



**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #1 ©
OCTOBER 20, 2018**

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.

1. $9,004 - 736 =$ _____ (nearest ten)
 A. 8,278 B. 8,000 C. 8,300 D. 8,260 E. 8,270

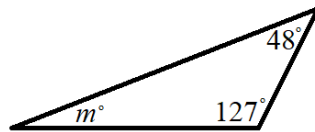
2. $439 + 2,749 =$ _____
 A. 3,188 B. 3,288 C. 3,088 D. 3,378 E. 3,368

3. $37 \times 77 =$ _____
 A. 2,819 B. 2,839 C. 2,849 D. 2,329 E. 2,919

4. $1,848 \div 84 =$ _____
 A. 18 B. 24 C. 32 D. 28 E. 22

5. $14\frac{3}{8}$ is equivalent to which of the following?
 A. 14.125 B. 14.375 C. 14.325 D. 14.675 E. 14.175

6. What is the value of m in the triangle?



A. 5 B. 42 C. 15 D. 66 E. 10

7. What is the prime factorization of the number 104?
 A. $2^2 \cdot 5^2 \cdot 7$ B. $8 \cdot 13$ C. $2^3 \cdot 13$ D. $2 \cdot 4 \cdot 13$ E. $5^2 \cdot 13$

8. What is the greatest palindrome that falls between 2,000 and 3,999?
 A. 9,999 B. 2,992 C. 4,004 D. 3,993 E. 1,991

9. What is the value of n , if $12n + 32 = 68$?
 A. -2 B. 4 C. 3 D. -4 E. 6

10. How many degrees are in the interior angles of a convex polygon with 5 sides?
 A. 540° B. 360° C. 270° D. 720° E. 900°

11. What value is nine more than the next term in the sequence 1, 4, 9, 16, 25, 36, ...?
 A. 58 B. 49 C. 45 D. 61 E. 40

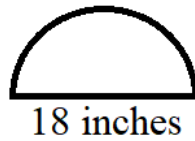
12. Simplify: $\frac{48 \div 6}{15 \cdot 2 \div 15}$
 A. $\frac{1}{4}$ B. $\frac{1}{2}$ C. 2 D. 4 E. $\frac{1}{8}$

13. If n is a negative integer and $n \leq 3$, which of the following produces the greatest value?
 A. $n + 8$ B. $13n$ C. $5n + 12$ D. $n - 200$ E. $-2n$

14. What value is 28% of 150?
 A. 44 B. 42 C. 46 D. 36 E. 122

15. $33 + 49 =$ _____ (Roman numeral)
 A. LXXXII B. XCII C. XDVII D. XLII E. CDXXII

16. If $\pi = 3$, what is the perimeter of the semi-circle with a diameter of 18 inches?



- A. 54 inches B. 27 inches C. 36 inches D. 45 inches E. 38 inches

17. What is the complement of $\angle A$, if $m\angle A = 27^\circ$?

- A. 63° B. 153° C. 54° D. 13.5° E. 333°

18. If $A = 1, B = 2, C = 3, \dots, Y = 25$ and $Z = 26$, what is the sum of the values of the letters of the word *PINK*?

- A. 54 B. 52 C. 50 D. 51 E. 53

19. The sum of two numbers is 25. One of the numbers is 7. What is the product of the two numbers?

- A. 126 B. 18 C. 11 D. 198 E. 175

20. If $g(x) = 4(x + 3)$, then find the value of $g(3 + 8)$.

- A. 56 B. 36 C. 44 D. 112 E. 72

21. $1.75 \text{ gal} = \underline{\hspace{2cm}} \text{ oz}$

- A. 96 B. 224 C. 256 D. 112 E. 348

22. Which set of numbers is correctly ordered from greatest to least?

- A. $-9, -6, -3, -1$ B. $-2, -5, -6, -11$ C. $3, 5, 7, 20$ D. $0.01, 0.1, 1, 10$ E. $9, -9, 6, -6$

23. Melinda plots point *A* at coordinates $(-15, 22)$. She then plots point *B* seventeen units to the right and nine units down from point *A*. What are the coordinates of point *B*?

- A. $(-35, 31)$ B. $(-2, 31)$ C. $(2, 13)$ D. $(-35, 13)$ E. $(2, 31)$

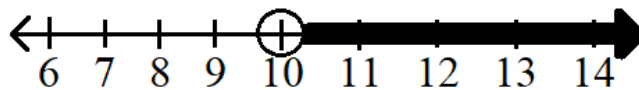
24. It takes Alan 7 gallons of paint to paint 9 walls. How many gallons of paint does Alan need to paint 153 walls?

- A. 123 B. 189 C. 135 D. 127 E. 119

25. If one-dozen pens cost \$13.44, what is the unit rate per pen?

- A. \$1.22 B. \$1.16 C. \$1.08 D. \$1.12 E. \$1.24

26. Which inequality matches the picture below?



- A. $x > 10$ B. $x \geq 10$ C. $x < 10$ D. $x \leq 10$ E. $x \leq 14$

27. How many more vertices does a dodecagonal prism have than a pentagonal prism?

- A. 7 B. 14 C. 12 D. 10 E. 19

28. Which of the following relations describes a function?

- A. $\{(4, 5), (4, 6), (4, 7)\}$ B. $\{(1, 1), (8, -1), (1, 7)\}$ C. $\{(8, 3), (0, 1), (4, 3)\}$ D. $\{(0, 4), (7, 7), (0, 2)\}$ E. $\{(4, 5), (5, 8), (4, 1)\}$

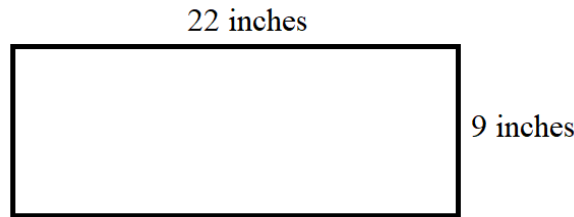
29. Alex, Blake and Chris have a total of 38 pet rocks. Alex and Blake have a total of 29 pet rocks. Blake and Chris have a total of 20 pet rocks. How many pet rocks does Alex have?

- A. 16 B. 11 C. 18 D. 9 E. 7

30. If $A = \{1, 2, 3, 4, 5\}$ and $B = \{3, 4, 5, 6, 7\}$, $A \cap B$ has how many elements?

- A. 3 B. 10 C. 7 D. 4 E. 6

31. Stephanie wants to paint the rectangle below. Each mini-paint pen Stephanie will use can only cover 6 inches². How many mini-paint pens will Stephanie need to paint the entire rectangle?



- A. 24 pens B. 31 pens C. 19 pens D. 33 pens E. 27 pens

32. How many $2\text{ cm} \times 2\text{ cm} \times 2\text{ cm}$ cubes can fit inside a larger cube with a side length of 8 cm ?

- A. 128 B. 64 C. 32 D. 16 E. 8

33. If 3 stars, 4 hearts, 7 clovers, 11 horse shoes and 5 diamonds are placed inside of a bag, what is the probability of reaching into the bag and not drawing out a horse shoe? The probability of drawing any of the shapes is equally likely.

- A. $\frac{7}{30}$ B. $\frac{7}{15}$ C. $\frac{11}{30}$ D. $\frac{1}{6}$ E. $\frac{19}{30}$

34. 34_{10} is equal to which of the following in base 6?

- A. 54 B. 102 C. $5\frac{2}{3}$ D. 28 E. 44

35. $(17n^2 - 8n + 13) - (11n + 7n^2 + 4) + (6 - 2n - 10n^2) =$ _____

- A. $14n^2 - 21n + 23$ B. $14n^2 - 17n + 15$ C. $20n^2 - 21n + 23$ D. $-21n + 23$ E. $-21n + 15$

36. Which point is a solution to the linear inequality $2x + 5y < 40$?

- A. (0, 8) B. (5, 8) C. (-1, 15) D. (14, 3) E. (0, -32)

37. Which of the following functions is an example of an exponential growth function?

- A. $y = 12(1.01)^x$ B. $y = 632(0.89)^x$ C. $y = x^2 - 45$ D. $y = 123 + x^3$ E. $y = 89\left(\frac{3}{4}\right)^x$

38. What is the slope of the line that passes through the points (19, 11) and (7, -5)?

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

39. What is the area of a square with vertices located at (-4, 8), (9, 8), (9, -5) and (-4, -5)?

- A. 196 units² B. 92.5 units² C. 121 units² D. 98 units² E. 169 units²

40. Factor completely: $15m^3 - 10m^2$

- A. $m^2(15m - 10)$ B. $5(m^3 - m^2)$ C. $5m(3m^2 - 2m)$ D. $5m^2(3m - 2)$ E. $(5m^2 - 2)(3m + 5)$

41. What is the measure of the radius of a circle with the equation $x^2 + (y - 8)^2 = 196$?

- A. 196 units B. 14 units C. 98 units D. 49 units E. 8 units

42. If $(m + 5)(m - 11) = m^2 + Bm - 55$, then what is the value of $-3B$?

- A. 18 B. -15 C. 165 D. -9 E. 48

43. The square below has a diagonal measuring $10\sqrt{2}$ cm. Assuming $\pi = 3$, what is the area of the unshaded region?



- A. $100\sqrt{2} - 75$ cm² B. $60 - 40\sqrt{2}$ cm² C. 75 cm² D. 200 cm² E. 25 cm²

44. Simplify: $\sqrt{252}$

- A. $126\sqrt{2}$ B. $4\sqrt{63}$ C. $13\sqrt{3}$ D. $6\sqrt{7}$ E. $12\sqrt{21}$

45. What is the value of y in the solution to the system of linear equations $\begin{cases} x + 9y = 2 \\ -x - 6y = -3 \end{cases}$?

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

46. $\log_7 343 = 3$ is equivalent to _____.

- A. $7^{343} = 3$ B. $3^7 = 343$ C. $\sqrt[7]{343} = 3$ D. $3^7 \cdot 7^3 = 343$ E. $7^3 = 343$

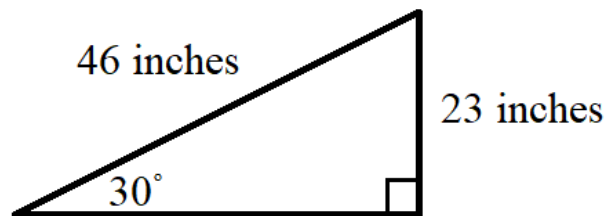
47. $\frac{24x^6}{5y^4} \cdot \frac{15x^2y^4}{3x^{-1}y^0} =$ _____

- A. $24x^9$ B. $8x^9$ C. $8x^7$ D. $24x^7y^8$ E. $8x^9y^8$

48. What are the coordinates of the vertex of the quadratic equation $y = x^2 - 8x + 7$?

- A. (-7, -1) B. (7, 1) C. (4, -9) D. (4, 11) E. (8, 7)

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



- A. 23 inches B. $23\sqrt{2}$ inches C. $23\sqrt{5}$ inches D. $23\sqrt{3}$ inches E. $23\sqrt{6}$ inches

50. Find the value of x , if $|x| = 17$.

- A. $x = 17$ B. $x = -17$ C. $x = 8.5$ D. $x = 34$ E. $x = \pm 17$

2018 – 2019 TMSCA Middle School Mathematics Test #1 Answer Key

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

2018-2019 TMSCA Middle School Mathematics Test #1 Selected Answers

19. The sum of two number is 25. One of the numbers is 7. The second number must then be $25 - 7 = 18$. Therefore, $18(7) = 126$.

21. One gallon = 128 ounces. Therefore, $1.75 \text{ gal} = 1.75(128) = 224$ ounces.

29. If we let $A = \text{Alex}$, $B = \text{Blake}$ and $C = \text{Chris}$, then $A + B + C = 38$. Since $B + C = 20$, then $A + 20 = 38$. Subtracting 20 from both sides gives us $A = 18$. Alex has 18 pet rocks.

30. The symbol \cap represents the intersection of two sets, what the two sets have in common. We are given the sets $A = \{1, 2, 3, 4, 5\}$ and $B = \{3, 4, 5, 6, 7\}$. $A \cap B$ is then what the two sets have in common. We see that $A \cap B = \{3, 4, 5\}$, which has three elements.

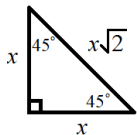
31. First we must find the area of the rectangle. The area of the rectangle is $22 \times 9 = 198 \text{ inches}^2$. A mini-paint pen can only cover 6 inches^2 , so we must divide 198 by 6 and get 33. Stephanie will need 33 mini-paint pens to paint the rectangle.

38. When given two points, the slope of the line passing though the point can be found using the slope formula $\frac{y_2 - y_1}{x_2 - x_1}$. The slope of the line passing through the points (19, 11) and (7, -5) is then $\frac{-5 - 11}{7 - 19} = \frac{-16}{-12} = \frac{4}{3}$.

40. The GCF of $15m^3 - 10m^2$ is $5m^2$. Divide each term by the GCF and get $\frac{15m^3}{5m^2} = 3m$ and $\frac{-10m^2}{5m^2} = -2$. Therefore $15m^3 - 10m^2$ factors to $5m^2(3m - 2)$.

42. $(m + 5)(m - 11) = m \cdot m - 11 \cdot m + 5 \cdot m - 11 \cdot 5 = m^2 - 6m - 55$. Since we now see that $B = -6$, then $-3B = -3(-6) = 18$.

43. The diagonal of a square is the hypotenuse of a $45 - 45 - 90$ right triangle. The ratio of the sides of a



$45 - 45 - 90$ can be seen as $\begin{matrix} x & & x\sqrt{2} \\ & \searrow & \\ & & x \end{matrix}$. Therefore, if the diagonal of the square is $10\sqrt{2}$ cm, the side length of the square is 10 cm. The area of the square is then $10^2 = 100 \text{ cm}^2$. The shaded region is a quarter circle with a radius of 10. The area of the quarter circle is $A = \frac{\pi r^2}{4} = \frac{3(100)}{4} = 75 \text{ cm}^2$. The area of the unshaded region is then $100 - 75 = 25 \text{ cm}^2$.

46. If $\log_x A = y$ can be written as $x^y = A$, then $\log_7 343 = 3$ can then be rewritten as $7^3 = 343$.

48. To find the coordinates of the vertex of a quadratic equation in standard form, $y = Ax^2 + Bx + C$, use $x = \frac{-B}{2A}$ to find the x -coordinate. We are given $y = x^2 - 8x + 7$, so $A = 1$, $B = -8$ and $C = 7$. Substituting and we get $x = \frac{8}{2(1)} = 4$. The x -coordinate is 4. To find the y -coordinate, substitute the x -value into the equation and solve for y . Therefore, $y = x^2 - 8x + 7 = 4^2 - 8(4) + 7 = 16 - 32 + 7 = -9$. The coordinates of the vertex of the graph of the quadratic equation $y = x^2 - 8x + 7$ are (4, -9).