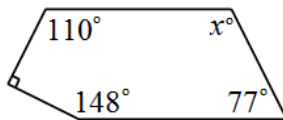


**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #8 ©
JANUARY 20, 2018**

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.

1. $-18 - (-297) =$ _____
 A. -315 B. -279 C. 315 D. 279 E. 297
2. $38\frac{5}{8} + (-18\frac{1}{4}) =$ _____
 A. $36\frac{1}{2}$ B. $36\frac{3}{8}$ C. $-20\frac{1}{2}$ D. $20\frac{1}{8}$ E. $20\frac{3}{8}$
3. $-3\frac{2}{3} \times 5\frac{1}{3} =$ _____
 A. $-19.\bar{5}$ B. $-19.\bar{6}$ C. $-19.\bar{4}$ D. $-19.\bar{56}$ E. $-19.\bar{65}$
4. $2,004 \div \frac{1}{2} =$ _____
 A. 8,016 B. 1,002 C. 506 D. 4,008 E. 100.2
5. How many diagonals can be drawn from one vertex of a regular 26-sided polygon?
 A. 299 B. 23 C. 21 D. 676 E. 13
6. What is the value of x ?



- A. 115 B. 107 C. 110 D. 125 E. 105
7. Evi had five necklaces. One necklace measured 280 millimeters, one measured 320 millimeters, one measured 276 millimeters, one measured 189 millimeters and one measured 330 millimeters. If Evi laid each necklace on the ground from end to end in a straight line, how many centimeters long would Evi's necklaces be?
 A. $140\frac{1}{4}$ cm B. $140\frac{1}{2}$ cm C. $139\frac{3}{4}$ cm D. $139\frac{1}{4}$ cm E. $139\frac{1}{2}$ cm
8. Steven has answered $\frac{5}{8}$ of the questions on a survey. What is the percentage of the survey that Steven has not answered?
 A. 37.5% B. 32.5% C. 62.5% D. 67.5% E. 75%
9. What is the area of a rhombus with diagonals of 21 cm and 54 cm?
 A. 283.5 cm^2 B. $1,134\text{ cm}^2$ C. 189 cm^2 D. 567 cm^2 E. 378 cm^2
10. What is the next term of the geometric sequence? 36, 18, 9, 4.5, ...
 A. 1.75 B. 2.75 C. 2.25 D. 2.5 E. 3.125
11. It is currently 10:15 am. What time will it be in 312 minutes?
 A. 2:47 pm B. 3:17 pm C. 3:27 pm D. 2:17 m E. 3:07 pm
12. $A = 24\%$ of 1,200 and $B = 80\%$ of 440. Find the value of $B - A$.
 A. -64 B. -76 C. 72 D. 84 E. 64
13. Simplify: $((-7 + 9)^2) \div 4 \cdot 3 \div 6 \cdot 3$
 A. 12 B. 3 C. 9 D. 1.5 E. 6
14. Juan is buying a new computer that has 8.9×10^{12} bytes of memory. Juan then adds an additional 4×10^{11} bytes of memory to his computer from an external source. How much memory does Juan's computer hold altogether?
 A. 8.94×10^{12} B. 9.3×10^{12} C. 8.94×10^{13} D. 9.3×10^{13} E. 9.3×10^{23}

15. If $a \heartsuit b = -a^2 - (-b)$, the what is the value of $4((-2)\heartsuit(-4))$?
A. -32 B. 32 C. -8 D. -64 E. -16
16. The mean, median and mode of five numbers are all the same. If four of the numbers are 8, 8, 2 and 8, what must the fifth number be?
A. 10 B. 18 C. 14 D. 9 E. 12
17. The measure of $\angle A$ is six more than five times the measure of its complement. What is the measure of $\angle A$?
A. 72° B. 82° C. 76° D. 68° E. 66°
18. $34 \times 54 =$ _____ (Roman numeral)
A. MDCCCXXXIV B. MDCCCXXXVII C. MDCCCXXXIX D. MDCCCXXVIII E. MDCCCXXXVI
19. If nine shirts cost \$131.85, how much do fourteen shirts cost?
A. \$204.90 B. \$205.10 C. \$203.70 D. \$205.60 E. \$204.70
20. $\frac{3}{4}$ mile + 240 feet = _____ yards
A. 1,670 B. 1,600 C. 1,300 D. 1,400 E. 1,450
21. $45 + 46 + 47 + \dots + 61 + 62 + 63 =$ _____
A. 1,024 B. 1,018 C. 981 D. 1,045 E. 1,026
22. 832 ounces = _____ gallons
A. 4.5 B. 5 C. 5.5 D. 6 E. 6.5
23. Mr. Scolia teaches two classes of 6th grade math. The average grades of the Unit 1 Test for the classes were 80 and 90, and the number of students in each class is 24 and 26, respectively. What is the overall average of the two classes combined?
A. 85.5 B. 85 C. 85.2 D. 85.4 E. 85.6
24. A nonagonal prism has eighteen vertices, eleven faces and how many edges?
A. 27 B. 18 C. 36 D. 9 E. 45
25. The hypotenuse of a right triangle measures 50 cm and a leg measures 48 cm. What is the measure of the second leg?
A. 28 cm B. 26 cm C. 18 cm D. 14 cm E. 16 cm
26. The probability of drawing a red queen from a standard deck of cards is 1:26. What are the odds of not drawing a red queen?
A. 25:1 B. 25:26 C. 1:25 D. 26:25 E. 13:2
27. What are the range values of the function $g(x) = x^2 + 3x - 1$ with a domain of $\{-3, 0, 14\}$?
A. $\{-1, 1, 129\}$ B. $\{-1, 1, 238\}$ C. $\{-1, 237\}$ D. $\{17, -1, 237\}$ E. $\{1, 237\}$
28. The total weight of the five female math club members is 430 pounds. The mean weight of the eight male math club member is 112 pounds. What is the mean weight of all thirteen math club members?
A. 96 pounds B. 102 pounds C. 108 pounds D. 97 pounds E. 103 pounds
29. You invest \$100 when you turn 18 years old. You are told that your money will double every two years. How much money will you have when you are 28 years old?
A. \$6,400 B. \$3,200 C. \$1,800 D. \$2,400 E. \$4,800

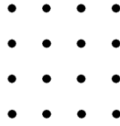
30. Anita built a pyramid that has a volume of 60 cm^3 . This is just a model of the pyramid Anita wants to build for her school project. If Anita doubles the length of the base, triples the width of the base and increases the height of the pyramid by 75%, what will be the volume of the new pyramid that Anita will build?

- A. 270 cm^3 B. 540 cm^3 C. 690 cm^3 D. 810 cm^3 E. 630 cm^3

31. How many whole numbers between 100 and 999, inclusive, is the 2nd digit equal to the sum of the 1st and 3rd digits?

- A. 38 B. 48 C. 49 D. 37 E. 45

32. How many different length line segments can be drawn whose endpoints are on a 4×4 dot grid?



- A. 6 B. 7 C. 8 D. 9 E. 10

33. $121_5 + 72_8 = \underline{\hspace{2cm}}$ (base 10)

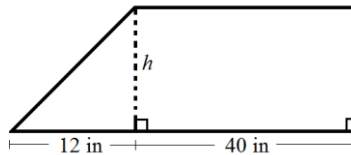
- A. 102 B. 94 C. 86 D. 88 E. 108

34. Simplify:

$$\frac{x^3y^3 \cdot 5x^2}{(2x^2)^{-2}}$$

- A. $20x^9y^3$ B. $10x^9y^3$ C. $20x^{10}y^3$ D. $10x^{10}y^3$ E. $\frac{5x^9y^3}{4}$

35. The area of the trapezoid is $1,610 \text{ in}^2$. What is the height of the trapezoid?



- A. 35 inches B. 38 inches C. 37 inches D. 36 inches E. 33 inches

36. Four members from the 16 member Kansas Kangaroos Science Club will be selected to be in charge of this year's end of the year party. How many groups of four students are possible?

- A. 1,640 B. 1,820 C. 43,680 D. 1,680 E. 2,120

37. It takes Frances 20 minutes riding her bicycle at an average of 12 mph to get to her grandmother's house. How many minutes would it take Frances to get to her grandmother's house if she traveled at an average of 5 mph?

- A. 36 minutes B. 54 minutes C. 48 minutes D. 42 minutes E. 50 minutes

38. The average of four test scores is an 86. If two test scores have four points added to them, one test has four points removed and the last test remains the same, what is the new average of the tests?

- A. 88 B. 86 C. 85 D. 87 E. 86.5

39. What is the positive geometric mean of the numbers 6 and 54?

- A. 20 B. 30 C. 24 D. $8\sqrt{6}$ E. 18

40. If $\pi = 3$, what is the circumference of the circle with an equation of $(x - 6)^2 + (y - 11)^2 = 441$?

- A. 63 units B. 2,646 units C. 126 units D. 189 units E. 221 units

41. Divide:

$$\frac{15x^2}{4y^2} \div \frac{5x}{2y}$$

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

42. What is the value of $3x^2$, if $\frac{x}{12(x-3)} = \frac{1}{x}$?

- A. 75 B. 243 C. 108 D. 192 E. 432

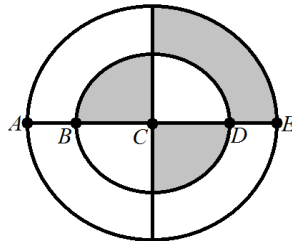
43. The area of a rectangle is 96 cm^2 . If the length of the rectangle is 4 cm longer than its width, what is the perimeter of the rectangle?

- A. 32 cm B. 56 cm C. 24 cm D. 44 cm E. 40 cm

44. If $a + 3b = 22$ and $2a + b = 34$, then find the value of $2a + 2b$.

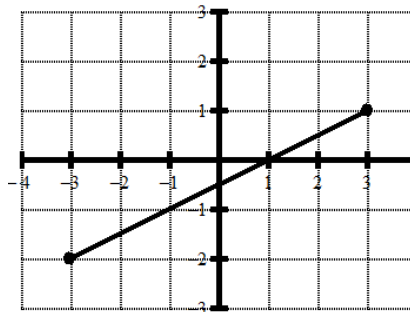
- A. 36 B. 48 C. 30 D. 44 E. 42

45. The picture below shows 2 circles with the same center at point C . Points B , C and D are on \overline{AE} . What is the area of the shaded region if the diameter of the larger circle is 24 cm and $AB = DE = 7 \text{ cm}$ (in terms of π)?



- A. $42.25\pi \text{ cm}^2$ B. $48.5\pi \text{ cm}^2$ C. $15.25\pi \text{ cm}^2$ D. $52.75\pi \text{ cm}^2$ E. $36.5\pi \text{ cm}^2$

46. What is the range of the graph?



- A. $-3 < y < 3$ B. $-3 \leq y \leq 3$ C. $-2 < y < 1$ D. $-2 \leq y \leq 1$ E. all real numbers

47. Angelique’s dog just gave birth to nine puppies, six male and three female. Angelique’s friend Jon wants to adopt four of the puppies. What is the probability that all four puppies are male?

- A. $\frac{2}{3}$ B. $\frac{4}{9}$ C. $\frac{1}{756}$ D. $\frac{5}{18}$ E. $\frac{5}{42}$

48. Solve: $\sqrt{\frac{3x}{x-8}} = 3$

- A. $x = 9$ B. $x = 12$ C. $x = -1$ D. $x = 1$ E. $x = -3$

49. Miguel has a total of 60 coins consisting of quarters and nickels. If the value of Miguel’s coins is \$10.60, how many more quarters than nickels does Miguel have?

- A. 22 B. 18 C. 16 D. 14 E. 15

50. The area of a triangle is $16x^2 + 2x - 0.5 \text{ units}^2$. If the base of the triangle is $8x - 1$ units, what is the height of the triangle?

- A. $2x + 1$ units B. $2x - 1$ units C. $2x + 0.5$ units D. $4x - 1$ units E. $4x + 1$ units

2017 – 2018 TMSCA Middle School Mathematics Test #8 Answer Key

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

10. A geometric sequence has a common ratio. In the sequence 36, 18, 9, 4.5, ..., the common ratio is $\frac{1}{2}$. Therefore, $4.5(\frac{1}{2}) = 2.25$.

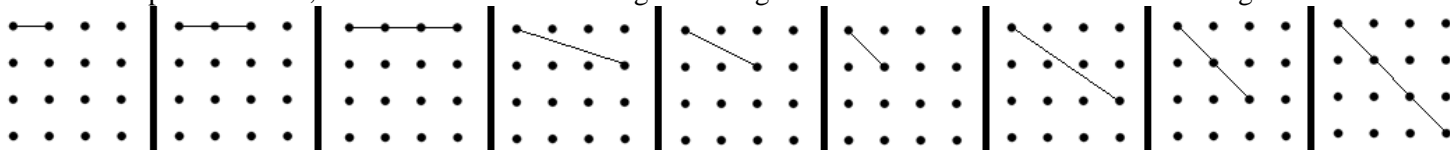
12. $12. A = 24\%$ of 1,200 = $0.24(1200) = 288$ and $B = 80\%$ of 440 = $0.8(440) = 352$. $B - A = 352 - 288 = 64$.

14. $8.9 \times 10^{12} = 8,900,000,000,000$ and $4 \times 10^{11} = 400,000,000,000$. $8,900,000,000,000 + 400,000,000,000 = 9,300,000,000,000 = 9.3 \times 10^{12}$.

26. The odds of drawing a red queen are 2:50 = 1:25. Therefore, the odds of not drawing a red queen are 25:1.

28. Five female math club members weigh 430 pounds, so each of them weigh $430 \div 5 = 86$ pounds. So, the average weight of all 13 members is $\frac{5 \cdot 86 + 8 \cdot 112}{13} = \frac{403 + 896}{13} = \frac{1326}{13} = 102$ pounds.

32. As in the picture below, there are nine different length line segments that can be drawn on a 4×4 dot grid.



34. $\frac{x^3 y^3 \cdot 5x^2}{(2x^2)^{-2}} = x^3 y^3 \cdot 5x^2 \cdot (2x^2)^2 = x^3 y^3 \cdot 5x^2 \cdot 4x^{2+2} = x^3 y^3 \cdot 5x^2 \cdot 4x^4 = 20x^{3+2+4} y^3 = 20x^9 y^3$.

37. *Distance = rate \times time*. Francis travels for 20 minutes at a rate of 12 mph, so her total distance is $20(12) = 240$ miles. If she travels the same distance at 5 mph, then we have $240 = 5t$. Divide both sides by 5 and $t = 48$. It would take Francis 48 minutes traveling at 5 mph to get to her grandmother's house.

42. Given $\frac{x}{12(x-3)} = \frac{1}{x}$, first cross multiply and $x^2 = 12x - 36$. Subtract $12x - 36$ from both sides and get $x^2 - 12x + 36 = 0$. Factor to get $(x - 6)^2 = 0$. Set $x - 6$ equal to zero and solve to get $x = 6$. $3(6)^2 = 3(36) = 108$.

47. There are six male and three female puppies, which is equal to nine puppies. Four puppies will be chosen, so there are ${}^9C_4 = \frac{9!}{4!(9-4)!} = \frac{9!}{4!5!} = 126$ total ways of choosing four puppies at a time. There are six male, so there are ${}^6C_4 = \frac{6!}{4!(6-4)!} = \frac{6!}{4!2!} = 15$ total ways of choosing four out of the six males. So, the probability of choosing four male puppies out of nine puppies is $\frac{15}{126} = \frac{5}{42}$.

48. First, undo the radical by squaring both sides, $\left(\sqrt{\frac{3x}{x-8}}\right)^2 = 3^2 \rightarrow \frac{3x}{x-8} = 9$. Change 9 into $\frac{9}{1}$ and make a proportion, $\frac{3x}{x-8} = \frac{9}{1}$. Cross multiply to get $3x = 9(x - 8) \rightarrow 3x = 9x - 72$. Subtract $3x$ from both sides and add 72 to both sides to get $6x = 72$. Divide 72 by 6 and $x = 12$.

50. Area of a triangle is $A = \frac{bh}{2}$. So, $16x^2 + 2x - 0.5 = \frac{(8x-1)h}{2}$. Multiply both sides by 2 and $32x^2 + 4x - 1 = (8x - 1)h$. Divide both sides by $8x - 1$ and $h = \frac{32x^2 + 4x - 1}{8x - 1}$. Factor the numerator and $h = \frac{(8x-1)(4x+1)}{8x-1}$. Now simplify to get $h = \frac{(8x-1)(4x+1)}{8x-1} = 4x + 1$. The height of the triangle is $4x + 1$ units.