TMSCA MIDDLE SCHOOL MATHEMATICS TEST #3 ©

NOVEMBER 3, 2018

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 Test #3

1. 7.05 + 9.687 = _____ (nearest tenth)
A. 16.6 B. 16.74 C. 16.7 D. 16.67 E. 17

2. $56\frac{1}{5} - 17\frac{3}{5}$ = _____
A. $39\frac{2}{5}$ B. $39\frac{3}{5}$ C. $39\frac{4}{5}$ D. $38\frac{3}{5}$ E. $38\frac{4}{5}$

3. $0.47 \times 6.8 =$ _____
A. 3.196 B. 319.6 C. 0.3196 D. 0.03196 E. 31.96

4. $552 \div 1.2$ = _____
A. 420 B. 42 C. 460 D. 48 E. 480

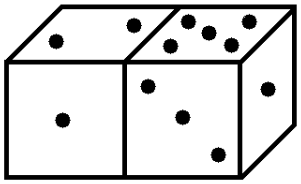
5. Stacy has $56.00 on Wednesday. On Thursday she had $49.00 and on Friday she had $42.00. If this pattern continues, on what day will Stacy have $0.00 left?
A. Wednesday B. Saturday C. Tuesday D. Thursday E. Monday

6. What is the GCF of the numbers 220 and 64?
A. 8 B. 4 C. 16 D. 32 E. 64

7. What is the area of a triangle with a base length of 32 cm and a height of 7 cm?
A. 224 cm^2 B. 96 cm^2 C. 103 cm^2 D. 168 cm^2 E. 112 cm^2

8. What is the reciprocal of $34\frac{2}{3}$?
A. $34\frac{3}{2}$ B. $-34\frac{2}{3}$ C. $\frac{104}{3}$ D. $\frac{3}{104}$ E. $-\frac{3}{104}$

9. A pair of dice are rolled and they land side-by-side as shown below. What is the sum of the number of dots on the faces that cannot be seen from the view below?



A. 18 B. 30 C. 32 D. 42 E. 12

10. What is the maximum number of 35¢ stamps Kate can buy with $12.00?
A. 29 B. 34 C. 35 D. 30 E. 36

11. What is the sum of the first five multiples of 4?
A. 60 B. 56 C. 64 D. 80 E. 76

12. Simplify: $6^2 \div 3(8 - 3)$
A. 60 B. 2.4 C. 93 D. 1.6 E. 29

13. If eight erasers cost $3.92, what is the unit rate per eraser?
A. 27¢ B. 34¢ C. 41¢ D. 49¢ E. 54¢

14. 4 quarts = _____ ounces
A. 64 B. 128 C. 256 D. 96 E. 84

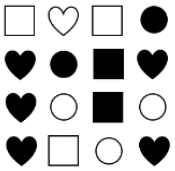
15. What is the sum of all the positive integral divisors of the number 12?
A. 16 B. 15 C. 28 D. 24 E. 56

16. What is the probability of drawing a four or eight from a standard deck of cards?
A. $\frac{2}{13}$ B. $\frac{8}{13}$ C. $\frac{4}{13}$ D. $\frac{1}{4}$ E. $\frac{5}{26}$

17. If $4 \times 4 \times 4 \times 4$ can be rewritten as 4^4, which of the following is equivalent to 5 + 5 + 5 + 5 + 5 + 5?
A. 6^5 B. 5^6 C. $6 \div 5$ D. 5×6 E. 5 + 6

18. In the sequence 14, 22, 30, 38, …, what is the value of the 8th term subtracted from the 11th term?
A. 12 B. 26 C. 16 D. 32 E. 24

19. If you select one shape at random from the array, what is the probability it will be a black shape?



A. $\frac{7}{16}$ B. $\frac{3}{8}$ C. $\frac{5}{16}$ D. $\frac{9}{16}$ E. $\frac{5}{8}$

20. What is $0.4\overline{6}$ expressed as a fraction?
A. $\frac{8}{17}$ B. $\frac{7}{15}$ C. $\frac{3}{7}$ D. $\frac{4}{9}$ E. $\frac{11}{23}$

21. Solve: $-\frac{3}{2}n \geq 24$
A. $n \geq 16$ B. $n \geq -16$ C. $n \leq 16$ D. $n \leq -16$ E. $n \geq -36$

22. Students in 6th grade were asked the question, "What is your favorite fruit?". The results showed that 216 students chose strawberries as their favorite fruit. This number represented 54% of the total number of 6th graders who answered the question. How many 6th graders answered the question?
A. 380 B. 360 C. 420 D. 400 E. 410

23. Which equation produces the values in the table below?

x	-4	0	8	20
y	3	6	12	21

A. $y = \frac{1}{2}x + 5$ B. $y = -x - 1$ C. $y = \frac{3}{4}x + 6$ D. $y = \frac{1}{4}x + 4$ E. $y = -3 + x$

24. Frank has three times as many nickels as Tom has dimes. If Tom has $18.30 worth of dimes, how many nickels does Frank have?
A. 479 B. 549 C. 537 D. 573 E. 519

25. If $k(n) = 8 - 21n$, then find the value of $k(-3)$ + 48.
A. -7 B. -55 C. 71 D. 119 E. 937

26. Given the relation {(1, 3), (2, 5), (6, 7), (8, 4), $(x, 9)$}, which of the following values would make the relation a function?
A. 2 B. 1 C. 4 D. 8 E. 6

27. 22^3 = _____
A. 10,548 B. 10,926 C. 10,928 D. 10,428 E. 10,648

28. 24 is what percent of 150?
A. 16% B. 18% C. 12.5% D. 14.5% E. 14%

29. What is the value of the lower-quartile of the data set of numbers 94, 78, 79, 91, 86, 80, 84, 86 and 86?
A. 86 B. 79 C. 80 D. 78.5 E. 79.5

30. If $M = \{a, b, c, d, e, f\}$ and $N = \{a, e, i, o, u\}$, $M \cup N$ has how many elements?
A. 10 B. 9 C. 11 D. 12 E. 2

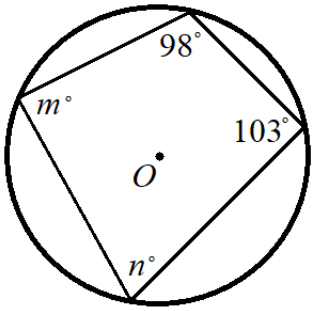
31. If $a \blacktriangledown b = 2ab^3$, what is the value of $\frac{1}{8} \blacktriangledown (-2)$?
A. ½ B. −½ C. −¼ D. -2 E. -4

32. $3n^3 \cdot n \cdot n \cdot 2n^{-2} \cdot n \cdot 2n^5$ = _____
A. $7n^{11}$ B. $8n^{11}$ C. $12n^9$ D. $12n^{10}$ E. $12n^{11}$

33. The ratio of green marbles to blue marbles is 3:11. If there are 198 blue marbles, how many green marbles are there?
A. 726 B. 54 C. 42 D. 595 E. 33

34. 211_5 = _____$_{10}$
A. 56 B. 12 C. 61 D. 54 E. 51

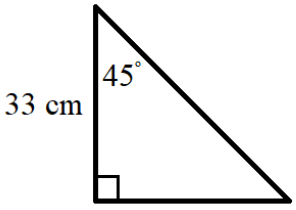
35. In the circle below, what is the sum of *m* and *n*?



A. 159 B. 201 C. 185 D. 175 E. 127

36. Point *A* has coordinates $(-17, -3)$ and point *B* has coordinates $(-7, 21)$. What is the distance from point *A* to point *B*?
A. 24 units B. 21 units C. 26 units D. 34 units E. 32 units

37. What is the measure of the hypotenuse of the triangle?



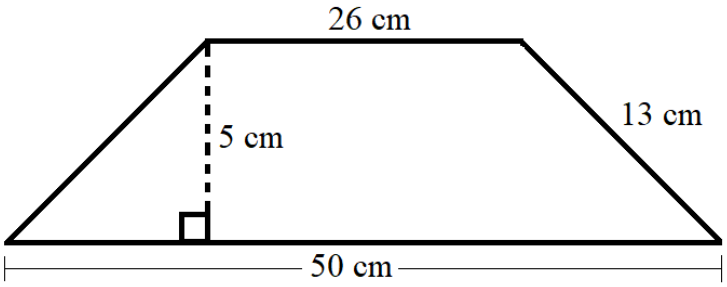
A. $33\sqrt{3}$ cm B. $33\sqrt{2}$ cm C. 33 cm D. $33\sqrt{6}$ cm E. 66 cm

38. A line with the equation $4x - 8y = -32$ is translated up four units. What are the coordinates of the new *y*-intercept?
A. -8 B. 12 C. 4 D. 8 E. 6

39. The slope of which line has a zero-slope?
A. $x = -3$ B. $y = x$ C. $y = 7 - 3x$ D. $y = 13$ E. $3y = 3y + 9$

40. Factor completely: $2x^2 - 8x - 90$
A. $(2x + 10)(x - 9)$ B. $(x + 5)(2x - 18)$ C. $(2x + 10)(2x - 18)$ D. $2(2x + 5)(x - 9)$ E. $2(x + 5)(x - 9)$

41. Maria is coloring a trapezoid with a blue crayon. What is the area Maria will color blue?



A. 1,300 cm^2 B. 190 cm^2 C. 112 cm^2 D. 130 cm^2 E. 650 cm^2

42. Simplify completely: $7n^{5/3}$
A. $\sqrt[3]{7n^5}$ B. $\sqrt[3]{(7n)^5}$ C. $\sqrt[5]{(7n)^3}$ D. $7n\sqrt[3]{n^2}$ E. $\frac{7n^5}{3}$

43. What is the measure of the diameter of a circle with the equation $(x + 14)^2 + (y - 7)^2 = 324$?
A. 36 units B. 7 units C. 162 units D. 18 units E. 21 units

44. What is the units digit of 3^{10}?
A. 1 B. 7 C. 9 D. 3 E. 0

45. What is the area of a triangle with its vertices having coordinates of $(4, -1)$, $(-2, 1)$ and $(2, 4)$?
A. 12.5 units^2 B. 13 units^2 C. 13.5 units^2 D. 14 units^2 E. 14.5 units^2

46. What is the rate of decay for the exponential decay function $y = 32(0.84)^x$?
A. 26.88% B. 32% C. 84% D. 8.4% E. 16%

47. What is the value of *n*, if $\log_3 729 = n$?
A. 243 B. 6 C. 7 D. 9 E. 81

48. What value is five more than the *y*-coordinate of the solution to the system $\begin{cases} 6x + y = -24 \\ y = \frac{3}{4}x - 6 \end{cases}$?
A. $\frac{7}{3}$ B. $-\frac{8}{3}$ C. -8 D. -13 E. -3

49. Mariam has a book that has 500 pages with 648 words per page. Mariam can read 180 words per minute. How many hours will it take Mariam to read her book?
A. 20 hours B. 25 hours C. 30 hours D. 35 hours E. 40 hours

50. Find the value of $\frac{x+1}{2}$, if $14 = \sqrt{4x}$.
A. 25 B. 2.25 C. 28 D. 4 E. 28.5

2018 – 2019 TMSCA Middle School Mathematics Test #3 Answer Key

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

2018-2019 TMSCA Middle School Mathematics Test #3 Selected Answers

21. To solve $-\frac{3}{2}n \geq 24$, multiply both sides by $-\frac{2}{3}$. However, when multiplying by a negative number, you must change the symbol to its opposite. The opposite of $\geq$ is $\leq$. Therefore, $-\frac{3}{2}n \cdot -\frac{2}{3} \geq 24 \cdot -\frac{2}{3}, n \leq -16$.

26. In order for a relation to represent a function, no *x*-value can repeat. We are given the relation {(1, 3), (2, 5), (6, 7), (8, 4), $(x, 9)$}, with choices 2, 1, 4, 8 and 6. Therefore, 4 is the answer because there are no other *x*-values of 4.

31. If $a \blacktriangledown b = 2ab^3$, the value of $\frac{1}{8} \blacktriangledown (-2) = 2(\frac{1}{8})(-2)^3 = 2(\frac{1}{8})(-8) = -2$.

32. $3n^3 \cdot n \cdot n \cdot 2n^{-2} \cdot n \cdot 2n^5 = 3 \cdot 2 \cdot 2 \cdot n^3 \cdot n \cdot n \cdot n^{-2} \cdot n \cdot n^5 = 12 \cdot n^{3+1+1-2+1+5} = 12n^9$.

33. Create the proportion $\frac{green\ marbles}{blue\ marbles} \rightarrow \frac{3}{11} = \frac{x}{198}$. 198 is a multiple of 11 because 198 = 11(18). Therefore, we can find the number of green marbles by multiplying 18 by 3 and 18(3) = 54.

35. If a quadrilateral is inscribed inside of a circle, then its opposite angles are supplementary. So, we now know that $103 + m = 180$ and subtracting 103 from both sides gives *m* = 77 and $98 + n = 180$ and subtracting 98 from both sides gives *n* = 82. Therefore, *m* + *n* = 77 + 82 = 159.

36. When given two points (x_1, y_1) and (x_2, y_2), the distance between them can be found using the formula $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$. We are given the points $(-17, -3)$ and $(-7, 21)$. Therefore, substituting into the formula and the distance between the points is $d = \sqrt{(-17 - (-7))^2 + (-3 - 21)^2} = \sqrt{(-10)^2 + (-24)^2}$ = $\sqrt{100 + 576} = \sqrt{676} = 26$.

42. We first need to know the rule $n^{\frac{a}{b}} = \sqrt[b]{n^a}$ or $\left(\sqrt[b]{n}\right)^a$. We are given $7n^{5/3}$ and $7n^{5/3} = 7 \cdot n^{5/3} = 7\sqrt[3]{n^5}$.

44. $3^1 = 3, 3^2 = 9, 3^3 = 27$ and $3^4 = 81$ and we see that the units digits of the powers of 3 cycle through the digits 3, 9, 7 and 1. $10 \div 4 = 2$ with a remainder of 2, and since $3^2 = 9$, the units digit of 3^{10} will end in 9.

46. An exponential decay function is written in the form $y = a \cdot b^x$, where $0 < b < 1$. We are given the equation $y = 32(0.84)^x$. To find the rate of decay, subtract the decay factor from 1 and then change that decimal to a percentage. Therefore, 1 – 0.84 = 0.16 = 16% decay.

49. Mariam has a book that has 500 pages with 648 words per page, so the book has a total of $500 \times 648 =$ 324,000 words. Since Mariam can read 180 words per minute, she can read 324,00 words in $324{,}000 \div 180 = 1{,}800$ minutes. There are 60 minutes in an hour, so $1{,}800 \div 60 = 30$ hours. It will take Mariam 30 hours to read her book.

50. To solve $14 = \sqrt{4x}$, square both sides. $14^2 = \left(\sqrt{4x}\right)^2 = 196 = 4x$ and after dividing both sides by 4, *x* = 49. Therefore, $\frac{x+1}{2} = \frac{49+1}{2} = \frac{50}{2} = 25$.