

**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #5 ©
NOVEMBER 19, 2016**

GENERAL DIRECTIONS

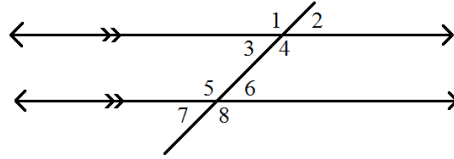
1. About this test:
 - A. You will be given 40 minutes to take this test.
 - B. There are 50 problems on this test.
2. All answers must be written on the answer sheet/Scantron form/Chatsworth card provided. If you are using an answer sheet be sure to use **BLOCK CAPITAL LETTERS**. Clean erasures are necessary for accurate grading on Scantrons and Chatsworth cards.
3. If you are using a Chatsworth or Scantron card, please follow the specific instructions given at your particular meet.
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.

1. Maya is preparing to make cookies. She has 16 ounces of flour, 24 ounces of sugar, 3 ounces of cinnamon and 19 ounces of chocolate chips. In total, how many ounces of ingredients does Maya have?
 A. 48 ounces B. 54 ounces C. 70 ounces D. 66 ounces E. 62 ounces
2. Shakira has a sheet of paper that is 14 inches long and needs to cut off $5\frac{4}{7}$ inches in order to make an origami animal. How long does the sheet of paper that Shakira needs have to be?
 A. $8\frac{3}{7}$ inches B. $19\frac{4}{7}$ C. $8\frac{4}{7}$ D. $9\frac{3}{7}$ E. $9\frac{4}{7}$
3. If you round each of the following products to the nearest hundredth, which product is the greatest?
 A. 0.23×0.16 B. 0.41×0.04 C. 0.24×0.19 D. 0.08×0.09 E. 0.1×0.3
4. Camille has 1 whole pizza and $\frac{3}{4}$ of another pizza remaining from a party and wants to divide the pizza amongst five people. How much pizza will each person receive?
 A. $\frac{5}{14}$ pizza B. $\frac{1}{5}$ pizza C. $\frac{7}{20}$ pizza D. $\frac{3}{20}$ pizza E. $\frac{3}{10}$ pizza
5. If $a = 1, b = 2, c = 3, \dots, z = 26$, what is the sum of the letters of the word *polygon*?
 A. 106 B. 111 C. 97 D. 98 E. 104
6. A survey of 200 people were asked how many hours of sleep they received each night. According to the survey, 7% of the people said they slept for 4 hours, 38% said they slept for 7 hours, 6% slept for 3 hours, 35% slept for 6 hours and 14% slept for 8 hours. How many people said they slept for 7 or more hours each night?
 A. 98 B. 28 C. 76 D. 104 E. 108
7. Sheila invited some friends over for some pizza. She can't remember if she invited the group of Becky, Lewis and Jane, the group of Becky, Lewis, Jane, John and Stephanie, or the group of Becky, Lewis, Jane, John, Stephanie and Lilly. Sheila does not eat pizza, only her friends do. Each friend will get an equal amount of pizza. To be prepared for any of the three groups to show up, what is the fewest number of slices into which Sheila must cut the pizza?
 A. 15 B. 12 C. 24 D. 30 E. 45
8. $\frac{14}{63} =$ _____ (decimal rounded to nearest hundredths)
 A. 0.20 B. 0.21 C. 0.22 D. 0.23 E. 0.24
9. What is the sum of the number of diagonals that can be drawn from one vertex of a decagon and one vertex of a pentagon?
 A. 10 B. 9 C. 8 D. 7 E. 12
10. $\$45.27 = 34$ quarters + 128 dimes + _____ nickels + 97 pennies.
 A. 350 B. 460 C. 450 D. 280 E. 520
11. If $m \otimes n = m(n + 17)$, then find the value of $(5 \otimes (2 \otimes 3))$.
 A. 225 B. 285 C. 195 D. 255 E. 315
12. How much greater is the LCM than the GCF of the numbers 44 and 100?
 A. 1,440 B. 1,100 C. 4,400 D. 4,396 E. 1,096
13. \overline{BD} bisects $\angle ABC$ and $m\angle ABD = 63.4^\circ$. What is the measure of $\angle ABC$?
 A. 31.7° B. 116.6° C. 126.6° D. 126.8° E. 116.8°

14. Clara has a bag that contains 8 red marbles, 7 green marbles and 10 white marbles. What is the probability of Clara choosing a red or green marble at random?

- A. 40% B. 60% C. 50% D. 70% E. 80%

15. If the measure of $\angle 2$ is equal to the complement of an angle measuring 41° , then what is the sum of the measure of $\angle 1$ and twice the measure of $\angle 7$?



- A. 229° B. 311° C. 147° D. 139° E. 278°

16. Steven deposits \$560 into a simple interest account for 12 years at 4.5%. How much money will be in Steven's account after the 12 years?

- A. \$320.40 B. \$302.40 C. \$842.40 D. \$862.40 E. \$922.40

17. Simplify: $3y^3 \cdot 2y^{-4} \cdot 2y^0 \cdot y$

- A. $6y^2$ B. $6y$ C. $12y^2$ D. $12y$ E. 12

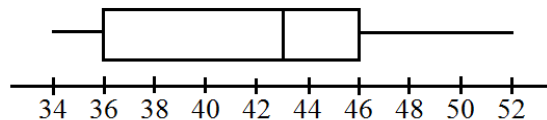
18. What is the sum of the 8th and 12th terms of the sequence? 0, 1, 1, 2, 3, 5, ...

- A. 102 B. 109 C. 111 D. 117 E. 114

19. What is the positive difference in the total number of degrees of a regular heptagon and a regular pentagon?

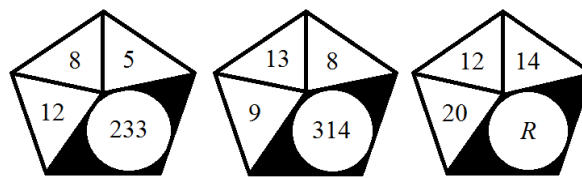
- A. 180° B. 150° C. 270° D. 360° E. 720°

20. Which set(s) of numbers best represents the box-and-whisker plot below?



- I. {46, 40, 52, 36, 44, 43, 34} II. {34, 47, 48, 43, 52, 40, 42} III. {34, 36, 43, 46, 52, 50, 51} IV. {43, 34, 34, 36, 52, 48, 44}
- A. I and II B. I only C. III only D. II and III E. I and IV

21. Use the examples below to find the value of R .



- A. 680 B. 720 C. 860 D. 740 E. 900

22. Which of the following are not solutions to the inequality $-12x - 2 < 9x + 19$?

- I. -3 II. -1 III. 17 IV. 0
- A. I and II B. III and IV C. I only D. III only E. III and IV

23. 50% of $\frac{1}{3}$ of 20% of 12,000,000,000 = _____ (scientific notation)

- A. 3×10^8 B. 4×10^8 C. 4×10^9 D. 2×10^9 E. 2×10^8

24. $324_5 = \text{_____}_{10}$

- A. 76 B. 62 C. 89 D. 78 E. 94

25. Jessie is buying a new cell phone for \$76.00. If the phone is on sale for 20% off and there is a 5% tax, how much will Jessie pay at the register of the store where she is buying the phone?

- A. \$63.84 B. \$91.96 C. \$60.04 D. \$61.58 E. \$62.64

26. To train for her marathon, Jana jogged 8 miles on Monday, 7 miles on Tuesday, 6 miles on Wednesday and 12 miles on Thursday. How many miles must Jana jog on Friday to have an average of 9 miles jogged for the five days?

- A. 9 miles B. 10 miles C. 11 miles D. 12 miles E. 14 miles

27. Mark has a bag of 40 marbles that are either yellow or green. There are twice as many yellow marbles as one-third the number of green marbles. How many yellow marbles are in Mark's bag?

- A. 24 B. 18 C. 36 D. 32 E. 16

28. If $\pi = 3$, let the area of a circle with a diameter of 8 inches be equal to A . Let B be equal to the area of a rectangle with a width of 9 inches and a height one-third its width. Find the value of $A - B$.

- A. 37 B. 24 C. 21 D. 165 E. 51

29. Given $a = 5$ and $b = -2$, find x if $x = \left(\frac{1}{a} - \frac{1}{b}\right) \div \left(\frac{2}{4a} - \frac{2}{4b}\right)$.

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

30. On a map, an 8 cm length represents 50 miles. How many miles does a 21 cm length represent?

- A. $131\frac{1}{4}$ miles B. $150\frac{1}{2}$ miles C. $156\frac{3}{4}$ miles D. $127\frac{3}{4}$ miles E. $137\frac{1}{4}$ miles

31. Eight friends went to *Wetter the Better Splashway*. Each person had to pay an entrance fee plus \$5.50 for a meal. The total cost of the trip of all the friends was \$260. How much did each person pay to get into *Wetter the Better Splashway*?

- A. \$42 B. \$33 C. \$27 D. \$21 E. \$24

32. What is the height of an equilateral triangle with a side length of 10 inches?

- A. 5 inches B. $5\sqrt{3}$ inches C. $10\sqrt{2}$ inches D. $10\sqrt{3}$ inches E. $5\sqrt{2}$ inches

33. If $f(x) = 4x - 7$, $g(x) = -x^2$ and $h(x) = 7 - x$, find the value of $g(-5) - f(11) + h(-3)$.

- A. -16 B. -36 C. -79 D. -48 E. -52

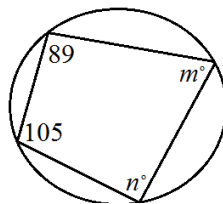
34. If 3 zig-zigs are equal to 5 wig-zigs, and 8 wig-zigs are equal to 4 zag-zigs, how many zig-zigs are equal to 20 zag-zigs?

- A. 18 B. 20 C. 22 D. 24 E. 28

35. Mark, Lucy, Michelle, Steve, Ahmed and Cai are on a team for a three-on-three basketball tournament. If only three of the friends can play at a time, in how many ways can a team of three be formed from the friends?

- A. 8 B. 9 C. 60 D. 12 E. 20

36. Using the picture below, what is the value of $2m - 3n$?



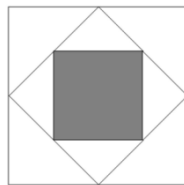
- A. -75 B. -91 C. -123 D. -166 E. -194

37. The expression $\sqrt{8}(\sqrt{18} + \sqrt{2})$ is twenty-three more than which value?

- A. -7 B. $-7\sqrt{2}$ C. 16 D. $16\sqrt{2}$ E. $-21\sqrt{7}$

38. If $(4x - 7)^2 = ax^2 + bx + c$, then find the value of $a + b + c$.
 A. -56 B. 9 C. -89 D. 37 E. 61
39. Let A equal the measure of the supplement of an angle measuring 76° . What is the measure of A in radians?
 A. $\frac{26\pi}{45}$ B. $\frac{19\pi}{45}$ C. $\frac{23\pi}{45}$ D. $\frac{3\pi}{5}$ E. $\frac{7\pi}{15}$
40. A rabbit population of 2,000 increases at a rate of 50% each year. How many rabbits will there be after 3 years?
 A. 5,450 B. 6,250 C. 6,750 D. 6,500 E. 7,250
41. Three distinct integers have a sum of 1 and a product of 36. What value is ten more than the least integer?
 A. 7 B. 13 C. 8 D. 14 E. 3
42. At Latoya's birthday party, one-half of her guests drank punch and seven-sixteenths drank lemonade. 4 guests drank neither punch nor lemonade and no guest drank both drinks. How many guests attended Latoya's birthday party?
 A. 76 B. 80 C. 84 D. 48 E. 64

43. In the picture below, we see a small shaded square inscribed in a larger square and then that larger square inscribed into an even larger square. If the vertices of each smaller square lie at the midpoint of the larger square's side that it is inscribed in, what fractional part of the largest square is not shaded?



- A. $\frac{3}{4}$ B. $\frac{1}{2}$ C. $\frac{1}{4}$ D. $\frac{3}{8}$ E. $\frac{5}{8}$
44. If $xy = 4$ and $x^2 + 9y^2 = 10$, then $(x + 3y)^2$ is equal to which of the following?
 A. 34 B. 16 C. 40 D. 24 E. 10
45. A triangle has its vertices located at $(5, 8)$, $(5, -2)$ and $(29, -2)$. If the triangle is dilated by a scale factor of $\frac{1}{2}$, then what is the new perimeter of the triangle?
 A. 34 units B. 37 units C. 36 units D. 30 units E. 32 units
46. What is the surface area of a cube with a side length of $4n^3$?
 A. $16n^9$ B. $64n^6$ C. $64n^9$ D. $96n^6$ E. $96n^9$
47. Find the value of m if the slope between the points $(8, 3)$ and $(m, -1)$ is $\frac{1}{3}$.
 A. -3 B. -5 C. -1 D. -2 E. -4
48. What is the perimeter of a regular octagon whose side length is one-fifth the length of the diameter of the circle with the equation $(x + 2)^2 + (y - 8)^2 = 256$?
 A. 160 units B. 51.2 units C. 44.8 units D. 104 units E. 102.4 units
49. What is the area of the quadrilateral with vertices located at $(7, 1)$, $(-1, 4)$, $(-5, -2)$ and $(2, -5)$?
 A. 56.25 units^2 B. 56.5 units^2 C. 58.5 units^2 D. 108.25 units^2 E. 117 units^2
50. Ahmad is using *Plants for Your Yard* landscaping company to buy trees for his acreage. If he buys 13 oak trees and 4 pine trees, his cost is \$487. If he buys 4 oak trees and 10 pine trees, his cost is \$562. Melissa wants to use *Plants for Your Yard*, but only wants to buy 1 oak tree and 1 pine tree. What will her cost be?
 A. \$84 B. \$90 C. \$112 D. \$58 E. \$70

2016 – 2017 TMSCA Middle School Mathematics Test #5 Answer Key

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

17. $3y^3 \cdot 2y^{-4} \cdot 2y^0 \cdot y = 3 \cdot 2 \cdot 2 \cdot y^{3+(-4)+0+1} = 12y^0 = 12.$

29. If $a = 5$ and $b = -2$, then $x = \left(\frac{1}{5} - \frac{1}{-2}\right) \div \left(\frac{2}{4(5)} - \frac{2}{4(-2)}\right) \cdot \left(\frac{1}{5} - \frac{1}{-2}\right) = \frac{7}{10}$ and $\left(\frac{2}{4(5)} - \frac{2}{4(-2)}\right) = \frac{7}{20}$. Thus, $\frac{7}{10} \div \frac{7}{20} = \frac{7}{10} \cdot \frac{20}{7} = 2.$

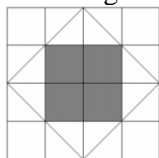
35. This is a combinations problem of 6 choose 3. Combinations can be found by $\frac{n!}{r!(n-r)!}$ Where n equals the total number of objects and r is equal to the number we are choosing from the total. So, $\frac{6!}{3!(3!)} = 20.$

36. If a quadrilateral is inscribed in a circle, then the opposite angles are supplementary. Therefore, m is equal to $180 - 105 = 75$ and n is equal to $180 - 89 = 91$. Now, $2m - 3n = 2(75) - 3(91) = -123.$

37. $\sqrt{8}(\sqrt{18} + \sqrt{2}) = 2\sqrt{2}(3\sqrt{2} + \sqrt{2}) = 2\sqrt{2}(4\sqrt{2}) = 8 \cdot 2 = 16.$ Since 16 is 23 more than a number, subtract 23 from 16 to get -7. 16 is 23 more than -7.

42. We know that $\frac{1}{2} + \frac{7}{16} = \frac{8}{16} + \frac{7}{16} = \frac{15}{16}$. This means that $\frac{15}{16}$ of Latoya's guests drank punch or lemonade and that $\frac{1}{16}$ drank neither. Since it was given that 4 guests drank neither, we need to solve the equation $\frac{1}{16}x = 4$. Multiplying both sides by 16 and we get 64. There were 64 guests at Latoya's birthday party.

43. Using the information we are given, we can draw the picture:



We see that there are a total of 16 small squares. Now, counting only the small squares, we see that 4 are shaded, leaving 12 that are not. $\frac{12}{16} = \frac{3}{4}$ of the largest square that is unshaded.

44. First, we multiply out $(x + 3y)^2$. $(x + 3y)^2 = (x + 3y)(x + 3y) = x^2 + 3yx + 3xy + 9y^2 = x^2 + 6xy + 9y^2$. It was given that $xy = 4$ and $x^2 + 9y^2 = 10$. We can rewrite $x^2 + 6xy + 9y^2$ as $x^2 + 9y^2 + 6xy$ and substituting gives us $10 + 6(4) = 10 + 24 = 34.$

45. The slope between the points $(5, 8)$ and $(5, -2) =$ undefined, meaning it is a vertical line. The slope between the points $(5, -2)$ and $(29, -2)$ is 0, meaning it is a horizontal line. Therefore, we have a right triangle since two slopes are perpendicular of each other. The vertical distance from $(5, 8)$ to $(5, -2)$ is 10 units. The horizontal distance from $(5, -2)$ to $(29, -2)$ is 24 units. Multiplying each by the scale factor of

$\frac{1}{2}$, and we get 5 and 12 units. Since these are the legs of the right triangle, you can use the Pythagorean theorem to calculate the third side and get 13. The perimeter is now $5 + 12 + 13 = 30$ units.