



**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #5 ©
NOVEMBER 21 , 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.

2015 – 2016 TMSCA Middle School Mathematics Test #5

1. If you have the numbers, 5.65, 11.77, 28.9 and 6.49, what would be the sum if you rounded each number to the nearest whole number before you added them together?

- A. 52 B. 53 C. 50 D. 54 E. 51

2. $721 - 810 =$ _____

- A. 1,531 B. -111 C. -89 D. -99 E. -69

3. $5\frac{1}{5} \cdot 6\frac{1}{2} =$ _____ (decimal)

- A. 33.8 B. 30.10 C. 30.01 D. 33.6 E. 32.4

4. $3.15 \div 1.4 =$ _____ (mixed number)

- A. 2.15 B. 2.6 C. $2\frac{3}{5}$ D. $2\frac{1}{4}$ E. $2\frac{3}{10}$

5. \$11.87 = 19 quarters + 60 dimes + _____ nickels + 2 pennies.

- A. 22 B. 24 C. 36 D. 30 E. 26

6. 32 is 16% of what value?

- A. 180 B. 164 C. 160 D. 200 E. 220

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

- A. $\frac{1}{2}$ C. 0.6 C. $4.\bar{6}$ D. $\sqrt{2.25}$ E. $\sqrt{5}$

8. 1,400 kilometers = _____ centimeters

- A. 1.4 B. 140,000 C. 140,000,000 D. 14,000,000 E. 1,400,000,000

9. Simplify: $3(6x - 5) + 3$

- A. $9x - 15$ B. $9x - 12$ C. $18x - 12$ D. $18x - 5$ E. $18x - 18$

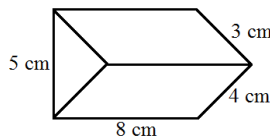
10. What is the diameter of a circle with an area of 225π units²?

- A. 112.5 units B. 15 units C. 60 units D. 30 units E. 45 units

11. What fraction of the letters of the word *MATHEMATICAL* are not consonants?

- A. $\frac{7}{12}$ B. $\frac{5}{12}$ C. $\frac{1}{3}$ D. $\frac{1}{4}$ E. $\frac{3}{5}$

12. What is the volume of the triangular prism below?



- A. 480 cm^3 B. 96 cm^3 C. 456 cm^3 D. 20 cm^3 E. 48 cm^3

13. 3 gallons = _____ quarts

- A. 36 B. 18 C. 12 D. 8 E. 6

14. Which expression below can be used to create the sequence 9.5, 10, 10.5, 11, ...?

- A. $\frac{1}{4}x + 8\frac{3}{4}$ B. $\frac{1}{3}x + 8\frac{2}{3}$ C. $\frac{1}{2}x + 9$ D. $\frac{1}{4}x + 9\frac{1}{4}$ E. $\frac{1}{2}x - 10$

15. What is the prime factorization of $4!$?

- A. $2^3 \cdot 3^2$ B. $4 \cdot 3 \cdot 2 \cdot 1$ C. $2^2 \cdot 3^2$ D. $2^3 \cdot 3$ E. $4 + 3 + 2 + 1$

16. Simplify: $4(2x + 7) - (-x - 3)$

- A. $8x + 28$ B. $9x + 4$ C. $9x + 31$ D. $9x + 25$ E. $7x + 31$

17. Let the LCM of 8 and 20 equal A . Find the sum of one-fourths of A and twelve.

- A. 22 B. 20 C. 24 D. 42 E. 13

18. Find the probability of choosing a card from a standard deck and getting a card with a ace on it.

- A. $\frac{4}{13}$ B. $\frac{1}{13}$ C. $\frac{5}{26}$ D. $\frac{11}{26}$ E. $\frac{8}{13}$

19. If the two legs of a right triangle measure 10 feet and 24 feet, what is the measure of the hypotenuse?

- A. 36 feet B. 34 feet C. 28 feet D. 26 feet E. 32 feet

20. Calculate the simple interest accumulated after depositing \$2,400 at 4.5% for 2 years.

- A. \$228 B. \$224 C. \$218 D. \$216 E. \$212

21. Find the percent of change if a quantity of 50 is increased to 62.

- A. 44% increase B. 24% increase C. 36% increase D. 28% increase E. 32% increase

22. Coach Billy has a PE class consisting of 18 girls and 15 boys. He wants to arrange the students into groups where no group has boys and girls, but only boys or only girls, and he wants the same number of members in each group. How many groups of students will Coach Billy have?

- A. 6 groups B. 5 groups C. 35 groups D. 11 groups E. 3 groups

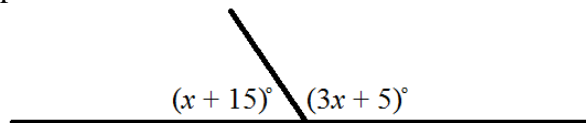
23. Simplify: $(16 \div 0.5 \div 4)^2$

- A. 64 B. 32 C. 16 D. 8 E. 4

24. A triangle has side lengths of 19 mm and 17 mm. What is the largest possible integral length of the third side of the triangle?

- A. 35 mm B. 36 mm C. 2 mm D. 1 mm E. 3 mm

25. Find the value of x using the picture below.



- A. 55 B. 40 C. 125 D. 30 E. 65

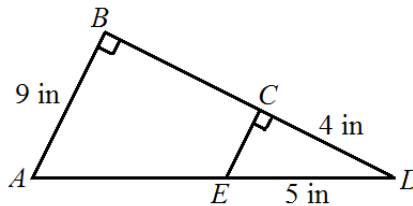
26. If the odds of it raining today are 12:17, what is the probability of it not raining today, in ratio form?

- A. 17:29 B. 12:29 C. 17:5 D. 1:5 E. 5:17

27. Find the next term in the sequence. 3.5, 14, 56, 224, ...

- A. 896 B. 298 C. 548 D. 676 E. 1,024

28. What is the slope of the line that passes through the points (4, 7) and (-8, 11)?
 A. $\frac{1}{2}$ B. -1 C. $-\frac{1}{4}$ D. -2 E. $-\frac{1}{3}$
29. Hriman has an endless supply of 4-cent and 11-cent stamps. What is the largest unattainable sum Hriman cannot create using his stamps?
 A. 15 B. 27 C. 14 D. 29 E. 43
30. The measure of an interior angle of a regular nonagon is equal to _____°.
 A. 140 B. 40 C. 135 D. 55 E. 155
31. In Lucy's recipe to make three-dozen cookies, four eggs are needed. How many eggs will Lucy need to make one-gross cookies?
 A. 18 B. 16 C. 12 D. 24 E. 20
32. Simplify: $2\sqrt{3}(2\sqrt{5} + \sqrt{7})$
 A. $4\sqrt{8} + \sqrt{14}$ B. $4\sqrt{15} + \sqrt{14}$ C. $4\sqrt{29}$ D. $4\sqrt{15} + 2\sqrt{10}$ E. $4\sqrt{15} + 2\sqrt{21}$
33. In the picture below, what is the measure of \overline{BC} ?



- A. 12 in B. 10 in C. 3 in D. 8 in E. 6 in
34. $16_9 + 41_9 = \underline{\hspace{2cm}}_{10}$
 A. 51 B. 57 C. 52 D. 55 E. 53
35. Which of the following points below does the line with the equation $3x - 4y = -24$ not pass through?
 A. (-6, 1.5) B. (0, 6) C. (-12, -3) D. (6, 10.5) E. (-8, 0.5)
36. Which exponential function below represents the situation, "The number of employees at a certain company is 140 and is increasing at a rate of 2.5% per year. How many employees will there be 7 years.?"
 A. $y = 140(0.975)^7$ B. $y = 140(2.5)^7$ C. $y = 140(1.25)^7$ D. $y = 140(3.5)^7$ E. $y = 140(1.025)^7$
37. If $\begin{bmatrix} -9 & 15 \\ -3 & 8 \end{bmatrix} + \begin{bmatrix} -7 & 19 \\ 11 & 3 \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, find the value of $ab + cd$.
 A. -456 B. 37 C. -632 D. 563 E. -563
38. How many combinations can be made from eight items taken three at a time?
 A. 336 B. 24 C. 168 D. 72 E. 56

39. A cable is stretched from the top of a 17 ft pole to the top of a 29 ft pole. If the two poles are 5 feet from each other, what is the length of the cable?

- A. 23 ft B. 12 ft C. 46 ft D. 13 ft E. 18 ft

40. What are the coordinates of the center of the circle with the equation $(x - 2)^2 + (y - 7)^2 = 64$ after it is translated to the right three units and translated up nine units?

- A. (2, 2) B. (2, 7) C. (5, 16) D. (1, 2) E. (5, -2)

41. How many zeroes are there in the solution to $2^6 \cdot 5^4$?

- A. 6 B. 4 C. 10 D. 5 E. 7

42. Find the growth rate of the exponential growth function $y = 17(1.49)^x$.

- A. 1.49% B. 49% C. 170% D. 17% E. 149%

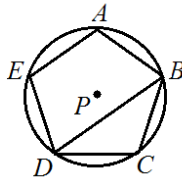
43. $\frac{2\pi}{3}$ (radians) = _____

- A. 270° B. 240° C. 150° D. 160° E. 120°

44. $16^{1.5} =$ _____

- A. 8 B. 4 C. 2 D. 32 E. 64

45. Given regular pentagon $ABCDE$ inscribed in $\odot P$ and chord \overline{DB} , what is the measure of $\angle EDB$?



- A. 108° B. 36° C. 84° D. 72° E. 98°

46. What are the roots of the quadratic equation $n^2 - 5n = 14$?

- A. $\{-2, 7\}$ B. $\{2, -7\}$ C. $\{-5, 14\}$ D. $\{-5, -14\}$ E. $\{-2\}$

47. Simplify: $\left(\frac{3m^3}{2m}\right)\left(\frac{2m^4}{m^5}\right)\left(\frac{m}{6m^{-2}}\right)$

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

48. If $f(x) = 2x^2 + 3$, then find $f(3x + 1)$.

- A. $18x^2 + 12x + 2$ B. $36x^2 + 24x + 4$ C. $36x^2 + 24x + 7$ D. $12x^2 + 6x + 5$ E. $18x^2 + 12x + 5$

49. The sum of the digits of a two-digit number is 13. If the digits are reversed, the new number is 45 more than the original number. What is the unit's digit of the original number?

- A. 4 B. 6 C. 7 D. 9 E. 3

50. Find x , if $\log_x 1,296 = 4$.

- A. 4 B. 6 C. 36 D. 18 E. 324

2015 – 2016 TMSCA Middle School Mathematics Test #5 Answer Key

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

2015 – 2016 TMSCA Middle School Mathematics Test #5 Selected Answers

13. We should know that there are four quarts in one gallon. The question is asking us to find how many quarts are in 3 gallons, so $3 \cdot 4 = 12$ quarts in 3 gallons.

15. $4! = 4 \cdot 3 \cdot 2 \cdot 1 = 24$. The prime factorization of $24 = 2^3 \cdot 3$.

37. If $\begin{bmatrix} -9 & 15 \\ -3 & 8 \end{bmatrix} + \begin{bmatrix} -7 & 19 \\ 11 & 3 \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then $\begin{bmatrix} -9 & 15 \\ -3 & 8 \end{bmatrix} + \begin{bmatrix} -7 & 19 \\ 11 & 3 \end{bmatrix} = \begin{bmatrix} -9 + (-7) & 15 + 19 \\ -3 + 11 & 8 + 3 \end{bmatrix} = \begin{bmatrix} -16 & 34 \\ 8 & 11 \end{bmatrix}$. We see that $a = -16$, $b = 34$, $c = 8$ and $d = 11$. We are asked to find the value of $ab + cd$, so we must calculate $-16 \cdot 34 + 8 \cdot 11 = -544 + 88 = -456$.

38. The formula to find the number of combinations of taking n items r at a time is ${}_nC_r = \frac{n!}{r!(n-r)!}$. We are asked to find the number of combinations of 8 items taken 3 at a time, so we must substitute into our formula, ${}_8C_3 = \frac{8!}{3!(8-3)!} = \frac{8!}{3!5!} = \frac{8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{3 \cdot 2 \cdot 1 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1} = 8 \cdot 7 = 56$ combinations.

48. Since $f(x) = 2x^2 + 3$, then $f(3x + 1) = 2(3x + 1)^2 + 3 = 2(9x^2 + 6x + 1) + 3 = 18x^2 + 12x + 2 + 3 = 18x^2 + 12x + 5$.

50. Since $\log_x 1,296 = 4$, we know that $x^4 = 1,296$. If we start with 1, we see $1^4 = 1$ and $2^4 = 16$, $3^4 = 81$, $4^4 = 256$, $5^4 = 625$ and $6^4 = 1,296$. So, we now know that $x = 6$.