



TMSCA MIDDLE SCHOOL MATHEMATICS

TEST #9 ©

JANUARY 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.

[illegible]

1. $45 + 192 + 4,360 + 63 =$ _____ (nearest ten)

- A. 4,670 B. 4,650 C. 4,660 D. 4,600 E. 4,700

2. $6,943 - 2,617 - 848 =$ _____ (nearest hundred)

- A. 3,000 B. 3,400 C. 3,500 D. 3,600 E. 3,580

3. $76.18 \times 1.05 =$ _____

- A. 79.379 B. 79.989 C. 81.489 D. 80.179 E. 81.779

4. $8.52 \div 0.12 =$ _____

- A. 71.4 B. 69.2 C. 69.6 D. 70.6 E. 71

5. Hema sold 119 bottles of water and 137 sodas in three days. At this rate, how many more sodas than bottles of water will Hema sell in 7 days?

- A. 36 B. 38 C. 52 D. 42 E. 48

6. Point A has coordinates (8, 7) and is reflected over the x -axis and then translated to the right 7 units. What are the new coordinates of A?

- A. (-1, 7) B. (15, -7) C. (15, 7) D. (1, 7) E. (-15, -7)

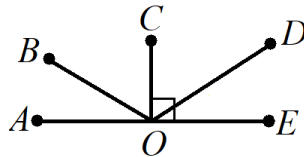
7. Marco has seven striped shirts, five solid shirts, and eight polka-dotted shirts all folded in his drawer. What is the probability Marco selects a shirt that is not striped nor solid from the drawer?

- A. $\frac{2}{5}$ B. $\frac{3}{5}$ C. $\frac{7}{20}$ D. $\frac{1}{4}$ E. $\frac{13}{20}$

8. $6! =$ _____

- A. $6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 \cdot 6$ B. $6 + 5 + 4 + 3 + 2 + 1$ C. $6 - 5 - 4 - 3 - 2 - 1$ D. 1 E. $6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$

9. In the picture below, $m\angle BOC = 67^\circ$ and $m\angle DOE = 53^\circ$. What is the measure of $\angle AOD$?



- A. 127° B. 157° C. 113° D. 140° E. 150°

10. 144 square inches = _____ square feet

- A. 72 B. 36 C. 18 D. 9 E. 1

11. If a number M is decreased by 18, the result will be $\frac{1}{4}$ of M . What is the value of M ?

- A. 32 B. 36 C. 18 D. 24 E. 28

12. Which expression is equivalent to $m + 7 \cdot \frac{5}{8}$?

- A. $7 \cdot 5 \div 8 + m$ B. $7 + m(5 \div 8)$ C. $(m + 7)(5 \div 8)$ D. $5 \div 8(7 + m)$ E. $(5 \div 8)m + 7$

13. If $2n + 4 = 18$, what is the value of $5n - 1$?

- A. 54 B. 29 C. 39 D. 59 E. 34

14. Yandel worked out at *Fitness Forever Gym* for 2 hours. Yandel stretched for 22 minutes, lifted weights for 50 minutes, and ran on the treadmill for the remainder of the time. What percentage of Yandel's workout was spent running on the treadmill?

- A. 30% B. 35% C. 40% D. 45% E. 50%

15. What is the mean of the set of numbers 141, 132, 132, 120, and 150?

- A. 146 B. 135 C. 153 D. 147 E. 149

16. $\triangle ABC \sim \triangle XYZ$, $AB = 14$ mm, $XY = 35$ mm, and $BC = 18$ mm. What is the measure of \overline{YZ} ?

- A. 31 mm B. 39 mm C. 45 mm D. 41 mm E. 40 mm

17. $\$85.74 = \underline{\hspace{1cm}}$ quarters + 90 dimes + 200 nickels + 324 pennies

- A. 286 B. 256 C. 242 D. 254 E. 268

18. Simplify: $2(2^3 - 2)^2 + 2(2 + 2)^0$

- A. 74 B. 76 C. 62 D. 80 E. 78

19. Cindy has four more than five times as many coins as Bethany. Denise has twice as many coins as Cindy. If Bethany has 17 coins, how many coins does Denise have?

- A. 146 B. 166 C. 178 D. 174 E. 160

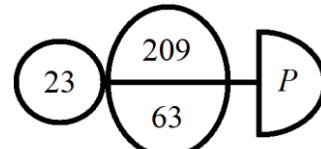
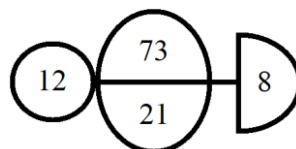
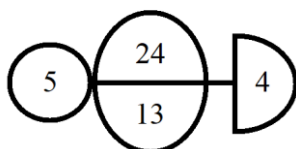
20. $\text{MMDX} - \text{MMCXXVII} = \underline{\hspace{1cm}}$ (Roman numeral)

- A. CCCLXXVII B. CCCLXXXVIII C. CCCLIII D. CCCLXVI E. CCCLXXXIII

21. $\sqrt{654}$ lies between which pair of integers?

- A. 23 and 24 B. 25 and 26 C. 26 and 27 D. 24 and 25 E. 28 and 29

22. Use the examples in the picture below to find the value of P .



- A. 24 B. 7 C. 17 D. 18 E. 13

23. What is the LCM of $42m^5n^3$ and $56mn^4$?

- A. $168m^5n^4$ B. $168m^6n^7$ C. $168mn^3$ D. $168mn$ E. 168

24. If three dozen oranges cost \$21.60, how much do fifteen oranges cost?

- A. \$12.00 B. \$9.00 C. \$6.60 D. \$9.20 E. \$7.20

25. What is the sum of the first dozen composite numbers?

- A. 147 B. 149 C. 151 D. 153 E. 155

26. One red number cube and one blue number cube are rolled. What are the odds of getting a red 2 and a blue 5 facing up?

- A. 1:35 B. 1:36 C. 1:6 D. 1:9 E. 1:5

27. How many two-digit integers exist where the ten's digit is greater than the one's digit?

- A. 99 B. 50 C. 45 D. 100 E. 49

28. Find the product of $(5.5 \times 10^5)(3.4 \times 10^{-2})$ in scientific notation.

- A. 8.9×10^4 B. 8.9×10^3 C. 1.87×10^4 D. 1.87×10^3 E. 2.1×10^3

29. $43_6 + 15_6 = \underline{\hspace{2cm}}$ (base 10)

- A. 26 B. 42 C. 58 D. 29 E. 38

30. How many triangles are in the picture below?



- A. 16 B. 32 C. 24 D. 20 E. 36

31. Let U be a universal set and A , B , and C be subsets of U defined as shown. Find $A \cup (B \cap C)$.

$$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

$$A = \{1, 2, 3, 4, 5\}$$

$$B = \{6, 7, 8, 9, 10\}$$

$$C = \{2, 4, 6, 8\}$$

- A. $\{\emptyset\}$ B. $\{2, 4\}$ C. $\{1, 3, 5\}$ D. $\{6, 8\}$ E. $\{1, 2, 3, 4, 5, 6, 8\}$

32. If the measure of an exterior angle of a regular polygon is 30° , how many sides does the polygon have?

- A. 6 B. 18 C. 12 D. 24 E. 14

33. On her birthday, Amyah was 13 years old and her mother was 31. Amyah notices that her age was the reverse of her mother's age. How old will Amyah be the next time her age is reverse of her mother's age?

- A. 25 B. 36 C. 34 D. 24 E. 48

34. If 1 inch is equivalent to 2.54 centimeters, how many centimeters is 1 yard?

- A. 365.76 cm B. 60.96 cm C. 30.48 cm D. 91.44 cm E. 7.62

35. Which of the following points does not lie on the line $y = -\frac{1}{3}x + 8$?

- A. $(-12, 10)$ B. $(-15, 13)$ C. $(9, 5)$ D. $(0, 8)$ E. $(21, 1)$

36. What is the probability of drawing a queen on your first draw and then, without replacement, drawing another queen on your second draw from a standard deck of cards?

- A. $\frac{1}{221}$ B. $\frac{1}{169}$ C. $\frac{2}{477}$ D. $\frac{1}{13}$ E. $\frac{1}{26}$

37. What is the largest unattainable sum of the numbers 4 and 17?

- A. 68 B. 37 C. 55 D. 47 E. 51

38. A line passes through the points $(11a + 5, 5a - 6)$ and $(x, 3a - 6)$. Which of the following expressions should be substituted for x for the line to have a slope of $\frac{1}{6}$?

- A. $a + 10$ B. $a + 5$ C. $5 - a$ D. $10 - a$ E. $5 - 2a$

39. What is the value of $f\left(\frac{1}{9}\right) + g\left(\frac{1}{2}\right)$, if $f(x) = x^{-\frac{3}{2}}$ and $g(x) = x^{-2}$?

- A. $\frac{3}{8}$ B. 23 C. 22 D. 31 E. $23\frac{3}{8}$

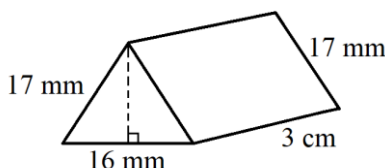
40. $\frac{\frac{6}{10} \cdot \frac{4}{10} \cdot \frac{8}{18} \cdot \frac{15}{2}}{\frac{2}{3} \div 2} =$ _____ (decimal)

- A. 2.5 B. 0.5 C. 3.5 D. 4.5 E. 2.4

41. The vertex of the quadratic equation $y = 8x - 2 - 3x^2$ is located within which quadrant?

- A. Quadrant I B. Quadrant II C. Quadrant III D. Quadrant IV E. Quadrant V

42. What is the volume of the triangular prism?



- A. 4,080 mm³ B. 360 mm³ C. 720 mm³ D. 1,080 mm³ E. 3,600 mm³

43. $5i(4 - 8i) =$ _____

- A. $20i - 40i$ B. $-20i$ C. $40 - 20i$ D. $20 + 40i$ E. $40 + 20i$

44. $(a^4b^{11}c^{-4})(a^{-3}b^{-2}c)\left(a^{\frac{1}{2}}b^{\frac{2}{3}}c\right)^6 =$ _____

- A. $a^4b^{15}c^9$ B. $a^4b^{13}c^3$ C. $a^3b^{15}c^3$ D. $a^3b^{36}c^{12}$ E. $a^4b^{36}c^9$

45. Find the value of x , if $2 \log_5 25 = x$.

- A. 50 B. 625 C. 2 D. 4 E. 125

46. What is the sum of the coordinates of the intersection point of the graphs of the linear equations $y = x + 23$ and $x + 2y = 22$?

- A. 5 B. 9 C. 7 D. -6 E. -8

47. The expression $\frac{5}{2-\sqrt{3}}$ is equivalent to which of the following?

- A. $10 - 5\sqrt{3}$ B. $10 + 5\sqrt{3}$ C. $\frac{2+\sqrt{3}}{5}$ D. $\frac{2-\sqrt{3}}{5}$ E. $7 - \sqrt{3}$

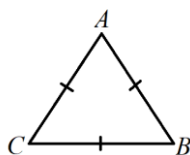
48. If $x + 2y = 7$ and $x - 2y = -1$, what is the value of $3^{x^2-y^2}$?

- A. 27 B. 9 C. 81 D. 243 E. 729

49. If the equation $n^2 + Wn - 162$ has $n = 18$ as one root, what is the value of W ?

- A. -9 B. 12 C. -12 D. -6 E. 9

50. If $AB = 10$, what is the area of the $\triangle ABC$?



- A. 50 units² B. $50\sqrt{3}$ units² C. $12.5\sqrt{3}$ units² D. 25 units² E. $25\sqrt{3}$ units²

2021 – 2022 TMSCA Middle School Mathematics Test #9 Answer Key

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

2021 – 2022 TMSCA Middle School Mathematics Test #9 Selected Answers

5. Hema sold 119 bottles of water and 137 sodas in three days, which is 18 more sodas than waters in three days. To find how many more sodas than waters will be sold in 7 days, set up the proportion

$\frac{18 \text{ more sodas}}{3 \text{ days}} = \frac{x \text{ more sodas}}{7 \text{ days}}$. Cross multiply to get $18(7) = 3x \rightarrow 126 = 3x$. Dividing both sides of the equation by 3 gives us 42 more sodas to be sold than waters in 7 days.

8. ! is the symbol for factorial. Factorial means to take the product of an integer and all positive integers below it. Therefore, $6! = 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$.

10. 144 square inches = 1 square foot.

$$18. 2(2^3 - 2)^2 + 2(2 + 2)^0 = 2(8 - 2)^2 + 2(4)^0 = 2(6)^2 + 2(1) = 2(36) + 2 = 72 + 2 = 74.$$

21. $\sqrt{654} \approx 25.57$, which lies between 25 and 26.

27. Create a list starting with 10, as shown:

10	= 1	From the list, it is seen that the number of two-digit integers with the ten's digit greater than the one's digit is $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 45$.
20, 21	= 2	
30, 31, 32	= 3	
...		
90, 91, 92, 93, 94, 95, 96, 97, 98 = 9		

32. To find the exterior angle measure of a regular polygon, use $\frac{360}{n}$, where n = number of sides of the polygon.

We are given an exterior angle of 30° . So, if $30 = \frac{360}{n}$, multiply both sides of the equation by n to get $30n = 360$. Dividing both sides of the equation by 30 and we get $n = 12$. A polygon with 12 sides is called a dodecagon.

34. If 1 inch = 2.54 centimeters, then 1 yard = 3 feet = $3(12) = 36$ inches = $36(2.54) = 91.44$ centimeters.

37. The largest unattainable sum of two numbers a and b , is equal to $ab - a - b$. Therefore, the largest unattainable sum of the numbers 4 and 17 is equal to $4(17) = 68$ and $68 - 4 - 17 = 47$.

$$40. \frac{\frac{6}{10} \cdot \frac{4}{10} \cdot \frac{8}{18} \cdot \frac{15}{2}}{\frac{2}{3} \div 2} = \frac{\frac{3 \cdot 2 \cdot 4 \cdot 15}{5 \cdot 5 \cdot 9 \cdot 2}}{\frac{2 \cdot 2}{3 \cdot 1}} = \frac{\frac{4}{3}}{\frac{2 \cdot 2}{3 \cdot 1}} = \frac{\frac{4}{3}}{\frac{2 \cdot 1}{3 \cdot 2}} = \frac{\frac{4}{3}}{\frac{2}{6}} = \frac{\frac{4}{3}}{\frac{1}{3}} = \frac{4}{3} \div \frac{1}{3} = \frac{4}{3} \cdot \frac{3}{1} = \frac{12}{3} = 4.$$

45. The Logarithmic Power Property states $a \cdot \log_b c = \log_b c^a$. So, $2 \log_5 25$ can be rewritten as $\log_5 25^2$. Since $\log_x y = z$ can be rewritten as $x^z = y$, $\log_5 25^2 = x$ can be rewritten as $5^x = 25^2$. Therefore, $5^x = 25^2 = (5^2)^2 = 5^4$, and thus $x = 4$.

50. The triangle given is an equilateral triangle. The formula for area of an equilateral triangle when give the side length is $A = \frac{s^2\sqrt{3}}{4}$. The given side length is 10 units, so substitute into the formula and area of $\triangle ABC = \frac{10^2\sqrt{3}}{4} = \frac{100\sqrt{3}}{4} = 25\sqrt{3}$ units².