TMSCA MIDDLE SCHOOL MATHEMATICS

TEST #2 ©

OCTOBER 29, 2022

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.

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1. $377 + 208 =$ _____ (nearest hundred)
A. 590   B. 500   C. 585   D. 600   E. 700

2. $578 - 189.2 =$ _____
A. 388   B. 428.8   C. 398.2   D. 419.2   E. 388.8

3. $65 \times 39 =$ _____
A. 2,475   B. 2,435   C. 2,535   D. 2,645   E. 2,515

4. $672 \div 12 =$ _____
A. 41   B. 61   C. 51   D. 56   E. 66

5. $89 =$ _____ (Roman numeral)
A. LXXXIX   B. XXCIX   C. XXCIV   D. LXXXIV   E. MCCCIX

6. What is the median of the set of numbers {45, 23, 54, 77, 12, 43, 56}?
A. 43   B. 54   C. 65   D. 45   E. 89

7. 1.82 meters = _____ millimeters
A. 18.2   B. 182   C. 1,820   D. 18,200   E. 182,000

8. Let n be the digit in the hundreds place and p be the digit in the thousands place in the number 438,712. Find the value of $5n - ¼p$.
A. 39   B. 33   C. 34   D. 38   E. 35

9. Lakita is buying a shirt costing $18.00 with a sales tax of 8%. To the nearest cent, how much tax will Lakita have to pay?
A. $1.32   B. $1.44   C. $1.56   D. $1.68   E. $1.84

10. What is the value of w in the picture below?
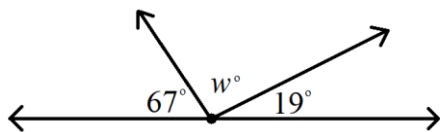
A. 84   B. 86   C. 71   D. 113   E. 94

11. $-18 + (-11) - (-14) =$ _____
A. -15 B. -21 C. -43 D. 7   E. -29

12. How many diagonals can be drawn from one vertex of a regular polygon with eleven sides?
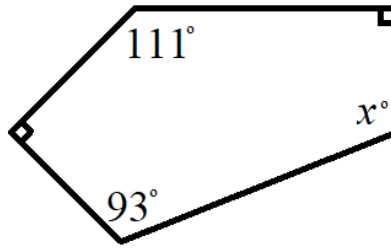A. 11   B. 22   C. 8   D. 9   E. 44

13. $3^3 \times 5^2$ is the prime factorization of which of the following integers?
A. 575   B. 600   C. 625   D. 650   E. 675

14. $2½\% =$ _____ (fraction)
A. $\frac{2}{5}$ B. $\frac{5}{2}$ C. $\frac{1}{40}$ D. $\frac{3}{40}$ E. $\frac{1}{24}$

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

A. 169   B. 168   C. 174   D. 156   E. 126

16. Which of the following equations is true?
A. $(-8) + 4 = -12$ B. $(-8) + 4 = -4$ C. $(-8) + 4 = -12$ D. $(-8) + 4 = 12$ E. $(-8) + 4 = -32$

17. If $m\angle A = 43°$, what is the positive difference of the supplement and complement of $\angle A$?
A. $43°$ B. $57°$ C. $47°$ D. $137°$ E. $90°$

18. $\$13.85 = 24$ quarters $+ 23$ dimes $+$ _____ nickels $+ 15$ pennies
A. 102   B. 106   C. 108   D. 96   E. 92

19. The ratio of girls to boys in Mrs. Peter's class is 5:4. How many students are in the class if there are 15 girls?
A. 18 students   B. 12 students   C. 36 students   D. 27 students   E. 24 students

20. $31,000,000,000 =$ _____ (scientific notation)
A. 31×10^9 B. 3.1×10^{10} C. 3.1×10^9 D. 3.1×10^{-9} E. 3.1×10^{-10}

21. The set {L, O, V, E} has how many subsets?
A. 16   B. 8   C. 4   D. 32   E. 256

22. What is the next term of the sequence? $-57, -41, -25, -9, ...$
A. 11   B. 9   C. 16   D. 5   E. 7

23. $\frac{1}{2} + \frac{1}{6} + \frac{1}{12} =$ _____
A. $\frac{1}{4}$ B. $\frac{3}{8}$ C. $\frac{5}{6}$ D. $\frac{3}{4}$ E. $\frac{7}{8}$

24. $87_{10} =$ _____ (base 5)
A. 312   B 321   C. 322   D. 434   E. 342

25. The probability of it raining tomorrow is $\frac{3}{5}$. What are the odds of it raining tomorrow?
A. 3:5   B. 2:8   C. 2:5   D. 2:3   E. 3:2

26. Which equation below is not true?
A. $-5 + 3 = -2$ B. $-9(3) = -27$ C. $-10 \div (-5) = -2$ D. $6 - 15 = -9$ E. $-8 + 12 = 4$

27. A regular hexagon has _____ total degrees.
A. 720   B. 900   C. 540   D. 1,080   E. 600

28. In ratio form, what is the probability of drawing a face card from a standard deck of cards?
A. 10:13   B. 1:6   C. 3:13   D. 9:52   E. 1:13

29. If $g(x) = 10x - 3x^2$, then what is the value of $g(-4)$?
A. −104   B. 184   C. −8   D. −88   E. 21

30. $d^3 + d^3 + d^3 =$ _____
A. d^9 B. $3d^3$ C. d^{27} D. $3d^9$ E. $3d$

31. Coco pays a one-time $75 membership fee to join *Pump Up Gym* and a $3.00 cleaning fee for each time she goes to the gym to work out. What is the total cost for Coco to work out a total of 20 visits to the gym?
A. $135.00   B. $78.00   C. $60.00   D. $138.00   E. $156.00

32. In the diagram below, $AB = \frac{1}{3}AC$, $AC = \frac{3}{4}AD$, and $AD = 60$ inches. What is the measure of $\overline{BC}$?

$$\underset{A \quad\quad B \quad\quad\quad\quad C \quad\quad D}{\bullet\quad\quad\bullet\quad\quad\quad\quad\bullet\quad\quad\bullet}$$
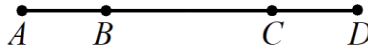
A. 15 inches   B. 45 inches   C. 24 inches   D. 48 inches   E. 30 inches

33. 30°C = _____°F
A. 72   B. 78   C. 84   D. 86   E. 92

34. What is the 21st term of the sequence 56, 59, 62, 65, …?
A. 113   B. 116   C. 109   D. 106   E. 119

35. The probability of Mike winning his basketball game is 2:3. What are the odds of Mike losing his basketball game?
A. 2:3   B. 2:1   C. 1:2   D. 1:3   E. 3:1

36. The graph of which line below is parallel to the graph of the line with the equation $y = -8x + 3$?
A. $y = 8x + 4$ B. $y = -8x - 2$ C. $y = \frac{1}{8}x - 1$ D. $y = -\frac{1}{8}x$ E. $y = -8$

37. If $(4x + 5)(2x - 1) = 8x^2 + Bx - 5$, then what is the value of $-2B - 3$?
A. −15   B. 9   C. −23   D. 5   E. −8

38. What is the simple interest accumulated after depositing $2,000 in an account paying 3.5% for 8 years?
A. $320.00   B. $480.00   C. $520.00   D. $560.00   E. $848.00

39. In the picture below, $AE = 3$, $EC = 12$, $EB = 6$, and $DE = x$. What is the value of x?
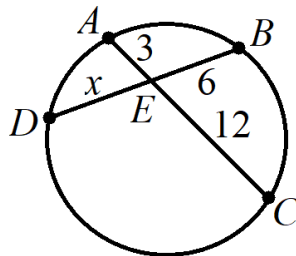
A. 8 units   B. 9 units   C. 4.5 units   D. 6 units   E. 1.5 units

40. If $\frac{w-4}{7} = p$, and $p = 6$, what is the value of $-2w$?

A. 17   B. 46   C. -21 D. -46 E. -92

41. The sum of four consecutive even integers is 148. What is the product of the least and greatest of these integers?

A. 1,360   B. 1,280   C. 1,512   D. 1,368   E. 1,292

42. $\sqrt{8}\left(\sqrt{48} + \sqrt{2}\right) = $ _____

A. $6\sqrt{6} + 8$ B. $8\sqrt{6} + 4$ C. $4\sqrt{6} + 8$ D. $8\sqrt{2} + 4$ E. $4\sqrt{2} + 8$

43. In her bedroom, Emily is replacing a square poster with a rectangular poster that is 4 inches wider and 4 inches shorter. What is the positive difference in the number of square inches in the areas of the posters?
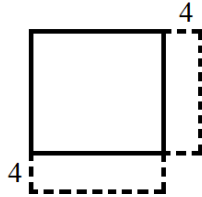
A. 4 in^2 B. 9 in^2 C. 20 in^2 D. 8 in^2 E. 16 in^2

44. What is the measure of the diameter of the circle with the equation $(x - 13)^2 + (y - 8)^2 = 576$?

A. 72 units   B. 144 units   C. 21 units   D. 288 units   E. 48 units

45. What is the equation of the vertical line passing through the point (11, 17)?

A. $y = 11x$ B. $x = 11$ C. $y = 17x$ D. $y = 17$ E. $x = 17$

46. How many combinations can be made of 8 items taken 2 at a time?
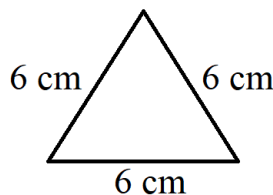
A. 28   B. 16   C. 56   D. 32   E. 24

47. What is the value of the fourth triangular number?

A. 15   B. 12   C. 21   D. 18   E. 10

48. $\left(\frac{4a^3b^4}{2ab^3}\right)^3 = $ _____

A. $6a^6b^3$ B. $8a^6b^3$ C. $6a^9b^9$ D. $8a^9b^9$ E. $32a^8b^9$

49. What is the area of the equilateral triangle below?

6 cm   6 cm

6 cm

A. $6\sqrt{3}$ cm^2 B. $12\sqrt{3}$ cm^2 C. $15\sqrt{3}$ cm^2 D. $9\sqrt{3}$ cm^2 E. $3\sqrt{3}$ cm^2

50. Which system of equations has no solution?

A. $\begin{cases} 3x + 4y = 5 \\ 6x + 8y = 10 \end{cases}$ B. $\begin{cases} 3x + 6y = 1 \\ x + y = 0 \end{cases}$ C. $\begin{cases} 2x + 8y = -14 \\ x - y = 20 \end{cases}$ D. $\begin{cases} 7x + 2y = 9 \\ 14x + 4y = 6 \end{cases}$ E. $\begin{cases} x + y = 12 \\ x - y = -6 \end{cases}$

2022 – 2023 TMSCA Middle School Mathematics Test #2 Answer Key

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

8. If n is the digit in the hundreds place and p is the digit in the thousands place in the number 438,712, then $n = 7$ and $p = 8$. Therefore, the value of $5n - \frac{1}{4}p$ is equal to $5(7) - \frac{1}{4}(8) = 35 - 2 = 33$.

14. $2\frac{1}{2}\% = 2.5\% = 0.025 = \frac{25}{1,000} = \frac{1}{40}$.

17. The supplement of $\angle A$, if $m\angle A = 43°$ is equal to $180 - 43 = 137°$, and the complement of $\angle A$, if $m\angle A = 43°$ is equal to $90 - 43 = 47°$. Therefore, the positive difference of the supplement and complement of $\angle A$, if $m\angle A = 43°$ is equal to $137 - 43 = 90°$.
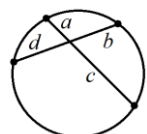
19. The ratio of girls to boys in Mrs. Peter's class is 5:4. If there are 15 girls in the class, then $5x = 15$ and after dividing both sides of the equation by 5, the value of x is equal to 3. Therefore, $4x = 4(3) = 12$, and the total number of students in the class is equal to $15 + 12 = 27$.

21. The total number of subsets of a given set with n elements can be found using the formula 2^n. The set {L, O, V, E} has 4 elements, so the total number of subsets of the set {L, O, V, E} is equal to $2^4 = 16$.

28. A standard deck of cards contains 52 cards. There are 13 cards of each suit and three face cards in each suit, Jack, Queen, and King, which equals $4(3) = 12$ total face cards. So, the probability of drawing a face card from a standard deck of cards is equal to $12:52 = 3:13$.

29. If $g(x) = 10x - 3x^2$, then the value of $g(-4)$ is equal to $g(-4) = 10(-4) - 3(-4)^2 = -40 - 3(16) = -40 - 48 = -88$.

39. When two chords intersect each other inside of a circle, the products of their segments are equal. So, using the picture, $ac = bd$. In the given problem, $6x = 3(12)$, or $6x = 36$. Dividing both sides of the equation by 6 gives the value $x = 6$.
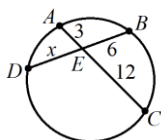
42. $\sqrt{8}\left(\sqrt{48} + \sqrt{2}\right) = 2\sqrt{2}\left(4\sqrt{3} + \sqrt{2}\right) = 2\sqrt{2}\left(4\sqrt{3}\right) + 2\sqrt{2}\left(\sqrt{2}\right) = 8\sqrt{6} + 2\sqrt{4} = 8\sqrt{6} + 2 \cdot 2 = 8\sqrt{6} + 4$.

45. The equation of any vertical line is x equal to a number. Therefore, the equation of the vertical line passing through the point (11, 17) if $x = 11$.

47. The formula to find the nth triangular number is $\frac{n(n+1)}{2}$. Therefore, the 4th triangular number is $\frac{4(5)}{2} = 10$.

48. This problem involves the exponent rules of $\frac{a^m}{a^n} = a^{m-n}$ and $(a^m)^n = a^{mn}$. So, using the stated exponent rules, $\left(\frac{4a^3b^4}{2ab^3}\right)^3 = (2a^{3-1}b^{4-3})^3 = (2a^2b^1)^3 = 8a^{2(3)}b^{1(3)} = 8a^6b^3$.