



**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #6 ©
DECEMBER 2, 2017**

GENERAL DIRECTIONS

- About this test:
 - You will be given 40 minutes to take this test.
 - There are 50 problems on this test.
- 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.
- If you are using a Chatsworth or Scantron card, please follow the specific instructions given at your particular meet.
- You may write anywhere on the test itself. You must write only answers on the answer sheet.
- You may use additional scratch paper provided by the contest director.
- All problems have **ONE** and **ONLY ONE** correct [BEST] answer. There is a penalty for all incorrect answers.
- Calculators **MAY NOT** be used on this test.
- 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.
- In case of ties, percent accuracy will be used as a tie breaker.

1. $45 - 7\frac{3}{8} =$ _____

- A. $32\frac{5}{8}$ B. $38\frac{5}{8}$ C. $36\frac{5}{8}$ D. $36\frac{5}{8}$ E. $37\frac{5}{8}$

2. $4\frac{5}{7} + 7\frac{1}{2} =$ _____

- A. $12\frac{3}{14}$ B. $12\frac{3}{4}$ C. $11\frac{11}{14}$ D. $11\frac{3}{14}$ E. $12\frac{5}{14}$

3. $33 \div -0.3 =$ _____

- A. -11 B. -55 C. -110 D. -0.11 E. -1.1

4. $-1.4 \times -3.9 =$ _____

- A. -5.46 B. -5.3 C. 5.64 D. 5.46 E. 5.03

5. Which expression below produces the greatest sum?

- A. $456 + 85$ B. $219 + 257$ C. $308 + 232$ D. $540 + 0.5$ E. $289 + 211$

6. What is the value of n , if $7,000 = 2^3 \cdot 5^n \cdot 7$?

- A. 0 B. 1 C. 2 D. 3 E. 4

7. 300 quarters = 610 dimes + 150 nickels + _____ pennies

- A. 550 B. 650 C. 600 D. 700 E. 750

8. Noah was mowing his yard when his mower ran out of gasoline. Noah poured 0.75 gallons of gasoline into his mower. How many ounces did Noah pour into his mower?

- A. 84 ounces B. 128 ounces C. 92 ounces D. 76 ounces E. 96 ounces

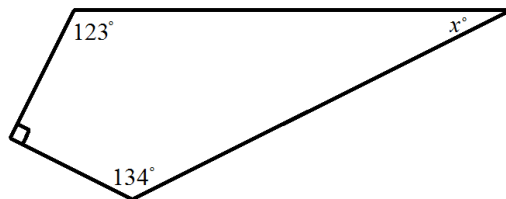
9. $1 + 3 + 5 + \dots + 17 + 19 + 21 =$ _____

- A. 132 B. 121 C. 128 D. 136 E. 125

10. Cynthia is 4 feet 6 inches tall and casts a shadow that is 8 feet long. At the exact same time, what is the length of the shadow cast by a tree that is 18 feet tall?

- A. 32 feet B. 32 feet 5 inches C. 28 feet 6 inches D. 30 feet 8 inches E. 30 feet

11. What is the value of x ?



- A. 46 B. 57 C. 27 D. 23 E. 13

12. If it takes 300 milliliters of paint to make 50 fishing lures, how many lures can be made using 450 milliliters of paint?

- A. 80 B. 75 C. 70 D. 65 E. 85

13. Simplify: $(|18 - 24|^2 - 11) + (-8 + 7 - 6 + 5)$

- A. -3 B. -571 C. -49 D. 23 E. 27

14. Noah has \$400. He will spend 35% of his money this weekend. How much will Noah have remaining?

- A. \$280 B. \$320 C. \$240 D. \$300 E. \$260

15. The supplement of $\angle A$ is equal to the complement of $\angle B$. If $\angle A = 117^\circ$, what is the measure of $\angle B$?
 A. 33° B. 63° C. 37° D. 27° E. 7°
16. The circumference of the Earth at the equator is about 250,000 miles. The circumference of Jupiter is about eleven times that of Earth. What is the circumference of Jupiter in scientific notation?
 A. 2.5×10^5 miles B. 2.5×10^6 miles C. 2.75×10^5 miles D. 2.65×10^5 miles E. 2.75×10^6 miles
17. 37 is written as XXXVII using six Roman numeral characters. What is the number that can be written using Roman numerals that uses the most characters?
 A. 3,888 B. 3,999 C. 3,998 D. 4,999 E. 9,999
18. What is the remainder when 342,876 is divided by the number 9?
 A. 3 B. 4 C. 5 D. 6 E. 7
19. If today is Saturday, what day will it be in 74 days?
 A. Monday B. Tuesday C. Wednesday D. Thursday E. Friday
20. What value is 325% of the number 84?
 A. 273 B. 189 C. 269 D. 281 E. 313
21. A five-digit bicycle combination lock must start with a 6. If digits cannot repeat, how many different bicycle lock combinations are possible?
 A. 720 B. 3,648 C. 3,024 D. 1,240 E. 15,120
22. What is the sum of the digits of the sum of the digits of the number 2,018?
 A. 9 B. 11 C. 4 D. 5 E. 2
23. How many total degrees are there in a regular 17 sided polygon?
 A. $2,700^\circ$ B. $2,880^\circ$ C. $2,520^\circ$ D. $3,060^\circ$ E. $2,540^\circ$
24. If one gallon = 231 cubic inches, how many gallons is 77 cubic inches?
 A. $\frac{1}{2}$ B. $\frac{2}{3}$ C. $\frac{1}{3}$ D. $\frac{1}{4}$ E. $\frac{3}{8}$
25. The number 300 is not divisible by which of the following?
 A. 25 B. 30 C. 75 D. 12 E. 45
26. Cards are numbered 1 – 12 and placed inside a bag. What is the probability Marcy draws a number not greater than 8?
 A. $\frac{5}{12}$ B. $\frac{7}{12}$ C. $\frac{2}{3}$ D. $\frac{1}{3}$ E. $\frac{3}{4}$
27. If $A = \{2, 4, 6, 8, 10\}$, $B = \{1, 2, 3, 4, 5\}$ and $C = \{3, 6, 9, 12, 15\}$, then $(A \cup B) \cap C =$ _____.
 A. $\{0\}$ B. $\{2, 3, 4, 6, 9, 12, 15\}$ C. $\{3\}$ D. $\{3, 6\}$ E. $\{2, 4\}$
28. If a triangle has side lengths measuring 3, 8 and 10 units, it is classified as which of the following?
 A. acute B. right C. obtuse D. equilateral E. isosceles
29. Simplify: $(x^5)^{-2} \cdot 2x^7$
 A. $2x^3$ B. 2 C. $2x$ D. $\frac{2}{x^3}$ E. $\frac{1}{2x^3}$
30. Simplify: $6^2 \div (9 + 3) - 3! \times \sqrt{4}$
 A. 6 B. -12 C. -9 D. 3 E. -11

31. Which exponential function(s) below represent exponential growth?

I. $y = \frac{1}{2} \left(\frac{4}{3}\right)^x$

II. $y = 0.89(0.3)^x$

III. $y = 199(0.78)^x$

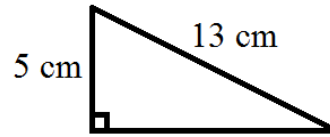
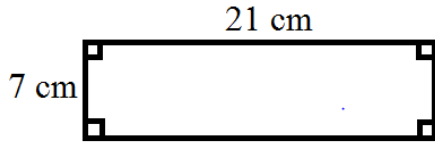
IV. $y = 214 \left(\frac{6}{7}\right)^x$

- A. I only B. I and II C. II, III and IV D. III and IV E. IV only

32. $78 + 109 =$ _____ (base 3)

- A. 20221 B. 20121 C. 20111 D. 20212 E. 21221

33. What is the combined areas of the figures?



- A. 86 cm^2 B. 177 cm^2 C. 156 cm^2 D. 212 cm^2 E. 207 cm^2

34. If Sheila runs $\frac{4}{13}$ mile in every $\frac{1}{26}$ hour, what is Sheila's unit speed per hour?

- A. 9 mph B. 7 mph C. 5 mph D. 6 mph E. 8 mph

35. Sally has a baggie filled with eight pieces of cherry flavored candy, four pieces of banana flavored candy and four pieces of blue-raspberry flavored candy. What is the smallest number of candies Sally must take out of the baggie to be certain she takes out one of each flavor?

- A. 4 B. 12 C. 15 D. 9 E. 13

36. What is the 21st term of the sequence? 108, 100, 92, 84, ...

- A. -54 B. -60 C. -52 D. -56 E. -64

37. Seventy-five percent of children eat fruit and sixty-five percent eat vegetables. What is the smallest possible percent of children who eat both fruit and vegetables?

- A. 30% B. 40% C. 50% D. 80% E. 10%

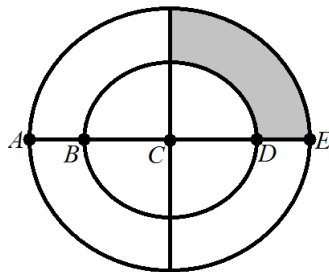
38. Michelle has a box that measures, 6 inches wide, 8 inches long and 7 inches high. How much sand is in the box is Michelle fills her box one inch from the top?

- A. 332 in^3 B. 288 in^3 C. 336 in^3 D. 240 in^3 E. 252 in^3

39. What is the slope of any vertical line?

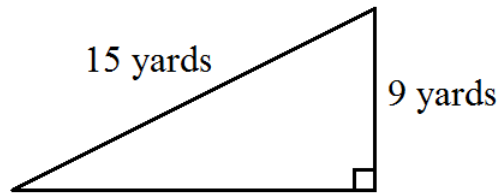
- A. undefined B. 0 C. 1 D. -1 E. $\frac{1}{2}$

40. 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 16 cm and $AB = DE = 3$ cm? Let $\pi = 3$.

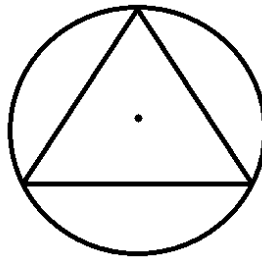


- A. 48.25 cm^2 B. 37.50 cm^2 C. 18.75 cm^2 D. 29.25 cm^2 E. 117 cm^2

41. When factored completely, $8x^2 + 48x - 56$ has how many factors?
 A. 0 B. 1 C. 2 D. 3 E. 4
42. If you square the sum of the coordinates of the solution of the system $\begin{cases} 2a - b = 12 \\ 3a + 2b = -3 \end{cases}$, you get which of the following?
 A. -18 B. 324 C. -324 D. 9 E. 81
43. Let A be the midpoint between the points $(9, 11)$ and $(17, 1)$. What are the coordinates of A after it is translated by the translation $(x, y) \rightarrow (x - 14, y - 10)$?
 A. $(12, 2)$ B. $(-10, -5)$ C. $(-1, -4)$ D. $(13, 6)$ E. $(3, -8)$
44. Paul is going to paint three offices at his work. Each office has the exact same dimensions. One can of paint covers 374 ft^2 and costs \$32.60. How much will it cost Paul to paint the three offices that total $2,992 \text{ ft}^2$?
 A. \$254.20 B. \$260.80 C. \$280.40 D. \$276.40 E. \$293.20
45. $64^{\frac{2}{3}} =$ _____
 A. 16 B. $8\sqrt{3}$ C. $8\sqrt{2}$ D. $4\sqrt{2}$ E. 32
46. For a football drill, Steve has to run around the triangle twice. What is the total distance Steve runs in the drill?



- A. 135 yards B. 54 yards C. 72 yards D. 81 yards E. 75 yards
47. What is the value of the positive geometric mean of the numbers 2 and 18?
 A. 9 B. 10 C. 6 D. 8 E. 12
48. Alex drew a circle circumscribing an equilateral triangle with a side length of 6 cm. What is the radius of the circle?



- A. $6\sqrt{3}$ cm B. $3\sqrt{3}$ cm C. $3\sqrt{2}$ cm D. $4\sqrt{3}$ cm E. $2\sqrt{3}$ cm
49. What is the sum of the solutions to the equation $\frac{x}{36-4x} = \frac{1}{4(x-1)}$?
 A. -9 B. 3 C. -3 D. 6 E. 0
50. Which of the following is the domain of the function $f(x) = \sqrt{5x - 10}$?
 A. $x \geq -2$ B. $x \leq \frac{1}{2}$ C. $x \geq \frac{1}{2}$ D. $x \geq 2$ E. $x \leq -2$

2017 – 2018 TMSCA Middle School Mathematics Test #6 Answer Key

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

2017-2018 TMSCA Middle School Mathematics Test #6 Selected Answers

8. 1 gallon = 128 ounces. 0.75 is 75% of 1 gallon, so 75% of 128 ounces = $0.75(128) = 96$ ounces.

18. To find the remainder when a number is divided by 9, continue to add the digits of the number until you get a single digit, which will be the remainder. $342,876 \rightarrow 3 + 4 + 2 + 8 + 7 + 6 = 30 \rightarrow 3 + 0 = 3$.

21. We know the first digit of the five-digit lock combination must be a 6. This means the last four digits can be 0–9, excluding 6 and cannot repeat. Therefore, there are 9 choices for the 2nd digit, 8 choices for the 3rd digit, 7 choices for the fourth digit and 6 choices for the fifth digit. Thus, there are $9 \cdot 8 \cdot 7 \cdot 6 = 3,024$ different bicycle lock combinations.

22. The sum of the digits of the number 2,018 is $2 + 0 + 1 + 8 = 11$. The sum of the digits of 11 is $1 + 1 = 2$.

28. We use the Pythagorean Theorem to classify triangles. a and b will always be the shortest sides. If $a^2 + b^2 = c^2$, then the triangle is right, if $a^2 + b^2 < c^2$, then the triangle is obtuse, if $a^2 + b^2 > c^2$, then the triangle is acute. $3^2 + 8^2 = 9 + 81 = 90$ and $10^2 = 100$. Since $90 < 100$, the triangle is obtuse.

30. $6^2 \div (9 + 3) - 3! \times \sqrt{4} = 6^2 \div 12 - 3! \times \sqrt{4} = 36 \div 12 - 6 \times \sqrt{4} = 36 \div 12 - 6 \times 2 = 36 \div 12 - 12 = 3 - 12 = -9$.

34. *Distance = rate \times time*. Our distance is $\frac{4}{13}$ mile and the time is $\frac{1}{26}$ hour. If *Distance = d* , *r = rate* and *t = time*, then $D = rt$ and substitute to get $\frac{4}{13} = \frac{1}{26}r$. Multiply both sides by the reciprocal of $\frac{1}{26}$ and we get $r = \frac{4}{13} \cdot \frac{26}{1} = \frac{104}{13} = 8$ mph.

39. The slope of any vertical line is undefined.

41. First, factor out the GCF of the terms of the trinomial, which is 8, $8x^2 + 48x - 56 \rightarrow 8(x^2 + 6x - 7)$. When factoring a trinomial in the form $Ax^2 + Bx + C$, when $A = 1$, look only at the C value. Find factors of C that sum to B , and use those as the second terms of the factors. Now, looking at only the trinomial within the parentheses, $x^2 + 6x - 7$, we notice that $A = 1$. Find the factors of -7 that sum of 6, which are 7 and -1 . So, $x^2 + 6x - 7 = (x + 7)(x - 1)$. Therefore, $8x^2 + 48x - 56$ factored completely is $8(x + 7)(x - 1)$, which has a total of three factors.

44. First, divide 2,992 by 374 and $\frac{2992}{374} = 8$. Multiply 8 by \$32.60 and $8(32.6) = 260.8$. It will cost Paul \$260.80 to paint all three of his offices.

45. $A^{\frac{m}{n}}$ can be rewritten as $\sqrt[n]{A^m}$ or $(\sqrt[n]{A})^m$. It is easier to simplify $64^{\frac{2}{3}}$ by rewriting it as $(\sqrt[3]{64})^2$. Using the correct order of operations, $\sqrt[3]{64} = \sqrt[3]{4 \cdot 4 \cdot 4} = 4$ and $4^2 = 16$.

47. The geometric mean of two numbers a and b is equal to \sqrt{ab} . Therefore, the geometric mean of 2 and 18 is $\sqrt{ab} = \sqrt{2 \cdot 18} = \sqrt{36} = 6$.

50. To find the domain of a square root function, set the radicand greater than or equal to 0 and then solve the inequality. We are given the function $f(x) = \sqrt{5x - 10}$ and the radicand is $5x - 10$. So, $5x - 10 \geq 0$. Add 10 to both sides and $5x \geq 10$. Divide both sides by 5 and $x \geq 2$. The domain of the function $f(x) = \sqrt{5x - 10}$ is $x \geq 2$.