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 ©

O C T O B E R 2 2 , 2 0 1 6

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.

2016 – 2017 TMSCA Middle School Mathematics Test #1

1. Which expression below produces the least sum?
A. 518 + 812 B. 100 + 834.6 C. 901+56 D. 371 + 499 E. 299 + 799

2. 7,498 – 3,227 = 6,003 – _____
A. 1,782 B. 1,732 C. 4,271 D. 4,272 E. 1,642

3. *Tea Cups Unlimited* buys tea bags that come in 50 pound bags. If each bag can make 1,245 cups, how make cups can *Tea Cups Unlimited* make if they purchase 6 bags?
A. 62,250 cups B. 10,320 cups C. 1,195 cups D. 7,470 cups E. 373,500

4. How many one-fifths are there in the number 47?
A. 235 B. 9.4 C. 18.8 D. 117.5 E. 470

5. What is the total number of triangles that can be found in the picture below?

A. 3 B. 4 C. 5 D. 6 E. 7

6. What is the Greatest Common Factor of the numbers 1,560 and 248?
A. 8 B. 120 C. 64 D. 16 E. 12

7. The number 114 has how many positive integral divisors?
A. 6 B. 8 C. 12 D. 10 E. 2

8. Today is Tuesday. What day of the week will it be 45 days the day after tomorrow?
A. Sunday B. Thursday C. Wednesday D. Monday E. Friday

9. $5.4 \times 20 =$ _____ (Roman numeral)
A. CVIII B. MIIX C. CIIX D. DXIII E. LVIII

10. $(3.5 \times 10^5)(2.4 \times 10^6) =$ _____ (scientific notation)
A. 5.9×10^{30} B. 5.9×10^{11} C. 8.4×10^{11} D. 4.2×10^{11} E. 8.4×10^{30}

11. $m\angle C = \frac{1}{2} m\angle A$ and $\angle A$ is the supplement to $\angle B$. If $m\angle B = 35^\circ$, what is the measure of $\angle C$.
A. 145° B. 27.5° C. 72.5° D. 107.5° E. 125.5°

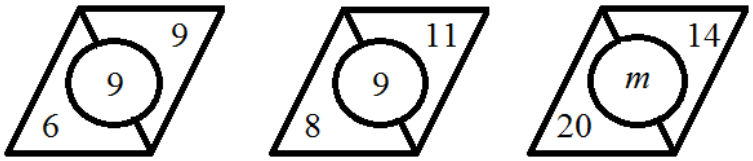
12. A new fishing pole costing $28.50 is on sale for 30% off, while a used fishing pole costs $22.75. How much do you save if you buy the new fishing pole that is on sale rather than the used fishing pole?
A. $8.55 B. $19.95 C. $2.20 D. $2.80 E. $3.20

13. What is the product of the number of edges of a pentagonal prism and the number of vertices of a hexagonal prism?
A. 120 B. 90 C. 180 D. 270 E. 150

14. The area of a square is 196 units^2. What is the perimeter of the square?
A. 28 units B. 48 units C. 36 units D. 54 units E. 56 units

15. Grace has a pair of numbered cubes. One is numbered 2, 4, 6, 8, 10, 12 and the second is numbered 3, 4, 5, 6, 7, 8. What is the probability of rolling the number cubes and getting a sum of 16?
A. $\frac{1}{4}$ B. $\frac{2}{9}$ C. $\frac{1}{18}$ D. $\frac{5}{36}$ E. $\frac{1}{12}$

16. Using the examples below, find the value of *m*.

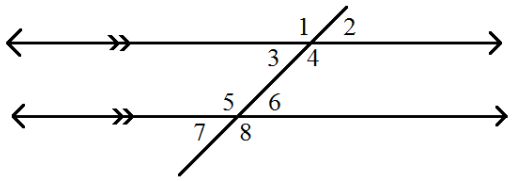


A. 36 B. 34 C. 16 D. 24 E. 30

17. If $m\nabla n = \frac{4}{m} + 10n$, then find the value of $\frac{1}{4}\nabla\frac{11}{5}$?

A. 353 B. 21.5 C. 14 D. 38 E. 42.5

18. If $m\angle 1 = 152^{\circ}$, what is the difference of the measure of $\angle 6$ subtracted from one-half the measure of $\angle 1$?



A. 28° B. 48° C. 76° D. 38° E. 19°

19. What is the sum of the next three terms in the arithmetic sequence? -57, -26, 5, …

A. 201 B. 93 C. 98 D. 192 E. 232

20. For the upcoming school year, Patricia buys nine boxes of pens at $8.65 each, five erasers for $0.80 each and a compass for $3.48. How much change will Patricia get back if she pays with a one hundred-dollar bill?

A. $15.67 B. $83.87 C. $42.83 D. $14.67 E. $14.91

21. $\frac{3}{14}$ = _____ (nearest thousandths)

A. 0.2 B. 0.31 C. 0.312 D. 0.213 E. 0.214

22. $32.15 = 112 quarters + 36 dimes + 3 nickels + _____ pennies.

A. 60 B. 120 C. 150 D. 25 E. 40

23. A square has a side length of 12 units. A rectangle has a length of 11 units and width of 17 units. How many units larger is the area of the rectangle than the area of the square?

A. 23 units^2 B. 43 units^2 C. 145 units^2 D. 44 units^2 E. 108 units^2

24. How many more diagonals can be drawn from one vertex of a decagon than from one vertex of a quadrilateral?

A. 1 B. 8 C. 7 D. 6 E. 33

25. What is the sum of the domain values of the relation {(-8, 9), (-3, 11), (-5, 6), (9, -1), (11, 0), (-3, 2), (5, 5), (6, 7)}?

A. 39 B. 27 C. 12 D. 41 E. 18

26. Sofia plays softball. When at bat, she has 35% of not hitting the ball. If Sofia bats 120 times in one season, how many times is she expected to hit the ball?

A. 78 B. 35 C. 42 D. 84 E. 64

27. $\overline{KL}$ has endpoints *K*(12, -11) and *L*(60, -54). If point *K* is reflected across the *x*-axis to create point *M*, what the coordinates of the midpoint of $\overline{LM}$?

A. (36, -43) B. (36, -21.5) C. (24, -21.5) D. (24, 21.5) E. (24, 36)

28. What is the sum of all positive integers that satisfy $7x + 8 < 92$?
A. 66 B. 78 C. 54 D. 90 E. 84

29. 2,018 – 1,898 = _____ (base 6)
A. 12 B. 302 C. 312 D. 342 E. 320

30. Becky is deciding which of two simple interest accounts to deposit her money in. Is she deposits \$540 into account *A* for 10 years, the bank will give her a rate of 6%. If she deposits \$600 into account *B* for 10 years, the bank will give her a rate of 4%. How much more interest will Becky acquire if she chooses plan *A* instead of plan *B*?
A. \$66.00 B. \$84.00 C. \$56.50 D. \$68.40 E. \$82.80

31. The odds of it raining today are 3:7. What is the probability of it not raining today?
A. $\frac{3}{7}$ B. $\frac{3}{10}$ C. $\frac{7}{10}$ D. $\frac{4}{7}$ E. $\frac{2}{5}$

32. What is the 120th term of the sequence? -18, -16, -14, -12, …
A. 216 B. 218 C. 220 D. 222 E. 224

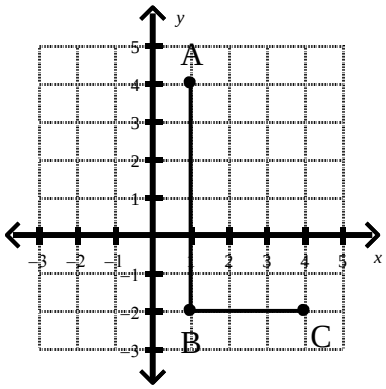
33. What is the least possible sum of two positive integers whose product is one less than 211?
A. 37 B. 18 C. 41 D. 29 E. 31

34. Simplify: $\frac{x^3y^4z^0}{xy^7z^2}$
A. $\frac{x^3}{y^{11}z}$ B. $\frac{x^3}{y^3z}$ C. $\frac{x^2}{y^3z^2}$ D. $\frac{x^2}{y^3z}$ E. $\frac{x^2}{y^4z^2}$

35. A square has a side length of $3x + 8$. If the square is dilated by a scale factor of 4, what is its new perimeter?
A. $12x + 8$ units B. $48x + 32$ units C. $48x + 128$ units D. $12x + 64$ units E. $48x + 64$ units

36. To convert degrees into radian measure, multiply the degrees by which of the following?
A. $\frac{\pi}{360}$ B. $\frac{\pi}{180}$ C. $\frac{\pi}{90}$ D. $\frac{90}{\pi}$ E. $\frac{180}{\pi}$

37. What is the slope of the line segment needed to create ΔABC?



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

38. The graph of the quadratic equation $y = x^2 + 3$ and $y = 2x - 4$ intersect in how may points?
A. 0 B. 1 C. 2 D. 3 E. 4

39. Mike is twelve years older than Becky. Ariel is five years younger than Becky. In four years, Mike will be twice as old as Becky. How old is Ariel?
A. 5 B. 8 C. 12 D. 3 E. 6

40. If the value of $3^{4x} = 42$, then find the value of 3^{4x+2}.
A. 3^{44} B. 396 C. 378 D. 44 E. 132

41. If $12\sqrt{120} = 24\sqrt{n}$, then what is the value of $\frac{n}{2} + 7$?
A. 22 B. 31 C. 42 D. 19 E. 26

42. The angles in a triangle are in a ratio of 1:2:3. What is the supplement to the smallest of these angles?
A. 90° B. 120° C. 150° D. 60° E. 180°

43. The combination of a bicycle lock has seven digits. If the first digit is a 3 and the last digit is a 4, how many lock combinations are there possible if no digit can repeat?
A. 100,000 B. 50,000 C. 4,320 D. 6,720 E. 6,540

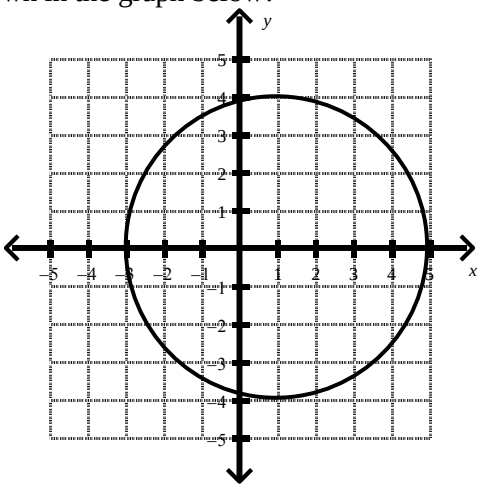
44. The slope of the line that passes through points *A* and *B* is -4. Find the value of *n* if *A* has coordinates (4, -6) and *B* has coordinates (2, *n*).
A. ½ B. -8 C. 10 D. 2 E. 4

45. What is the sum of the lower quartile and upper quartile for the set of numbers? 32, 38, 44, 46, 54
A. 84 B. 85 C. 88 D. 86 E. 70

46. If $f(x) = 2x^2 + 3$ and $g(x) = 3 - x$, find the value of $f(g(6))$.
A. 21 B. 18 C. -72 D. 78 E. 45

47. Which quadratic equation below has a vertex of (2, 4)?
A. $y = 3(x-2)^2 + 4$ B. $y = 3(x+2)^2 + 4$ C. $y = 3(x-2)^2 - 4$ D. $y = 3(x+2)^2 - 4$ E. $y = 3(x-4)^2 + 2$

48. What is the equation of the circle shown in the graph below?



A. $x^2 + y^2 = 8$ B. $(x+1)^2 + y^2 = 8$ C. $(x-1)^2 + y^2 = 16$ D. $(x+1)^2 + y^2 = 16$ E. $(x+1)^2 + y^2 = 4$

49. What is the sum of the solutions to the equation? $|4x - 1| = 19$
A. 0.5 B. 9.5 C. 4.5 D. -1.5 E. 5

50. Melissa went to the zoo and saw a cage that had birds flying in the air as well as lizards crawling around on the ground. Melissa counted 40 heads and 112 legs. How many more birds did Melissa see than lizards?
A. 12 B. 6 C. 10 D. 8 E. 4

2016 – 2017 TMSCA Middle School Mathematics Test #1 Answer Key

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

4. $47 \div \frac{1}{5} = 47 \cdot \frac{5}{1} = 235.$

10. Using the associative property of multiplication, we can rearrange the numbers to give us the following, $(3.5 \times 10^5)(2.4 \times 10^6) = (3.5 \times 2.4)(10^5 \cdot 10^6) = 8.4 \times 10^{11}$.

18. $\angle 1 \cong \angle 5$ because they are corresponding angles. Therefore, $m\angle 5 = 152^\circ$. $\angle 5$ and $\angle 6$ are supplementary, so $m\angle 6 = 180 - 152 = 38^\circ$. Now, $\frac{1}{2}m\angle 1 - m\angle 6 = 76 - 28 = 48^\circ$.

22. \$32.15 − 112 quarters − 36 dimes − 3 nickels = $\$32.15 = \$28.00 - \$3.60 - \$0.15 = \$0.40$. $\$0.40 = 40¢$ = 40 pennies.

25. A relation is a set of ordered pairs. In a relation or function, the *x*-values make up the domain values. We are given the relation {(-8, 9), (-3, 11), (-5, 6), (9, -1), (11, 0), (-3, 2), (5, 5), (6, 7)}. To sum the domain, we get -8 + -3 + -5 + 9 + 11 + -3 + 5 + 6 = 12.

35. It is given that the square has a side length of $3x + 8$. If the square is dilated by a scale factor of 4, then the new side length is $4(3x + 8) = 12x + 32$. To find the perimeter, you must multiply the side length by 4, since a square has 4 sides. Thus, the new perimeter is $4(12x + 32) = 48x + 128$.

43. The bicycle combination has 7 digits with no digit repeating and the first digit is a 3 and the last digit is a 4. There are 5 remaining digits to think of, and no digit can repeat. Because the 3 and 4 are already taken, we have 8 choices for the 2nd, 7 choices for the 3rd, 6 choices for the 4th, 5 choices for the 5th and 4 choices for the 6th position We find the number of combinations by multiplying $8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 = 6{,}720$.

48. The equation of a circle is $(x - h)^2 + (y - k)^2 = r^2$, with center at (h, k) and radius *r*. The circle give has its center at (1, 0) and has a radius of 4. Therefore, the equation of the circle from the given graph is $(x - 1)^2 + (y - 0)^2 = 4^2$, which simplifies to $(x - 1)^2 + y^2 = 16$.

49. We are given the equation $|4x - 1| = 19$. Since this is an absolute value equation, we know that $|4x - 1|$ has to equal -19 or 19. S, rewrite the equation making two equations and solve each. We get the equations $4x - 1 = 19$ and $4x - 1 = -19$. Solving each equation gives us $4x = 20$ and $x = 5$ and $4x = -18$ and $x = -4.5$. Thus, $5 + -4.5 = 0.5$.

50. For this problem, you can create a system of equations. Remember to use variables that represent characters in your problem. We will use *B* for birds and *L* for lizards. Our equation for the number of heads is $B + L = 40$ and equation for legs is $2B + 4L = 112$. We multiply the first equation by 2 and we get $2B + 2L = 80$. If we subtract this equation from the second, we get $2L = 32$ and we solve to get $L = 16$. Substituting 16 in for *L* in the original first equation and we get $B + 16 = 40$ and we solve to get $B = 24$. So, $24 - 16 = 8$. There are 8 more birds than lizards.