TMSCA MIDDLE SCHOOL MATHEMATICS TEST #4 ©

NOVEMBER 16, 2013

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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1. $\sqrt{576} =$ _____
A. 22   B. 23   C. 24   D. 26   E. $26\sqrt{2}$

2. -888 – 999 + 777 – 1 = _____
A. -1,109   B. -1,111   C. -1,101   D. -1,110   E. 665

3. (4.8)(2.2)(1.5) = _____
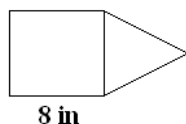A. 15.64   B. 16.46   C. 15.74   D. 15.84   E. 15.94

4. $14\dfrac{4}{5} \div 2\dfrac{1}{2} =$ _____
A. 5.76   B. 5.88   C. 5.84   D. 5.96   E. 5.92

5. 1.4 hours + one-quarter hour = _____ minutes
A. 84.15   B. 109   C. 115   D. 125   E. 99

6. What is the perimeter of the shape below if a square and an equilateral triangle share a side?

8 in

A. 56 in   B. 48 in   C. 40 in   D. 32 in   E. 64 in

7. Evaluate $2abc \div de$, if $a = 2$, $b = 2$, $c = 2$, $d = 4$ and $e = 3$.
A. 12   B. $1.\overline{3}$ C. $2.\overline{3}$ D. 6   E. $0.\overline{6}$

8. Joanna is buying a shirt for $12.50 and there is a 6% tax. How much will Joanna pay in tax?
A. $0.67   B. $0.75   C. $7.50   D. $13.25   E. $0.95

9. $\dfrac{7}{8} =$ _____ (decimal)
A. 0.95   B. 0.85   C. 0.825   D. 0.875   E. 0.925

10. 500 has how many distinct prime divisors?
A. 5   B. 4   C. 3   D. 2   E. 6

11. Solve for d: $7 - d = -7 - (-9)$
A. -5   B. 9   C. 11   D. -11   E. 5

12. A(n) _____ line is a line that touches a curve at a point without crossing over.
A. Secant   B. Tangent   C. Chord   D. Arc   E. Inscribed

13. 45 cm + 1,200 mm + 1 km = _____ m
A. 1,006.5   B. 1,001.65   C. 1,201.65   D. 1,265.5   E. 1,000.85

14. What are the odds of tossing a number cube and it landing with a prime number facing up?
A. 1:1   B. 3:6   C. 1:2   D. 1:3   E. 2:3

15. _____$^\circ C = 113^\circ F$
A. 33   B. 45   C. 39   D. 42   E. 55

16. The measures of two complementary angles are in a ratio of 2:7. The measure of the supplement of the smaller angle is _____$^\circ$.
A. 20   B. 160   C. 70   D. 40   E. 88

17. 628 = _____ (Roman numeral)
A. CDXXVIII   B. DCXXVIII   C. DCXXXLVIII   D. DCXXIIX   E. DCXXVII

18. What is the total surface area of the figure below that is made out of unit cubes?
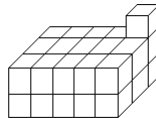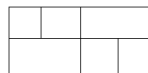
A. 66 units^2 B. 63 units^2 C. 68 units^2 D. 73 units^2 E. 31 units^2

19. The total degrees of a 14-sided polygon is equal to _____ degrees.
A. 2,280   B. 2,040   C. 2,520   D. 2,160   E. 2,340

20. What are the coordinates of the point (3, -2) after it is reflected across the *y*-axis and then the *x*-axis?
A. (3, -2)   B. (-2, 3)   C. (-3, 2)   D. (-3, -2)   E. (3, 2)

21. How many rectangles can be found in the figure below?

A. 10   B. 11   C. 14   D. 15   E. 6

22. Simplify: $3\sqrt{12}$
A. $\sqrt{36}$ B. $6\sqrt{3}$ C. $3\sqrt{6}$ D. $12\sqrt{2}$ E. $12\sqrt{3}$

23. 120_{10} = _____$_6$
A. 320   B. 321   C. 315   D. 20   E. 420

24. In ratio form, what is the probability of drawing an ace or a red four from a standard deck of cards?
A. 2:13   B. 4:13   C. 8:13   D. 3:26   E. 3:23

25. Ainsley is picking strawberries that are $0.04 per ounce. How much will she have to pay for picking one and one-half gallons of strawberries?
A. $7.68   B. $5.64   C. $9.82   D. $6.44   E. $7.28

26. $2 + 4 + 6 + \ldots + 18 + 20 + 22 =$ _____
A. 122   B. 132   C. 136   D. 134   E. 128

27. What value if seven more than the additive inverse of -16?
A. -9   B. 9   C. -23   D. 11   E. 23

28. Two integers that have no common factor other than 1 or -1 are said to be _____ _____.
A. composite twins   B. relatively prime   C. prime twins   D. twin prime   E. coprime twins

29. Which of the following relations is not a function?
A. (9, 1), (2, 2), (1, 2)   B. (2, 6), (8, 1), (7, 7)   C. (3, 3), (4, 4), (5, 5)   D. (1, 2), (1, 8), (1, 7)   E. (3, 3), (4, 3), (5, 3)

30. What is the value of the 10th triangular number?
A. 45   B. 66   C. 36   D. 46   E. 55

31. Which of the following below is not an example of a rational number?

A. $\sqrt{2}$ B. $4.\overline{7}$ C. $\dfrac{16}{2}$ D. 2.8   E. -6

32. What is the 21st term of the sequence?   -4, -1, 2, 5, …
A. 64   B. 68   C. 56   D. 52   E. 60

33. Find the measure of the missing side in the triangle below.
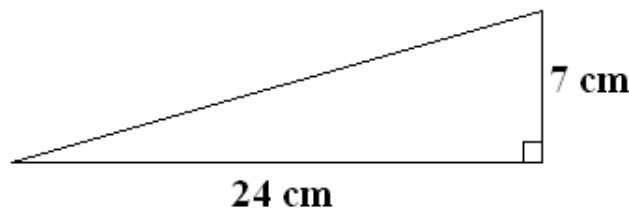
A. 29 cm   B. 27 cm   C. 25 cm   D. 26 cm   E. 28 cm

34. Simplify: $4(3m - 7) - 2(m + 6)$
A. $14m - 30$ B. $14m - 40$ C. $10m - 40$ D. $12m - 30$ E. $10m - 30$

35. How many regions in a plane are determined by three lines, no two are parallel and only three are concurrent?
A. 3   B. 4   C. 5   D. 6   E. 7

36. In a class survey of 30 students, 18 students said they liked cats, 17 students said they liked dogs and 10 students said they liked both cats and dogs. How many students didn't like cats or dogs?
A. 10   B. 5   C. 7   D. 3   E. 8

37. Find the range value of the function $f(x) = 3x^2 - 7$, when the domain value are {-2, 3, 8}.
A. {29, 74, 569}   B. {-19, 20, 192}   C. {5, 11, 41}   D. {5, 20, 185}   E. {8, 3, -2}

38. Janet opened a book and the sum of the two pages she was looking at was 257. What was the page number with the smallest absolute value?
A. 256   B. 129   C. 130   D. 128   E. 127

39. Solve the inequality: $4x - 9 < 23$

A. $x < 8$　　　　　　　B. $x < 3.5$　　　　　　　C. $x < -3.5$　　　　　　　D. $x > 3.5$　　　　　　　E. $x > 14.75$

40. Simplify: $\dfrac{64a^2bc^8}{16abc^3}$

A. $28a^2c^5$　　　　　　　B. $4ac^5$　　　　　　　C. $4a^2bc^5$　　　　　　　D. $28abc^5$　　　　　　　E. $4a^3b^2c^{11}$

41. What is the units digit of 6^9?

A. 6　　　　　　　B. 9　　　　　　　C. 2　　　　　　　D. 3　　　　　　　E. 4

42. Find the percent of increase when 24 increases to 30.
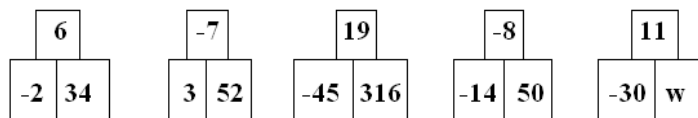
A. 20%　　　　　　　B. 30%　　　　　　　C. 5%　　　　　　　D. 75%　　　　　　　E. 25%

43. Find the value of C if $\log_6 C = 3$.

A. 216　　　　　　　B. 18　　　　　　　C. 729　　　　　　　D. 2　　　　　　　E. 4

44. What is the measure of the diameter of the circle that has an equation of $(x-3)^2 + (y-6)^2 = 49$?

A. -9 units　　　　　　　B. 9 units　　　　　　　C. 49 units　　　　　　　D. 14 units　　　　　　　E. 24.5 units

45. Find a pattern using the boxes below and find the value of **w**.

6		-7		19		-8		11
-2	34	3	52	-45	316	-14	50	-30	w

A. -76　　　　　　　B. 91　　　　　　　C. 151　　　　　　　D. 121　　　　　　　E. -330

46. Simplify: $5i^3$

A. -5　　　　　　　B. $5i$　　　　　　　C. $-5i$　　　　　　　D. 5　　　　　　　E. $\sqrt{5}i$

47. 1,920 acres = _____ square miles

A. 2　　　　　　　B. 2.5　　　　　　　C. 3　　　　　　　D. 3.5　　　　　　　E. 4

48. $\begin{bmatrix} -3 & 9 \\ 4 & -8 \end{bmatrix} - \begin{bmatrix} -11 & 19 \\ -7 & 3 \end{bmatrix} =$

A. $\begin{bmatrix} 8 & 28 \\ 3 & -5 \end{bmatrix}$　　B. $\begin{bmatrix} -8 & -10 \\ -11 & -5 \end{bmatrix}$　　C. $\begin{bmatrix} 8 & -10 \\ 11 & -11 \end{bmatrix}$　　D. $\begin{bmatrix} 8 & -10 \\ 11 & -5 \end{bmatrix}$　　E. $\begin{bmatrix} 14 & 28 \\ 11 & 11 \end{bmatrix}$

49. What is the sum of the coordinates of the solution to the following system? $\begin{cases} 2x + 3y = 23 \\ x = 2y - 6 \end{cases}$

A. 9　　　　　　　B. 20　　　　　　　C. -1　　　　　　　D. 1　　　　　　　E. 7

50. Find the slope of the line that passes through the points $(2a + 5, 6a + 7)$ and $(2a + 3, 4a - 3)$.

A. $a - 4$　　　　　　　B. $a + 5$　　　　　　　C. $a - 2$　　　　　　　D. $a + 3$　　　　　　　E. $a + 4$

2013-2014 TMSCA Middle School Mathematics Test #4 Answer Key

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

6. To find the perimeter of the picture below, we see that the square and the equilateral triangle share a side length. So, we must only add the out side lengths.

8 in
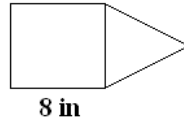
The perimeter is now, $8 + 8 + 8 + 8 + 8 = 40$ inches.

28. Two integers that have no common factor other than 1 or -1 are said to be relatively prime.

38. Create an equation: $x + x + 1 = 257$. This gives $2x + 1 = 257$. Solve the equation and $x = 128$. The two pages are 128 and 129, but 128 is our answer.

42. The formula to calculate the percent of change is $\dfrac{change\ in\ amount}{original} \times 100$. Using our

problem, $\dfrac{30 - 24}{24} = \dfrac{6}{24} = \dfrac{1}{4} = 0.25 \times 100 = 25\%$ increase.

43. $\log_6 C = 3 \rightarrow 6^3 = C \rightarrow 6^3 = 216 = C$

45. Using the picture below,

We can see a pattern. Take the first figure, $6^2 + (-2) = 34$. The same goes for all the figures, $(-7)^2 + 3 = 52, 19^2 + (-45) = 316, (-8)^2 + (-14) = 50$. So, we must calculate, $11^2 + (-30) = 121 - 30 = 91$.