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 # 8 ©

J A N U A R Y 2 3, 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.
3. If using a scantron answer form be sure to correctly denote the number of problems not attempted.
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.

2015 – 2016 TMSCA Middle School Mathematics Test #8

1. 283 – 678 = _____
A. -315 B. -395 C. 415 D. -415 E. -961

2. -751 + 1,003 = _____
A. -254 B. 252 C. 1,754 D. -352 E. 352

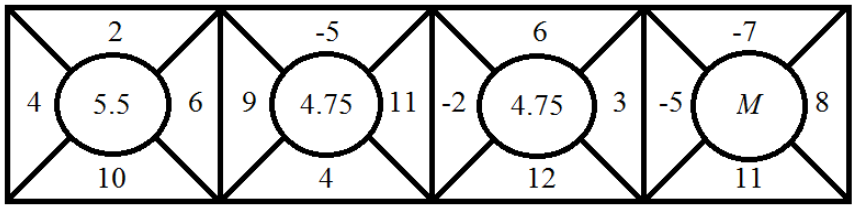
3. Let *A* equal the product of 45.92 and 14.3. What is the value of *A* rounded to the nearest whole number?
A. 700 B. 650 C. 660 D. 657 E. 656

4. Four hundred eighty divided by twelve is equal to eight multiplied by what number?
A. 5 B. 14 C. 6 D. 11 E. 24

5. What number is 48% of 4,100?
A. 2,050 B. 2,034 C. 2,068 D. 1,968 E. 1,954

6. $\frac{45}{8}$ = _____
A. 4.875 B. 4.825 C. 5.625 D. 5.375 E. 5.225

7. Use the examples below to find the value of *M*.



A. 2.25 B. 3.5 C. 3.75 D. 1.25 E. 1.75

8. Find the sum of the largest palindrome less than 512 and the fourth smallest prime number.
A. 512 B. 522 C. 508 D. 510 E. 507

9. The Roman numeral *CCLX* as an Arabic number has the prime factorization of which of the following?
A. $3^2 \cdot 5 \cdot 7$ B. $3^2 \cdot 7 \cdot 13$ C. $2^2 \cdot 5 \cdot 13$ D. $2^2 \cdot 7 \cdot 11$ E. $2^2 \cdot 11 \cdot 13$

10. 48 kilograms + 400 centigrams = _____ grams
A. 48,400 B. 4,804 C. 48,040 D. 48,004 E. 48,000.4

11. How many minutes are there in 1.5 days?
A. 1,080 B. 7,200 C. 5,400 D. 3,600 E. 2,160

12. The complement to an angle measuring 76.08° is equal to ____$^\circ$.
A. 11.92 B. 12.82 C. 13.92 D. 13.72 E. 14.92

13. Simplify: $6(3n - 4) - 4(3n + 5)$
A. $6n - 44$ B. $30n - 30$ C. $30n - 44$ D. $6n - 30$ E. $2n + 3$

14. What is the area of a rhombus with diagonals measuring 54 and 14 inches?
A. 422 in^2 B. 378 in^3 C. 756 in^2 D. 189 in^2 E. 296 in^2

15. If 9 shirts cost $119.34, how much do 5 shirts cost?
A. $64.70 B. $66.30 C. $68.50 D. $69.10 E. $72.20

16. What is the largest unattainable sum of the numbers 12 and 7?
A. 72 B. 23 C. 47 D. 65 E. 55

17. ½ mile + 60 feet = _____ yards
A. 880 B. 900 C. 2,700 D. 1,850 E. 1,670

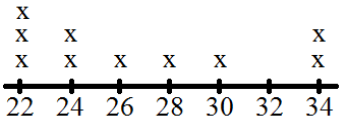
18. Classify a triangle with its vertices measuring 43°, 39° and 98°.
A. acute B. equiangular C. right D. obtuse E. oblique

19. Find the next term in the sequence: 2,592, 432, 72, 12, 2, …
A. ⅓ B. ⅔ C. ⅛ D. ⅜ E. ¼

20. $54_6 + 110_2 =$ _____$_{10}$
A. 34 B. 38 C. 40 D. 42 E. 36

21. What is the probability of rolling a pair of dice and getting a sum divisible by 3?
A. ½ B. ⅔ C. ¼ D. ⅓ E. ¾

22. What is the arithmetic mean of the data in the line plot below?



A. 24.8 B. 26.6 C. 25.4 D. 25.6 E. 26.8

23. The probability of drawing a red marble from a bag is 2:7. What are the odds of not drawing a red marble from the bag?
A. 5:2 B. 5:7 C. 7:2 D. 7:5 E. 2:5

24. If a leg of a right triangle measures 30 units and its hypotenuse measures 34 units, what is the measure of the missing leg?
A. 16 units B. 32 units C. 8 units D. 24 units E. 18 units

25. Which prism below has eight faces, twelve vertices and eighteen edges?
A. triangular prism B. octagonal prism C. rectangular prism D. decagonal prism E. hexagonal prism

26. The sum of three consecutive odd integers is 129. What is the value of five more than the largest of these integers?
A. 46 B. 48 C. 47 D. 49 E. 50

27. A triangle has side lengths measuring 6 feet, 4 feet and 8 feet. If the triangle is dilated by a scale factor of 3, what is the perimeter of the new triangle?
A. 36 ft B. 54 ft C. 84 ft D. 48 ft E. 64 ft

28. The parent function of linear equations is translated to the right 6 units. What is the new equation of the line?
A. $y = x + 6$ B. $y = x + 3$ C. $y = x - 6$ D. $y = x + 12$ E. $y = x - 12$

29. How many ways can six different books be arranged on a shelf?
A. 720 B. 120 C. 540 D. 46,656 E. 36

30. Simplify: $\left(5\sqrt{12}\right)^2$
A. 300 B. 60 C. 3,600 D. 720 E. 14,400

31. Which of the functions below is nonlinear?

A. $f(x) = 3x^2 + 1$ B. $f(x) = x - 1$ C. $f(x) = -3$ D. $f(x) = -4x$ E. $f(x) = \frac{3}{4}x + 9$

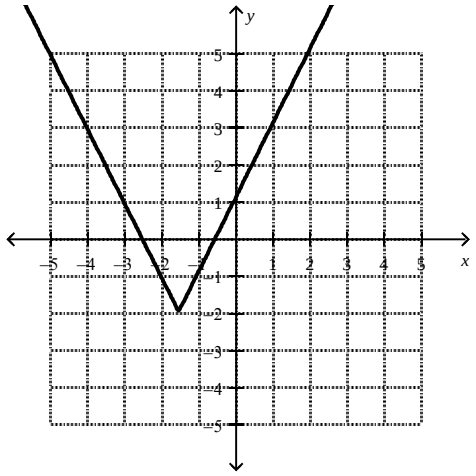
32. $\frac{7\pi}{4}$ = _____

A. 325° B. 315° C. 280° D. 320° E. 265°

33. What is the positive root of $\sqrt{12\frac{1}{4}}$?

A. 6.25 B. 3.5 C. $2\sqrt{3.25}$ D. 6.5 E. 3.0625

34. State the range of the graph below.



A. $x \geq -2$ B. all real numbers C. $-3 \leq y \leq 3$ D. $y \leq 3$ E. $y \geq -2$

35. If $(3n - 5)(6n + 7) = 18n^2 + Bn - 35$, then find the value of $3B + 40$.

A. 13 B. -9 C. 21 D. -30 E. 18

36. If $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix} - \begin{bmatrix} 5 & -5 \\ 6 & -6 \end{bmatrix} - \begin{bmatrix} -4 & -1 \\ -3 & -2 \end{bmatrix} = \begin{bmatrix} a & c \\ b & d \end{bmatrix}$, then find the value of $ab - ac + ad - bc + bd - cd$.

A. -101 B. 112 C. -121 D. -111 E. 101

37. A painting is worth \$2,400 and is increasing in value by 5% each year. Which function below models the paintings value after ten years?

A. $y = 2{,}400(1.05)^{10}$ B. $y = 2{,}400(0.05)^{10}$ C. $y = 2{,}400(0.95)^{10}$ D. $y = 2{,}400(1.5)^{10}$ E. $y = 2{,}400(5)^{10}$

38. What is the direct variation equation that passes through the point (4, 6)?

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

39. Calculate the simple interest if depositing \$1,200 at 5% for 18 months.

A. \$90.00 B. \$108.00 C. \$180.00 D. \$84.00 E. \$110.00

40. Find the product of the roots of the quadratic equation $8x^2 - 16 = 48x$.

A. 6 B. -3 C. $-\frac{1}{2}$ D. $-\frac{1}{3}$ E. -2

41. If $g(x) = 2x^2 - 4x$, find $g(x - 3)$.

A. $2x^2 - 12x + 18$ B. $2x^2 - 16x + 18$ C. $2x^2 - 16x + 30$ D. $2x^2 - 12x + 30$ E. $2x^2 - 16x + 6$

42. Simplify: $(ab^{-2})^3(a^4b^2)^5(a^3b)(a^{-5}b^6)^0$

A. $a^{10}b^8$ B. $a^{10}b^2$ C. $a^{21}b^{11}$ D. $a^{26}b^5$ E. a^3b^5

43. The value of the discriminant of the quadratic equation $4x^2 - 2x + ½ = 0$is equal to _____.

A. 8 B. -4 C. 4 D. -8 E. 16

44. Calculate the area of a pentagon that has its vertices located at (-5, -1), (-5, 2), (0, 4), (2, 1) and (-1, -2).

A. 32.5 units^2 B. 24.5 units^2 C. 36 units^2 D. 22.5 units^2 E. 27.5 units^2

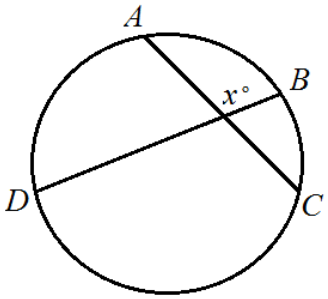
45. Using interval notation, solve: $-52 < 2x + 6 \leq 44$

A. (-29, 25] B. (-32, 19] C. [-29, 19) D. (-29, 19] E. [-32, 25)

46. Which of the following is equivalent to $\log_7 8 + \log_7 5 + \log_7 3$?

A. $\log_7 120$ B. $\log_7 43$ C. $\log_7 16$ D. $\log_7 67$ E. $\log_7 160$

47. Find the value of x in the picture below, given minor arc $AB = 60^\circ$ and minor arc $DC = 150^\circ$.



A. 75 B. 135 C. 115 D. 105 E. 110

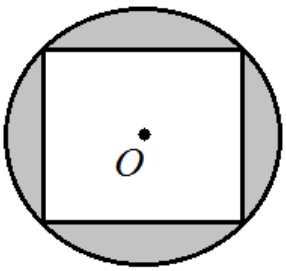
48. Tickets were sold for a fundraiser dinner. Adult tickets were $4.50 and child tickets were $3.00. If a total of 112 tickets were sold and $456.00 was raised, how many more adults attended the dinner than children?

A. 32 B. 48 C. 36 D. 54 E. 46

49. Rationalize the denominator: $\frac{12}{\sqrt{6}}$

A. $12\sqrt{6}$ B. $\frac{\sqrt{6}}{2}$ C. $\frac{\sqrt{6}}{12}$ D. $6\sqrt{6}$ E. $2\sqrt{6}$

50. The inscribed square below has an area of 12.5 units^2. In terms of π, what is the area of the circle?



A. 12.5π units^2 B. 25π units^2 C. 6.25π units^2 D. 12.25π units^2 E. 3.125π units^2

2015 – 2016 TMSCA Middle School Mathematics Test #8 Answer Key

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

2015 – 2016 TMSCA Middle School Mathematics Test #8 Selected Answers

9. *CCLX* as an Arabic number is 260. The prime factorization of 260 is $2^2 \cdot 5 \cdot 13$.

15. If 9 shirts cost \$119.34, how much do 5 shirts cost? To solve this problem, we can create a proportion. $\frac{\$119.34}{9\ shirts} = \frac{x}{5\ shirts}$. We can use the method of cross products to solve this proportion. $5(119.34) = 9x \rightarrow 596.7 = 9x$. Now we divide by 9 and $\frac{596.7}{9} = 66.3 = \$66.30$.

22. The data from the line plot can be listed as 22, 22, 22, 24, 24, 26, 28, 30, 34 and 34. To find the arithmetic mean, we have $\frac{22+22+22+24+24+26+28+30+34+34}{10} = \frac{266}{10} = 26.6$.

38. The direct variation form of a line is equal to $y = kx$, where k is the constant of variation, or slope. Also remember, a direct variation passes through the origin. If the line passes through the point (4, 6), then the slope is equal to $\frac{6-0}{4-0} = \frac{6}{4} = \frac{3}{2}$. Therefore, the direct variation line that passes through the point (4, 6) is $y = \frac{3}{2}x$.

46. $\log_7 8 + \log_7 5 + \log_7 3 = \log_7(8 \cdot 5 \cdot 3) = \log_7 120$.

49. To rationalize the denominator, there can be no radical in the denominator.
$\frac{12}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{12\sqrt{6}}{6} = 2\sqrt{6}$.