



# TMSCA MIDDLE SCHOOL MATHEMATICS TEST #2 © NOVEMBER 2, 2013

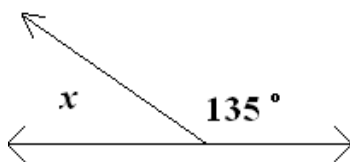
## GENERAL DIRECTIONS

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.

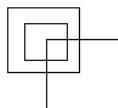
[illegible]

2013-2014 TMSCA Middle School Mathematics Test #2

1.  $1,998 + 9,889 =$  \_\_\_\_\_  
 A. 10,887                      B. 11,787                      C. 11,887                      D. 12,887                      E. 10,987
2.  $200 - 687 =$  \_\_\_\_\_  
 A. 487                              B. -283                              C. 887                              D. -477                              E. -487
3.  $1.25 \times 2.4 =$  \_\_\_\_\_  
 A. 3.0                              B. 3.2                              C. 3.4                              D. 2.8                              E. 3.6
4.  $7.8 \div 0.06 =$  \_\_\_\_\_  
 A. 0.13                              B. 1.3                              C. 13                              D. 130                              E. 1,300
5. A connected section of the circumference of a circle is called a(n) \_\_\_\_\_ of a circle.  
 A. Chord                              B. Arc                              C. Secant                              D. Radius                              E. Tangent
6. Evaluate  $\frac{2a+b}{1-c}$  if  $a = 3$ ,  $b = 8$  and  $c = -6$ .  
 A. -2.8                              B. 2                              C. 2.8                              D. 4                              E. -1
7.  $4n^3 - 7n + 8$  is an example of a(n) \_\_\_\_\_ trinomial.  
 A. linear                              B. quadratic                              C. cubic                              D. quartic                              E. tritic
8.  $1 \text{ day} + 1.5 \text{ hours} =$  \_\_\_\_\_ minutes  
 A. 1,440                              B. 25.5                              C. 61.5                              D. 1,441.5                              E. 1,530
9. The measure of  $\angle x$  from the picture below is equal to \_\_\_\_\_  $^\circ$ .



- A. 65                              B. 55                              C. 45                              D. 35                              E. 70
10. What is the GCF of the two numbers 112 and 154?  
 A. 6                              B. 8                              C. 14                              D. 16                              E. 22
11. How many distinct rectangles can be found in the picture below?



- A. 2                              B. 3                              C. 4                              D. 5                              E. 6
12. Lindsey wants to buy a new ipad that costs \$654. She already has \$120 in her bank account. If Lindsey saves \$89 a week, how many weeks will it take Lindsey to have enough money saved to buy the ipad?  
 A. 6                              B. 7                              C. 8                              D. 9                              E. 4

13. 28 is 14% of what number?

- A. 200                      B. 220                      C. 392                      D. 180                      E. 292

14. Find the next term in the sequence: 7, 12, 12, 24, 17, 48, 22, ...

- A. 54                      B. 27                      C. 96                      D. 120                      E. 64

15. MMIV = \_\_\_\_\_ (Arabic number)

- A. 24                      B. 240                      C. 204                      D. 2,400                      E. 2,004

16. If  $\frac{1}{6} + \frac{1}{12} + \frac{1}{20} = \frac{3}{m}$ , then find the value of  $m$ .

- A. 8                      B. 10                      C. 12                      D. 11                      E. 9

17.  $4,321 \times 9 - 1 =$  \_\_\_\_\_

- A. 38,888                      B. 48,888                      C. 28,888                      D. 58,888                      E. 36,888



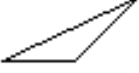

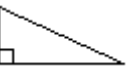
18. Marcus wants to put a 5 in.  $\times$  7 in. picture inside a frame that would give the picture a 2 inch border. What is the area of the picture frame?

- A. 35 in<sup>2</sup>                      B. 99 in<sup>2</sup>                      C. 134 in<sup>2</sup>                      D. 28 in<sup>2</sup>                      E. 64 in<sup>2</sup>

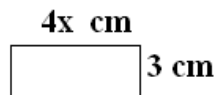
19. 2,640 feet = \_\_\_\_\_ mile(s)

- A.  $\frac{1}{4}$                       B.  $\frac{1}{2}$                       C. 1                      D.  $1\frac{1}{4}$                       E.  $1\frac{1}{2}$

20. Which triangle below is an example of an obtuse scalene triangle?

- A.                       B.                       C.                       D.                       E. 

21. The perimeter of the rectangle below is 102 cm. Find the value of  $x$ .

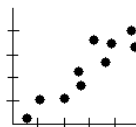


- A. 16.5                      B. 16.6                      C. 14                      D. 10.5                      E. 12

22. Find  $g(7)$ , if  $g(n) = -(-n)^2 - n$ .

- A. -56                      B. -42                      C. 42                      D. -63                      E. -21

23. The scatter plot below shows which type of correlation?



- A. positive                      B. negative                      C. symmetric                      D. no correlation                      E. diagonal

24. What is the area of a regular heptagon with a side length of 11 cm and an apothem of 8 cm?

- A. 316 cm<sup>2</sup>                      B. 412 cm<sup>2</sup>                      C. 616 cm<sup>2</sup>                      D. 308 cm<sup>2</sup>                      E. 298 cm<sup>2</sup>

25. Maria rides her bike to a friend's house 9 miles north. Maria's mom picks her up from her friend's house and travels west for 40 miles. If they drive straight home, how many miles will it take?  
A. 52 miles                      B. 41 miles                      C. 43 miles                      D. 44 miles                      E. 43.5 miles
26. What are the range values of the function  $f(x) = -x^2 - 1$ , when the domain values are  $\{-2, 0, 3\}$ ?  
A.  $\{3, -1, 8\}$                       B.  $\{-5, -1, -10\}$                       C.  $\{-5, -2, 8\}$                       D.  $\{3, -1, -10\}$                       E.  $\{5, -1, -7\}$
27.  $67_{10} = \text{_____}_4$   
A. 1300                      B. 163                      C. 16.3                      D. 1003                      E. 3100
28. How many regions in a plane are determined by four lines, no two are parallel and no three are concurrent?  
A. 10                      B. 11                      C. 12                      D. 13                      E. 14
29. How many total diagonals can be drawn in the interior of a regular pentagon?  
A. 2                      B. 3                      C. 5                      D. 8                      E. 10
30. Which of the following is the additive inverse of the number -12?  
A. -12                      B. 21                      C. -6                      D. -21                      E. 12
31. Ashish swims for 19 minutes Monday, 22 minutes Tuesday, 35 minutes Wednesday, 24 minutes Thursday and 32 minutes Friday. What was Ashish's average number of minutes swimming for the five days?  
A. 26 min 40 sec                      B. 24 min 26 sec                      C. 25 min 40 sec                      D. 25 min 22 sec                      E. 26 min 24 sec
32. What is the area of a trapezoid with bases 6 and 14 inches and a height of 10 inches?  
A.  $840 \text{ in}^2$                       B.  $100 \text{ in}^2$                       C.  $420 \text{ in}^2$                       D.  $200 \text{ in}^2$                       E.  $400 \text{ in}^2$
33. 180 meters = \_\_\_\_\_ centimeters  
A. 0.18                      B. 1.8                      C. 1,800                      D. 18,000                      E. 180,000
34.  $\frac{5}{8} = \text{_____}$  (decimal)  
A. 0.625                      B. 0.675                      C. 0.65                      D. 0.575                      E. 0.585
35. Find  $n$ , if  $(3^2)^8 = 3^n$ .  
A. 16                      B. 6                      C. 10                      D. 64                      E. 256
36. What is the probability of drawing a red six from a standard deck of cards?  
A.  $\frac{1}{16}$                       B.  $\frac{1}{26}$                       C.  $\frac{1}{2}$                       D.  $\frac{4}{52}$                       E.  $\frac{1}{13}$
37. If  $3x - 9 = 27$ , then  $5x$  is equal to \_\_\_\_\_.  
A. 12                      B. 81                      C. -81                      D. 60                      E. 36

38. How many zeroes will be in the product of  $2^5 \cdot 3 \cdot 5^8$ ?

- A. 3                      B. 8                      C. 13                      D. 5                      E. 14

39. Find  $a$ , if  $3\sqrt{160} = a\sqrt{10}$ .

- A. 48                      B. 4                      C. 12                      D. 16                      E. 19

40. What is the slope of the line with the equation  $3x - 18y = 5$ ?

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

41. Find the midpoint between the points (10, 5) and (2, -1).

- A. (12, 6)                      B. (6, 2)                      C. (6, 6)                      D. (12, -2)                      E. (2, 6)

42. What is the upper quartile for the set of numbers 28, 22, 14, 19, 20, 16 and 20?

- A. 16                      B. 20                      C. 22                      D. 26                      E. 25

43. What are the coordinates for the vertex point of the graph of the function  $f(x) = x^2 + 6x + 5$ ?

- A. (-3, -4)                      B. (-6, -4)                      C. (-6, 5)                      D. (-3, 5)                      E. (-3, -5)

44. Find the geometric mean of the numbers 6 and 24.

- A. 15                      B. 12                      C. 27                      D. 3                      E. 18

45. How many combinations can be made from 8 items taken 5 at a time?

- A. 64                      B. 72                      C. 56                      D. 24                      E. 336

46. If  $\pi = 3$ , what is the lateral surface area of a cylinder with a radius of 4 inches and a height of 13 inches?

- A.  $302 \text{ in}^2$                       B.  $408 \text{ in}^2$                       C.  $312 \text{ in}^2$                       D.  $672 \text{ in}^2$                       E.  $276 \text{ in}^2$

47. Simplify:  $-7i^2$

- A. 7                      B. -7                      C.  $\sqrt{7}$                       D.  $\sqrt{-7}$                       E.  $7i$

48. If  $3\begin{bmatrix} 3 & 11 \\ x & -5 \end{bmatrix} = \begin{bmatrix} 9 & 33 \\ -45 & -15 \end{bmatrix}$ , and  $x = 5a$ , then find the value of  $7a$ .

- A. -21                      B. 3                      C. -3                      D. -15                      E. -30

49. Find the value of  $a$ , if  $\log_a 64 = 3$ .

- A. 32                      B. 16                      C. 8                      D. 4                      E. 2

50. Solve:  $|x + 8| = 22$

- A. {14}                      B. {-14, 14}                      C. {-30, 14}                      D. {-30}                      E. {-30, 30}

2013-2014 TMSCA Middle School Mathematics Test #2 Answer Key

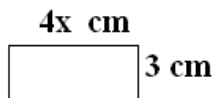
1. C	18. E	35. A
2. E	19. B	36. B
3. A	20. C	37. D
4. D	21. E	38. D
5. B	22. A	39. C
6. B	23. A	40. A
7. C	24. D	41. B
8. E	25. B	42. C
9. C	26. B	43. A
10. C	27. D	44. B
11. D	28. B	45. C
12. A	29. C	46. C
13. A	30. E	47. A
14. C	31. E	48. A
15. E	32. B	49. D
16. B	33. D	50. C
17. A	34. A	

2013-2014 TMSCA Middle School Mathematics Test #2 Selected Solutions

6. Substitute the expression  $\frac{2a+b}{1-c}$  if  $a = 3$ ,  $b = 8$  and  $c = -6$  and we get  $\frac{2(3)+8}{1-(-6)}$ . Now simplify to get  $\frac{2(3)+8}{1-(-6)} = \frac{6+8}{1+6} = \frac{14}{7} = 2$ .

15. Roman numerals are as such: I = 1, V = 5, X = 10, L = 50, C = 100, D = 500 and M = 1,000. If a smaller number is in front of a larger number, you subtract the smaller from the larger. Therefore, MMIV = M = 1,000 + M = 1,000 + IV = 5 - 1 = 4 = 2,004.

21. We are given the perimeter of the rectangle is 102 cm. From our



picture, we can see the dimensions are  $4x$  and  $3$ . Using our perimeter formula,  $P = 2l + 2w$ , we substitute to get  $2(4x) + 2(3) = 102 \rightarrow 8x + 6 = 102$ . Now we solve our equation and we get  $8x + 6 = 102 \rightarrow 8x = 96 \rightarrow x = 12$ .

35.  $(3^2)^8 = 3^{2 \cdot 8} = 3^{16}$ , therefore,  $n = 16$ .

47. Since  $i = \sqrt{-1}$ ,  $i^2 = -1$  and  $-7i^2 = -(7)(-1) = 7$ .

50. Solving an absolute value equation, after the absolute value is by itself, you must set the expression within the absolute value equal to the positive and negative number after the equal sign.  $|x+8| = 22 \rightarrow x+8 = 22$  &  $x+8 = -22$  Solving each and we get the solutions of 14 and -30. Therefore, the solution set is  $\{-30, 14\}$ .