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
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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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2018 – 2019 TMSCA Middle School Mathematics Kick-Off Test

1. 78 + 99 = _____
A. 176 B. 178 C. 177 D. 187 E. 167

2. 1,019 – 328 = _____
A. 637 B. 631 C. 691 D. 651 E. 1,347

3. $76 \times 31 =$ _____
A. 2,356 B. 2,281 C. 2,286 D. 2,386 E. 2,466

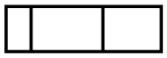
4. $456 \div 24 =$ _____
A. 17 B. 24 C. 26 D. 19 E. 23

5. Which of the following lists is in the correct order of least to greatest?
A. $-0.5, -2, -4.5, -8$ B. $17, 9, 5, 3$ C. $-8, -0.3, 2, 0$ D. $-1.3, -0.8, -0.2, 1$ E. $-87, 90, 10, 1$

6. What is the value of *A*, if $A = \frac{3042}{3+0+4+2}$?
A. 507 B. 234 C. 338 D. 342 E. 273

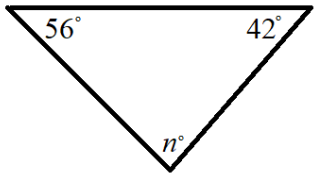
7. What is the prime factorization of the number 220?
A. $2^2 \cdot 5 \cdot 11^2$ B. $2^2 \cdot 5 \cdot 11$ C. $2^3 \cdot 5 \cdot 11$ D. $2^2 \cdot 5^2 \cdot 11$ E. $2^3 \cdot 5^2 \cdot 11$

8. How may rectangles can be found in the picture below?



A. 3 B. 6 C. 5 D. 4 E. 9

9. What is the value of *n* in the triangle?



A. 62 B. 69 C. 72 D. 84 E. 82

10. What is the arithmetic mean of the numbers 76, 84 and 203?
A. 43 B. 143 C. 121 D. 181.5 E. 127

11. If the number $12{,}345.\overline{12345}$ is written out, what is the 27th digit after the decimal?
A. 1 B. 2 C. 3 D. 4 E. 5

12. What is the value of *w*, if $6w - 4 = 38$?
A. 7 B. 6 C. 5⅓ D. 8 E. 6⅔

13. Evaluate $ab \div cd$, if $a = 12$, $b = 8$, $c = 4$ and $d = 6$.
A. 6 B. 4 C. 144 D. 64 E. 9.6

14. If $\pi = 3$, what is the circumference of a circle with a diameter of 15 inches?
A. 5 inches B. 405 inches C. 90 inches D. 18 inches E. 45 inches

15. Which expression below is an example of a linear binomial?
A. $x^2 + 3x - 7$ B. $15x$ C. $-7x + x^2$ D. $-9x - 1$ E. $6x^3$

16. What value is 64% of 200?
A. 128 B. 136 C. 148 D. 124 E. 132

17. 89 – 52 = _____ (Roman numeral)
A. XXXIV B. XLVII C. XXXVII D. XCVII E. XDII

18. What is the name of a polygon with 7 sides?
A. hexagon B. nonagon C. octagon D. heptagon E. seventhagon

19. Shania chews six pieces of gum a day. How many pieces of gun will Shania chew in two weeks?
A. 14 B. 60 C. 84 D. 72 E. 144

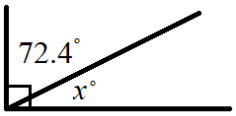
20. $\angle A$ and $\angle B$ form a linear pair. What is the total degree measure of $\angle A$ and $\angle B$?
A. 360° B. 180° C. 90° D. 120° E. 270°

21. Billy drew a rectangle that had a length of 12 inches and a width 3 inches shorter than the length. What is the perimeter of the rectangle Billy drew?
A. 24 inches B. 30 inches C. 42 inches D. 36 inches E. 48 inches

22. Isabel told her friend five numbers which were 45, 15, 20, 5 and 10. What was the average of the five numbers Isabel told her friend.
A. 21 B. 14 C. 19 D. 17 E. 18

23. 4,500 cm = _____ mm
A. 450 B. 45,000 C. 45 D. 4.5 E. 450,000

24. What is the value of *x* in the picture below?



A. 105.6 B. 107.6 C. 17.6 D. 15.6 E. 18.6

25. Simplify: $5(12 - 2^3) + 3(4^2 - 7)$
A. 47 B. 93 C. 33 D. 66 E. 61

26. Which of the following integers is both a perfect square and perfect cube?
A. 27 B. 16 C. 64 D. 100 E. 125

27. If $f(x) = 78 - 19x$, find the value of $f(3)$.
A. 57 B. 21 C. 177 D. 1,425 E. 135

28. $3m \cdot m \cdot m \cdot m \cdot 2m \cdot m \cdot m$ is equivalent to which of the following?
A. $5m^6$ B. $5m^8$ C. $6m^8$ D. $6m^6$ E. $6 + m^6$

29. $\frac{3}{16}$ = _____ (nearest thousandths)
A. 0.187 B. 0.18725 C. 0.186 D. 0.188 E. 0.1885

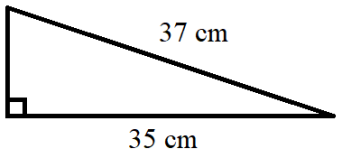
30. Sebastian started running a marathon at 9:07 am and finished running at 2:24 pm. How many minutes did it take Sebastian to complete the marathon?
A. 324 minutes B. 310 minutes C. 303 minutes D. 317 minutes E. 309 minutes

31. Three consecutive positive integers sum to 162. What is the smallest of these integers?
A. 49 B. 50 C. 81 D. 52 E. 53

32. Adeena chooses two cards from a standard deck of cards. What is the probability Adeena will choose a queen on her first draw and then, with replacement, draw a king on her second draw?
A. $\frac{1}{169}$ B. $\frac{1}{2,704}$ C. $\frac{1}{221}$ D. $\frac{2}{13}$ E. $\frac{30}{221}$

33. The set $\{A, B, C, D\}$ has how many subsets?
A. 4 B. 2 C. 16 D. 8 E. 32

34. What is the measure of the missing side of the triangle?



A. 14 cm B. 12 cm C. 16 cm D. 21 cm E. 51

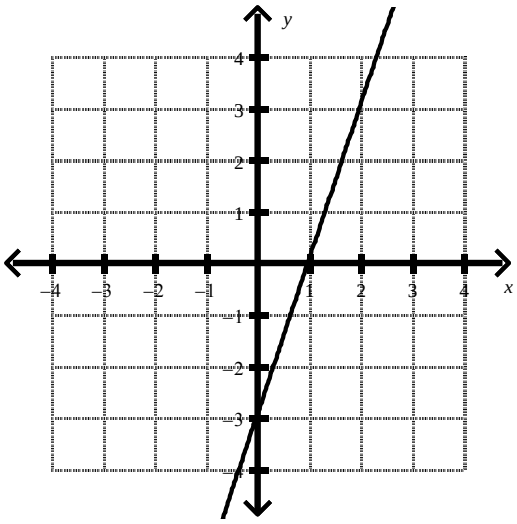
35. Kylee is buying a shirt for $24.50, a pair of pants for $45.20 and a hat for $13.30. If the tax rate is 8%, how much will Kylee's total bill be?
A. $87.98 B. $88.94 C. $88.76 D. $89.64 E. $89.34

36. Which point below is not a solution to the linear inequality $2x + 5y \geq 20$?
A. (10, 0) B. $(-10, 24)$ C. $(-8, 3)$ D. (0, 11) E. (100, 21)

37. When graphed, the linear equation $y = 12 - \frac{6}{5}x$ has a _____ slope.
A. positive B. negative C. undefined D. zero E. correlation

38. Which of the following equations is an example of an exponential equation?
A. $y = 8(x)^4$ B. $y = x^2$ C. $y = 7(2)^x$ D. $y = 4x$ E. $y = \sqrt{x}$

39. What is the equation for the graphed line?



A. $-3x + y = 3$ B. $4x - y = 1$ C. $6x - 2y = 6$ D. $2x + 6y = 6$ E. $6x - 3y = -3$

40. $\frac{2}{x}+\frac{5}{3x}=$_____

A. $\frac{11}{3x}$ B. $\frac{7}{4x}$ C. $\frac{10}{3x^2}$ D. $\frac{7}{3x^2}$ E. $\frac{3}{4x}$

41. What is the value of the discriminant of the quadratic equation $y = 6x^2 + 4x - 3$?

A. 16 B. -72 C. 88 D. 80 E. 84

42. Solve for *x*: $8 = \sqrt{-5 + x}$

A. -3 B. 13 C. 40 D. 69 E. ± 69

43. $37_{10} + 45_{10}$ = _____ (base 4)

A. 1012 B. 82 C. 202 D. 1112 E. 1102

44. Simplify: $\sqrt{96}$

A. $48\sqrt{2}$ B. $24\sqrt{2}$ C. $8\sqrt{6}$ D. $3\sqrt{32}$ E. $4\sqrt{6}$

45. A quadratic function has the equation $f(x) = x^2 - 8x + 5$. What is the equation of the axis of symmetry for the graph of the quadratic function?

A. $x = -2$ B. $x = 5$ C. $x = -8$ D. $x = 4$ E. $x = ¼$

46. Identify the *x*-coordinate of the solution to the system of linear equations $\begin{cases} 4x - 3y = -19 \\ -6x + 2y = 11 \end{cases}$.

A. 7 B. ½ C. ¼ D. 2 E. -4

47. Factor: $x^2 - 7x - 60$

A. $(x + 6)(x - 10)$ B. $(x + 5)(x - 12)$ C. $(x - 5)(x + 12)$ D. $(x - 15)(x + 4)$ E. $(x - 20)(x + 3)$

48. Which of the following is equivalent to $5^3 = 125$?

A. $\log_5 125 = 3$ B. $\log_5 3 = 125$ C. $\log_{125} 5 = 3$ D. $\log_{125} 3 = 5$ E. $\log_3 5 = 125$

49. What are the coordinates of the center of the circle with the equation $x^2 + y^2 = 40$?

A. (20, 20) B. (0, 1) C. (1, 0) D. (0, 0) E. $(-20, -20)$

50. $\frac{27x^2y^3}{8xy} \cdot \frac{2x^3y}{9xy^4}$ = _____

A. $\frac{27x^5y^4}{17}$ B. $\frac{3x^2}{4y^2}$ C. $\frac{3x^3}{4y}$ D. $\frac{3x^2}{8y^3}$ E. $\frac{3x}{4y^2}$

2018 – 2019 TMSCA Middle School Mathematics Kick-Off Test Answer Key

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

2018-2019 TMSCA Middle School Mathematics Kick-Off Test Selected Answers

13. If $a = 12$, $b = 8$, $c = 4$ and $d = 6$, then $ab \div cd = (12)(8) \div (4)(6)$. Using order of operations correctly, $(12)(8) \div (4)(6) = 96 \div (4)(6) = 24(6) = 144$.

22. To find the average of a set of numbers, add the numbers and divide the sum by the number of numbers that were added together. So, the average of 45, 15, 20, 5 and 10 is $\frac{45+15+20+5+10}{5} = \frac{95}{5} = 19$.

27. If $f(x) = 78 - 19x$, then $f(3) = 78 - 19(3) = 78 - 57 = 21$.

32. There are 52 cards in a standard deck of cards. There are four kings and four queens in a deck of cards. The probability of drawing a queen on the first draw is $\frac{4}{52}$ and since we replace the card, the probability of drawing a king from the deck is also $\frac{4}{52}$. Therefore, the probability of drawing a queen on the first draw, replacing it, and then a king on the second draw is $\frac{4}{52} \times \frac{4}{52} = \frac{16}{2,704} = \frac{1}{169}$.

33. To find the number of subsets of a set with *n* elements, use 2^n. The set {*A, B, C, D*} has 4 elements. Therefore, the set {*A, B, C, D*} has $2^4 = 16$ subsets?

34. The triangle is a right triangle, so to find the measure of the missing side we must use the Pythagorean Theorem. The Pythagorean Theorem is $a^2 + b^2 = c^2$, where *c* is the hypotenuse and *a* and *b* are the legs of the triangle. We are given the hypotenuse and a leg, so $a^2 + 35^2 = 37^2$. Squaring the numbers, we have $a^2 + 1{,}225 = 1{,}369$. Subtract 1,225 from both sides and $a^2 + 1{,}225 - 1{,}225 = 1{,}369 - 1{,}225 \rightarrow a^2 = 144$. Square root both sides and $\sqrt{a^2} = \sqrt{144}$, which gives us $a = 12$. The missing side measure is 12 cm.

37. The slope-intercept form or a linear equation is $y = mx + b$, where *m* is the slope and *b* is the *y*-intercept of the line. The linear equation $y = 12 - \frac{6}{5}x$ can be rewritten as $y = -\frac{6}{5}x + 12$. The slope is then $-\frac{6}{5}$, which is negative.

40. In order to add fractions, you must have common denominators. Our common denominator of $\frac{2}{x} + \frac{5}{3x}$ is $3x$. So, first we must multiply $\frac{2}{x}$ by $\frac{3}{3}$. $\frac{2}{x} \times \frac{3}{3} = \frac{6}{3x}$. Now, $\frac{6}{3x} + \frac{5}{3x} = \frac{11}{3x}$.

42. To solve $8 = \sqrt{-5 + x}$, first square each side of the equation. $8^2 = \left(\sqrt{-5 + x}\right)^2 \rightarrow 64 = -5 + x$. Now, add 5 to both sides of the equation and $64 + 5 = -5 + x + 5 \rightarrow 69 = x$.

44. $\sqrt{96} = \sqrt{16 \times 6} = \sqrt{16} \times \sqrt{6} = 4\sqrt{6}$.

48. Exponents can be rewritten as logs. $A^n = B$ can be rewritten as $\log_A B = n$. Therefore, $5^3 = 125$ can be rewritten as $\log_5 125 = 3$.

50. For this problem, you need the following exponent rule: $a^m \times a^n = a^{m+n}$, $\frac{a^m}{a^n} = a^{m-n}$, and $a^{-m} = \frac{1}{a^m}$. Using these rules, $\frac{27x^2y^3}{8xy} \cdot \frac{2x^3y}{9xy^4} = \frac{54x^{2+3}y^{3+1}}{72x^{1+1}y^{1+4}} = \frac{54x^5y^4}{72x^2y^5} = \frac{3x^{5-2}y^{4-5}}{4} = \frac{3x^3y^{-1}}{4} = \frac{3x^3}{4y}$.