



TMSCA MIDDLE SCHOOL MATHEMATICS

TEST #10 ©

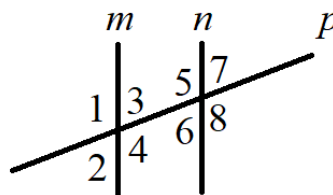
FEBRUARY 6, 2021

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.

[illegible]

1. $66 + 132 + 264 =$ _____
 A. 486 B. 462 C. 428 D. 442 E. 482
2. $1,800 - 355 - 681 =$ _____
 A. 794 B. 744 C. 774 D. 824 E. 764
3. $12 \times 14 \times 16 =$ _____
 A. 2,698 B. 2,618 C. 2,676 D. 2,688 E. 2,528
4. $512 \div 16 \div 32 =$ _____
 A. 8 B. 4 C. 2 D. 1 E. 16
5. Evaluate $\frac{a-b}{4} + \frac{1}{2}c$ for $a = 8$, $b = -20$ and $c = -22$.
 A. 18 B. -14 C. 8 D. -4 E. -16
6. How many three-digit palindrome's can be created using the digits 1, 2, 3, and 4, if the digits can repeat?
 A. 16 B. 24 C. 12 D. 4 E. 8
7. Simplify: $\frac{3}{4}(8m - 12n) - 3(2m + 5n)$
 A. $-24n$ B. $3m - 24y$ C. $-3m - 24y$ D. $6y$ E. $-6m - 12y$
8. $719 - 45 - 287 + 2 =$ _____ (Roman numeral)
 A. CCCDIX B. CDLXVII C. CCCXCVI D. CCCXCIX E. CCCLXXXIX
9. What number is 13% of 750?
 A. 94.5 B. 95.5 C. 96.5 D. 99.5 E. 97.5
10. Jimmy drew a regular octagon. From one of the vertices, Jimmy drew all diagonals possible. How many triangles were created after Jimmy drew the diagonals?
 A. 6 B. 8 C. 12 D. 10 E. 16
11. If $m \parallel n$ and $m\angle 1 = 127^\circ$, what is the angle measure of the complement of $\angle 7$?



- A. 37° B. 53° C. 57° D. 43° E. 47°
12. In Mrs. Baker's class, 18 out of 45 students wear glasses. What percent of students in Mrs. Baker's class do not wear glasses?
 A. 40% B. 55% C. 60% D. 65% E. 58%
13. 1.4 hectometers = _____ centimeters
 A. 1,400,000 B. 140,000 C. 14,000 D. 1,400 E. 0.000014
14. What is the remainder when the number 45,318 is divided by 12?
 A. 6 B. 4 C. 7 D. 9 E. 3

15. What is the sum of the first 12 consecutive even integers?

- A. 148 B. 152 C. 164 D. 156 E. 162

16. What is the set of domain values for the function $\{(12, 4), (-6, 3), (8, -2), (0, 1)\}$?

- A. $\{-6, 0, 8, 12\}$ B. $\{-2, 1, 3, 4\}$ C. $\{14\}$ D. $\{6\}$ E. $\{-3, 1, 6, 16\}$

17. Which value makes the equation $\frac{1}{3}(9x + 9) = \frac{2}{3}(12 - 3x)$?

- A. $x = \frac{1}{2}$ B. $x = -\frac{1}{2}$ C. $x = -1$ D. $x = -\frac{1}{3}$ E. $x = 1$

18. Malinda is 4 feet 6 inches tall, Michelle is 5 feet 4 inches tall, and Tonya is 5 feet 8 inches tall. What is the average height of all three girls?

- A. 5 feet 3 inches B. 5 feet 1 inch C. 4 feet 11 inches D. 4 feet 10 inches E. 5 feet 2 inches

19. How many 6-inch square tiles are needed to cover a square floor that measures 4 feet by 4 feet?

- A. 96 B. 132 C. 64 D. 128 E. 48

20. If 20% of M is 26 and 14% of N is 21, what is the value of $M - N$?

- A. -4 B. -20 C. -32 D. 40 E. -50

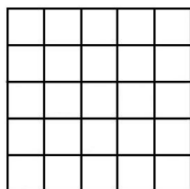
21. If $A = 2020, 2027, 2034, \dots$ and $B = 2018, 2027, 2036, \dots$, Which is the next number after 2027 that appears in both A and B ?

- A. 2063 B. 2074 C. 2083 D. 2090 E. 2099

22. What is the sum of all two-digit multiples of 18?

- A. 270 B. 252 C. 288 D. 306 E. 252

23. How many squares can be found in the 5×5 square grid below?



- A. 45 B. 55 C. 91 D. 64 E. 52

24. How many subsets can be created using the set $\{A, B, C, D, E, F, G\}$?

- A. 64 B. 256 C. 196 D. 32 E. 128

25. Two prime numbers have a least common multiple of 91. What is the sum of these two prime numbers?

- A. 22 B. 24 C. 18 D. 24 E. 20

26. A human heart can beat 80 beats per minute. How many beats can a human heart beat in one day? Answer in scientific notation.

- A. 1.152×10^5 B. 5.4×10^3 C. 6.912×10^6 D. 2.88×10^5 E. 1.728×10^5

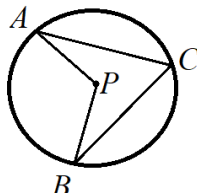
27. $99_{13} = \underline{\hspace{2cm}}$ (base 10)

- A. 132 B. 126 C. 130 D. 128 E. 112

28. If $g\Delta h = -3gh - (gh)^2$, then what is the value of $-2\Delta 5$?

- A. -40 B. -120 C. -30 D. -150 E. -70

29. What is the measure of $\angle APB$, if $m\angle ACB = 47^\circ$?



- A. 84° B. 23.5° C. 42° D. 94° E. 133°

30. How many diagonals can be drawn inside a regular 19-sided polygon?

- A. 148 B. 164 C. 152 D. 144 E. 156

31. Which of the following is equivalent to $(4^3)^5$?

- A. 2^{30} B. 2^{15} C. 2^{40} D. 2^{16} E. 2^{243}

32. 2 days + 1.75 hours = _____ minutes

- A. 2,880 B. 2,985 C. 2,895 D. 2,885 E. 2,995

33. Point A has coordinates $(-7, 13)$. What are the coordinates of point A if it is rotated clockwise about the origin by 90° ?

- A. $(13, 7)$ B. $(7, 13)$ C. $(-7, -13)$ D. $(-13, 7)$ E. $(-13, -7)$

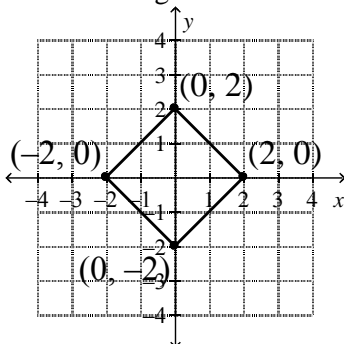
34. Our Furniture Fits store marks up merchandise 40% for profit. If a kitchen table costs the store \$1,250, what is the selling price of the kitchen table?

- A. \$1,550 B. \$1,500 C. \$1,650 D. \$1,750 E. \$1,850

35. Line A passes through the points $(-7, 9)$ and $(-3, 1)$. Line B passes through the points $(6, 18)$ and $(4, y)$. If lines A and B are perpendicular, what is the value of y?

- A. 23 B. 17 C. 29 D. 25 E. 19

36. What is the area of the square plotted on the coordinate grid below?



- A. $4\sqrt{2}$ units² B. 4 units² C. $6\sqrt{2}$ units² D. 8 units² E. $8\sqrt{2}$ units²

37. What is the largest unattainable sum of the numbers 7 and 15?

- A. 105 B. 98 C. 90 D. 83 E. 79

38. What is the product of the first and second of three consecutive even integers if the sum of the first and third is 46 more than the second?

- A. 2,112 B. 2,024 C. 2,208 D. 2,016 E. 1,932

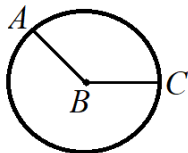
39. $\sqrt{516} + \sqrt{169} =$ _____
 A. 26 B. $\sqrt{685}$ C. 23 D. $2\sqrt{129}$ E. $15\sqrt{129}$

40. $100_4 \div 20_4 =$ _____ (base 4)
 A. 5 B. 4 C. 3 D. 2 E. 10

41. If $A = \begin{bmatrix} -5 & 8 \end{bmatrix}$ and $B = \begin{bmatrix} -7 \\ -4 \end{bmatrix}$, then what is the product AB ?
 A. $\begin{bmatrix} 35 & -32 \end{bmatrix}$ B. $\begin{bmatrix} 35 \\ -32 \end{bmatrix}$ C. $\begin{bmatrix} -5 & -7 \\ 8 & -4 \end{bmatrix}$ D. $\begin{bmatrix} -5 & -56 \\ 0 & -4 \end{bmatrix}$ E. $\begin{bmatrix} 3 \end{bmatrix}$

42. The roots of the equation $x^2 - 10x = -24$ are the lengths of the legs of a right triangle. What is the length of the hypotenuse of the triangle?
 A. $\sqrt{10}$ B. $2\sqrt{10}$ C. $\sqrt{73}$ D. $3\sqrt{22}$ E. $2\sqrt{13}$

43. In $\odot B$ below, $BC = 6$ cm. If $\pi = 3$ and $m\angle ABC = 150^\circ$, what is the length of minor arc AC ?



A. 15 cm B. 18 cm C. 12 cm D. 21 cm E. 9 cm

44. What is the value of y , if $\log_5 125 = y$?
 A. 25 B. 3 C. 75 D. 5 E. 625

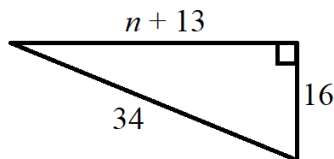
45. Which of the following is the solution to the compound inequality $-2x + 7 > 1$ and $4x + 3 \geq -13$?
 A. $3 < x \leq 4$ B. $-3 \leq x < 4$ C. $2.5 \leq x < 4$ D. $-4 \leq x < 3$ E. $-2.5 \leq x < -4$

46. How many ways can 25¢ be made using only pennies, nickels, and dimes?
 A. 10 B. 14 C. 12 D. 15 E. 13

47. The odds in favor of a spinner landing on the color purple are 4:7. What is the probability of the spinner not landing on purple?
 A. 4:11 B. 7:4 C. 3:7 D. 3:4 E. 7:11

48. If $(x - 5)(x^2 + 2x - 3) = Ax^3 + Bx^2 + Cx + D$, what is the value of $A + B + C + D$?
 A. 0 B. 8 C. 32 D. -6 E. 4

49. What is the value of n below?



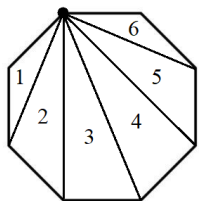
A. 21 B. 17 C. 18 D. 30 E. 14

50. Simplify by rationalizing the denominator: $\frac{2}{2+\sqrt{2}}$
 A. $\frac{4-\sqrt{2}}{2}$ B. $\frac{2-\sqrt{2}}{2}$ C. $2 - \sqrt{2}$ D. $2 + \sqrt{2}$ E. $\frac{2+\sqrt{2}}{2}$

2020 – 2021 TMSCA Middle School Mathematics Test #10 Answer Key

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

10. There are 5 diagonals that can be drawn from a single vertex in a regular octagon, as shown in the picture.



Once the five diagonals are drawn, there are a total of 6 triangles that are formed.

21. A and B are both arithmetic sequences having common differences of 7 and 9, respectively. The LCM of 7 and 9 is 63, so the next term after 2027 to appear in both A and B is $2027 + 63 = 2090$.

22. The two-digit multiples of 18 are 18, 36, 54, 72, and 90. Therefore, their sum is equal to $18 + 36 + 54 + 72 + 90 = 270$.

25. The least common multiple of any two prime numbers is the product of those two prime numbers. Therefore, since $91 = 7 \cdot 13$, the sum of 7 and 13 is equal to $7 + 13 = 20$.

31. Using the exponent rule $(a^m)^n = a^{m \cdot n}$, $(4^3)^5 = ((2^2)^3)^5 = 2^{2 \cdot 3 \cdot 5} = 2^{30}$.

33. The geometric rule for rotating a point (x, y) 90° clockwise is $(y, -x)$. Point A has coordinates $(-7, 13)$, and after it is rotated by 90° clockwise, its new coordinates are $(13, 7)$.

$$39. \sqrt{516 + \sqrt{169}} = \sqrt{516 + 13} = \sqrt{529} = 23.$$

41. A 1×2 matrix multiplied by a 2×1 matrix will produce a 1×1 matrix, such as $\begin{bmatrix} a \\ b \end{bmatrix} \times \begin{bmatrix} c & d \end{bmatrix} = [ac + bd]$. So, if $A = \begin{bmatrix} -5 & 8 \end{bmatrix}$ and $B = \begin{bmatrix} -7 \\ -4 \end{bmatrix}$, then the product $AB = \begin{bmatrix} -5 & 8 \end{bmatrix} \times \begin{bmatrix} -7 \\ -4 \end{bmatrix} = [(-5)(-7) + 8(-4)] = [3]$.

44. $\log_x Z = y$ and be rewritten as $x^y = Z$. We are given $\log_5 125 = y$. This can be rewritten as $5^y = 125$. Since $5^1 = 5$, $5^2 = 25$, and $5^3 = 125$, we see that $y = 3$.

46. There are 12 ways to make 25¢ using only dimes, nickels, and pennies. Let d = dimes, n = nickels, and p = pennies. The 12 ways are then $(2d, 1n, 0p)$, $(2d, 0n, 5p)$, $(1d, 3n, 0p)$, $(1d, 2n, 5p)$, $(1d, 1n, 10p)$, $(1d, 0n, 15p)$, $(0d, 5n, 0p)$, $(0d, 4n, 5p)$, $(0d, 3n, 10p)$, $(0d, 2n, 15p)$, $(0d, 1n, 20p)$, and $(0d, 0n, 25p)$.

47. If the odds in favor of a spinner landing on the color purple are 4:7, then the probability of the spinner landing on purple is $\frac{4}{11}$. The probability of the spinner not landing on purple is then $1 - \frac{4}{11} = \frac{11}{11} - \frac{4}{11} = \frac{7}{11} = 7:11$.

50. To rationalize the denominator of $\frac{2}{2+\sqrt{2}}$, you must multiple the fraction by $\frac{2-\sqrt{2}}{2-\sqrt{2}}$. So, $\frac{2}{2+\sqrt{2}} \cdot \frac{2-\sqrt{2}}{2-\sqrt{2}} = \frac{2(2-\sqrt{2})}{(2+\sqrt{2})(2-\sqrt{2})} = \frac{4-2\sqrt{2}}{4-2} = \frac{4-2\sqrt{2}}{2} = 2 - \sqrt{2}$.