



**TMSCA MIDDLE SCHOOL  
MATHEMATICS  
TEST #13 ©  
FEBRUARY 28, 2015**

**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]

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1.  $456 + 7,876 =$  \_\_\_\_\_ (nearest hundred)

- A. 8,000                      B. 8,100                      C. 8,200                      D. 8,300                      E. 8,230

2.  $78,990 - 45,826 =$  \_\_\_\_\_ (nearest thousand)

- A. 30,000                      B. 34,000                      C. 33,200                      D. 33,100                      E. 33,000

3.  $15\frac{2}{3} \cdot 6\frac{3}{7} =$  \_\_\_\_\_

- A.  $100\frac{6}{7}$                       B.  $100\frac{5}{7}$                       C.  $100\frac{2}{7}$                       D.  $100\frac{4}{7}$                       E.  $100\frac{3}{7}$

4.  $46.2 \div 0.4 =$  \_\_\_\_\_

- A. 118.5                      B. 120.5                      C. 115.5                      D. 110.5                      E. 112.5

5. 26% of 400 is what number?

- A. 104                      B. 106                      C. 96                      D. 110                      E. 98

6. What is the largest palindrome less than 1,345?

- A. 1,441                      B. 2,992                      C. 1,991                      D. 1,331                      E. 1,111

7.  $123,456,788 \div 9$  has a remainder of which of the following?

- A. 8                      B. 9                      C. 7                      D. 6                      E. 4

8. What is the median of the stem-and-leaf plot below?

4		4		
5		2	2	7
6		1	6	

*key: 4|4 = 44*

- A. 52                      B. 57                      C. 54.5                      D. 52.75                      E. 56.5

9. Which point below could be added to the relation  $\{(3, 4), (-7, 8), (19, 1)\}$  to not make the new relation a function?

- A. (23, 4)                      B. (5.4, 1)                      C. (1, 19)                      D. (6, 6)                      E. (3, 0)

10. The LCM of 12 and 76 is how much greater than the number 119?

- A. 101                      B. 76                      C. 107                      D. 109                      E. 43

11. Two supplementary angles have measures in the ratio of 5:31. What is the measure of the larger angle?

- A.  $135^\circ$                       B.  $25^\circ$                       C.  $155^\circ$                       D.  $115^\circ$                       E.  $140^\circ$

12. Find the next term in the sequence: 4, 5, 9, 14, 23, 37, ...

- A. 48                      B. 49                      C. 55                      D. 58                      E. 60

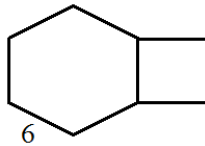
13. 4 minutes +  $\frac{1}{4}$  hour = \_\_\_\_\_ seconds

- A. 1,280                      B. 1,140                      C. 1,240                      D. 1,160                      E. 15,300

14. 450 decimeters + 67 meters = \_\_\_\_\_ decameters

- A. 112                      B. 51.7                      C. 5.17                      D. 1.12                      E. 11.2

15. A regular hexagon and a square share a common side, as in the picture below. What is the area of the square?



- A. 24 units<sup>2</sup>      B. 36 units<sup>2</sup>      C. 30 units<sup>2</sup>      D.  $6\sqrt{2}$  units<sup>2</sup>      E.  $36\sqrt{2}$  units<sup>2</sup>

16. \$16.89 = 49 \text{ pennies} + 61 \text{ nickels} + \underline{\hspace{2cm}} \text{ dimes} + 15 \text{ quarters}

- A. 96      B. 114      C. 98      D. 112      E. 106

17.  $2^5 \cdot 4^2 \cdot 6 \cdot 5^8$  has how many zeroes in its product?

- A. 7      B. 8      C. 9      D. 10      E. 12

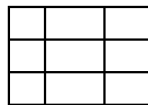
18.  $0.\overline{318} = \underline{\hspace{2cm}}$  (fraction)

- A.  $\frac{7}{22}$       B.  $\frac{9}{40}$       C.  $\frac{10}{43}$       D.  $\frac{4}{15}$       E.  $\frac{6}{19}$

19. Simplify:  $5(3n - 7) + 6(n - 1) + 3(2n + 4)$

- A.  $27n - 4$       B.  $27n - 29$       C.  $26n - 23$       D.  $19n - 4$       E.  $15n - 27$

20. How many rectangles can be found in the picture below?



- A. 48      B. 42      C. 36      D. 32      E. 28

21. A regular 12-sided polygon has how many total diagonals?

- A. 108      B. 54      C. 36      D. 18      E. 24

22. 1,920 acres =                  square miles

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

23. A hummingbird can flap its wing 250 times in  $1\frac{1}{2}$  minutes, how many times can a hummingbird flap its wings in 15 minutes?

- A. 2,000      B. 2,250      C. 2,500      D. 2,750      E. 3,000

24. What is the reciprocal of A, if  $A = 4.5 + 7\frac{3}{8}$ ?

- A.  $11\frac{5}{8}$       B.  $11\frac{7}{8}$       C.  $-11\frac{7}{8}$       D.  $\frac{8}{95}$       E.  $-\frac{8}{95}$

25.  $\{3, 6, 9, 12, 15\} \cap \{2, 4, 6, 8, 10, 12\}$  has how many subsets?

- A. 32      B. 256      C. 4      D. 512      E. 8

26. If the point  $(-5, -7)$  is rotated  $270^\circ$  counter-clockwise about the origin, what are its new coordinates?

- A.  $(-7, -5)$       B.  $(-7, 5)$       C.  $(5, -7)$       D.  $(-5, 7)$       E.  $(5, 7)$

27.  $25_7 \times 23_7 + 100_7 = \underline{\hspace{2cm}}_7$

- A. 1041                      B. 1605                      C. 1651                      D. 1061                      E. 1551

28. What is the volume of a sphere with a radius of 6 inches, letting  $\pi = 3$ ?

- A.  $864 \text{ in}^3$                       B.  $144 \text{ in}^3$                       C.  $2,592 \text{ in}^3$                       D.  $1,008 \text{ in}^3$                       E.  $720 \text{ in}^3$

29. Michelle is buying an outfit that costs \$36.40. If tax is 7.5%, how much will Michelle's total bill be?

- A. \$39.13                      B. \$39.63                      C. \$32.87                      D. \$42.26                      E. \$40.15

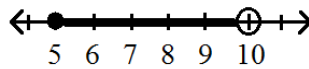
30. Nine people are in a room and must shake hands with each other exactly one time. How many handshakes will occur?

- A. 45                      B. 62                      C. 8                      D. 27                      E. 36

31. Which of the following equations has "no solution" as its solution?

- A.  $3y = 3$                       B.  $3x - 6 = -3x + 6$                       C.  $4(x - 5) = 2(2x + 1)$                       D.  $\frac{1}{2}n = 2n + 4$                       E.  $4m = 0$

32. Which inequality statement below matches the graph?



- A.  $x < 5 \text{ or } x > 10$                       B.  $5 < x \leq 10$                       C.  $x > 5 \text{ or } x < 10$                       D.  $5 \leq x < 10$                       E.  $10 \leq x < 5$

33. What is the 61<sup>st</sup> term in the sequence?

-13, -11, -9, -7, ...

- A. 107                      B. 109                      C. 121                      D. 119                      E. 111

34. Calculate the percent decrease if 40 reduces to 37.

- A. 4.8%                      B. 5.2%                      C. 6.4%                      D. 6.5%                      E. 7.5%

35. Point  $B$  is the midpoint of  $\overline{AD}$  and point  $C$  is the midpoint of  $\overline{BD}$ . If the coordinates of  $B$  are (1, 8) and the coordinates of  $C$  are (4, 4), then what is the distance of  $\overline{AD}$ ?

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

36. What is the slope of the line that passes through the points (3, 7) and (18, -83)?

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

37. Find  $n$ , if  $\frac{\frac{1}{7^3}}{\frac{4}{7^3}} = 7^n$ .

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

38. What is the mean absolute deviation of the data set 47, 48, 48, 51 and 56?

- A. 1                      B. 2                      C. 2.8                      D. 3                      E. 3.8

39. Which exponential growth function below has a growth rate of 233%?

- A.  $y = 2(3.33)^x$                       B.  $y = 6(233)^x$                       C.  $y = 21(133)^x$                       D.  $y = 11(2.33)^x$                       E.  $y = 9(23.3)^x$

40. What is the area of a pentagon with its vertices located at (1, -2), (5, 3), (-1, 5), (-8, 2) and (-4, -3)?  
 A. 75 units<sup>2</sup>      B. 67 units<sup>2</sup>      C. 54 units<sup>2</sup>      D. 61 units<sup>2</sup>      E. 73 units<sup>2</sup>

41. How many combinations can be made from ten objects taken six at a time?  
 A. 210      B. 151,200      C. 132      D. 240      E. 180

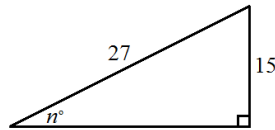
42. Simplify:  $\frac{1+\frac{1}{x}}{1-\frac{1}{x}}$   
 A.  $\frac{x-1}{x+1}$       B.  $x+1$       C.  $x-1$       D.  $\frac{x+1}{x-1}$       E.  $\frac{1}{x}-1$

43.  $(5\sqrt{8})(-3\sqrt{6}) =$  \_\_\_\_\_  
 A.  $-60\sqrt{3}$       B.  $-15\sqrt{2}$       C.  $-30\sqrt{6}$       D.  $-45\sqrt{3}$       E.  $-45\sqrt{6}$

44. What is the product of the roots of the quadratic equation  $4 = 2x^2 - 7x + 1$ ?  
 A.  $\frac{1}{2}$       B. -1.5      C. -3.5      D.  $2\frac{1}{3}$       E.  $-2\frac{1}{3}$

45. If  $f(x) = -x^2 - 2x$  and  $g(x) = \frac{1}{2}x$ , then find the value of  $f(g(f(4)))$ .  
 A. -144      B. -120      C. 48      D. -36      E. 8

46. Which expression below can be used to find the measure of  $\angle n$ ?

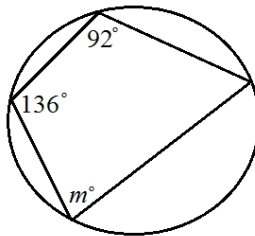


- A.  $\sin^{-1}\left(\frac{15}{27}\right)$       B.  $\cos^{-1}\left(\frac{15}{27}\right)$       C.  $\tan^{-1}\left(\frac{27}{15}\right)$       D.  $\cos^{-1}\left(\frac{27}{15}\right)$       E.  $\cos\left(\frac{15}{27}\right)$

47. A circle with an equation of  $(x + 15)^2 + (y - 7)^2 = 441$  has a circumference of which of the following, letting  $\pi = 3$ ?  
 A. 1,323 units      B. 63 units      C. 42 units      D. 126 units      E. 96 units

48. Simplify:  $\frac{\sqrt{3xy^3}\sqrt{2x^2y}}{\sqrt{6x^3y^4}}$   
 A. 1      B. -1      C. 0      D. 2      E. -2

49. Find the value of  $m$  in the picture below.



- A. 144      B. 46      C. 88      D. 76      E. 92

50. Factor completely:  $n^3 - 1$   
 A.  $(n-1)(n^2 - n + 1)$       B.  $(n+1)(n^2 - 1)$       C.  $(n+1)(n-1)^2$       D.  $(n-1)(n^2 + n + 1)$       E.  $(n-1)(n+1)^2$

2014-2015 TMSCA Middle School Mathematics Test #13 Answer Key

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

2014-2015 TMSCA Middle School Mathematics Test #13 Selected Answers

12. We are given the sequence 4, 5, 9, 14, 23, 37, ... We can see after the first two terms, to get the next you add the two previous. To get 9, 4 and 5 were added and so forth. Therefore, to get the next term in the sequence, you must add 23 and 37 to get 60.

26. Is the point  $(a, b)$  is rotated  $270^\circ$  counter-clockwise about the origin, then its new coordinates are  $(b, -a)$ . We are given the point  $(-5, -7)$  and it is rotated  $270^\circ$  counter-clockwise about the origin, so its new coordinates are  $(-7, 5)$ .

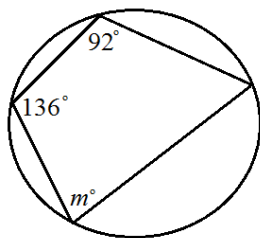
31. C.  $4(x - 5) = 2(2x + 1)$  is the answer because  $4(x - 5) = 2(2x + 1) = 4x - 20 = 4x + 2$ . Subtracting  $4x$  from both sides gives us  $-20 = 2$ , which is no solution.

42. Remember, to add or subtract fractions, you must have common denominators. Therefore,

$$\frac{1 + \frac{1}{x}}{1 - \frac{1}{x}} = \frac{\frac{x}{x} + \frac{1}{x}}{\frac{x}{x} - \frac{1}{x}} = \frac{\frac{x+1}{x}}{\frac{x-1}{x}} = \frac{x+1}{x} \div \frac{x-1}{x} = \frac{x+1}{x} \cdot \frac{x}{x-1} = \frac{x(x+1)}{x(x-1)} = \frac{x+1}{x-1}.$$

$$48. \frac{\sqrt{3xy^3}\sqrt{2x^2y}}{\sqrt{6x^3y^4}} = \frac{\sqrt{3xy^3 \cdot 2x^2y}}{\sqrt{6x^3y^4}} = \frac{\sqrt{6x^3y^4}}{\sqrt{6x^3y^4}} = 1.$$

49. If a quadrilateral is inscribed in a circle, two opposite vertices are supplementary. So, from our picture,



we see that the angle measuring  $92^\circ$  is opposite  $\angle m$ , Therefore,  
 $\angle m = 180 - 92 = 88^\circ$ .