

**TMSCA MIDDLE SCHOOL  
MATHEMATICS  
TEST #7 ©  
JANUARY 12, 2019**

**GENERAL DIRECTIONS**

- About this test:
  - You will be given 40 minutes to take this test.
  - There are 50 problems on this test.
- 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.
- If you are using a Chatsworth or Scantron card, please follow the specific instructions given at your particular meet.
- You may write anywhere on the test itself. You must write only answers on the answer sheet.
- You may use additional scratch paper provided by the contest director.
- All problems have **ONE** and **ONLY ONE** correct [BEST] answer. There is a penalty for all incorrect answers.
- Calculators **MAY NOT** be used on this test.
- 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.
- In case of ties, percent accuracy will be used as a tie breaker.



1.  $900.7 + 11.9 + (-367.1) =$  \_\_\_\_\_  
 A. 545.5                      B. 1,297.7                      C. 1,279.7                      D. 1,255.9                      E. 533.6

2.  $-14\frac{3}{8} - (-8\frac{7}{8}) =$  \_\_\_\_\_  
 A.  $-23\frac{1}{4}$                       B.  $-22\frac{1}{4}$                       C.  $-5\frac{1}{2}$                       D.  $-6\frac{1}{2}$                       E.  $-6\frac{1}{4}$

3.  $9.8 \times 6.4 =$  \_\_\_\_\_ (nearest integer)  
 A. 62                      B. 63                      C. 60                      D. 64                      E. 61

4.  $27\frac{1}{2} \div \frac{1}{4} =$  \_\_\_\_\_  
 A. 110                      B. 27.75                      C. 110.25                      D. 110.75                      E. 110.5

5. What is the greatest integer less than  $\frac{34}{5}$ ?  
 A. 29                      B. 6                      C. 7                      D. 39                      E. 5

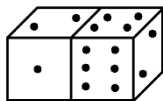
6. What is the LCM of the numbers 36 and 42?  
 A. 252                      B. 1,512                      C. 756                      D. 378                      E. 6

7. Simplify:  $\frac{3}{4}(3^0 \cdot 4^2) - (-5)^2$   
 A. -13                      B. 22                      C. 25                      D. -9                      E. 11

8. Stephanie has fifteen quarters, twelve dimes, eight nickels and thirteen pennies. Jacob has fourteen quarters, twenty-three dimes, nine nickels and fifteen pennies. How much more money does Jacob have than Stephanie?  
 A. \$1.22                      B. \$1.02                      C. \$1.12                      D. \$0.92                      E. \$0.82

9. Marcus has all the letters of the alphabet written on separate cards inside of a bag. He reaches inside the bag to draw out one card. What is the probability the card chosen is a vowel?  
 A.  $\frac{3}{13}$                       B.  $\frac{5}{26}$                       C.  $\frac{3}{10}$                       D.  $\frac{1}{5}$                       E.  $\frac{1}{6}$

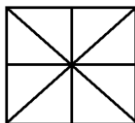
10. A pair of dice was rolled and they land side-by-side as shown below. If each face represents the value of the number of dots on it, what is the product of the values of the faces not shown,?



A. 5,400                      B. 3,600                      C. 96                      D. 2,880                      E. 1,440

11. 3 pints = \_\_\_\_\_ ounces  
 A. 96                      B. 36                      C. 72                      D. 48                      E. 54

12. How many triangles can be found in the picture below?



A. 16                      B. 8                      C. 20                      D. 14                      E. 12

13. What is the sum of all the positive integral divisors greater than 15 but less than 170 of the number 165?  
 A. 279                      B. 268                      C. 264                      D. 253                      E. 288

14. What is the sum of the reciprocals of the numbers 11 and 13?

- A.  $\frac{15}{143}$                       B.  $\frac{34}{143}$                       C.  $\frac{1}{11}$                       D.  $\frac{1}{13}$                       E.  $\frac{24}{143}$

15. MMDCLIX + MLVII + DXLIV = \_\_\_\_\_ (Arabic number)

- A. 4,180                      B. 4,260                      C. 4,320                      D. 4,140                      E. 4,120

16. Find  $a - b + c - d$ , if  $2,040 = 2^a \cdot 3^b \cdot 5^c \cdot 17^d$ .

- A. 2                      B. 3                      C. 5                      D. 4                      E. 6

17. Which expressions below have the same sum?

- I.  $76 + (-14)$                       II.  $-23 + 85$                       III.  $-45 + (-17)$                       IV.  $88 + (-16)$   
 A. I, II and III                      B. I, II and IV                      C. III and IV                      D. I and III                      E. I and II

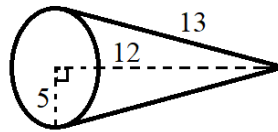
18. Marsha ran from her house to Emily’s house in 15 minutes. It took Miranda six minutes less to ride her bike from her house to Emily’s house. How many more seconds did it take Marsha to run to Emily’s house than it took Miranda to ride her bike to Emily’s house?

- A. 480                      B. 900                      C. 540                      D. 360                      E. 240

19. What is the value of  $\frac{1}{3}n - 3$ , if  $\frac{12}{23} = \frac{n}{138}$ ?

- A. 15                      B. 1                      C. 43                      D. 21                      E. 18

20. The formula to find the volume of a cone is  $V = \frac{1}{3}Bh$ , where  $B$  is the area of the base and  $h$  is the height of the cone. What is the volume of the cone? Let  $\pi = 3$ .



- A. 250 units<sup>3</sup>                      B. 300 units<sup>3</sup>                      C. 200 units<sup>3</sup>                      D. 325 units<sup>3</sup>                      E. 225 units<sup>3</sup>

21. An adult ticket to *Silly Splashes* costs \$24.00. A child ticket costs 40% cheaper than an adult ticket. How much would a father, mother and their three children cost to get in to *Silly Splashes*?

- A. \$91.20                      B. \$79.60                      C. \$83.40                      D. \$120.80                      E. \$95.10

22. If  $\frac{3}{8} = \frac{A}{48} = \frac{36}{B} = \frac{63}{C}$ , then what is the value of  $A + B - C$ ?

- A. -54                      B. -82                      C. -106                      D. -46                      E. -90

23. What is the surface area of a cube that has a volume of 216 cm<sup>3</sup>?

- A. 216 cm<sup>2</sup>                      B. 512 cm<sup>2</sup>                      C. 144 cm<sup>2</sup>                      D. 1,296 cm<sup>2</sup>                      E. 324 cm<sup>2</sup>

24. Ashley, Becky and Caroline has a total of 66 bracelets. Ashley and Becky have a total of 41 bracelets. Becky and Caroline have a total of 42 bracelets. How many bracelets does Becky have?

- A. 15                      B. 23                      C. 19                      D. 17                      E. 21

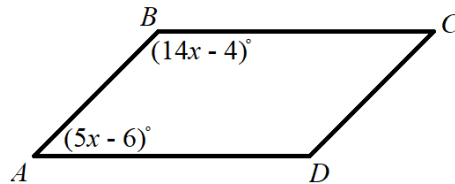
25. Shayna visited her uncle in Germany. At the time, the American dollar was equivalent to  $\frac{3}{4}$  of the Euro. Shayna bought a skirt that cost her twenty-four Euros. How much would the skirt be in American dollars?

- A. \$28.00                      B. \$32.00                      C. \$18.00                      D. \$36.00                      E. \$42.00

26. Angelique collected 13 seashells in 24 minutes. At this rate how many seashells can Angelique collect in two hours?

- A. 37 seashells                      B. 52 seashells                      C. 78 seashells                      D. 72 seashells                      E. 65 seashells

27. What is the measure of an interior angle of a regular nonagon?  
 A.  $108^\circ$                       B.  $140^\circ$                       C.  $135^\circ$                       D.  $160^\circ$                       E.  $124^\circ$
28. Andy has an average of 88 after taking 5 tests. What is the lowest possible score Andy could have made on any one test?  
 A. 35                                  B. 45                                  C. 30                                  D. 50                                  E. 40
29. If  $A = \{2, 4, 6, 8\}$ , two-digit integers can be formed using elements of  $A$ . How many distinct two-digit integers can be formed, none of which have repeating digits?  
 A. 9                                      B. 8                                      C. 12                                      D. 16                                      E. 6
30. What is the rate of decay of the exponential decay function  $y = 6\left(\frac{7}{8}\right)^x$ ?  
 A. 12.5%                              B. 87.5%                              C. 51.25%                              D. 6%                                      E. 0.06%
31. If  $h(x) = x^2 \div \frac{1}{2} - 10$ , then what is the value of  $h\left(\frac{5}{2}\right)$ ?  
 A.  $\frac{5}{2}$                                       B.  $\frac{25}{8}$                                       C.  $\frac{25}{4}$                                       D.  $\frac{4}{25}$                                       E.  $-10\frac{4}{25}$
32. How many integers make the inequality  $n^2 \leq 15$  true?  
 A. 7                                      B. 3                                      C. 4                                      D. 15                                      E. 30
33.  $ABCD$  is a parallelogram. Find  $m\angle D$ .



- A.  $136^\circ$                               B.  $44^\circ$                               C.  $88^\circ$                               D.  $176^\circ$                               E.  $142^\circ$
34. How many zeros will the product of  $1^1 \times 2^2 \times 3^3 \times 4^4 \times 5^5$  end with?  
 A. 10                                      B. 7                                      C. 5                                      D. 4                                      E. 2
35. The side length of a square is  $3\sqrt{6}$  cm. What is the measure of the square's diagonal?  
 A.  $6\sqrt{6}$  cm                              B.  $6\sqrt{3}$  cm                              C.  $4\sqrt{2}$  cm                              D.  $4\sqrt{6}$  cm                              E.  $5\sqrt{3}$  cm
36. Sasheem has four different colored marbles. One is red, one is blue, one is green and one is purple. Sasheem has four cups, each cup the same color as one of the marbles. If Sasheem closes his eyes and places one marble in each cup, what is the probability he places each marble in the same color of cup?  
 A.  $\frac{1}{16}$                                       B.  $\frac{1}{256}$                                       C.  $\frac{1}{24}$                                       D.  $\frac{1}{32}$                                       E.  $\frac{1}{4}$
37. Belinda is buying a shirt for \$18.00, two pairs of shoes for \$72.00 each and a skirt for \$45.00. If the tax rate is 7%, what will Belinda's total bill be?  
 A. \$207.00                              B. \$219.42                              C. \$144.45                              D. \$223.59                              E. \$221.49
38. How many sides does a convex polygon with 77 diagonals have?  
 A. 12                                      B. 18                                      C. 16                                      D. 10                                      E. 14
39. What is the 101<sup>st</sup> term of the sequence? 96, 94, 92, 90, ...  
 A. -104                                      B. -102                                      C. -106                                      D. -110                                      E. -108

40.  $3\sqrt{8}(\sqrt{50} + 2\sqrt{18}) =$  \_\_\_\_\_

- A. 124                      B. 136                      C. 112                      D. 132                      E. 162

41. Solve for y:  $\sqrt{\frac{y}{4}} = \sqrt{y+3}$

- A. 12                      B. -12                      C. 8                      D. -4                      E. -16

42.  $\frac{4}{3}\pi$  radians is equivalent to which of the following in degrees?

- A.  $135^\circ$                       B.  $240^\circ$                       C.  $45^\circ$                       D.  $115^\circ$                       E.  $215^\circ$

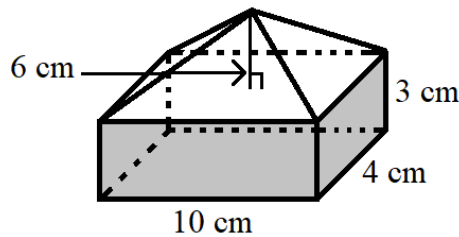
43. If  $x + y = 9$  and  $xy = 4$ , what is the value of  $x^2 + y^2$ ?

- A. 77                      B. 14                      C. 10                      D. 65                      E. 73

44. Which of the following lines is the circle with equation  $(x - 16)^2 + (y - 9)^2 = 36$  not tangent to?

- A.  $x = 10$                       B.  $y = 15$                       C.  $x = 22$                       D.  $y = 10$                       E.  $y = 3$

45. What is the volume of the figure?



- A.  $120 \text{ cm}^3$                       B.  $240 \text{ cm}^3$                       C.  $160 \text{ cm}^3$                       D.  $140 \text{ cm}^3$                       E.  $200 \text{ cm}^3$

46.  $\log_7\left(\frac{x}{y^3}\right)$  is equivalent to \_\_\_\_\_.

- A.  $\log_7(x \cdot y^3)$                       B.  $3 \log_7\left(\frac{x}{y}\right)$                       C.  $\log_7 x - 3 \log_7 y$                       D.  $x \log_7 y^3$                       E.  $3(\log_7 x - \log_7 y)$

47. Willis measured the central angle of a regular pentagon to be  $84^\circ$ . By how many degrees was Willis away from the correct measure of the central angle of a regular pentagon?

- A.  $12^\circ$                       B.  $16^\circ$                       C.  $8^\circ$                       D.  $14^\circ$                       E.  $6^\circ$

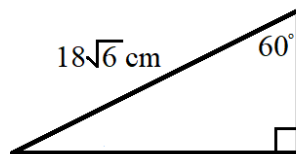
48. What are all the real values of  $x$  which satisfy  $\sqrt{1 \cdot 3 \cdot 9 \cdot 3 \cdot 1} = x^2$ ?

- A.  $\{3\}$                       B.  $\{\pm 3\}$                       C.  $\{-3\}$                       D.  $\{9\}$                       E.  $\{\pm 9\}$

49. If  $\frac{\frac{1}{2} + \frac{1}{3} + \frac{1}{4}}{\frac{1}{2} + \frac{1}{3} + \frac{1}{6}} = \frac{A}{B}$ , what is the value of  $B - A$ ?

- A. 1                      B. 2                      C. 3                      D. 4                      E. 5

50. What is the measure of the longest leg of the triangle?



- A.  $27\sqrt{2} \text{ cm}$                       B.  $9\sqrt{6} \text{ cm}$                       C.  $27\sqrt{6} \text{ cm}$                       D.  $18\sqrt{3} \text{ cm}$                       E.  $18\sqrt{2} \text{ cm}$

2018 – 2019 TMSCA Middle School Mathematics Test #7 Answer Key

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

2018-2019 TMSCA Middle School Mathematics Test #7 Selected Answers

11. Since 1 pint = 16 ounces, 3 pints =  $3 \times 16 = 48$  ounces.

23. The volume of a cube can be found using the formula  $V = s^3$ . Since the cube has a volume of  $216 \text{ cm}^3$ , the side length is  $\sqrt[3]{216} = 6 \text{ cm}$ . The formula to find the surface area of a cube is  $SA = 6s^2$ . Substituting into the formula and we get  $SA = 6s^2 = 6(6^2) = 6(36) = 216 \text{ cm}^2$ .

32. There are 7 integers that make the inequality  $n^2 \leq 15$  true. They are  $-3, -2, -1, 0, 1, 2$  and  $3$ .

33. In a parallelogram, consecutive interior angles are supplementary. From the picture given, then  $14x - 4 + 5x - 6 = 180$  and simplify to get  $19x - 10 = 180$ . Add 10 to both sides to get  $19x = 190$  and solve to get  $x = 10$ . Also in a parallelogram, opposite angles are congruent. This means  $m\angle B = m\angle D$ . Since  $m\angle B = 14x - 4 = 14(10) - 4 = 140 - 4 = 136$ , then  $m\angle D = 136^\circ$ .

36. Since there are four marbles, each a different color, then there are  $4! = 24$  ways of arranging them in order. Of those combinations, only 1 will be the correct order of matching a marble with its correct color cup.

Therefore, there is a probability of  $\frac{1}{24}$  Sasheem places each colored marble in its correct color of cup.

37.  $\$18.00 + 2 \times \$72.00 + \$45.00 = \$207$ . Since there is a tax rate of 7%,  $207(1.07) = \$221.49$ .

38. To find the total number of diagonals that can be drawn inside a regular polygon, use the formula  $\frac{n(n-3)}{2}$ . Since we know the number of diagonals, work backwards.  $77 = \frac{n(n-3)}{2}$ . Multiply both sides by 2 and the result is  $154 = n(n-3)$ . This gives us  $n^2 - 3n = 154$ , and after moving 154 to the left side and  $n^2 - 3n - 154 = 0$ . This factors to  $(n+11)(n-14) = 0$ . After solving each equation, we get  $n = -11$  and  $14$ . A polygon cannot have a negative number of sides, so a regular polygon with 77 diagonals has 14 sides.

41. Given  $\sqrt{\frac{y}{4}} = \sqrt{y+3}$ , square both sides and  $\left(\sqrt{\frac{y}{4}}\right)^2 = (\sqrt{y+3})^2$  gives us  $\frac{y}{4} = y+3$ . Multiply both sides by 4 and we get  $y = 4y + 12$ . Subtract  $4y$  from both sides and  $-3y = 12$ . Divide both sides by  $-3$  and  $y = -4$ .

42. To change a radian measure to a degree measure, multiply the radian measure by  $\frac{180}{\pi}$ . Therefore,  $\frac{4}{3}\pi \cdot \frac{180}{\pi} = \frac{4(180)\pi}{3\pi} = 4(60) = 240^\circ$ .

43. If  $x + y = 9$ , then  $(x + y)^2 = 9^2$  and  $x^2 + 2xy + y^2 = 81$ . Since  $xy = 4$ ,  $2xy = 8$ . Substituting 8 for  $xy$ , then  $x^2 + 8 + y^2 = 81$ . Subtract 8 from both sides of the equation and  $x^2 + y^2 = 73$ .

47. To find the central angle of a regular polygon, use  $\frac{360}{n}$ , where  $n$  is equal to the number of sides of the polygon. A pentagon has 5 sides, so the central angle of a regular pentagon is  $\frac{360}{5} = 72^\circ$ . Willis measured the central angle of a regular pentagon to be  $84^\circ$ , which is  $84 - 72 = 12$  from the correct measure.