T M S C A M I D D L E S C H O O L

M A T H E M A T I C S

T E S T # 1 ©

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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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2021 – 2022 TMSCA Middle School Mathematics Test #1

1. 313 + 78 = _____
A. 391 B. 401 C. 235 D. 24,414 E. 385

2. 107 – 69 = _____
A. 48 B. 42 C. 38 D. 176 E. 32

3. 24×7 = _____ (nearest ten)
A. 150 B. 160 C. 170 D. 140 E. 180

4. $512 \div 4$ = _____
A. 136 B. 138 C. 133 D. 118 E. 128

5. XXXVII = _____ (Arabic number)
A. 357 B. 3,570 C. 33 D. 37 E. 307

6. Simplify: $64 - (12 + 18 + 2(7) + 2(3) + 6)$
A. 12 B. 10 C. 6 D. 14 E. 8

7. Which expression represents three times the sum of a number and twelve?
A. $3(n + 12)$ B. $3n + 12$ C. $3(n - 12)$ D. $3n - 12$ E. $n + 3(12)$

8. What is the greatest common factor, or GCF, of the numbers 45 and 60?
A. 105 B. 5 C. 180 D. 15 E. 9

9. What is 45% of 400?
A. 180 B. 170 C. 165 D. 175 E. 190

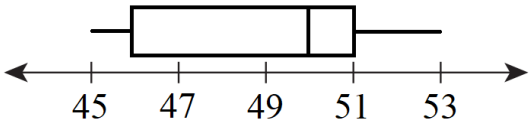
10. A rectangle has a length of 6 cm and a width of 9 cm. If each side of the rectangle is doubled, what is the perimeter of the new rectangle?
A. 60 cm B. 30 cm C. 54 cm D. 216 cm E. 108 cm

11. Ebony tells her friend Shayna she is thinking of three integers that sum to 60. If Ebony subtracts the same number from each of the three integers, she gets 11, 12, and 19. Which of the following is one of Ebony's original three integers?
A. 14 B. 22 C. 17 D. 19 E. 15

12. Karla drew an obtuse angle. Which of the following could have been the angle measure of the angle Karla drew?
A. 15° B. 90° C. 75° D. 180° E. 120°

13. In which quadrant would point *A* be plotted in, if the *x*-coordinate of *A* is a positive number and the *y*-coordinate of *A* is a negative number?
A. Quadrant I B. Quadrant II C. Quadrant III D. Quadrant IV E. Quadrant V

14. What is the value of the median of the box-and-whisker plot?



A. 8 B. 50 C. 49 D. 48.5 E. 47.5

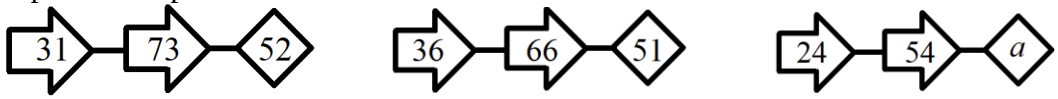
15. What is the probability of rolling a pair of dice and getting a sum of 8?
A. $\frac{4}{9}$ B. $\frac{5}{36}$ C. $\frac{1}{3}$ D. $\frac{1}{4}$ E. $\frac{1}{9}$

16. The number of birds to fish is in the ratio of 3 to 8. If there are 104 fish, how many birds are there?
A. 36 B. 39 C. 46 D. 116 E. 42

17. 2 miles = _____ feet
A. 10,560 B. 11,640 C. 10,280 D. 10,640 E. 3,520

18. Which inequality is true if $m = 7.4$?
A. $3m > 24.2$ B. $15.1 < 2m$ C. $29.8 > 4m$ D. $5m > 38$ E. $6m \leq 42.8$

19. Use the examples in the picture below to find the value of *a*.



A. 78 B. 39 C. 30 D. 40 E. 74

20. Luca ran a distance race in 1.35 hours. How many minutes did it take Luca to run the race?
A. 76 B. 81 C. 95 D. 135 E. 93

21. If $g(x) = |x - 17| + 6$, then the value of $g(4)$ is equal to which of the following?
A. 19 B. 7 C. -7 D. 27 E. 15

22. Which of the following is equivalent to 7.4×10^6?
A. 7,400,000 B. 74,000,000 C. 0.0000074 D. 0.00000074 E. 8,000

23. 3 quarters + 7 dimes + 15 pennies = _____
A. \$2.10 B. \$1.60 C. \$1.40 D. \$2.20 E. \$1.80

24. If $x\nabla y = 6x + 3y$, then what is the value of $11\nabla 7$?
A. 87 B. 648 C. 76 D. 27 E. 75

25. What is the mean of the set of numbers 16, 73, 51, and 24?
A. 164 B. 52 C. 39 D. 47 E. 41

26. $42_6 =$ _____ (base 10)
A. 26 B. 30 C. 24 D. 28 E. 32

27. The sum of two integers is 32. One of the integers is 17. What is the product of the two integers?
A. 544 B. 480 C. 255 D. 240 E. 306

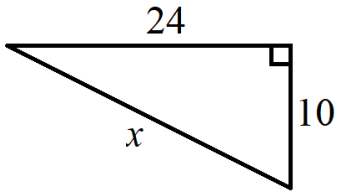
28. Which set of integers is listed correctly from greatest to least?
A. $-1, 0, 1, 2$ B. 12, 14, 16, 20 C. 6, 7, 4, 8 D. 8, 3, 0, -4 E. $-4, -2, -1, 3$

29. If $A = \{2, 4, 6, 8, 10\}$ and $B = \{1, 3, 5, 7, 9\}$, how many elements are in $A \cup B$?
A. 10 B. 0 C. 7 D. 25 E. 5

30. What is the slope of the line that passes through the points $(-14, 13)$ and $(5, 18)$?

A. $\frac{5}{19}$ B. $-\frac{5}{19}$ C. $\frac{19}{5}$ D. $-\frac{19}{5}$ E. $-3\frac{4}{5}$

31. What is the length of the missing side of the triangle?



A. 25 B. 14 C. 32 D. 26 E. 34

32. A new kayak costing $420.00 is on sale for 25% off, while a used kayak costs $360.00. How much cheaper is buying the new kayak that is on sale rather than the used kayak?

A. $35.00 B. $45.00 C. $30.00 D. $40.00 E. $50.00

33. $63{,}827 \div 12$ has a remainder of _____.

A. 9 B. 7 C. 5 D. 3 E. 11

34. On a map, ½ inch = 5 miles. If a distance of 7½ inches is measured, what is the actual distance in miles?

A. 50 B. 125 C. 75 D. 175 E. 150

35. Which of the following represents an exponential function?

A. $y = -3x - 9$ B. $y = x^3$ C. $y = 7x$ D. $y = 0.5(4)^x$ E. $y = 2x^2 + 2x$

36. Which of the following is equivalent to $4x - 7y = -28$?

A. $y = \frac{4}{7}x + 4$ B. $y = -\frac{4}{7}x + 4$ C. $y = \frac{4}{7}x - 4$ D. $y = -\frac{4}{7}x - 4$ E. $y = \frac{4}{7}x - 7$

37. Bailey deposits $420 into a simple interest account that pays interest at a rate of 4.5%. How much money will be in Bailey's bank account if she leaves the money untouched for 8 years?

A. $514.90 B. $535.60 C. $552.20 D. $571.20 E. $567.40

38. What is the value of *B*, if $(x + 3)(2x - 1) = 2x^2 + Bx - 3$?

A. 7 B. 4 C. 6 D. -7 E. 5

39. If $x = \sqrt{4 \cdot 5 \cdot 5 \cdot 4}$, what is the value of $-7x$?

A. -140 B. -28 C. -560 D. -126 E. $-1{,}400$

40. $\frac{\frac{2}{5} - \frac{1}{4}}{2 - \frac{1}{3}}$ = _____ %

A. 25 B. 9 C. 10 D. 11 E. 7

41. What is the 19th term of the arithmetic sequence $-51, -43, -35, \ldots$?

A. 85 B. 77 C. 93 D. 100 E. 195

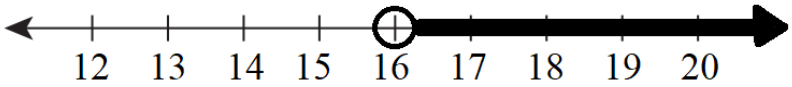
42. What is the sum of all the positive integers satisfying $2n - 1 < 7$?
A. 10 B. 6 C. 28 D. 36 E. 4

43. Point *C* is the midpoint of $\overline{AB}$. If *A* has coordinates (10, 4) and *B* has coordinates $(-6, 12)$, what are the coordinates of *C*?
A. (2, 8) B. $(-2, -4)$ C. $(-2, 8)$ D. $(2, -8)$ E. $(2, 4)$

44. $\sqrt{52}$ = _____
A. $2\sqrt{26}$ B. $6\sqrt{2}$ C. $6\sqrt{26}$ D. $2\sqrt{13}$ E. $4\sqrt{13}$

45. What is the value of the *y*-coordinate of the solution of the system $\begin{cases} y = x + 14 \\ x + 2y = 19 \end{cases}$?
A. -3 B. 5 C. 11 D. -17 E. 9

46. Which of the following is the correct interval notation that is represented by the graph?



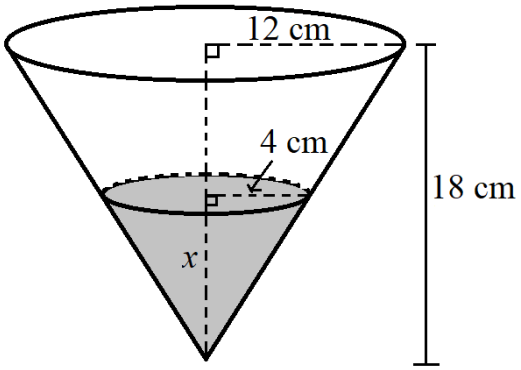
A. (16, ∞] B. $(-\infty, 16)$ C. $[-\infty, 16)$ D. $(16, \infty)$ E. [16, ∞]

47. What is the area of a triangle with vertices $(3, -1)$, $(-4, 3)$, and (3, 3)?
A. 16 units^2 B. 15 units^2 C. 14 units^2 D. 14.5 units^2 E. 15.5 units^2

48. Simplify: $y \cdot y^2 \cdot y^{-4} \cdot y^9$
A. $4y$ B. y^8 C. $4y^7$ D. y^7 E. y^{10}

49. What is the axis of symmetry of the graph of the equation $y = 2x^2 - 9x + 6$?
A. $x = -\frac{2}{9}$ B. $x = -\frac{9}{2}$ C. $x = -\frac{9}{4}$ D. $\frac{4}{9}$ E. $x = \frac{9}{4}$

50. A paper cone is partially filled with water. The cone's radius is 12 cm and its height is 18 cm. If the radius of the surface of the water is 4 cm, what is the volume of the water in the paper cone? Let $\pi = 3$.



A. 96 cm^3 B. 48 cm^3 C. 144 cm^3 D. 72 cm^3 E. 108 cm^3

2021 – 2022 TMSCA Middle School Mathematics Test #1 Answer Key

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

2021 – 2022 TMSCA Middle School Mathematics Test #1 Selected Answers

19. The first example shows $\frac{31+73}{2} = 52$, and the second example shows that $\frac{36+66}{2} = 51$. From the first two examples, we see the pattern $\frac{a+b}{2} = c$. Therefore, $a = \frac{24+54}{2} = 39$.

21. If $g(x) = |x - 17| + 6$, then the value of $g(4) = |4 - 17| + 6 = |-13| + 6 = 13 + 6 = 19$.

27. The sum of two integers is 32. If, one of the integers is 17, then the second integer is equal to 32 – 17 = 15. Therefore, the product of the two integers is equal to (15)(17) = 255.

29. $A \cup B$ symbolizes the union of sets *A* and *B*, and is the set containing all the elements that are elements of set *A* or of set *B* or that are in both sets *A* and *B*. Therefore, if $A = \{2, 4, 6, 8, 10\}$ and $B = \{1, 3, 5, 7, 9\}$, $A \cup B = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, which contains 10 elements.

34. To find the actual distance in miles, set up a proportion, $\frac{\frac{1}{2}\,in}{5\,mi} = \frac{7\frac{1}{2}\,in}{x\,mi}$. Cross multiply to get $(5)\left(7\frac{1}{2}\right) = \frac{1}{2}x$. This gives us $37\frac{1}{2} = \frac{1}{2}x$. Multiply both sides of the equation by 2 and get $x = \left(35\frac{1}{2}\right)(2) = 75$ miles.

35. An exponential function is written in the form $y = a \cdot b^x$. Of the answer choices given, choice D, which is $y = 0.5(4)^x$, is the only answer choice representing an exponential function.

39. If $x = \sqrt{4 \cdot 5 \cdot 5 \cdot 4}$, then $x = \sqrt{400} = 20$. Therefore, the value of $-7x = -7(20) = -140$.

40. $\frac{\frac{2}{5}-\frac{1}{4}}{2-\frac{1}{3}} = \frac{\frac{8}{20}-\frac{5}{20}}{\frac{6}{3}-\frac{1}{3}} = \frac{\frac{3}{20}}{\frac{5}{3}} = \frac{3}{20} \div \frac{5}{3} = \frac{3}{20} \cdot \frac{3}{5} = \frac{9}{100} = 9\%$.

43. The midpoint formula of two points (x_1, y_1) and (x_2, y_2). Therefore, if point *C* is the midpoint of $\overline{AB}$, and *A* has coordinates (10, 4) and *B* has coordinates $(-6, 12)$, then the coordinates of *C* are $\left(\frac{10+(-6)}{2}, \frac{4+12}{2}\right) = \left(\frac{4}{2}, \frac{16}{2}\right) = (2, 8)$.

44. $\sqrt{52} = \sqrt{4 \cdot 13} = \sqrt{4} \cdot \sqrt{13} = 2 \cdot \sqrt{13} = 2\sqrt{13}$.

48. The Product of Powers Property of Exponents states $a^m \cdot a^n = a^{m+n}$. So, we apply this property to the expression $y \cdot y^2 \cdot y^{-4} \cdot y^9$ and get $y \cdot y^2 \cdot y^{-4} \cdot y^9 = y^{1+2+(-4)+9} = y^8$.

49. The standard form of a quadratic equation is $y = Ax^2 + Bx + C$. The axis of symmetry of the graph of a quadratic equation in standard form is found using $x = \frac{-B}{2A}$. Therefore, the axis of symmetry for the given equation $y = 2x^2 - 9x + 6$ is $x = \frac{-(-9)}{2(2)} = \frac{9}{4}$.