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
DISD I N V I T A T I O N A L ©
O C T O B E R 6, 2 0 1 8

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.

2018 – 2019 TMSCA Middle School DISD Invitational Mathematics Test

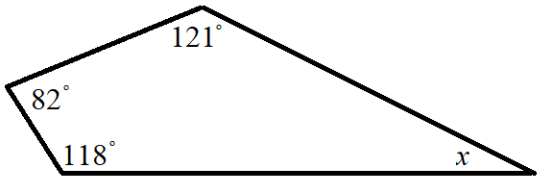
1. 457 + 327 + 89 = _____ (nearest ten)
A. 860 B. 850 C. 863 D. 870 E. 800

2. $-874 - 51 - (-657)$ = _____
A. -268 B. $-1{,}582$ C. 1,480 D. 166 E. $-1{,}480$

3. $5\frac{3}{4} \times 3\frac{1}{2}$ = _____
A. $15\frac{1}{8}$ B. $15\frac{3}{8}$ C. $18\frac{3}{8}$ D. $20\frac{3}{8}$ E. $20\frac{1}{8}$

4. $96 \div 1.25$ = _____
A. 78.4 B. 76.8 C. 74.6 D. 77.2 E. 77.8

5. What is the supplement of $m\angle x$ below?



A. 51° B. 129° C. 141° D. 151° E. 121°

6. 18,000,000,000 = _____ (scientific notation)
A. 18×10^{-9} B. 1.8×10^{-10} C. 18×10^{9} D. 0.18×10^{11} E. 1.8×10^{10}

7. What is the sum of the reciprocals of the numbers 6 and 9?
A. $\frac{5}{18}$ B. $\frac{7}{18}$ C. $\frac{1}{9}$ D. $\frac{1}{6}$ E. $\frac{11}{18}$

8. What is 45% of the number 340?
A. 147 B. 157 C. 153 D. 161 E. 155

9. 450 km = _____ cm
A. 4,500,000 B. 450,000 C. 0.000045 D. 45,000,000 E. 450,000,000

10. 19 quarters + 35 dimes + 24 nickels = \$10.34 − _____ pennies
A. 89 B. 76 C. 77 D. 91 E. 85

11. Simplify: $(3(16-13)^2)^2$
A. 729 B. 1,296 C. 6,561 D. 36 E. 144

12. DLVI + CCLXXXVIII = _____ (Arabic number)
A. 1,212 B. 764 C. 928 D. 904 E. 844

13. $\sqrt{829}$ lies between which two integers?
A. 29 & 30 B. 27 & 28 C. 26 & 27 D. 28 & 29 E. 30 & 31

14. How many improper subsets can be created from the set {12, 14, 16, 18, 20, 22}?
A. 63 B. 64 C. 12 D. 36 E. 1

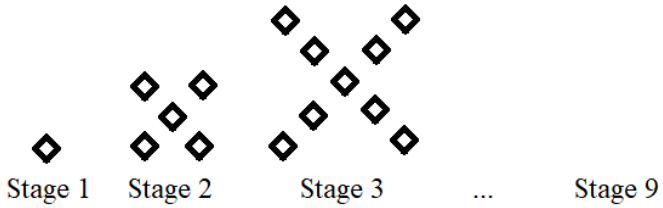
15. 24 is to 93 as 96 is to what value?
A. 317 B. 372 C. 232 D. 332 E. 412

16. It took Mandy 8 hours to travel 112 miles. What was Mandy's average rate of speed?
A. 104 mph B. 26 mph C. 14 mph D. 22 mph E. 18 mph

17. If $2{,}646 = 2^a \cdot 3^b \cdot 7^c$, what is the value of $(a+b)^c$?
A. 25 B. 27 C. 16 D. 64 E. 4

18. Marisol started a race at 9:00 am and finished one-quarter of an hour before noon. Leslie started the same race twenty minutes after Marisol and finished eighteen minutes before Marisol. How many minutes did it take Leslie to finish the race?
A. 127 B. 145 C. 207 D. 165 E. 132

19. If the pattern continues, how many diamonds will be needed for Stage 9?

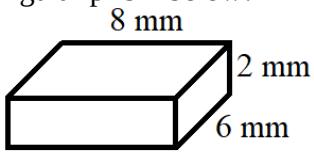


A. 29 B. 21 C. 37 D. 41 E. 33

20. 24% of 420 = 35% of _____.
A. 409 B. 324 C. 288 D. 256 E. 272

21. What is the value of the upper quartile of the data set of numbers 31, 25, 27, 19, 25, 17 and 11?
A. 17 B. 29 C. 10 D. 27 E. 25

22. What is the lateral surface area of the rectangular prism below?



A. 56 mm^2 B. 104 mm^2 C. 52 mm^2 D. 44 mm^2 E. 76 mm^2

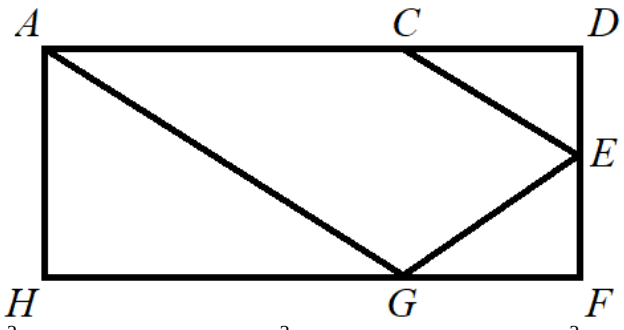
23. $(-6m^2 + 8m - 3) - (-5m - 6m^2 + 9) =$ _____
A. $-12m^2 + 3m + 6$ B. $-12m^2 + 13m - 12$ C. $3m + 6$ D. $13m + 6$ E. $13m - 12$

24. If you roll a pair of dice, what is the probability of getting a sum of 5?
A. $\frac{1}{6}$ B. $\frac{1}{4}$ C. $\frac{1}{2}$ D. $\frac{1}{9}$ E. $\frac{1}{18}$

25. What is the next term in the sequence 1, 2, 7, 10, 19, 36, 65, …?
A. 88 B. 100 C. 97 D. 113 E. 120

26. If $f(x) = 18x^2 - 16$, what is the value of $f\left(\frac{5}{3}\right)$?
A. 14 B. 34 C. 10 D. -6 E. 134

27. In rectangle *ADFH*, *CD* = *FG*, *E* is the midpoint of $\overline{DF}$, and $HG = \frac{5}{7}AD$. What is the area of quadrilateral *ACEG*, if *AD* = 21 cm and *AH* = 8 cm?



A. 84 cm^2 B. 108 cm^2 C. 96 cm^2 D. 60 cm^2 E. 72 cm^2

28. $122^\circ F =$ _____ $^\circ C$
A. 90 B. 162 C. 58 D. 50 E. 43

29. 78 + 82 + 86 + … + 114 + 118 + 122 = _____
A. 1,078 B. 1,326 C. 600 D. 1,200 E. 960

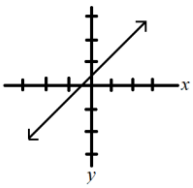
30. What is the maximum number of 48¢ stamps Mark can buy with $78.20?
A. 158 B. 159 C. 160 D. 162 E. 163

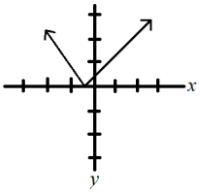
31. What is the height of a trapezoid that has an area of 186 cm^2 and bases measuring 28 cm and 34 cm?
A. 3 cm B. 9 cm C. 6 cm D. 12 cm E. 4 cm

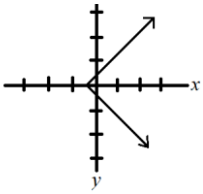
32. If $a \Delta b = a^2 + b^2 - 3$, what is the value of $(3 \Delta 2) \Delta (1 \Delta (-2))$?
A. 101 B. 10 C. 82 D. 794 E. 46

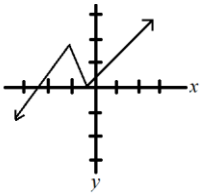
33. How many two-digit numbers have an odd product if you multiply the two digits?
A. 15 B. 100 C. 50 D. 25 E. 81

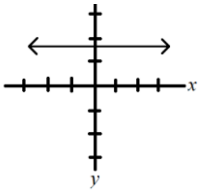
34. Which of the following is not a function?

A. 

B. 

C. 

D. 

E. 

35. A line passes through the points (4, 6) and (*x*, 9) and has a slope of $-\frac{1}{7}$. What is the value of *x*?
A. -3 B. -25 C. -14 D. -11 E. -17

36. Melanie is at a store. She is going to buy a shirt for $24.50 and a pair of shoes for $58.50. If the tax rate is 6%, what will be Melanie's total bill for her purchase?
A. $83.00 B. $132.80 C. $87.98 D. $89.04 E. $88.56

37. What is the area of a triangle with vertices located at (5, 6), (9, 12) and (21, 6)?
A. 48 units^2 B. 192 units^2 C. 72 units^2 D. 64 units^2 E. 96 units^2

38. What is the measure of one interior angle of a regular dodecagon?
A. 145° B. 150° C. 144° D. 135° E. 126°

39. How many combinations can be made from 8 pizza toppings taken 3 at a time?
A. 56 B. 60 C. 120 D. 24 E. 48

40. What is the growth rate of the exponential function $y = 2.81(3.2)^x$?
A. 281% B. 181% C. 32% D. 220% E. 320%

41. What is the mean absolute deviation of the numbers 46, 64, 48 and 54?
A. 53 B. 7 C. 8 D. 6 E. 7.5

42. What is the value of *x*, if $\frac{5}{3}\log_6 216 = x$?
A. 2 B. 3 C. 6 D. 15 E. 5

43. What is the product of the coordinates of the solution of the system of linear equations $\begin{cases} -y = -3x + 18 \\ -2x = y + 8 \end{cases}$?
A. -10 B. -6 C. -24 D. 8 E. 18

44. $4\sqrt{3}(\sqrt{6} + \sqrt{18})$ = _____
A. $24\sqrt{2}$ B. $24\sqrt{6}$ C. $12\sqrt{2} + 12\sqrt{3}$ D. $12\sqrt{3} + 12\sqrt{6}$ E. $12\sqrt{2} + 12\sqrt{6}$

45. What are the new coordinates of the center of a circle with an equation of $(x-8)^2 + (y+3)^2 = 256$, if the circle is translated nineteen units to the left and eleven units up?
A. $(-27, 14)$ B. $(-11, 8)$ C. $(-11, 14)$ D. $(-27, 8)$ E. $(-27, -11)$

46. Which of the following is a factor of $6x^2 - 17x - 45$?
A. $2x + 9$ B. $2x + 5$ C. $6x - 9$ D. $3x + 5$ E. $x - 9$

47. Matilda can clean her house in one-third of an hour. Luis can clean the same house in half an hour. If they work together, how many minutes will it take Matilda and Luis to clean the house?
A. 12 minutes B. 15 minutes C. 9 minutes D. 10 minutes E. 8 minutes

48. $\frac{6}{n+3} - \frac{4}{n+2}$ is equivalent to which of the following?
A. $\frac{2n+12}{n^2+5n+6}$ B. $\frac{2n+12}{n^2+6}$ C. $\frac{2n}{n^2+5n+6}$ D. $\frac{2n}{n^2+6}$ E. $\frac{2n+24}{n^2+5n+6}$

49. The graph of the line with equation $2x - y = 8$ intersects the graph of the quadratic equation $y = x^2 - 3x - 4$ at the point (4, 0) and another point. What are the coordinates of the second point of intersection of the two graphs?
A. $(1.5, -6.25)$ B. $(-6, -2)$ C. $(0, -4)$ D. $(1, -6)$ E. $(-2, 6)$

50. $\frac{5a^4b^3}{4ab^2} \cdot \frac{16a^2b^{-2}}{ab^3} \cdot \frac{a^{-1}b}{a^2b^{-2}}$ = _____
A. $\frac{20a^6}{b^8}$ B. $\frac{20a}{b}$ C. $\frac{20a^2}{b}$ D. $\frac{20a}{b^2}$ E. $\frac{20a^2}{b^2}$