TMSCA MIDDLE SCHOOL MATHEMATICS TEST #2 ©

OCTOBER 27, 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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1. $24\frac{7}{8} + 19\frac{5}{8}$ = _____

A. $43\frac{1}{2}$ B. $44\frac{1}{4}$ C. $43\frac{1}{4}$ D. $44\frac{1}{2}$ E. $43\frac{3}{4}$

2. 23 – 76 = _____

A. -53 B. -49 C. -59 D. 53 E. 49

3. 65×9.8 = _____

A. 637.3 B. 637.03 C. 637.0 D. 63.7 E. 637.7

4. $864 \div 0.4$ = _____

A. 216 B. 2,160 C. 21.6 D. 0.216 E. 2.16

5. $\frac{45}{6}$ is equivalent to which of the following?

A. $7\frac{1}{2}$ B. $7\frac{5}{6}$ C. $7\frac{1}{3}$ D. $7\frac{2}{3}$ E. $39\frac{1}{6}$

6. Madison cut out a rectangle for her craft's project. The rectangle had a length of 34 cm and a perimeter of 86 cm. What is the width of the rectangle Madison cut out for her project?

A. 18 cm B. 9 cm C. 12 cm D. 52 cm E. 26 cm

7. 234,000,000 mm = _____ km

A. 23,400 B. 2.34 C. 23.4 D. 234 E. 2,340

8. What is the number of vertices of a decagonal prism?

A. 100 B. 10 C. 15 D. 50 E. 20

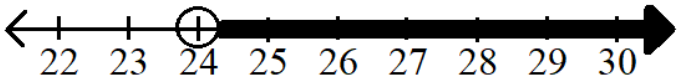
9. On a coordinate grid, which ordered pair describes a point that is located eight units to the right of the origin and seven units below the *x*-axis?

A. $(-7, 8)$ B. $(7, 8)$ C. $(8, 7)$ D. $(8, -7)$ E. $(-8, -7)$

10. What is the supplement of $\angle B$, if $m\angle B = 107^\circ$?

A. 17° B. 63° C. 73° D. 53.5° E. 214°

11. Which inequality models the graph?



A. $x \geq 24$ B. $x \leq 24$ C. $x > 24$ D. $x < 24$ E. $24 < x \leq 30$

12. What is the range of the stem and leaf plot?

2	1
3	5 7
4	2 2

key: $3|5 = 35$

A. 21 B. 63 C. 37 D. 35 E. 42

13. What percent of the letters in the word *SMILE* are vowels?

A. 20% B. 40% C. 15% D. 12.5% E. 24%

14. What is the largest two-digit perfect cube?

A. 81 B. 125 C. 99 D. 64 E. 27

15. Simplify: $4(3-8)+6^2-3^3+1^8$

A. -12 B. -11 C. -10 D. -3 E. 14

16. $\angle B$ is the supplement of $\angle A$. If $m\angle A = \frac{1}{2}(86^\circ)$, then $m\angle B =$ ____°.

A. 47 B. 43 C. 133 D. 194 E. 137

17. The average of four numbers is 14. If the numbers are 16, 22, 11 and *n*, what is the value of *n*?

A. 9 B. 7 C. 11 D. 12 E. 8

18. Which of the following sequences is an example of an arithmetic sequence?

A. 2, 4, 8, 16, … B. 44, 22, 11, 5.5, … C. 17, 21, 25, 29, … D. ½, ¼, ¾, … E. 0, 1, 1, 2, …

19. $\frac{5}{16}$ = _____ (nearest hundredths)

A. 0.31 B. 0.325 C. 0.32 D. 0.33 E. 0.3

20. Point *M* has coordinates of $(-19,-38)$ and is translated by the rule $(x,y) \rightarrow (x-7, y+14)$. What are the coordinates of point *M* after its translation?

A. $(-12,-14)$ B. $(-26,-24)$ C. $(-26,-52)$ D. $(-12,-52)$ E. $(12,-24)$

21. Patricia started watching a movie at 6:37 pm. She had to pause the movie for ¼ of an hour to get snacks. Patricia finally finished the movie at 9:20 pm. How many minutes long was the movie, excluding the snack break?

A. 148 minutes B. 163 minutes C. 144 minutes D. 177 minutes E. 153 minutes

22. 462 cubic inches = _____ gallons

A. 3 B. 1 C. 5 D. 4 E. 2

23. If $H = 4^2 + 11^2$, what is the remainder when *H* is divided by 9?

A. 7 B. 3 C. 4 D. 5 E. 2

24. $(5x^2-3x-1)-(11+2x-3x^2)$ = _____

A. $2x^2-x-10$ B. $8x^2-x-10$ C. $2x^2-5x-10$ D. $8x^2-5x-12$ E. $2x^2-5x-12$

25. $752_{10} - 618_{10}$ = _____ (base 6)

A. 342 B. 134 C. 1102 D. 1034 E. 314

26. Mitchel paid \$2.75 less for French fries than he paid for a hamburger. Altogether Mitchel paid \$9.75 for the fries and hamburger. What was the cost of the French fries?

A. \$2.75 B. \$3.00 C. \$2.50 D. \$6.25 E. \$3.50

27. What is the sum of the digits of the product of 54 and 67?

A. 12 B. 11 C. 14 D. 16 E. 18

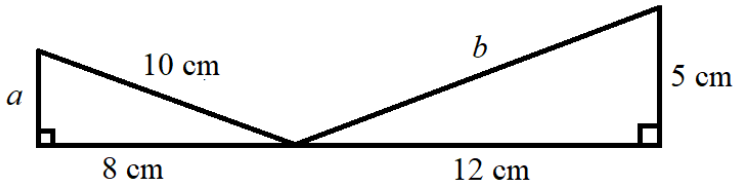
28. A square having a side length of 24 cm is dilated by a scale factor or $\frac{2}{3}$. What is the perimeter of the new square?

A. 96 cm B. 576 cm C. 256 cm D. 72 cm E. 64 cm

29. LXI + CXCIX = _____ (Roman numeral)

A. CCXIII B. CCLX C. MDIV D. CXLVIII E. DXV

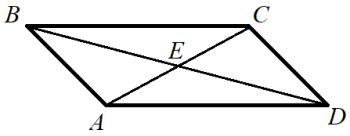
30. What is the sum of *a* and *b* in the picture?



A. 16 cm B. 19 cm C. 35 cm D. 23 cm E. 21 cm

31. If 42 is to 71 as 126 is to *n*, then the value of *n* is equal to which of the following?
A. 116 B. 165 C. 256 D. 213 E. 155

32. *ABCD* is a parallelogram. Find *AC*, if *AE* = 7*x* – 3 and *AC* = 16*x* – 38.



A. 109 units B. 221 units C. 218 units D. 70 units E. 140 units

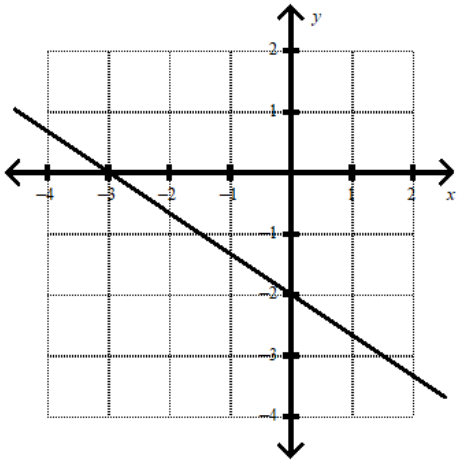
33. Which of the following functions is an example of an exponential decay function?
A. $y = 34(1.002)^x$ B. $y = 0.89(3.2)^x$ C. $y = 1.1(0.9)^x$ D. $y = 0.01(2)^x$ E. $y = 78(7.8)^x$

34. $77^\circ F =$ _____ $^\circ C$
A. 25 B. 30 C. 35 D. 27 E. 32

35. Alan walks into a store and sees a new helmet on sale for $16.00, but decides not to buy it. The next week Alan goes into the store and the helmet is selling for $24. What is the percent increase of the price of the helmet?
A. 80% B. 8% C. 40% D. 108% E. 50%

36. How many permutations can be made of 7 different letters taken 3 at a time?
A. 21 B. 240 C. 343 D. 210 E. 35

37. What is the equation of the line graphed below?



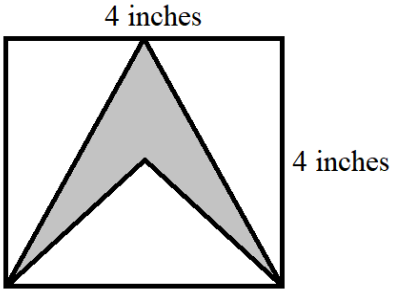
A. $y = \frac{3}{2}x + 2$ B. $y = \frac{2}{3}x - 2$ C. $y = -\frac{2}{3}x - 2$ D. $y = -\frac{3}{2}x - 2$ E. $y = -\frac{2}{3}x + 2$

38. What is the sum of the coordinates of the vertex of the quadratic equation $y = 4x^2 - 24x + 3$?
A. -33 B. -30 C. 12 D. 9 E. 3

39. The equation of which line has an undefined slope?

A. $y = -\frac{1}{2}x - 8$ B. $y = 6x - 1$ C. $x = y$ D. $x = 6$ E. $y = -11$

40. An arrow is formed in the $4\ in \times 4\ in$ square by joining the bottom corners to the midpoint of the top edge and the center of the square. What is the area of the arrow?



A. 4 in^2 B. 18 in^2 C. 16 in^2 D. 12 in^2 E. 6 in^2

41. Simplify completely: $17\sqrt{224}$

A. $34\sqrt{112}$ B. already simplified C. $68\sqrt{14}$ D. $4\sqrt{14}$ E. $11\sqrt{14}$

42. Which of the following is the quadratic equation $y = (x + 5)^2 - 8$ expressed in standard form?

A. $y = x^2 + 5x - 3$ B. $y = x^2 + 10x + 25$ C. $y = x^2 + 10x + 2$ D. $y = x^2 + 17$ E. $y = x^2 + 10x + 17$

43. If $h(m) = 12m + 27m$, then find the value of $h(a + 1)$.

A. $39a$ B. $39a + 2$ C. $39a + 13$ D. $39a + 39$ E. $39a + 1$

44. Factor completely: $2x^2 - 13x - 7$

A. $(2x + 1)(x - 7)$ B. $(2x - 7)(x + 1)$ C. $(2x - 1)(x + 7)$ D. $(2x + 7)(x - 1)$ E. $(7x - 1)(x + 2)$

45. If $\log_n 256 = 4$, what is the value of *n*?

A. 16 B. 2 C. 4 D. 64 E. 8

46. What is the product of the coordinates of the solution of the system $\begin{cases} y = 4x - 6 \\ y = -2x + 12 \end{cases}$?

A. 9 B. -12 C. 24 D. 12 E. 18

47. 6! + 1 = _____

A. 7! B. 721 C. 5,041 D. 7 E. $2^4 \cdot 3 \cdot 5$

48. Solve for *w*: $|7w| - 2 = 12$

A. $\{\pm 2\}$ B. $\{2\}$ C. $\{-2\}$ D. $\{½\}$ E. $\{\pm ½\}$

49. The 4th term of a sequence is 3 and the 6th term is 4. Every term after the 2nd term is the sum of the preceding two terms. What is the value of the 12th term of this sequence?

A. 37 B. 51 C. 60 D. 57 E. 59

50. What is the sum of the coordinates of the center of the circle with the equation $(x - 6)^2 + (y + 4)^2 = 225$?

A. 10 B. -2 C. 15 D. -24 E. 2

2018 – 2019 TMSCA Middle School Mathematics Test #2 Answer Key

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

2018-2019 TMSCA Middle School Mathematics Test #2 Selected Answers

15. $4(3-8)+6^2-3^3+1^8=4(-5)+6^2-3^3+1^8=4(-5)+36-27+1=-20+36-27+1=-10.$

27. 54(67) = 3,618 and 3 + 6 + 1 + 8 = 18.

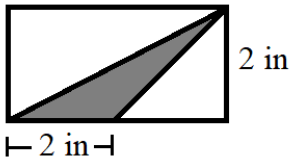
31. To find the value of *n*, set up a proportion; $\frac{42}{71}=\frac{126}{n}$. We see that 42 can be multiplied by 3 to get 126, so multiply 71 by 3 and 71(3) = 213. Therefore, *n* = 213.

34. To change a Fahrenheit temperature to a Celsius temperature, use the formula $C=\frac{5}{9}(F-32)$. We are given the temperature of $77^\circ F$ and need to change it to Celsius. Substituting into the formula and $C=\frac{5}{9}(F-32)=\frac{5}{9}(77-32)=\frac{5}{9}(45)=25$. Therefore, $77^\circ F=25^\circ C$.

36. To find the number of permutations of *n* objects taken *r* at a time, use the formula ${}_nP_r=\frac{n!}{(n-r)!}$. We have 7 objects taken 3 at a time, so substituting into the formula and we get ${}_nP_r=\frac{n!}{(n-r)!}=\frac{7!}{(7-3)!}=\frac{7!}{4!}$ and then $\frac{7!}{4!}=\frac{7\cdot6\cdot5\cdot4\cdot3\cdot2\cdot1}{4\cdot3\cdot2\cdot1}=7\cdot6\cdot5=210.$

39. A vertical line has an undefined slope. The equation of a vertical line is written as *x* = #. Therefore, of the given choices, *x* = 6 is the only equation of a vertical line, which has an undefined slope.

40. Look at only half the picture as below:



We now see a triangle with a base of 2 inches and a height of 2 inches. Finding the area of the triangle gives us $A=\frac{bh}{2}=\frac{2\cdot2}{2}=\frac{4}{2}=2$ in^2. Since this is only half of the picture, the area of the arrow is twice the area of the triangle. So, the area of the arrow is 4 in^2.

41. $17\sqrt{224}=17\cdot\sqrt{224}=17\cdot\sqrt{2^5\cdot7}=17\cdot\sqrt{(2^2)^2\cdot2}\cdot\sqrt{7}=17\cdot2^2\cdot\sqrt{2}\cdot\sqrt{7}=17\cdot4\cdot\sqrt{2\cdot7}=68\sqrt{14}.$

43. If $h(m)=12m+27m$, then $h(a+1)=12(a+1)+27(a+1)$. Now, 12(*a* + 1) = 12*a* + 12 and 27(*a* + 1) = 27*a* + 27. Therefore, $h(a+1)=12(a+1)+27(a+1)=12a+12+27a+27$ and after combining like terms, $h(a+1)=39a+39$.

45. $\log_n 256=4$ can be rewritten as $n^4=256$. The inverse of taking a value to the power of 4 is finding the fourth root of the value. Therefore, fourth root both sides and $\sqrt[4]{n^4}=\sqrt[4]{256}$ gives us *n* = 4.

48. To solve an absolute value equation, first get the absolute value be itself. In our equation, add 2 to both sides to get $|7w|=14$. Now, set the equation inside the absolute value symbol equal to the positive and negative value of the right side of the equation and solve both equations. $7m = 14$ and $7w=-14$. Solving the first equation by dividing both sides by 7 gives us *w* = 2 and solving the second equation by dividing both sides by 7 gives us $w=-2$. Therefore, the solutions to the equation are $w=-2$ and 2, which can be written as ±2.