ≠ C. ≈ D. ~ E. Δ

12. Find the next term in the sequence: 35, 46, 57, 68, 79, …

A. 89 B. 90 C. 91 D. 92 E. 93

13. _____$^\circ F = 70^\circ C$

A. 158 B. 146 C. 162 D. 134 E. 126

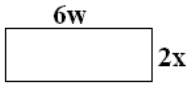
14. 3 cups + 1 gallon + 2 quarts = _____ ounces

A. 210 B. 212 C. 214 D. 216 E. 218

15. Simplify: $(6x^2 - 8x - 12) - (7x - 3x^2 + 14)$

A. $9x^2 - 15x - 26$ B. $-x^2 - 5x - 26$ C. $13x^2 - 11x + 2$ D. $-x^2 - 5x + 2$ E. $9x^2 - x - 26$

16. Find the perimeter of the rectangle below.



A. 8wx B. 24wx C. 12w + 4x D. $12w^2 + 4x^2$ E. 16wx

17. Which of the following below is 9,240 not divisible by?
A. 2 B. 3 C. 11 D. 157 E. 7

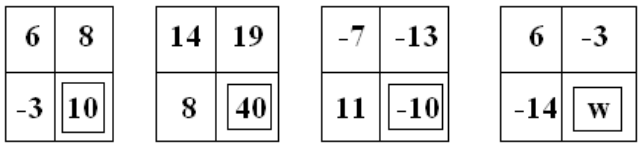
18. A(n) _____ angle is an angle in a circle with its vertex at the circle's center.
A. Inscribed B. Interior C. Centroid D. Central E. Radial

19. $\sqrt{1{,}200}$ is between which two integers?
A. 32 & 33 B. 33 & 34 C. 34 & 35 D. 35 & 36 E. 36 & 37

20. What is the simple interest acquired depositing $1,500 at 8% for 3 years?
A. $340 B. $360 C. $380 D. $400 E. $420

21. $43 \times 27 =$_____ (Roman numeral)
A. MCLXI B. MDCI C. MCXLI D. MCXLXI E. MCLVI

22. Use the boxes below to find a pattern to find the value of **w**.



A. -16 B. -70 C. -1 D. -22 E. -12

23. 18% of 145 = _____
A. 27.9 B. 26.1 C. 27.1 D. 28.3 E. 26.9

24. If $a \otimes b = (a+b)(a-b)$, then find the value of $6 \otimes -11$.
A. 25 B. 289 C. -85 D. -66 E. -132

25. 10110111_2 = _____$_8$
A. 276 B. 256 C. 287 D. 247 E. 267

26. Bruce and his three friends ate at *Pizza Works* and their bill totaled $24.76. They plan on splitting the bill equally. If they each add one dollar for a tip, how much will everyone owe towards the bill?
A. $6.19 B. $6.44 C. $6.69 D. $10.16 E. $7.19

27. Jeffery can mow a yard in 1.5 hours, while Sara could mow the same yard in sixty minutes. If the two worked together, how many minutes would it take them to mow the yard?
A. 24 min B. 0.6 min C. 36 min D. 42 min E. 30 min

28. What is the sum of all the positive integral divisors of the number 76?

A. 124 B. 63 C. 64 D. 140 E. 132

29. $54{,}321 \times 9 - 1 =$ _____

A. 588,888 B. 488,888 C. 586,868 D. 468,686 E. 498,898

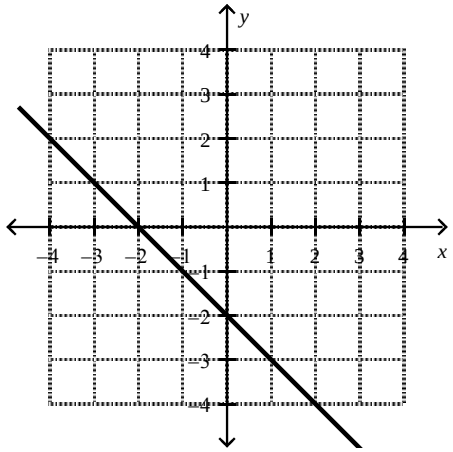
30. How many regions in a plane are determined by six lines, no two are parallel and no three are concurrent?

A. 20 B. 21 C. 22 D. 23 E. 24

31. Markus has 12¢ and 11¢ stamps. What is the largest unattainable sum he cannot make using his stamps?

A. 109 B. 132 C. 156 D. 143 E. 211

32. If the linear equation graphed below were translated to the left 4 units, what would be its new *y*-intercept?



A. -6 B. -4 C. 8 D. 2 E. -8

33. What is the value of the *x*-intercept of the linear equation $4x - 9y = -16$?

A. $1.\overline{7}$ B. -¼ C. 2.25 D. -2.25 E. -4

34. Find the coordinates of the midpoint between the points (17, -5) and (11, -17).

A. (14, -6) B. (14, -11) C. (3, -11) D. (28, -12) E. (3, -6)

35. How many numbers less than 8 are relatively prime to 8?

A. 7 B. 6 C. 4 D. 3 E. 2

36. If $(3x-2)(4x-5) = ax^2 + bx + c$, what is the sum of $a + b + c$?

A. -1 B. 12 C. 10 D. -23 E. -11

37. If it is 9:30 am on a Wednesday, what day and time will it be 60 hours and 40 minutes later?

A. Friday, 11:20 pm B. Saturday, 10:10 am C. Friday, 10:20 am D. Saturday, 8:40 pm E. Friday, 10:10 pm

38. The sum of 7 consecutive integers is 112, what is the value of seven more than twice the middle integer?

A. 23 B. 33 C. 42 D. 39 E. 25

39. A hexagon has angle measures of $145^\circ, 65^\circ, 113^\circ, 77^\circ, 148^\circ$ and A°. What is the sum of the digits of *A*?

A. 10 B. 9 C. 8 D. 7 E. 6

40. What is the geometric mean of the numbers 9 and 36?

A. 22.4 B. 14.4 C. 18 D. 16 E. 21

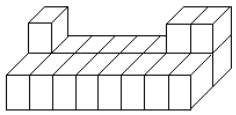
41. Simplify: $11i^3 - 4i + 2i^2$

A. $-2 - 15i$ B. $-2 + 15i$ C. $2 - 15i$ D. $-17i$ E. $17i$

42. *No More Leaks Plumbing Company* charges \$50 for an initial visit plus \$45 per hour. *Stop it Before it Starts Plumbing Company* charges \$30 for an initial visit plus \$65 per hour. After how many hours will the charges from both plumbing companies be the same?

A. 1 hour B. 2 hours C. 3 hours D. 4 hours E. 5 hours

43. If the blocks used to create the figure below were $2cm \times 2cm \times 2cm$, what is the figure's surface area?



A. 216 cm^2 B. 176 cm^2 C. 328 cm^2 D. 248 cm^2 E. 252 cm^2

44. If $\begin{bmatrix} 11 & -8 \\ -13 & -7 \end{bmatrix} - 2\begin{bmatrix} -5 & 12 \\ 6 & -8 \end{bmatrix} + \begin{bmatrix} -17 & -8 \\ 14 & 9 \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, what is the value of $2a - b - c - d$?

A. 21 B. 74 C. 37 D. 41 E. 33

45. What is the range of the graph of the quadratic equation $y = 3x^2 - 12x - 4$?

A. all real numbers B. $y \geq -4$ C. $y \geq 2$ D. $y \geq -16$ E. $y \leq -4$

46. Solve: $-25 \leq 3x - 1 \leq 47$

A. $-8 < x < 16$ B. $-8.\overline{6} \leq x \leq 15.\overline{6}$ C. $-8 < x \leq -6$ D. $-7 \leq x \leq 17$ E. $-8 \leq x \leq 16$

47. Simplify: $\left(\frac{12ab^3c^2}{6a^2bc^5}\right) \cdot \left(\frac{18a^2bc}{ab^4c^4}\right) \cdot \left(\frac{ab^2}{abc}\right)$

A. $\frac{36a}{bc^7}$ B. $\frac{36}{abc^7}$ C. $\frac{36}{c^7}$ D. $\frac{36a}{c^7}$ E. $\frac{36ac^7}{b}$

48. Solve for *N*: $W = \frac{1}{4}(8M + N)$

A. $4W - 8M = N$ B. $4W + 8M = N$ C. $2W + 8M = N$ D. $2W - M = N$ E. $W + 8M = N$

49. Using a standard deck of cards, what is the probability of drawing a queen on the first draw and then a red king on the second draw if you do not replace the first card, in ratio form?

A. 5:2,653 B. 2:663 C. 2:221 D. 1:338 E. 6:2,653

50. If $6^{x+1} = 252$, what is the value of 6^x?

A. 42 B. 244 C. 258 D. 26 E. 36

2013-2014 TMSCA Middle School Mathematics Test #7 Answer Key

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

2013-2014 TMSCA Middle School Mathematics Test #7 Selected Solutions

22. Like the picture below, assign each small rectangle a variable.

a	*b*
c	*d*

Using the variables that do not have an inner rectangle, we see that $a + b + c - 1 = d$.

6	8
-3	10

14	19
8	40

-7	-13
11	-10

6	-3
-14	w

$6 + 8 + (-3) - 1 = 10$ $\quad 14 + 19 + 8 - 1 = 40$ $\quad -7 + (-13) + 11 - 1 = -10$

Therefore, $6 + (-3) + (-14) - 1 = w$ and $w = -12$.

36. $(3x-2)(4x-5) = 3x(4x) - 3x(5) - 2(4x) - 2(-5) = 12x^2 - 15x - 8x + 10 = 12x^2 - 23x + 10$

Thus, $12 + (-23) + 10 = -1$.

47. First, simplify each set of parentheses, then multiply and finally reduce afterwards.

$$\left(\frac{12ab^3c^2}{6a^2bc^5}\right)\cdot\left(\frac{18a^2bc}{ab^4c^4}\right)\cdot\left(\frac{ab^2}{abc}\right) = \frac{2b^2}{ac^3}\cdot\frac{18a}{b^3c^3}\cdot\frac{b}{c} = \frac{36ab^3}{ab^3c^7} = \frac{36}{c^7}$$

49. The probability of drawing a queen is $\frac{4}{52}$. The probability of drawing a red king without replacing the first card is $\frac{2}{51}$. So, $\frac{4}{52} = \frac{1}{13}$ and $\frac{1}{13}\cdot\frac{2}{51} = \frac{2}{663} = 2:663$.

50. You have to remember you exponent rules for this question, $6^{x+1} = 6^x \cdot 6^1$. Now divide both sides by 6 and $\frac{6^x \cdot 6}{6} = \frac{252}{6} \rightarrow 6^x = 42$.