



TMSCA MIDDLE SCHOOL MATHEMATICS

TEST # 6 ©

DECEMBER 10, 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.

[illegible]

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1. $87 + (11 + 99) + 3 =$ _____

- A. 204 B. 202 C. 200 D. 198 E. 196

2. $\frac{2}{3} - \frac{1}{8} =$ _____

- A. $\frac{1}{11}$ B. $\frac{3}{5}$ C. $\frac{1}{24}$ D. $\frac{7}{12}$ E. $\frac{13}{24}$

3. $34.5 \times 0.07 =$ _____ (nearest hundredth)

- A. 2.5 B. 2.51 C. 3.1 D. 2.42 E. 2.41

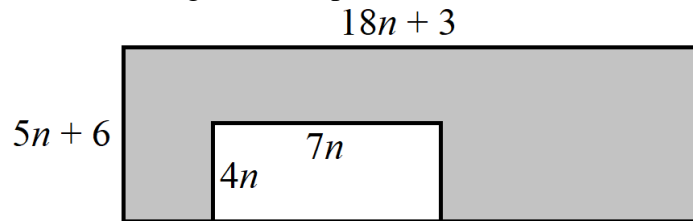
4. $420 \div 4 \div 5 =$ _____

- A. 47 B. 34 C. 35 D. 21 E. 27

5. 23 decagrams = _____ grams

- A. 0.23 B. 230 C. 2,300 D. 0.023 E. 2.3

6. If $n = 2$, what is the area of the shaded region in the picture below?



- A. 624 units² B. 584 units² C. 512 units² D. 248 units² E. 368 units²

7. 9 quarters + 11 dimes + 8 nickels + 15 pennies = 7 quarters + _____ dimes + 20 nickels + 5 pennies

- A. 11 B. 15 C. 17 D. 7 E. 13

8. Which list shows the numbers in order from least to greatest?

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

9. What is the GCF of the numbers 85 and 51?

- A. 510 B. 34 C. 255 D. 3 E. 17

10. Simplify: $-3|12 - 23|$

- A. 33 B. -105 C. 105 D. -27 E. -33

11. Which of the following values is $\frac{2}{3}$ the value of the multiplicative inverse of $1\frac{1}{3}$?

- A. $\frac{3}{4}$ B. $\frac{2}{5}$ C. $\frac{1}{2}$ D. $\frac{10}{3}$ E. $\frac{5}{6}$

12. $\sqrt{250}$ lies between which pair of integers?

- A. 15 and 16 B. 14 and 15 C. 16 and 17 D. 13 and 14 E. 17 and 18

13. $148 + 73 =$ _____ (Roman numeral)

- A. CLXXXVII B. XMCCLVII C. CMXLVII D. CCXXI E. CDI

14. If $\pi = 3$, what is the measure of the diameter of a circle with an area of 108 ft^2 ?

- A. 6 ft B. 18 ft C. 27 ft D. 12 ft E. 15 ft

15. Shiela scored an 84 and an 85 on her first two quizzes. What must Shiela score on her third quiz to have a quiz average of 89?

- A. 95 B. 94 C. 98 D. 96 E. 93

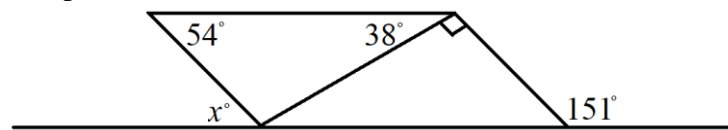
16. $12,345 \times 9 + 6 =$ _____

- A. 111,105 B. 111,115 C. 111,111 D. 111,001 E. 111,121

17. $1\frac{1}{2}\%$ of 600 = _____

- A. 90 B. 900 C. 0.9 D. 0.09 E. 9

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



- A. 27 B. 31 C. 29 D. 33 E. 37

19. One-third of one-half of a number, n , is 200. What is the value of one-fourth of n ?

- A. 300 B. 100 C. 120 D. 240 E. 360

20. How many prime numbers are there between 10 and 60?

- A. 17 B. 15 C. 13 D. 11 E. 19

21. If $a \circ b = a^3 + b^2$, then what is the value of $(-1) \circ (-3)$?

- A. -11 B. 8 C. -10 D. 10 E. -9

22. 4 gallons = _____ ounces

- A. 924 B. 462 C. 256 D. 384 E. 512

23. $0.0\bar{2} =$ _____ (fraction)

- A. $\frac{1}{90}$ B. $\frac{1}{99}$ C. $\frac{1}{24}$ D. $\frac{1}{45}$ E. $\frac{1}{30}$

24. What is the value of the star in the picture below?

$$\square + \square + \square = 78$$

$$\square - \star - \star = 12$$

- A. -2 B. -7 C. 26 D. 14 E. 7

25. The toll for Highway 91 is 42¢ for every 7 miles traveled. What is the toll for a trip of 217 miles on Highway 91?

- A. \$13.42 B. \$12.60 C. \$13.02 D. \$13.44 E. \$12. 82

26. $678 \times 10^4 =$ _____ (scientific notation)

- A. 6.78×10^6 B. 6.78×10^2 C. 67.8×10^5 D. 6.78×10^{-2} E. 6.78×10^{-4}

27. Three positive integers are in a ratio of 1:4:5 and have a sum of 120. What is the largest of the three integers?

- A. 72 B. 60 C. 64 D. 76 E. 84

28. $257_{10} = \underline{\hspace{2cm}}$ (base 5)

- A. 1444 B. 2442 C. 2034 D. 2132 E. 2012

29. How many total diagonals can be drawn inside of a regular 13-sided polygon?

- A. 54 B. 20 C. 65 D. 10 E. 130

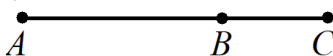
30. $66 \text{ ft/sec} = \underline{\hspace{2cm}} \text{ mi/hr}$

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

31. $\frac{1}{30} + \frac{1}{42} + \frac{1}{56} = \underline{\hspace{2cm}}$

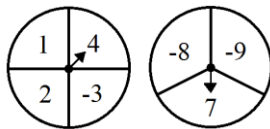
- A. $\frac{1}{12}$ B. $\frac{3}{40}$ C. $\frac{1}{16}$ D. $\frac{3}{45}$ E. $\frac{3}{38}$

32. In \overline{AC} below, $AB = 4x - 15$, $BC = 2x - 7$, and $AC = 56$. What is the measure of \overline{AB} ?



- A. 38 units B. 37 units C. 42 units D. 45 units E. 39 units

33. One spinner is equally divided into four sections and another is equally divided into three sections, as shown below. When both spinners are spun, what is the probability that the product of the two values is negative?



- A. $\frac{1}{4}$ B. $\frac{3}{7}$ C. $\frac{7}{12}$ D. $\frac{5}{12}$ E. $\frac{2}{3}$

34. Maribelle has a doll collection. She keeps 12 dolls in a box, which is only 15% of her entire collection. She keeps the rest of her collection on a shelf. What is the total number of dolls in Maribelle's collection?

- A. 60 B. 80 C. 50 D. 70 E. 90

35. Let A be equal to the number of perfect squares that lie between 110 and 340. Which of the following is equivalent to \sqrt{A} ?

- A. $2\sqrt{2}$ B. $4\sqrt{2}$ C. $\sqrt{10}$ D. 3 E. $\sqrt{14}$

36. Point C is the midpoint of \overline{AB} . If A has coordinates (11, 19) and B has coordinates $(-7, 15)$, what is the sum of the coordinates of C ?

- A. 38 B. 30 C. 26 D. 23 E. 19

37. How many positive integral divisors does the number with the prime factorization of $2^4 \times 3^2 \times 7^2$ have?

- A. 45 B. 16 C. 32 D. 54 E. 42

38. What is the value of the x -intercept of the graph of the linear equation $3x + 8y = -12$?

- A. $-\frac{3}{2}$ B. $-\frac{1}{4}$ C. -4 D. $-\frac{2}{3}$ E. $-\frac{3}{8}$

39. What is the equation $2m = 3p + 4$ solved for p ?

- A. $p = -\frac{2}{3}m - 4$ B. $p = \frac{2m+4}{3}$ C. $p = \frac{2m-4}{3}$ D. $p = \frac{2m}{3} - 4$ E. $p = \frac{2m}{3} + 4$

40. A regular octagon has a perimeter of 72 cm. If a square has the same side measure as the octagon, what is the area of the square?

- A. 36 cm^2 B. 324 cm^2 C. 81 cm^2 D. $1,296 \text{ cm}^2$ E. 144 cm^2

41. What is the measure of the radius of the circle with the equation $x^2 + y^2 + 8x - 2y = 64$?

- A. 64 units B. 8 units C. 81 units D. 9 units E. 16 units

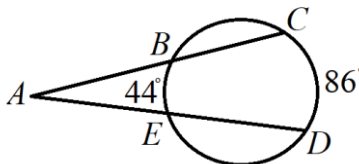
42. What is the rate of decay of the exponential decay function $h(x) = 5.6(0.34)^x$?

- A. 46% B. 66% C. 34% D. 5.6% E. 56%

43. $\left(\frac{2ab^{-3}}{8a^2b}\right)^{-1} =$ _____

- A. $\frac{1}{4ab^4}$ B. $4a^2b^4$ C. $\frac{1}{4a^2b^4}$ D. $\frac{b^4}{4a}$ E. $4ab^4$

44. In the picture below, arc $BE = 44^\circ$ and arc $CD = 86^\circ$. What is the measure of $\angle BAE$?



- A. 21° B. 42° C. 22° D. 43° E. 65°

45. Which of the following is a factor of the trinomial $6x^2 + x - 1$?

- A. $3x + 1$ B. $3x + 2$ C. $2x + 1$ D. $2x - 3$ E. $2x + 3$

46. What is/are the solution(s) of the equation $|x + 4| = 13$?

- A. $\{9, 17\}$ B. $\{-17, -9\}$ C. $\{-9, 17\}$ D. $\{-9\}$ E. $\{-17, 9\}$

47. Evan deposits \$800 into a simple interest account at a 6% rate for 7 years. How much money will be in Evan's bank account after the seven years?

- A. \$336 B. \$504 C. \$1,012 D. \$1,136 E. \$1,224

48. How is the compound inequality $-3 < n \leq 8$ expressed in interval notation?

- A. $(-3, 8]$ B. $(-3, 8)$ C. $[-3, 8)$ D. $[-3, 8]$ E. $[n > -3]$

49. Which of the following systems below have a solution of $(5, 3)$?

I. $\begin{cases} x = y + 2 \\ 4x = 5y + 5 \end{cases}$ II. $\begin{cases} x - y = -4 \\ y = 2x - 6 \end{cases}$ III. $\begin{cases} 4x = -6y - 7 \\ x + y = 18 \end{cases}$ IV. $\begin{cases} 3x - y = 12 \\ 2y = -x + 11 \end{cases}$

- A. I and II B. II and III C. III and IV D. I and IV E. I and III

50. What is the area of the quadrilateral with its vertices located at $(-2, 1)$, $(4, 2)$, $(3, -2)$, and $(-1, -3)$?

- A. 15 units^2 B. 20 units^2 C. 18 units^2 D. 23 units^2 E. 24 units^2

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

2022 – 2023 TMSCA Middle School Mathematics Test #6 Selected Answers

5. If 1 decagram = 10 grams, then 23 decagrams = $23(10) = 230$ grams.

11. The multiplicative inverse of a number is its reciprocal, the number when multiplied by the original number equals 1. To find the multiplicative inverse of $1\frac{2}{3}$, first change it into the improper fraction $\frac{5}{3}$. The reciprocal is then $\frac{3}{5}$. Therefore, the value of $\frac{2}{3}$ of $\frac{3}{5}$ is equal to $\frac{2}{3} \times \frac{3}{5} = \frac{6}{15} = \frac{2}{5}$.

15. To find the third quiz which will give Shiela an average of 89, set up the equation $\frac{84+85+x}{3} = 89$. This equation simplifies to $\frac{169+x}{3} = 89$. To solve this equation, multiply both sides of the equation by 3 to get $169 + x = 267$. To find the value of x , subtract 169 from both sides of the equation, to get $x = 98$. Shiela must score a 98 on her 3rd quiz to have an average of 89.

17. $1\frac{1}{2}\%$ of 600 = $0.015(600) = 9$.

22. If 1 gallon = 128 ounces, 4 gallons = $4(128) = 512$ ounces.

29. The formula to find the total number of diagonals that can be found in a regular polygon is $\frac{n(n-3)}{2}$, where n is equal to the number of sides of the polygon. Therefore, the total number of diagonals can be drawn inside of a regular 13-sided polygon is equal to $\frac{13(13-3)}{2} = \frac{13(10)}{2} = \frac{130}{2} = 65$.

35. The number of perfect squares between 110 and 340 are 121, 144, 169, 196, 225, 256, 289, and 324, which is a total of 8 numbers, so $A = 8$. Therefore, $\sqrt{A} = \sqrt{8} = \sqrt{4 \times 2} = \sqrt{4} \times \sqrt{2} = 2 \times \sqrt{2} = 2\sqrt{2}$.

36. The midpoint of two points (x_1, y_1) and (x_2, y_2) can be found using $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$. If point C is the midpoint of \overline{AB} , with A having coordinates (11, 19) and B having coordinates $(-7, 15)$, then the coordinates of C are $\left(\frac{11+(-7)}{2}, \frac{19+15}{2}\right) = \left(\frac{4}{2}, \frac{34}{2}\right) = (2, 17)$. Therefore, the sum of the coordinates of C is equal to $2 + 17 = 19$.

38. The standard form of a linear function is $Ax + By = C$. To find the x -intercept, substitute 0 in for y and solve the remaining equation. Given the equation $3x + 8y = -12$, first substitute 0 in place of y to get $3x + 8(0) = -12$, which simplifies to $3x = -12$. Therefore, after dividing both sides of the equation by 3, the value of the x -intercept of the graph of the equation $3x + 8y = -12$ is $x = -4$.

47. The formula for simple interest is $I = prt$, where p is the principal amount, r is the rate, and t is the time, in years. So, if \$800 is deposited into a simple interest account at a 6% rate for 7 years, the interest acquired is equal to $I = (800)(0.06)(7) = \$336$. The question is asking, how much money will be in Evan's bank account after the seven years, so after finding the interest acquired, it must be added to the original amount deposited, which is \$800. Therefore, the amount of money in Evan's account is equal to $\$800 + \$336 = \$1,136$.

48. Interval notation is an easy way of expressing inequalities. In interval notation, $<$ is denoted as $($, $>$ is denoted as $)$, \leq is denoted at $[$, and \geq is denoted as $]$. Therefore, using interval notation, the compound inequality $-3 < n \leq 8$ is denoted as $(-3, 8]$.