

**TMSCA MIDDLE SCHOOL  
MATHEMATICS  
TEST #7 ©  
JANUARY 14, 2017**

**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. Which expression below produces the smallest sum?

- A.  $-19 + (-519)$       B.  $-711 + 258$       C.  $-1 + (-478)$       D.  $-345 + (-179)$       E.  $-100 + (-411)$

2. Cynthia loves chocolates. She goes to the store and buys 54 chocolate candies. If Cynthia gives a third of her candies away and then eats 19 pieces, how many chocolate candies does Cynthia have remaining?

- A. 21      B. 17      C. 37      D. 13      E. 23

3.  $48 \div 0.12 \div 0.4 =$  \_\_\_\_\_

- A. 1      B. 0.01      C. 100      D. 10      E. 1,000

4. Melanie wants to find the product of the numbers  $5\frac{2}{3}$ , 1.25 and  $3\frac{6}{12}$ . What will be Melanie's product?

- A.  $19\frac{23}{24}$       B.  $11\frac{1}{3}$       C.  $24\frac{19}{24}$       D.  $23\frac{23}{24}$       E.  $28\frac{5}{12}$

5. Myra watches a movie that lasts 2.2 hours. Henry watches a movie that lasts 196 minutes. How much longer is Henry's movie than Myra's movie?

- A.  $1\frac{1}{15}$  hrs.      B.  $1\frac{7}{30}$  hrs.      C. 54 minutes      D. 34 minutes      E.  $1\frac{2}{5}$  hrs.

6. What is the product of the number of vertices and edges of a pentagonal prism?

- A. 70      B. 150      C. 1,050      D. 105      E. 140

7.  $0.\overline{234} =$  \_\_\_\_\_ (fraction)

- A.  $\frac{13}{55}$       B.  $\frac{13}{50}$       C.  $\frac{26}{99}$       D.  $\frac{26}{111}$       E.  $\frac{79}{333}$

8. If  $a = 1, b = 2, c = 3, \dots, z = 26$ , what is the sum of the letters of the word *quadratic*?

- A. 94      B. 88      C. 96      D. 87      E. 95

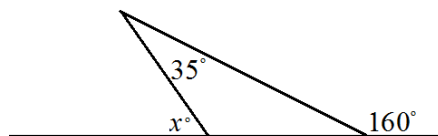
9. Two pages that face each other in a book have 377 as the sum of their page numbers. What is the product of these page numbers?

- A. 35,532      B. 35,344      C. 34,969      D. 35,721      E. 34,596

10.  $\angle 1$  and  $\angle 2$  are vertical angles. Classify  $\angle 1$  if  $m\angle 1 = (10x - 20)^\circ$  and  $m\angle 2 = (8x + 2)^\circ$ .

- A. acute      B. obtuse      C. right      D. straight      E. apex

11. Using the picture below, find the value of one-half of  $x$ .



- A. 17.5      B. 35      C. 55      D. 27.5      E. 37.5

12.  $14,000,000,000,000 \div 0.2 =$  \_\_\_\_\_ (scientific notation)

- A.  $7 \times 10^{13}$       B.  $7 \times 10^{12}$       C.  $7 \times 10^{11}$       D.  $7 \times 10^{10}$       E.  $7 \times 10^{14}$

13. 24% of 700 = 60% of what value?

- A. 280      B. 420      C. 360      D. 320      E. 240

14. If  $a\Delta b = a^2 - 7ab$ , then find the value of  $\left(\left((-1)\Delta 3\right)\Delta 6\right)$ .

- A. -280      B. -360      C. -440      D. -520      E. -260

15. Shayna wants to color half of the rectangle she drew in the color yellow. Her rectangle measure 8 inches by 1.5 feet. What is the area of the rectangle Shayna will color yellow?

- A.  $18 \text{ in}^2$       B.  $12 \text{ in}^2$       C.  $6 \text{ in}^2$       D.  $144 \text{ in}^2$       E.  $72 \text{ in}^2$

16. Simplify:  $(12a^3)(2a^5)^2$

- A.  $576a^{28}$       B.  $576a^{13}$       C.  $24a^{28}$       D.  $48a^{13}$       E.  $48a^{28}$

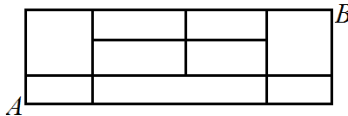
17. Caleb can wash 20 dishes in 8 minutes. How many dishes can Caleb wash in 1.5 hours?

- A. 160      B. 240      C. 225      D. 175      E. 215

18. Shelby’s pool was starting to turn green because of algae. The pool man told Shelby to pour 1.5 gallons of muriatic acid into her pool. If Shelby has poured 3 quarts of muriatic acid into the pool, how many more ounces of muriatic acid must Shelby pour into her pool?

- A. 36 ounces      B. 128 ounces      C. 192 ounces      D. 96 ounces      E. 84 ounces

19. Moving only upwards or to the right, how many paths are there from A to B?

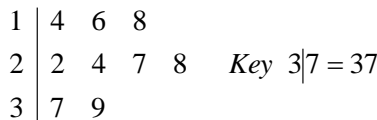


- A. 17      B. 18      C. 19      D. 20      E. 22

20. If  $A = 13x - 14y + 8$  and  $B = 8x - 10y - 6$ , then value of the expression  $2A - 3B$  is equal to  $Mx + Ny + P$ . Find the value of  $M + N + P$ .

- A. -1      B. 22      C. 38      D. 99      E. 25

21. Luanne asked nine of her friends how many dolls they had and then created the stem-and-leaf plot below.



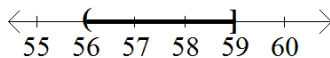
If Luanne accidentally recorded 14 instead of 34, by how much positive difference are the medians of the data she recorded than the actual data?

- A. 14      B. 10      C. 4      D. 2      E. 3

22. April bought a shirt for \$14.00 with an 8% tax added on. If April paid with a \$20, bill, how much change did April receive?

- A. \$6.22      B. \$7.88      C. \$4.88      D. \$6.24      E. \$8.80

23. Which of the following is not in the solution set for the compound inequality graphed?



- A. 56      B. 56.8      C. 57      D. 58      E. 59

24.  $65 \times 31 =$  \_\_\_\_\_ (Roman numeral)

- A. CCVX      B. MMLXV      C. MMCXV      D. DDXLV      E. MMXV

25.  $323_5 = 100_2 \times$  \_\_\_\_\_<sub>3</sub>

- A. 101      B. 120      C. 121      D. 211      E. 201

26. A triangle has side length of 4, 17 and y units. What is the sum of all possible integral lengths of y?

- A. 140      B. 111      C. 119      D. 126      E. 84

27. 27 smaller cubes are used to construct a  $3 \times 3 \times 3$  large cube. If the large cube is painted blue and dismantled back into 27 small cubes, how many of the smaller cubes will have exactly two of their faces painted blue?

- A. 8                      B. 6                      C. 1                      D. 15                      E. 12

28. The product of 123 and  $2E4$  is  $28,7G2$ . Find the value of  $\frac{4(E+G)}{11}$

- A. 6                      B. 7                      C. 5                      D. 8                      E. 4

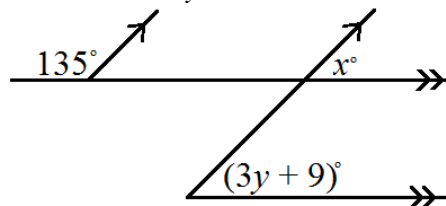
29. Simplify:  $3\left(\frac{5!}{4!-3!}\right)$

- A. 16                      B. 24                      C. 20                      D. 360                      E. 48

30. There are three fiction books and four nonfiction books at your house. Your goal is to read three books over the summer. If you choose books at random, what is the probability you read all nonfiction books?

- A.  $\frac{3}{7}$                       B.  $\frac{4}{7}$                       C.  $\frac{4}{35}$                       D.  $\frac{7}{35}$                       E.  $\frac{1}{3}$

31. Using the picture below, what is the product of  $x$  and  $y$ ?



- A. 5,670                      B. 432                      C. 540                      D. 620                      E. 810

32.  $\sqrt{1,500}$  simplifies to  $a\sqrt{b}$ . What is the value of  $a + b$ ?

- A. 250                      B. 25                      C. 15                      D. 50                      E. 5

33. What is the product of the coordinates of the vertex of the quadratic function  $f(x) = 4x^2 - 8x + 6$ ?

- A. 2                      B. 10                      C. 32                      D. 12                      E. -1

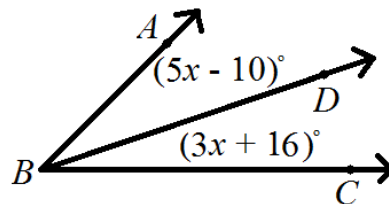
34. Find the value of  $b$ , if a line with a slope of  $\frac{3}{8}$  passes through the points  $(3, -5)$  and  $(12, b)$ .

- A.  $-1\frac{5}{8}$                       B.  $-1\frac{3}{4}$                       C.  $-1\frac{3}{8}$                       D.  $-1\frac{7}{8}$                       E.  $-1\frac{1}{4}$

35. The 24 students in Manny's class took a survey of their favorite ice-cream. Three said they liked vanilla, ten said chocolate, four said mint chocolate-chip, two said strawberry and five said mocha. If a pie graph were drawn to represent the results, how many degrees should be used for mocha flavor?

- A.  $55^\circ$                       B.  $20.8^\circ$                       C.  $105^\circ$                       D.  $75^\circ$                       E.  $85^\circ$

36. Using the picture below,  $\overline{BD}$  bisects  $\angle ABC$ . Find the measure of the supplement of  $\angle ABC$ .



- A.  $60^\circ$                       B.  $80^\circ$                       C.  $125^\circ$                       D.  $70^\circ$                       E.  $75^\circ$

37. Find the area of a sector of a circle with an arc length of 20 inches and a radius of 6 inches.

- A.  $120 \text{ in}^2$                       B.  $90 \text{ in}^2$                       C.  $150 \text{ in}^2$                       D.  $30 \text{ in}^2$                       E.  $60 \text{ in}^2$

38. Change  $160^\circ$  into radian measure.

- A.  $\frac{9\pi}{10}$                       B.  $\frac{6\pi}{7}$                       C.  $\frac{5\pi}{8}$                       D.  $\frac{8\pi}{9}$                       E.  $\frac{11\pi}{12}$

39. If  $f(x) = 10x^3 + 5$  and  $g(x) = 73 - x^2$ , find the value of  $f(2) - g(12)$ .

- A. 148                      B. 156                      C. -132                      D. 146                      E. -12

40. A squirrel population in a park is 1,000 and is increasing at a rate of 20% each year. How many squirrels will be in the park after two years if none die or are killed during that time span?

- A. 1,220                      B. 1,360                      C. 1,420                      D. 1,440                      E. 1,560

41. What is the geometric mean of the numbers 12 and 20?

- A.  $16\sqrt{2}$                       B. 16                      C.  $4\sqrt{15}$                       D.  $6\sqrt{5}$                       E.  $2\sqrt{30}$

42. Find the area of a quadrilateral with vertices located at (7, 3), (-1, 5), (-6, -2) and (3, -5).

- A. 75 *units*<sup>2</sup>                      B. 105 *units*<sup>2</sup>                      C. 64.5 *units*<sup>2</sup>                      D. 96 *units*<sup>2</sup>                      E. 84 *units*<sup>2</sup>

43. What is the equation of the direct variation that passes through the points (2, 7) and (14, 49)?

- A.  $y = 2.5x$                       B.  $y = -7x$                       C.  $y = -3.5x$                       D.  $y = 7x$                       E.  $y = 3.5x$

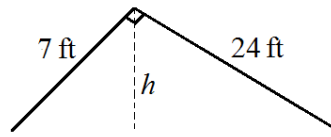
44. If 3 bats are worth 7 gloves and 5 gloves are worth 11 balls, how many balls are worth 30 bats?

- A. 146                      B. 150                      C. 154                      D. 166                      E. 172

45. If  $x + y = 16$  and  $xy = 14$ , what is the value of  $x^2 + y^2$ ?

- A. 256                      B. 242                      C. 266                      D. 228                      E. 214

46. Mariam is going to slide down the slide at her neighborhood park. The slide was made by connecting a 7 ft ladder to a 24 ft plastic slide at a right angle. What is the vertical height of the slide?



- A.  $6\frac{7}{25}$  ft                      B.  $6\frac{3}{5}$  ft                      C.  $6\frac{24}{25}$  ft                      D.  $6\frac{21}{25}$  ft                      E.  $6\frac{18}{25}$  ft

47. Kharim has two identical poles that are 6 feet long. He leans the poles on parallel walls that are exactly 4 feet apart with the ends of each pole resting against the bottom of each wall and the other end of each pole resting on the other wall. In simplest radical form, how far above the ground do the two poles cross?

- A.  $4\sqrt{5}$  feet                      B.  $2\sqrt{5}$  feet                      C.  $\sqrt{5}$  feet                      D.  $3\sqrt{5}$  feet                      E.  $2.5\sqrt{5}$  feet

48. If the solution to the system  $\begin{cases} x + y + z = -4 \\ 2x + 3y = 6 \\ 2y - z = 4 \end{cases}$  is  $(x, y, z)$ , find the value of  $x - y + z$ .

- A. 14                      B. 0                      C. -4                      D. -2                      E. 1

49. Simplify:  $\frac{4}{2+\sqrt{6}}$

- A.  $-4 + 2\sqrt{6}$                       B.  $2 - \sqrt{6}$                       C.  $4 + 2\sqrt{6}$                       D.  $4 - 2\sqrt{6}$                       E.  $2 + 2\sqrt{6}$

50. You are given a list of numbers  $\{a, b, c, d, e, f, g\}$ . The average of the first four numbers is 11 and the average of the last four numbers is 18.  $14\frac{4}{7}$  is the average of all seven numbers. Which of the following is the number that is common to both sets of four numbers?

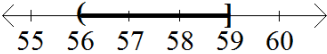
- A. 8                      B. 14                      C. 16                      D. 10                      E. 12

2016 – 2017 TMSCA Middle School Mathematics Test #7 Answer Key

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

9. Create an equation, letting  $x$  equal one page and  $x + 1$  equal to the second page. We have  $x + x + 1 = 377$ , and  $2x + 1 = 377$ , so  $2x = 376$  and  $x = 188$ . Our page numbers are now 188 and 189. The product of 188 and 189 is  $188 \cdot 189 = 35,532$ .

17. First, convert 1.5 hours into minutes. 60 minutes equal 1 hour, so 1.5 hours is equal to 90 minutes. Next, set up a proportion,  $\frac{20 \text{ dishes}}{8 \text{ min}} = \frac{x \text{ dishes}}{90 \text{ min}}$ . Cross multiply and we get  $8x = 1,800$ . Divide by 8 and  $1,800 \div 8 = 225$  dishes.

23. We are given  Using interval notation, ( is equal to  $<$  and ] is equal to  $\leq$ . Therefore, the inequality or our graph is  $56 < x \leq 59$ . 56 is the answer because  $x > 56$ , not  $x \geq 56$ .

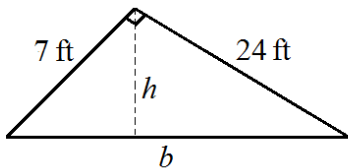
35. Since five students said they like mocha, we have  $\frac{5}{24}$ . Since there are  $360^\circ$  in a circle,  $\frac{5}{24} \cdot 360 = 75^\circ$ .

36. If  $\overline{BD}$  bisects  $\angle ABC$ , then  $5x - 10 = 3x + 16$ . Solve the equation by subtracting  $3x$  from both sides and adding 10 to both sides and then we have  $2x = 26$ , and  $x = 13$ . Substituting into one of the expressions and  $5(13) - 10 = 55$ . Since this is half the measure of  $\angle ABC$ , then  $m\angle ABC = 110^\circ$ . The supplement of  $\angle ABC$  is then  $180 - 110 = 70^\circ$ .

40. Create an exponential function,  $y = a \cdot b^x$ , for the squirrel population. The initial population is 1,000 at an increasing rate of 20% for 2 years, which gives us  $y = 1,000(1 + 0.2)^2 = 1,000(1.2)^2 = 1,440$ .

41. The geometric mean of 12 and 20 is  $\sqrt{12 \cdot 20} = \sqrt{240} = \sqrt{2^4 \cdot 3 \cdot 5} = 4\sqrt{15}$ .

46. First, draw a base connecting the ladder and slide as below



Since we have a right triangle, we can find its area as  $\frac{7 \cdot 24}{2} = 84$ . We can find  $b$  using the Pythagorean theorem.  $a^2 + b^2 = c^2$ ;  $7^2 + 24^2 = b^2$ ;  $b^2 = 625$ ;  $b = 25$ . No matter how you turn the triangle, it will have the same area. Therefore,  $\frac{25h}{2} = 84$  and  $h = 84 \cdot \frac{2}{25} = 6\frac{18}{25}$  feet.

49. To simplify  $\frac{4}{2+\sqrt{6}}$ , multiply by 1 using the conjugate of  $2 + \sqrt{6}$ , which is  $2 - \sqrt{6}$ .  $\frac{4}{2+\sqrt{6}} \cdot \frac{2-\sqrt{6}}{2-\sqrt{6}} = \frac{4(2-\sqrt{6})}{(2+\sqrt{6})(2-\sqrt{6})} = \frac{8-4\sqrt{6}}{4-2\sqrt{6}+2\sqrt{6}-6} = \frac{8-4\sqrt{6}}{-2} = -4 + 2\sqrt{6}$ .