

**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #8 ©
JANUARY 19, 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. $-57 + (-39) + 18 =$ _____
 A. 0 B. -78 C. -114 D. 36 E. 18

2. $27 - 15\frac{2}{3} =$ _____ (improper fraction)
 A. $12\frac{2}{3}$ B. $\frac{38}{3}$ C. $\frac{34}{3}$ D. $\frac{124}{3}$ E. $\frac{22}{3}$

3. $12\frac{1}{4} \times 5.4 =$ _____
 A. 67.5 B. 66.45 C. 67.15 D. 66.35 E. 66.15

4. $5\frac{1}{2} \div \frac{2}{11} =$ _____
 A. 1 B. $\frac{131}{4}$ C. 60.5 D. 30.25 E. $28\frac{1}{4}$

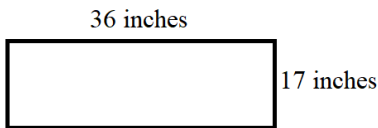
5. What is the units digit of the sum $44 + 45 + 46 + \dots + 51 + 52$?
 A. 4 B. 3 C. 2 D. 1 E. 0

6. 2.4 miles = _____ feet
 A. 12,762 B. 12,672 C. 0.8 D. 7,392 E. 13,968

7. If you roll a number cube labeled 1, 2, 3, 4, 5, 6, and spin a spinner labeled A, B, C, D, E and F, what is the probability of getting a number greater than 2 and a vowel?
 A. $\frac{2}{9}$ B. $\frac{1}{2}$ C. $\frac{5}{18}$ D. $\frac{2}{3}$ E. $\frac{5}{12}$

8. How much greater is the LCM than the GCF of the numbers 60 and 72?
 A. 378 B. 360 C. 348 D. 276 E. 326

9. If the length of the rectangle below is increased by 6 inches and the width is decreased by 4 inches, what is the new perimeter of the rectangle?



A. 106 inches B. 110 inches C. 612 inches D. 98 inches E. 126 inches

10. Simplify: $\frac{2}{3}(9 - 12) - \frac{1}{2}(2^3 + 12)$
 A. $1.\bar{3}$ B. 7 C. -12 D. 8 E. -6

11. What is the value of $A - B + C$, if $\frac{91}{A} = \frac{B}{72} = \frac{21}{C} = \frac{7}{6}$?
 A. 16 B. 12 C. 8 D. 10 E. 9

12. If $A = 1, B = 2, C = 3, \dots, Y = 25$ and $Z = 26$, what is the sum of the values of the letters of the word *MAGENTA*?
 A. 57 B. 59 C. 63 D. 65 E. 61

13. 38 fluid ounces = _____ cups
 A. 4.75 B. 5.25 C. 3.75 D. 6.25 E. 4.25

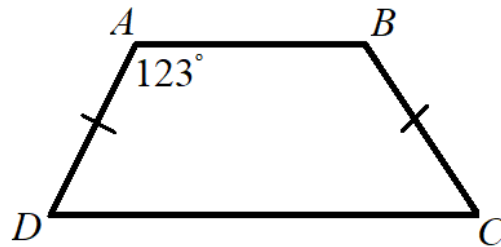
14. What is the 31st term of the arithmetic sequence 15, 22, 29, 36, ...?
 A. 215 B. 212 C. 248 D. 231 E. 225

15. $76 \text{ quarters} + 111 \text{ dimes} + 35 \text{ nickels} + 210 \text{ pennies} = \$37.45 - \underline{\hspace{2cm}}$ nickels
 A. 35 B. 54 C. 65 D. 70 E. 82

16. The number 15 can be written as the sum of ten consecutive integers. What is the product of all ten integers?
 A. 720 B. $-4,320$ C. 4,320 D. 480 E. 0

17. Grace has a fishing lure that weighs one-half of an ounce. How many lures does Grace need to total one pound?
 A. 32 B. 16 C. 8 D. 24 E. 48

18. $ABCD$ is a trapezoid. Find $m\angle C$.



A. 123° B. 82° C. 57° D. 49° E. 53°

19. A bicycle lock had four characters. The first three are numbers 0 – 9 and the fourth is a letter. If the numbers can only be used once, how many combinations are possible?
 A. 260 B. 26,000 C. 19,640 D. 23,400 E. 18,720

20. Silas scores 103 points on his video game on his first try, 111 points on his second try and 121 points on his third try. What must Silas score on his fourth try to have an average of 108 points scored?
 A. 101 B. 97 C. 103 D. 99 E. 105

21. Mogley has four times as many nickels as Neha has in quarters. If Neha has \$27.75 worth of quarters, what is the value of Mogley’s nickels?
 A. \$22.20 B. \$24.05 C. \$23.40 D. \$22.30 E. \$23.10

22. If $a \heartsuit b = \frac{3}{4}a - \frac{1}{2}b$, what is the value of $(12 \heartsuit 16) \heartsuit (20 \heartsuit 4)$?
 A. $-5\frac{3}{4}$ B. $-6\frac{1}{2}$ C. $-4\frac{1}{4}$ D. $-4\frac{1}{2}$ E. $-3\frac{3}{4}$

23. What is the length of the diameter of a circle with an area of $256\pi \text{ cm}^2$?
 A. 24 cm B. 16 cm C. 48 cm D. 32 cm E. 28 cm

24. The set $\{6, 12, 18, 24, 30, 36\}$ has how many proper subsets?
 A. 1 B. 128 C. 127 D. 63 E. 64

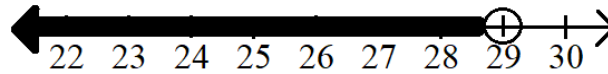
25. What is the sum of the reciprocals of all the factors of the number 28?
 A. 2 B. 56 C. $3\frac{3}{4}$ D. $3\frac{1}{2}$ E. $2\frac{1}{2}$

26. Simplify: $\frac{2}{3}(9x - 6) + 4(-2x - 3) + 2x + 7$
 A. $2x + 9$ B. $-2x + 9$ C. 16 D. 4 E. -9

27. What is the value of the slope of the line with the equation $\frac{3}{8}y + \frac{3}{4}x = \frac{1}{8}$?
 A. $-\frac{1}{2}$ B. $\frac{5}{8}$ C. $\frac{1}{3}$ D. -2 E. 4

28. In Houston, the temperature went to as low as $5.5^{\circ}C$ in March. What is this temperature in degrees Fahrenheit?
 A. $37.5^{\circ}F$ B. $42.5^{\circ}F$ C. $41.9^{\circ}F$ D. $37.9^{\circ}F$ E. $42.9^{\circ}F$

29. Which inequality has the solution set graphed below?



A. $2x \leq 58$ B. $2x - 33 < 25$ C. $x + 2x < 58 - x$ D. $29x - 1 < 28$ E. $\frac{1}{2}x + 6 \leq 62$

30. The angles in a pentagon are in a ratio of 2:5:6:6:8. What is the positive difference between the largest and smallest angles?

A. 110° B. 120° C. 140° D. 180° E. 60°

31. The odds of Jeana winning the race are 2:5. What is the probability of Jeanna losing the race?

A. $\frac{2}{5}$ B. $\frac{3}{5}$ C. $\frac{5}{7}$ D. $\frac{2}{7}$ E. $\frac{5}{3}$

32. $342_5 + 123_5 = \underline{\hspace{2cm}}_5$

A. 1120 B. 1001 C. 1101 D. 1020 E. 1102

33. What is the y-intercept of the graph of the exponential function $y = 5(2)^x$?

A. 5 B. 2 C. 3 D. 10 E. 25

34. If $f(x) = x^3$ and $g(x) = 6 - 2x$, what is the value of $f(g(-4))$?

A. 2,744 B. 10,648 C. -5,324 D. -2,662 E. 1,928

35. What is the sum of the first 7 terms of the sequence 1, 6, 7, 13, 20, ...?

A. 80 B. 47 C. 219 D. 133 E. 127

36. What is the value of C such that $x^2 - 18x + C$ is a perfect square trinomial?

A. 81 B. -9 C. $-\frac{9}{2}$ D. -81 E. 9

37. What is the value of the mean absolute deviation of the set of numbers 24, 29, 35, 40 and 42?

A. 14 B. 6 C. 8.5 D. 4.5 E. 7

38. Martin bowls in a league. So far this season, he has scored a 182, 177, 189, 201 and 158. What must Martin score in his next game to have a season average of 190?

A. 196 B. 233 C. 251 D. 300 E. 245

39. What is the units digit of 12^7 ?

A. 0 B. 6 C. 2 D. 4 E. 8

40. $5! \times 4! = 4 \times \underline{\hspace{2cm}}$

A. $5! + 1$ B. $5! - 1$ C. $6!$ D. $3! \times 2!$ E. $7!$

41. Which of the following points does not lie on the circle with the equation $(x + 10)^2 + (y + 12)^2 = 25$?

A. $(-10, -7)$ B. $(-5, -12)$ C. $(-15, -12)$ D. $(-10, -17)$ E. $(-10, -12)$

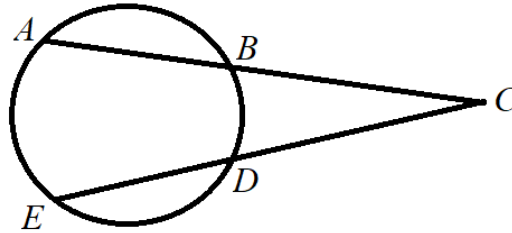
42. $\frac{\log_8 7}{3}$ can be rewritten as _____.

A. $\log_8(\sqrt[3]{7})$ B. $\log_8\left(\frac{7}{3}\right)$ C. $3 \log_8 7$ D. $\log_8(\sqrt{7^3})$ E. $\log_8 7^3$

43. $150^\circ =$ _____ (radians)

- A. $\frac{5}{9}\pi$ B. $\frac{4}{5}\pi$ C. $\frac{2}{3}\pi$ D. $\frac{5}{6}\pi$ E. $\frac{7}{12}\pi$

44. In the picture below, $AB = 6$ mm, $BC = 12$ mm and $DC = 9$ mm. What is ED ? (Picture not drawn to scale.)



- A. 18 mm B. 15 mm C. 16 mm D. 13 mm E. 17 mm

45. $((3x^{-3}y^4z^0)^2)^{-2} =$ _____

- A. $\frac{x^{12}}{81y^{16}}$ B. $\frac{x^6}{12y^8}$ C. $\frac{y^{16}}{81x^{12}}$ D. $\frac{81x^8}{y^{10}z^2}$ E. $\frac{x^{12}}{81y^{16}z^2}$

46. The circle circumscribed about regular pentagon $ABCDE$ has an area of 324π units². If the angle bisectors of $\angle A$ and $\angle C$ intersect at O , what is the measure of \overline{AO} ?

- A. 24 units B. 36 units C. 18 units D. 81 units E. 16 units

47. Which of the following cannot be a factor of $18x^2 - 15x - 12$?

- A. 3 B. $2x + 1$ C. $3x - 4$ D. $6x + 3$ E. $9x + 12$

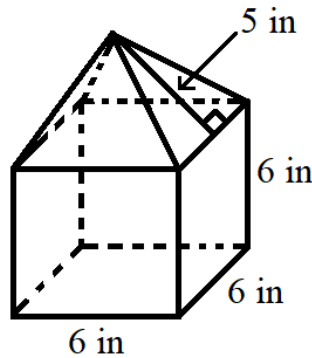
48. It took Evan 4 hours to row his boat downstream 48 miles. It took Evan 6 hours to row his boat upstream 48 miles. What was Evan's rate?

- A. 2 mph B. 10 mph C. 8 mph D. 6 mph E. 12 mph

49. The equation $\left|\frac{m}{3} - 1\right| = 17$ has two solutions. What is the sum of the solution to the equation?

- A. 6 B. 8 C. 15 D. 18 E. 9

50. What is the volume of the figure.



- A. 216 in^3 B. 248 in^3 C. 264 in^3 D. 288 in^3 E. 312 in^3

2018 – 2019 TMSCA Middle School Mathematics Test #8 Answer Key

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

2018-2019 TMSCA Middle School Mathematics Test #8 Selected Answers

16. 15 can be written as the sum of the ten integers $-3 + (-2) + (-1) + 0 + 1 + 2 + 3 + 4 + 5 + 6$. Since 0 is one of the integers, the product of all 10 integers is 0.

17. 1 pound = 16 ounces. A lure weighs one-half ounce, so $16 \div \frac{1}{2} = 32$ lures to equal 1 pound.

19. The lock has four positions and the first three are a digit 0 – 9, where the digits cannot repeat. The first three positions of the lock have a total of $10 \cdot 9 \cdot 8 = 720$ combinations. The fourth position is a letter, so the total number of lock combinations is $720 \cdot 26 = 18,720$.

27. The standard form of a linear equation is $Ax + By = C$, where A , B and C are integers. We are given the equation $\frac{3}{8}y + \frac{3}{4}x = \frac{1}{8}$, so first we must multiply the equation by the common denominator 8, and we get $8(\frac{3}{8}y + \frac{3}{4}x = \frac{1}{8}) = 3y + 6x = 8$. Rewrite the equation in standard form to get $6x + 3y = 8$. The slope of a linear equation in standard form is $\frac{-A}{B}$. In the equation, $A = 6$ and $B = 3$, so the slope is $\frac{-6}{3} = -2$.

31. If the odds of Jeana winning the race are 2:5, then the odds of Jeana losing the race are 5:2 and the probability of Jeana losing the race is then $\frac{5}{7}$.

33. An exponential function is in the form $y = a \cdot b^x$, where a is the y-intercept of the graph. In the equation $y = 5(2)^x$, 5 is the y-intercept.

34. If $f(x) = x^3$ and $g(x) = 6 - 2x$, the value of $f(g(-4))$ is $f(6 - 2(-4)) = f(6 + 8) = f(14)$ and now $f(14) = 14^3 = 2,744$.

44. If two secants are drawn to a circle from one exterior point, then the product of the external segment and the total length of the other segment are equal. So from the picture given, $BC(BC + AB) = DC(DC + ED)$. We are given $AB = 6$ mm, $BC = 12$ mm and $DC = 9$ mm, so if we let $ED = x$, then $12(12 + 6) = 9(9 + x)$ and $216 = 81 + 9x$. Subtract 81 from both sides and $135 = 9x$. Divide both sides by 9 and $x = 15$. Therefore, $ED = 15$ mm.

$$45. ((3x^{-3}y^4z^0)^2)^{-2} = \left(\left(\frac{3y^4}{x^3}\right)^2\right)^{-2} = \left(\frac{9y^8}{x^6}\right)^{-2} = \left(\frac{x^6}{9y^8}\right)^2 = \frac{x^{12}}{81y^{16}}.$$

46. All the angle bisectors of any regular polygon meet at the center of the circumscribed circle about the polygon. The measure of \overline{AO} is then equal to the radius of the circle. We are given the area is 324π units², since the area of a circle is found by $A = \pi r^2$, $324\pi = \pi r^2$. Divide both sides by π and $324 = r^2$. Square root both sides and $r = 18$. Thus, the measure of \overline{AO} is equal to 18 units.

48. Let Evan's rate = x and the rate of the current = y . Since *distance = rate \times time*, we can make the equations $48 = 4(x + y)$, Evan with the current, and $48 = 6(x - y)$, Evan against the current. Solve the first equation, divide both sides by 4 and we get $12 = x + y$. Solve the second equation by dividing both sides by 6 and we get the equation $8 = x - y$. We now have the system of equations $\begin{cases} 12 = x + y \\ 8 = x - y \end{cases}$. Add both equations together and we get $20 = 2x$. Divide both sides by 2 and $x = 10$. Evan's rate is then 10 mph.