

TMSCA MIDDLE SCHOOL MATHEMATICS

TEST #1 ©

OCTOBER 22, 2022

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.

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1. $211 + 735 =$ _____

- A. 966 B. 956 C. 946 D. 976 E. 926

2. $3,022 - 734 =$ _____

- A. 2,288 B. 2,188 C. 2,388 D. 2,378 E. 2,398

3. $23 \times 57 =$ _____

- A. 1,311 B. 1,431 C. 1,421 D. 1,291 E. 1,321

4. $2,608 \div 8 =$ _____

- A. 378 B. 376 C. 372 D. 326 E. 346

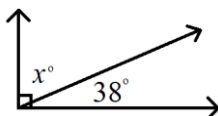
5. What is the unit rate of purchasing 9 Broadway show tickets for \$527.76?

- A. \$57.94 per ticket B. \$58.64 per ticket C. \$59.14 per ticket D. \$57.64 per ticket E. \$58.54 per ticket

6. What is the mode of the set of numbers $\{32, 44, 65, 57, 72, 32, 34, 57, 32, 18\}$?

- A. 44.3 B. 54 C. 32 D. 90 E. 57

7. What is the value of x in the picture below?



- A. 12 B. 52 C. 142 D. 62 E. 112

8. What is the prime factorization of the number 180?

- A. $2 \times 3^3 \times 5$ B. $2^2 \times 3^3 \times 5$ C. $2^2 \times 3^2 \times 5$ D. $2^2 \times 3^3 \times 5^2$ E. $2^2 \times 3^2 \times 5^2$

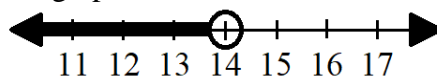
9. $\frac{5}{9} =$ _____ (decimal)

- A. $0.\overline{5}$ B. 0.56 C. 0.5 D. $0.5\overline{6}$ E. $0.\overline{56}$

10. 730 centimeters = _____ meters

- A. 73,000 B. 7,300 C. 73 D. 7.3 E. 0.73

11. Which inequality is represented by the graph below?



- A. $n > 14$ B. $n \geq 14$ C. $n = 14$ D. $n \leq 14$ E. $n < 14$

12. If $\pi = 3$, what is the circumference of a circle with a radius of 17 mm?

- A. 51 mm B. 102 mm C. 867 mm D. 25.5 mm E. 204 cm

13. What are the new coordinates of the point $(3, 1)$ by a translation of $(x, y) \rightarrow (x - 7, y + 5)$?

- A. $(10, -4)$ B. $(-4, -4)$ C. $(10, 6)$ D. $(8, -6)$ E. $(-4, 6)$

14. LXXIV = _____ (Arabic number)

- A. 64 B. 69 C. 74 D. 124 E. 129

15. $-12^2 =$ _____

- A. -24 B. 24 C. 144 D. -144 E. -4

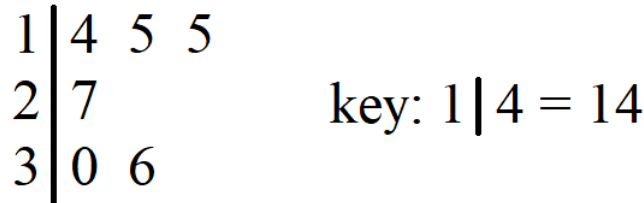
16. Which name can the polynomial $4m - 3$ be classified?

- A. linear monomial B. quadratic binomial C. linear binomial D. quartic monomial E. quadratic monomial

17. $\angle Y = 46.3^\circ$. What is the measure of the supplement of $\angle Y$?

- A. 133.7° B. 43.7° C. 103.7° D. 53.7° E. 203.7°

18. What is the median of the data in the stem and leaf plot below?



- A. 21 B. 27 C. 15 D. 24.5 E. 22.5

19. Lilly wants to buy a shirt that has an original price of \$60.00. If the shirt is on sale for 30% off, how much will Lilly save?

- A. \$16.50 B. \$17.00 C. \$18.50 D. \$14.00 E. \$18.00

20. $\frac{4}{5}$ of $\frac{3}{4}$ of 1,000 = _____

- A. 450 B. 600 C. 750 D. 550 E. 700

21. What is the sum of all the prime numbers greater than ten, but less than 30?

- A. 108 B. 127 C. 112 D. 143 E. 125

22. What number below is the multiplicative inverse of the number $3\frac{2}{7}$?

- A. $\frac{7}{23}$ B. $-\frac{7}{23}$ C. $3\frac{2}{7}$ D. $-3\frac{2}{7}$ E. 3.29

23. What is the perimeter of an equilateral triangle with a side length of $(4n + 1)$?

- A. $4n + 1$ B. $8n + 2$ C. $12n + 1$ D. $12n + 2$ E. $12n + 3$

24. Muhammad is reading a book that has 432 pages. There are 24 chapters in Muhammad’s book. If each chapter in Muhammad’s book has the same number of pages, how many pages are in each chapter?

- A. 14 B. 15 C. 16 D. 17 E. 18

25. $64_7 =$ _____ (base 10)

- A. 46 B. 52 C. 54 D. 48 E. 61

26. Pooja is thinking of two positive integers in a ratio of 4:9 that sum to 208. What is the value of the larger number Pooja is thinking of?

- A. 144 B. 148 C. 136 D. 126 E. 156

27. A piggy bank contains 24 coins consisting of at least 1 penny, 1 nickel, 1 dime, and 1 quarter worth \$2.41. What is the maximum number of dimes possible in the piggy bank?

- A. 18 B. 24 C. 21 D. 20 E. 15

28. $5.8 \times 10^{-2} =$ _____

- A. 0.058 B. 0.58 C. 58 D. 580 E. 0.0058

29. $\angle A$ and $\angle B$ are complementary. The measure of $\angle B$ is twice the measure of $\angle A$. What is the measure of the supplement of $\angle A$?

- A. 120° B. 60° C. 90° D. 130° E. 150°

30. $1,000,000 + 129,000,000 =$ _____ (scientific notation)

- A. 1.291×10^6 B. 1.291×10^8 C. 1.3×10^6 D. 1.3×10^8 E. 1.3×10^{-6}

31. What is the 9th term in the sequence? $-8, -3, 2, 7, 12, \dots$

- A. 27 B. 32 C. 37 D. 22 E. 42

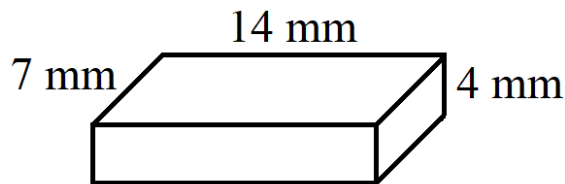
32. How many positive integral divisors does the number 54 have?

- A. 6 B. 4 C. 10 D. 8 E. 12

33. What is the sum of the GCF and LCM of the numbers 24 and 36?

- A. 60 B. 72 C. 12 D. 84 E. 120

34. What is the lateral surface area of the rectangular prism below?



- A. 392 mm^2 B. 196 mm^2 C. 364 mm^2 D. 308 mm^2 E. 168 mm^2

35. $\{H, E, A, T\} \cap \{W, A, V, E\}$ has how many elements?

- A. 6 B. 2 C. 16 D. 8 E. 12

36. 2 miles = _____ feet

- A. 10,560 B. 3,520 C. 5,280 D. 12,320 E. 7,040

37. Hope has nine and fifteen-cent stamps. What is the largest sum she cannot create using her stamps?

- A. 135 B. 114 C. 111 D. 121 E. 123

38. What is the slope of the line passing through the points $(9, -11)$ and $(-3, -7)$?

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

39. Simplify: $\sqrt{140}$

- A. $7\sqrt{20}$ B. $10\sqrt{14}$ C. $2\sqrt{35}$ D. $2\sqrt{70}$ E. $4\sqrt{35}$

40. $30^\circ =$ _____ (radians)

- A. $\frac{\pi}{2}$ B. $\frac{\pi}{3}$ C. $\frac{\pi}{4}$ D. $\frac{\pi}{6}$ E. $\frac{\pi}{10}$

41. Which of the following is a factor of $3x^2 - 17x - 28$?

- A. $3x + 4$ B. $x - 28$ C. $x + 7$ D. $x + 3$ E. $3x - 7$

42. Which of the following is not an example of an exponential function?

- A. $f(x) = 3^x$ B. $f(x) = 5(2.8)^x$ C. $f(x) = x^4$ D. $f(x) = 13(0.4)^x$ E. $f(x) = 100^x + 4$

43. If $28 = \frac{2x}{3}$, then what is the value of $\frac{x}{6}$?

- A. 9 B. 7 C. 12 D. 14 E. 8

44. How many distinct three-digit numbers can be created from the set $\{1, 2, 3, 4, 5\}$, if no digit can be repeated?

- A. 120 B. 60 C. 9 D. 27 E. 30

45. $86^\circ\text{F} =$ _____ $^\circ\text{C}$

- A. 44 B. 28 C. 118 D. 34 E. 30

46. What is the solution to the system of equations $\begin{cases} 8x - 10y = 15 \\ y = \frac{4}{5}x - 6 \end{cases}$?

- A. $(3, 0.9)$ B. $(5, 2.5)$ C. $(-2, -3.1)$ D. no solution E. infinitely many solutions

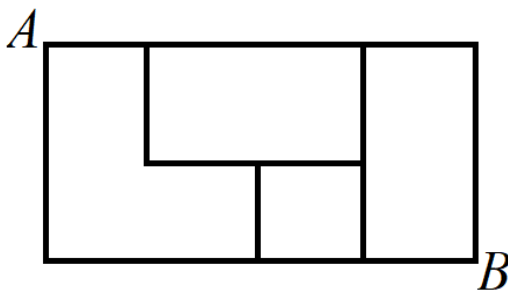
47. $\frac{4}{m} + \frac{4}{7m} =$ _____

- A. $\frac{1}{m}$ B. $\frac{16}{7m^2}$ C. $\frac{32}{7m}$ D. $\frac{8}{7m^2}$ E. $\frac{1}{3}$

48. What are the coordinates of the vertex of the graph of the quadratic equation $0 = x^2 - 8x + 3$?

- A. $(4, -13)$ B. $(8, 3)$ C. $(\frac{1}{4}, \frac{17}{16})$ D. $(-8, -125)$ E. $(-4, 1)$

49. Moving only to the right and/or down, how many pathways exist from point A to point B?



- A. 3 B. 4 C. 5 D. 6 E. 7

50. What is the measure of the radius of the circle with the equation $(x + 17)^2 + (y + 12)^2 = 24$?

- A. 24 units B. $2\sqrt{6}$ units C. 12 units D. $8\sqrt{3}$ units E. $4\sqrt{6}$ units

2022 – 2023 TMSCA Middle School Mathematics Test #1 Answer Key

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

2022 – 2023 TMSCA Middle School Mathematics Test #1 Selected Answers

13. If the point $(3, 1)$ is translated by the rule of $(x, y) \rightarrow (x - 7, y + 5)$, then its new coordinates are $(3, 1) \rightarrow (3 - 7, 1 + 5) = (-4, 6)$.

15. $-12^2 = -1 \times 12^2 = -1 \times 144 = -144$.

21. All the prime numbers greater than ten, but less than 30 are 11, 13, 17, 19, 23, and 29. Therefore, the sum of these prime numbers is equal to $11 + 13 + 17 + 19 + 23 + 29 = 112$.

22. The multiplicative inverse of the number is the reciprocal of the number, or the number when multiplied by the original number produces the value of 1. To find the multiplicative inverse of $3\frac{2}{7}$, first change it to the improper fraction of $\frac{23}{7}$. The multiplicative inverse of $\frac{23}{7}$ is then $\frac{7}{23}$, because $\frac{23}{7} \times \frac{7}{23} = 1$.

23. An equilateral triangle has all side lengths of equal value. If the side length of an equilateral triangle is $(4n + 1)$, then its perimeter is equal to $(4n + 1) + (4n + 1) + (4n + 1) = 12n + 3$.

26. Set up the equation $4x + 9x = 208$, which simplifies to $13x = 208$. Dividing both sides of the equation by 13 gives the value of $x = 16$. To find the value of the larger number, multiply 9 by 16 to get $9(16) = 144$.

27. If a piggy bank contains 24 coins consisting of at least 1 penny, 1 nickel, 1 dime, and 1 quarter worth \$2.41, then to calculate the maximum number of dimes possible in the piggy bank, subtract 1 penny, 1 nickel, and 1 quarter from \$2.41 to get $\$2.41 - 0.01 - 0.05 - 0.25 = \2.10 . To find the number of dimes, divide \$2.10 by 0.10 to get 21. The maximum number of dimes in the piggy bank is 21.

36. If 1 mile = 5,280 feet, then 2 miles = $2(5,280) = 10,560$.

39. $\sqrt{140} = \sqrt{4 \times 35} = \sqrt{4} \times \sqrt{35} = 2 \times \sqrt{35} = 2\sqrt{35}$.

40. To change a degree measure to a radian measure, multiply the degree measure by $\frac{\pi}{180}$. Therefore, 30° is equal to $30 \times \frac{\pi}{180} = \frac{30\pi}{180} = \frac{\pi}{6}$ radians.

44. If no digit can be repeated, there are 5 choices of digits for the hundreds place value, 4 choices for the tens place value, and 3 choices for the ones place value. Therefore, there are $5 \times 4 \times 3 = 60$ three-digit numbers that can be formed from the set $\{1, 2, 3, 4, 5\}$ with no repeating digits.

47. To add fractions, there must be common denominators. We are given the fraction of $\frac{4}{m}$ and $\frac{4}{7m}$. The common denominator of m and $7m$ is $7m$. To change $\frac{4}{m}$ to a fraction with the common denominator, multiply the fraction by $\frac{7}{7}$. Therefore, $\frac{4}{m} \times \frac{7}{7} = \frac{28}{7m}$, and $\frac{28}{7m} + \frac{4}{7m} = \frac{32}{7m}$.