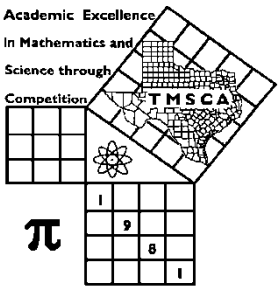

TMSCA MIDDLE SCHOOL MATHEMATICS

TEST #3 ©

NOVEMBER 5, 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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2022 – 2023 TMSCA Middle School Mathematics Test #3

1. $34 + 71 + 109 =$ _____

A. 204 B. 214 C. 224 D. 194 E. 206

2. $68.77 - 18.08 =$ _____ (nearest tenth)

A. 50.7 B. 50.6 C. 50.8 D. 51 E. 49.6

3. $73 \times 64 =$ _____

A. 4,582 B. 4,672 C. 4,722 D. 4,592 E. 4,642

4. $1{,}035 \div 45 =$ _____

A. 26 B. 43 C. 33 D. 23 E. 36

5. A football traveled 148 feet in 4 seconds. Which rate is equivalent to the rate the football traveled?

A. 33 ft/sec B. 37 ft/sec C. 39 ft/sec D. 35 ft/sec E. 41 ft/sec

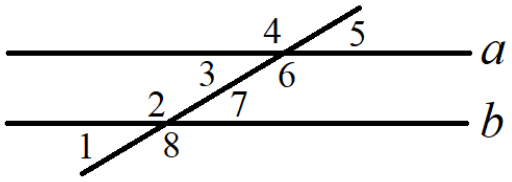
6. 2.3 kilograms = _____ grams

A. 0.023 B. 0.23 C. 23 D. 230 E. 2,300

7. In a right triangle, one angle measures 37°. What is the measure of the other acute angle?

A. 53° B. 63° C. 117° D. 113° E. 143°

8. In the picture below, lines *a* and *b* are parallel. Which pair of angles represents a pair of corresponding angles?



A. $\angle 1$ & $\angle 7$ B. $\angle 2$ & $\angle 7$ C. $\angle 3$ & $\angle 6$ D. $\angle 5$ & $\angle 8$ E. $\angle 6$ & $\angle 8$

9. $(-19) + 16 =$ _____

A. -35 B. -3 C. 3 D. 35 E. -25

10. CXIX = _____ (Arabic number)

A. 64 B. 69 C. 111 D. 119 E. 1,019

11. What value is 52% of 300?

A. 144 B. 152 C. 156 D. 148 E. 154

12. Buford has a bag containing 7 red, 8 blue and 5 green marbles. If he reaches inside his bag without looking, what is the probability of Buford not choosing a red marble?

A. $\frac{7}{10}$ B. $\frac{4}{5}$ C. $\frac{13}{20}$ D. $\frac{1}{4}$ E. $\frac{3}{5}$

13. Which of the following is not a quadrilateral?

A. parallelogram B. trapezoid C. pentagon D. rhombus E. kite

14. Margie is 5 feet tall and casts a 7 feet shadow. Next to Margie is a tree casting a shadow 28 feet long. How much taller is the tree than Margie?
A. 15 feet B. 18 feet C. 20 feet D. 17 feet E. 25 feet

15. The point $(4, -3)$ was dilated to the coordinates $(2, -1.5)$. Which algebraic representation represents this dilation?
A. $(x, y) \rightarrow (2x, 2y)$ B. $(x, y) \rightarrow \left(\frac{1}{2}x, y\right)$ C. $(x, y) \rightarrow \left(x, \frac{1}{2}y\right)$ D. $(x, y) \rightarrow \left(\frac{1}{2}x, \frac{1}{2}y\right)$ E. $(x, y) \rightarrow \left(\frac{1}{4}x, \frac{1}{4}y\right)$

16. $-3(5x - 4) - 4(7 - 4x) - 5 - x =$ _____
A. -21 B. $-x - 21$ C. $x - 16$ D. -16 E. $-x - 16$

17. 0.00062 = _____ (scientific notation)
A. 6.2×10^4 B. 62×10^5 C. 6.2×10^{-4} D. 0.62×10^{-3} E. 6.2×10^{-5}

18. How many odd numbers are there between 10 and 50?
A. 25 B. 23 C. 22 D. 21 E. 20

19. What is the next term of the sequence? 4, 4, 8, 12, 20, 32, 52, …
A. 68 B. 84 C. 76 D. 74 E. 88

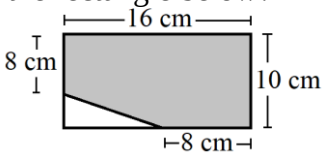
20. 3 gallons = _____ ounces
A. 128 B. 256 C. 384 D. 320 E. 192

21. What is the mean of the set of numbers {34, 66, 45, 5, 40, 34, 8, 8}?
A. 8 B. 58 C. 61 D. 30 E. 34

22. The probability of Marcus winning his basketball game is 3 out of 7. What are the odds of Marcus not winning his basketball game?
A. 3:10 B. 2:5 C. 3:7 D. 4:7 E. 4:3

23. What is the sum of the distinct prime factors of the number 150?
A. 8 B. 10 C. 15 D. 18 E. 16

24. What is the area of the shaded region of the rectangle below?



A. 160 cm^2 B. 96 cm^2 C. 128 cm^2 D. 152 cm^2 E. 144 cm^2

25. Quan has baseball cards and football cards in a ratio of 8:3, respectively. If Quan has 1,110 football cards, how many total cards does he have?
A. 3,330 B. 4,440 C. 4,280 D. 3,820 E. 4,070

26. 146_8 = _____ (base 10)
A. 112 B. 104 C. 116 D. 102 E. 108

27. If $12 - 8x$ is 10 more than 50, what is the value of $-13x$?
A. 78 B. -104 C. -92 D. 91 E. 65

28. What is the range of the function $g(x) = -2x + 11$, when the domain is $\{-12, 18\}$?
A. $\{24, 35\}$ B. $\{35, 47\}$ C. $\{35, -25\}$ D. $\{24, 47\}$ E. $\{24, -47\}$

29. Parallelogram *ABCD* has vertices at *A*$(-3, -4)$, *B*$(-1, 8)$ and *D*$(7, -4)$. If the fourth vertex, point *C*, of parallelogram *ABCD* lies in the first quadrant, what are its coordinates?
A. $(7, 8)$ B. (9, 8) C. (8, 8) D. (10, 8) E. (12, 8)

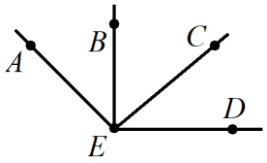
30. $\frac{1}{20} + \frac{1}{30} + \frac{1}{42}$ = _____
A. $\frac{3}{28}$ B. $\frac{3}{32}$ C. $\frac{1}{36}$ D. $\frac{1}{28}$ E. $\frac{3}{40}$

31. Point *B* is the midpoint of $\overline{AC}$. If point *A* has coordinates (11, 24) and point *C* has coordinates $(-1, 30)$, what are the coordinates of point *B*?
A. $(10, 54)$ B. (10, 27) C. (5, -3) D. (5, 27) E. (6, -3)

32. What is the equation $8x - 2y = -24$ solved for *y*?
A. $y = \frac{1}{4}x + 12$ B. $y = -\frac{1}{4}x + 12$ C. $y = 4x + 12$ D. $y = -4x + 12$ E. $y = 4x - 12$

33. 44 *ft/sec* = _____ *mi/hr*
A. 30 B. 32 C. 26 D. 44 E. 18

34. In the picture below, $\overline{AE} \perp \overline{EC}$ and $\overline{BE} \perp \overline{ED}$. If $m\angle CED = 25^\circ$, what is the sum of $m\angle AEB + m\angle BED$?



A. 125° B. 65° C. 130° D. 95° E. 115°

35. What is the percent of change is 250 is reduced to 150?
A. 40% B. 50% C. 45% D. 55% E. 60%

36. Which of the following points does not lie on the line with the equation $4x - y = 7$?
A. $(-11, -51)$ B. $(-1, -11)$ C. $(-3, -18)$ D. (4, 9) E. (13, 45)

37. $(3m + 4)(3m - 4)$ = _____
A. $9m^2 + 16$ B. $9m^2 - 16$ C. $9m^2 + 24m - 16$ D. $9m^2 + 24m + 16$ E. $9m^2 + 12m - 16$

38. What is the slope of the graph of the line with the equation $10x + 3y = -15$?
A. $\frac{10}{3}$ B. $-\frac{10}{3}$ C. $\frac{3}{10}$ D. -5 E. $-\frac{3}{2}$

39. If $A = 2^4 \cdot 3^2 \cdot 5^7$, then *A* ends in _____ zeroes.
A. 4 B. 8 C. 7 D. 6 E. 5

40. 30% of 6,400 = 80% of _____.
A. 3,600 B. 5,400 C. 4,800 D. 2,400 E. 2,800

41. Which of the following is a factor of the trinomial $2x^2 + 19x + 42$?
A. $2x - 1$ B. $x - 6$ C. $x + 7$ D. $2x - 6$ E. $2x + 7$

42. What is the growth factor in the exponential growth function $y = 9(2.3)^x$?
A. 130 B. 9 C. 11.3 D. 2.3 E. 1.3

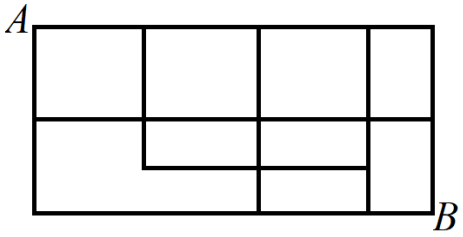
43. Which system of equations has infinitely many solutions?
A. $\begin{cases} y = -0.5x + 2 \\ 4x + 2y = 8 \end{cases}$ B. $\begin{cases} y = 0.5x - 1 \\ 4x + 8y = 16 \end{cases}$ C. $\begin{cases} y = -0.75x + 4 \\ 6x + 8y = 32 \end{cases}$ D. $\begin{cases} 3x + 4y = -12 \\ 3x + 4y = 12 \end{cases}$ E. $\begin{cases} y = 0.75x + 6 \\ 3x + 4y = 12 \end{cases}$

44. If $\pi = 3$, what is the diameter of a circle with an area of 972 units^2?
A. 24 units B. 36 units C. 48 units D. 42 units E. 18 units

45. What is the *y*-coordinate of the vertex of the graph of the quadratic function $f(x) = 3x^2 + 6x - 11$?
A. -1 B. 168 C. -14 D. -11 E. 12

46. Which of the following is the solution set of the compound inequality $-30 < 5x < 55$
A. $-25 < x < 60$ B. $-35 < x < 50$ C. $-150 < x < 275$ D. $-\frac{1}{5} < x < \frac{1}{11}$ E. $-6 < x < 11$

47. In the picture below, moving only to the right and/or down, how many paths exist from point *A* to point *B*?

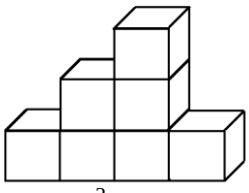


A. 24 B. 18 C. 22 D. 20 C. 21

48. 90° = _____ (radians)
A. $\frac{\pi}{2}$ B. $\frac{\pi}{5}$ C. $\frac{\pi}{3}$ D. $\frac{\pi}{12}$ E. $\frac{\pi}{8}$

49. What is the center and radius of the circle with the equation $(x - 5)^2 + (y + 8)^2 = 100$?
A. center: $(5, -8)$ radius: 10 B. center: $(-5, 8)$ radius: 10 C. center: $(5, -8)$ radius: 100 D. center: $(-5, 8)$ radius: 100 E. center: $(5, -8)$ radius: 50

50. Seven 2-inch cubes are glued together to create the figure below. What is the surface area of the figure?



A. 128 in^2 B. 112 in^2 C. 116 in^2 D. 168 in^2 E. 156 in^2

2022 – 2023 TMSCA Middle School Mathematics Test #3 Answer Key

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

2022 – 2023 TMSCA Middle School Mathematics Test #3 Selected Answers

12. There are a total of 20 marbles in the bag. If 7 of the marbles are red, then the probability of not choosing a red marble is equal to $\frac{20-7}{20} = \frac{13}{20}$.

14. First, we must find the height of the tree. Use the following proportion, $\frac{height\ of\ Margie}{length\ of\ Margie's shadow} = \frac{height\ of\ tree}{length\ of\ tree's shadow} \rightarrow \frac{5}{7} = \frac{x}{28}$. Cross multiply to get $7x = 140$. Dividing both sides of the equation by 7 gives the value x = 20 feet, which is the height of the tree. Therefore, the tree is 20 – 5 = 15 feet taller than Margie.

19. After the first two terms of the sequence, the next term is the sum of the previous two terms. For example, the given sequence is 4, 4, 8, 12, 20, 32, 52, … After the first two terms, the third term is the sum of the first two terms, 4 + 4 = 8. The fourth term is the sum of the second and third terms, 4 + 8 = 12. So, to get the next term of the sequence, add 32 and 52 to get 32 + 52 = 84.

20. If one gallon = 128 ounces, then 3 gallons = 3(128) = 384 ounces.

23. The prime factorization of 150 is equal to $2 \times 3 \times 5^2$, so the sum of its distinct prime factors is equal to the sum of 2 + 3 + 5 = 10.

28. To find the range of the function $g(x) = -2x + 11$, when the domain is $\{-12, 18\}$, substitute each domain value in individually and calculate its corresponding range value. $g(-12) = -2(-12) + 11 = 35$ and $g(18) = -2(18) + 11 = -25$. Therefore, given a domain of $\{-12, 18\}$, the range of the function $g(x) = -2x + 11$ is $\{35, -25\}$.

31. Give two points, (x_1, y_1) and (x_2, y_2), the midpoint formula is $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$. Given point *A* with coordinates (11, 24) and point *C* with coordinates $(-1, 30)$, the midpoint, is $\left(\frac{11+(-1)}{2}, \frac{24+30}{2}\right) = \left(\frac{10}{2}, \frac{54}{2}\right) = (5, 27)$. Thus, if point *B* is the midpoint of $\overline{AC}$, its coordinates are (5, 27).

32. To solve for *y* in the equation $8x - 2y = -24$, first, subtract 8*x* from both sides of the equation to get $8x - 2y - 8x = -8x - 24 \rightarrow -2y = -8x - 24$. Finally, divide both sides of the equation by -2 to get $y = 4x + 12$.

37. $(3m + 4)(3m - 4) = 3m(3m) - 3m(4) + 3m(4) + 4(-4) = 9m^2 - 12m + 12m - 16 = 9m^2 - 16$.

38. The standard form of a linear equation is $Ax + By = C$, with its slope equal to $-\frac{A}{B}$. We are given the equation $10x + 3y = -15$, so substituting and we get a slope of $-\frac{10}{3}$.

39. $A = 2^4 \cdot 3^2 \cdot 5^7 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5$, so there are four pairs of 2×5 that can be formed, which produces $10 \times 10 \times 10 \times 10 = 10{,}000$. This means that *A* will end in four 0's.

42. An exponential growth function is in the form $f(x) = a \cdot b^x$, where $b > 1$ and b is the growth factor. Given the exponential growth function $y = 9(2.3)^x$, the growth factor is then 2.3.