TMSCA MIDDLE SCHOOL MATHEMATICS TEST #13 ©

FEBRUARY 25, 2017

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. Calculate the product of 48 and 35.

A. 83 B. 13 C. 73 D. 1680 E. 1660

2. $1\frac{1}{3} \times 2\frac{5}{6} =$ _____.

A. $3\frac{7}{9}$ B. $2\frac{5}{18}$ C. $3\frac{5}{9}$ D. $2\frac{7}{9}$ E. $2\frac{5}{9}$

3. $8{,}768 \div 4 = 1{,}073 +$ _____

A. 2,319 B. 1,079 C. 1,119 D. 1,369 E. 1,319

4. Timbo has $48\frac{3}{4}$ ounces of liquid to be used for a science project. He must divide the liquid evenly into 6 containers. How many ounces will be in each container?

A. $8\frac{1}{8}$ B. $6\frac{3}{8}$ C. $7\frac{3}{8}$ D. $8\frac{3}{8}$ E. $7\frac{7}{8}$

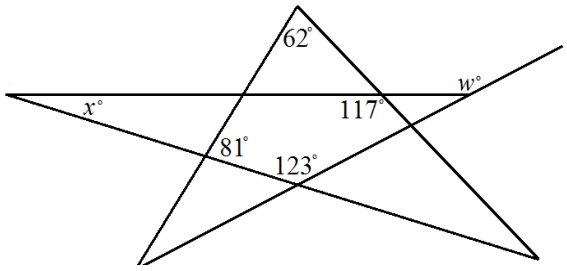
5. Simplify: $3^2 + 4(6) - 12 \div 3$

A. 7 B. 13 C. 21 D. 29 E. 25

6. Latoya rolls a pair of dice. What is the probability that her dice will show a sum of 7 on the top sides?

A. $\frac{1}{12}$ B. $\frac{1}{6}$ C. $\frac{1}{3}$ D. $\frac{1}{4}$ E. $\frac{1}{2}$

7. Using the picture below, find the sum of *x* and *w*.



A. 152 B. 175 C. 140 D. 166 E. 174

8. A driver averaged 65 mph and took $4\frac{2}{5}$ hours to travel from Houston to Dallas. What is the distance between Houston and Dallas?

A. 266.5 miles B. 273 miles C. 264 miles D. 279.5 miles E. 286 miles

9. $56 + 18.98 + 0.052 + 4.2 =$ _____

A. 79.232 B. 72.25 C. 72.232 D. 79.323 E. 78.323

10. $12 \times 1.2 \times 0.5 =$ _____

A. 7.2 B. 72 C. 7.02 D. 0.072 E. 720

11. As a Roman numeral, what is the product of the number of vertices of an octagon and the number of vertices of a hexagon?

A. XLVIII B. XXXXIII C. XCVIII D. LXVIII E. XXXVIII

12. $101 \times 343 =$ _____

A. 34,743 B. 343,343 C. 34,643 D. 3,463 E. 34,463

13. The sum of the first four positive multiples of 3 is _____.

A. 11 B. 16 C. 18 D. 30 E. 5

14. $1687 - 142.2 =$ _____

A. 265 B. 1,544.82 C. 1545.8 D. 1545.82 E. 1,544.8

15. Keeley is buying a new pair of shoes. The price on the shoebox says $76.99. If she gives the salesperson four twenty dollar bills, how much change will she receive?
A. $3.91 B. $3.11 C. $2.01 D. $2.91 E. $3.01

16. Abe has a rectangular container measuring 6 inches wide, 8 inches high and 12 inches long. He needs to fill his container half-way with water to wash his mom's car. How much water will be needed for Abe's task?
A. 576 in^3 B. 26 in^3 C. 288 in^3 D. 13 in^3 E.278 in^3

17. What value of *x* makes the equation true? $-5(2x-3)+4x-1=2(2x+9)$
A. -0.4 B. 0.2 C. -0.25 D. 0.75 E. 0.6

18. A football field is 100 yards long. Michael ran for one-fifth of the football field on one play and then ran for another one-fourth of a football field on a different play. In total, how many yards did Michael run for?
A. 145 yd B. 125 yd C. 120 yd D. 45 yd E. 55 yd

19. On a map, 1 inch is equal to ½ miles. Rahim owns a tractor and is planning to mow one-tenth of his rectangular piece of land. If his land measures 3 inches by 5 inches, how many acres of land does Rahim plan to mow. (1 $mile^2$ = 640 acres)
A. 180 acres B. 360 acres C. 280 acres D. 160 acres E. 240 acres

20. 92 + 93 + 94 + … + 102 + 103 = _____
A. 1,170 B. 1,168 C. 1,618 D. 1,162 E. 1,070

21. For $\overline{AB}$, A is located at $-14$and B is located at 23. What is the location of the midpoint of $\overline{AB}$?
A. 4.5 , B. 18.5 C. 9 D. 11 E. 55

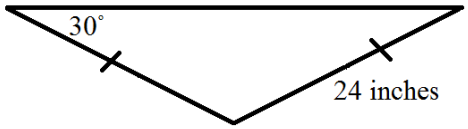
22. Seven copies of a magazine cost less than $12, but eight copies of the same magazine cost more than $13. How much could one copy of the magazine cost?
A. $1.50 B. $1.40 C. $1.70 D. $1.60 E. $1.80

23. If 4 shimmies are equivalent to 9 wammies and 6 wammies are equivalent to 11 zimmies, how many shimmies are equivalent to 132 zimmies?
A. 36 B. 20 C. 32 D. 48 E. 24

24. Mark has a rectangle that has a length of $4a^2b^5$ units and an area of $24a^5b^{12}$ $units^2$. Joey wants to draw a rectangle that is twice as wide as Mark's rectangle. How wide will Joey's rectangle be?
A. $8a^6b^{14}$ B. $8a^7b^{17}$ C. $12a^7b^{17}$ D. $12a^6b^{14}$ E. $12a^3b^7$

25 311_5 = _____$_{10}$
A. 41 B. 21 C. 81 D. 79 E. 47

26. Find the area of the triangle below.



A. $144\sqrt{3}\ in^2$ B. $288\sqrt{3}\ in^2$ C. $72\sqrt{3}\ in^2$ D. $196\sqrt{3}\ in^2$ E. $256\sqrt{3}\ in^2$

27. What is the sum of the next two terms of the sequence? 14, 18, 22, …
A. 56 B. 48 C. 40 D. 46 E. 30

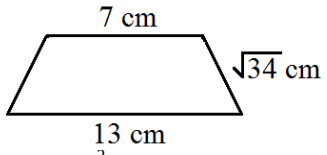
28. How much money will be in a bank account if $3,000 is deposited at a rate of 7% compounded yearly after 2 years?
A. $3,437.40 B. $3,439.10 C. $3,434.70 D. $3,153.70 E. $3,834.10

29. Sara worked 24 hours during the week and was paid $180.00. Julian worked 30 hours during the week and was paid $234.00. How many more cents per hour did Julian make than Sara?
A. 25¢ B. 24¢ C. 32¢ D. 28¢ E. 30¢

30. What value is nineteen more than the median of the set of numbers {24, 32, 17, 19, 28}?
A. 43 B. 36 C. 44 D. 26 E. 34

31. What is the sum of the slopes of the lines $12y + 18x = 5$ and $-12x + 20y = 7$?
A. $-\frac{3}{5}$ B. $-\frac{1}{3}$ C. $-\frac{7}{8}$ D. $-\frac{11}{12}$ E. $-\frac{9}{10}$

32. What is the area of the isosceles trapezoid below?



A. 40 cm^2 B. 60 cm^2 C. 75 cm^2 D. 50 cm^2 E. 80 cm^2

33. The solution set $(-\infty, -11)$ is the solution for which of the following inequalities?
A. $x - 8 \geq -7$ B. $x - 3 \geq -11$ C. $3x + 5 < 2x - 6$ D. $3x + 7 > 2x + 11$ E. $2x + 3 > x + 8$

34. A jar contains 9 red marbles, 7 blue marbles and 4 yellow marbles. If two marbles are selected at random, without replacement, what is the probability that the two marbles selected are the same color?
A. $\frac{1}{2}$ B. $\frac{4}{5}$ C. $\frac{63}{190}$ D. $\frac{12}{95}$ E. $\frac{2}{19}$

35. The number 13 is a prime number. If you reverse its digits, you get 31, which is also prime. How many two-digit prime numbers can be found that will also be prime if you reverse their digits?
A. 8 B. 9 C. 10 D. 7 E. 11

36. *Subs Your Way* ☺ spends *x* dollars on bread and *y* dollars on meats. *Subs Your Way* ☺'s profit per day is modeled by $f(x, y) = 12{,}000 - x - 2y$. What is the profit of one day if *Subs Your Way* ☺ spends \$200 on bread and \$640 on meats?
A. \$10,250 B. \$11,640 C. \$10,760 D. \$10,460 E.\$10,520

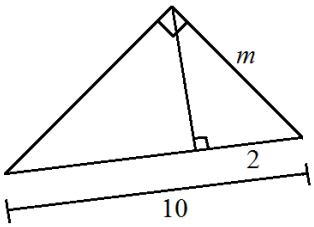
37. In base 10, what is the sum of the largest four-digit base 5 number and the smallest four-digit base 4 number?
A. 697 B 789 C. 798 D. 688 E. 669

38. A Pythagorean triple is said to be primitive if and only if *a*, *b*, and *c* share no common divisors. Which of the following Pythagorean triples is not a primitive Pythagorean triple?
A. 9, 40, 41 B. 8, 15, 17 C. 20, 21, 29 D. 12, 35, 37 E. 15, 36, 39

39. How many positive integers less than or equal to 20 can be written as the sum of two prime numbers?
A. 18 B. 12 C. 15 D. 16 E. 9

40. If $4^x + 4^{x-1} = 50$, then 4^{2x} is equal to which of the following?
A. 1,600 B. 2,500 C. 256 D. 625 E. 156.25

41. Using the picture below, find the value of m^4.



A. 400 B. 1,024 C. 784 D. 50 E. 256

42. The graph of $x^2 + y^2 + 16x - 24y = -159$ is a circle. What is the length of the diameter of the circle?
A. 10 units B. 14 units C. 15 units D. 24 units E. 18 units

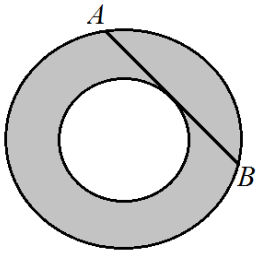
43. If $1+\frac{1}{1+\frac{1}{1+\frac{1}{3}}}=\frac{a}{b}$, then $\sqrt{a+b}$ is equal to which of the following?

A. $2\sqrt{3}$ B. $2\sqrt{22}$ C. $3\sqrt{2}$ D. $3\sqrt{6}$ E. $9\sqrt{2}$

44. For his class, Mr. Chu drew a quadrilateral on a large coordinate grid sheet of paper. The vertices of the quadrilateral were (-5, 2), (-2, -2), (5, -4) and (8, 4). Mr. Chu called on a student to throw a plastic dart at the quadrilateral. The dart landed inside the quadrilateral, tearing a hole one-fourth the area of the quadrilateral. What was the area of the hole?

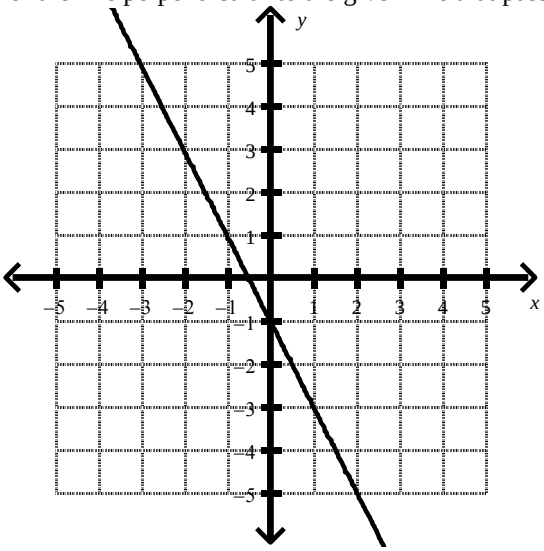
A. 12 units^2 B. 16 units^2 C. 10 units^2 D. 13 units^2 E. 15 units^2

45. Find the area of the shaded region below, if $\overline{AB}$ is tangent to the unshaded circle and measures 12 cm.



A. $144\pi\ cm^2$ B. $72\pi\ cm^2$ C. $36\pi\ cm^2$ D. $24\pi\ cm^2$ E. $16\pi\ cm^2$

46. Which of the following is the equation of the line perpendicular to the given line that passes through the point (3, 1)?



A. $x + 2y = 0.5$ B. $x + 2y = 1$ C. $x - 2y = -0.5$ D. $x - 2y = 0.5$ E. $x - 2y = 1$

47. The arithmetic mean of four positive integers is 6. What is the greatest possible sum of the squares of the four integers?

A. 114 B. 441 C. 524 D. 444 E. 521

48. Alice and Brody have bedrooms of equal dimensions. Alice can paint her bedroom in 3 hours and Brody can paint his bedroom in 2 hours. If they painted together, how long would it take them to paint one bedroom?

A. 1 hr 16 min B. 1 hr 8 min C. 1 hr 12 min D. 1 hr 10 min E. 1 hr 20 min

49. Find the value of $\frac{x+7y}{x-y}$ if $\frac{3x+y}{x-2y}=4$.

A. 11 B. -7 C. 6 D. ¼ E. 2

50. What is the sum of all the positive integers that satisfy $\frac{1}{3}x+\frac{1}{2}<\frac{1}{4}x+2$?

A. 171 B. 190 C. 153 D. 136 E. 161

2016 – 2017 TMSCA Middle School Mathematics Test #13 Answer Key

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

2016-2017 TMSCA Middle School Mathematics Test #13 Selected Answers

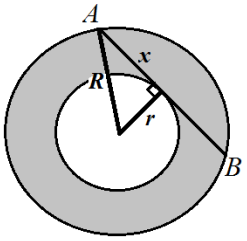
35. There are 9 prime numbers that also create a prime number once their digits are reversed. The nine prime numbers are 11, 13, 17, 31, 37, 71, 73, 79 and 97.

36. We want to find $f(x, y) = 12{,}000 - x - 2y$, with x dollars on bread and y dollars on meats. We are given \$200 on bread and \$640 on meats, so $f(200, 640) = 12{,}000 - 200 - 2(640) = \$10{,}520$ profit.

38. All the sets of three numbers are primitive Pythagorean triples, except the set {15, 36, 39} because all three terms share a common factor of 3.

39. There are 15. 4 = 2 + 2, 5 = 2 + 3, 6 = 3 + 3, 7 = 2 + 5, 8 = 3 + 5, 9 = 2 + 7, 10 = 5 + 5, 12 = 5 + 7, 13 = 2 + 11, 14 = 7 + 7, 15 = 2 + 13, 16 = 3 + 13, 18 = 5 + 13, 19 = 2 + 17 and 20 = 3 + 17.

45. First draw a radius of the inside non-shaded circle that is perpendicular to $\overline{AB}$. Next draw a radius from where $\overline{AB}$ lies on the large circle to the center, as below.



Now we see that $R^2 = r^2 + x^2$. x is equal to 6 cm because it is a chord with a radius drawn through it, which bisects it. Using the multiplication of equality, we can multiply all terms by π and this means the area of the large circle is $\pi R^2 = \pi r^2 + \pi x^2$. Remember, we are looking for $\pi R^2 - \pi r^2$, so we need to subtract πr^2 from both sides. Therefore, $\pi R^2 - \pi x^2 = \pi x^2 = \pi 6^2 = 36\pi\ cm^2$.

49. If $\frac{3x+y}{x-2y} = 4$, then $\frac{3x+y}{x-2y} = \frac{4}{1}$, giving us $3x + y = 4$ and $x - 2y = 1$. Solve the system by first eliminating y by multiplying the first equation by 2. $2(3x + y = 4) = 6x + 2y = 8$. Add both equations and get $6x + 2y + x - 2y = 8 + 1$, so $7x = 9$ and $x = \frac{9}{7}$. Substituting $\frac{9}{7}$ in for x, and $\frac{9}{7} - 2y = 1$ and $y = \frac{1}{7}$. Substituting our values into $\frac{x+7y}{x-y}$, and we get $\frac{\frac{9}{7}+7\cdot\frac{1}{7}}{\frac{9}{7}-\frac{1}{7}} = \frac{\frac{16}{7}}{\frac{8}{7}} = \frac{16}{7}\cdot\frac{7}{8} = 2$.