TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #4 ©
NOVEMBER 14 , 2015

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.

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1. $65 + 199 + 988 =$ _____
A. 1,284   B. 1,282   C. 1,392   D. 1,252   E. 1,212

2. $400 - 47.99 =$ _____
A. 352.1   B. 352.01   C. 352.11   D. 352.09   E. 352.001

3. 0.56 multiplied by 1.12 is equal to which of the following rounded to the nearest hundredth?
A. 0.6272   B. 0.627   C. 0.628   D. 0.62   E. 0.63

4. $5\frac{1}{3} \div 3\frac{1}{2} =$ _____
A. $1\frac{11}{21}$ B. $1\frac{4}{7}$ C. $2\frac{4}{7}$ D. $2\frac{5}{21}$ E. $1\frac{5}{6}$

5. 1.5 days = _____ minutes
A. 2,160   B. 2,640   C. 2,480   D. 2,240   E. 1,680

6. If A = 1, B = 2, C = 3, …, Y = 25, and Z = 26, what is the sum of the letters of the word *FUN*?
A. 51   B. 41   C. 39   D. 44   E. 40

7. How many quadrilaterals can be found in the picture below?

A. 1   B. 2   C. 3   D. 4   E. 5

8. If $3x - 7 = 14$, then $x^2 + 1 =$ _____.
A. $6.\overline{4}$ B. 6.4   C. 50   D. 49   E. $137.\overline{1}$

9. How many total diagonals can be drawn in a regular hexagon?
A. 6   B. 18   C. 9   D. 12   E. 15

10. Which of the following numbers below is not an example of a natural number?
A. -5   B. $\sqrt{100}$ C. 1   D. $\frac{12}{4}$ E. 1,123

11. $0.0000074 =$ _____ (scientific notation)
A. 7.4×10^6 B. 7.4×10^7 C. 74×10^6 D. 74×10^{-5} E. 7.4×10^{-6}

12. $44 + 199 =$ _____ (Roman numeral)
A. CCXLVIII   B. CMXLIII   C. CCXLIII   D. DDLXIII   E. CDXLVIII

13. How many distinct prime factors does the number 640 have?
A. 1   B. 2   C. 3   D. 4   E. 5

14. The supplement of a $119.4°$ angle is equal to ____$°$.
A. 29.6   B. 58.46   C. 19.6   D. 240.6   E. 60.6

15. Which integer is in the solution set for the inequality $4x - 5 \geq 19$?
A. -7   B. -5.6   C. 10.1   D. 0   E. 8

16. What is the sum of the number of vertices and edges of a pentagonal prism?
A. 32   B. 17   C. 22   D. 25   E. 18

17. 300 meters + 5,400 decimeters + 1,200,000 millimeters = _____ hectometers
A. 20.4   B. 6.9   C. 8.4   D. 17.4   E. 15.9

18. Which expression is equivalent to $(6m^3 + 3m^2) - (2m^3 - m)$?
A. $4m^3 + 2m^2$ B. $9m^3 + 2m^2$ C. $4m^3 + 2m^2 + m$ D. $4m^3 + 3m^2 + m$ E. $4m^3 + 3m^2 - m$

19. If the spinner below were to be spun, what percentage would be the probability of not getting a B?
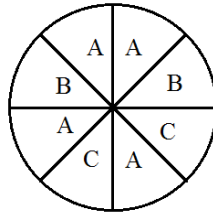
A. $33\frac{1}{3}$%   B. 25%   C. 50%   D. $66\frac{2}{3}$%   E. 75%

20. Rianna is buying candy that costs 4¢ each. If she has a 5-dollar bill, how many pieces of candy can she buy, assuming the is no tax? Round your answer to the nearest whole piece of candy.
A. 105 pieces   B. 12 pieces   C. 130 pieces   D. 125 pieces   E. 75 pieces

21. Find the range of the function $f(x) = 10x + 3$ when given a domain of {-2, 7}.
A. {-23, 73}   B. {-17, 73}   C. {13, 20}   D. {15, 20}   E. {-17, 20}

22. Simplify: $-19 - (-10) + (-7) + 12 - 3^2$
A. –13   B. 5   C. -33   D. 14   E. -23

23. If ¼ inch = 6 miles on a map, how many inches would 48 miles measure on the map?
A. 2½ inches   B. 2 inches   C. 2¾ inches   D. 1¾ inches   E. 2¼ inches

24. Find the value of 15% of the number 620.
A. 78   B. 87   C. 93   D. 97   E. 103
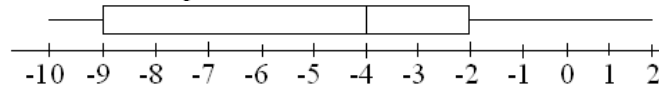
25. Calculate the lower quartile of the set of numbers.   15, 17, 19, 22, 24, 27, 31, 33, 33, 54, 61
A. $30.\overline{45}$ B. 27   C. 33   D. 46   E. 19

26. A(n) _____ is a transformation that preserves size and shape.
A. isometry   B. composition   C. transformation   D. glide reflection   E. dilation

27. Calculate the range of the box-and-whisker plot below.

A. -8   B. 7   C. -4   D. 12   E. 8

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

29. $3m^2(m^3)^4 =$ _____
A. $3m^{14}$ B. $3m^9$ C. $81m^{12}$ D. $3m^{24}$ E. $81m^9$

30. A rectangular prism $1\ cm \times 2\ cm \times 3\ cm$ is enlarged by a scale factor of 2. What is the new volume of the rectangular prism?

A. 6 cm^3 B. 8 cm^3 C. 48 cm^3 D. 24 cm^3 E. 36 cm^3

31. Two sides of a triangle measure 4 inches and 9 inches. What is the largest possible integral length the third side of the triangle?

A. 13 inches   B. 14 inches   C. 12 inches   D. 5 inches   E. 6 inches

32. Change the quadratic equation $y = (x + 7)^2 - 5$ into standard form.

A. $y = x^2 + 14x + 54$ B. $y = x^2 + 14x + 49$ C. $y = x^2 + 25x + 49$ D. $y = x^2 + 14x + 44$ E. $y = x^2 + 25x + 49$

33. Identify the decay factor in the exponential decay function $y = 8(0.56)^x$.

A. 0.44   B. 44   C. 8   D. 0.56   E. 1.56

34. $47_{10} + 29_{10} =$ _____ $_8$

A. 114   B. 76   C. 122   D. 176   E. 136

35. $\frac{\pi}{2}$ (radians) = _____

A. 45° B. 270° C. 90° D. 180° E. 60°

36. Use the examples below to find the value of m.

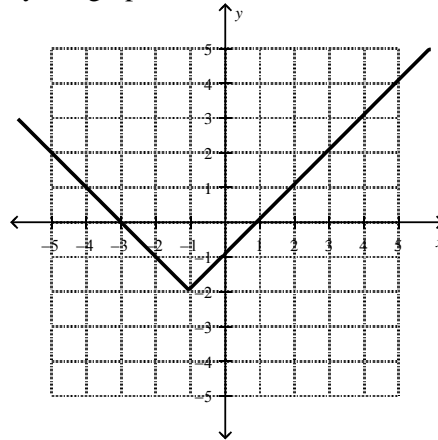| 6 | | 8 | | 14 | | 22 |
| 6 | | 8 | | 8 | | m |
| 9 | | 12 | | 3 | | 15 |
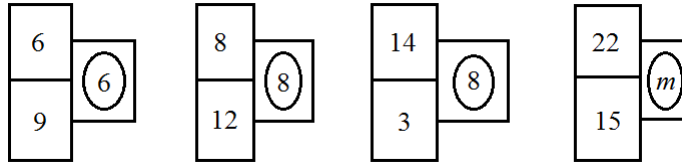
A. 8   B. 10   C. 14   D. 16   E. 20

37. If $\begin{bmatrix} 6 & -3 \\ -5 & 8 \end{bmatrix} + \begin{bmatrix} -5 & 1 \\ 7 & -3 \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, find the value of $ab - cd$.

A. -8   B. 8   C. -6   D. -12   E. 15

38. What type of function can be modeled by the graph below?

A. linear   B. quadratic   C. absolute value   D. exponential   E. radical

39. Solve for x: $\frac{1}{x} = \frac{2}{5}$

A. $x = 0.4$ B. $x = 0.2$ C. $x = 2.5$ D. $x = 5$ E. $x = 5.2$

40. $169^{0.5} =$ _____
A. 13   B. 84.5   C. 42.25   D. 338   E. 26

41. Bobby can read 180 words per minute. If there are approximately 310 words on a page, about how many pages can Bobby read in an hour?
A. 135 pages   B. 35 pages   C. 142 pages   D. 57 pages   E. 23 pages

42. What is the slope of the line with the equation $4x - 2y = 24$?
A. 6   B. -12   C. -½   D. ½   E. 2

43. $4 + 7 + 10 + 13 + \ldots + 28 + 31 =$ _____
A. 165   B. 175   C. 144   D. 208   E. 148

44. If the value of the discriminant of a quadratic equation is equal to zero, how many solutions does the quadratic equation have?
A. 0   B. 1   C. 2   D. 3   E. no solution

45. Calculate the simple interest if depositing $1,200 at 10% for 8 years.

A. $960.00   B. $980.00   C. $945.50   D. $960.50   E. $945.00

46. If the solution to the system $\begin{cases} 2x + 3y = -21 \\ y = \frac{1}{2}x - 14 \end{cases}$ is (a, b), what is the value of $a + b$?
A. 6   B. -7   C. -5   D. 11   E. 7

47. $4\sqrt{11}$ is the simplified form of which of the following?
A. $\sqrt{88}$ B. $\sqrt{176}$ C. $\sqrt{15}$ D. $\sqrt{44}$ E. $\sqrt{704}$

48. From the picture below, if the measure of $\angle APB = 122°$, what is the measure of $\angle ACB$?
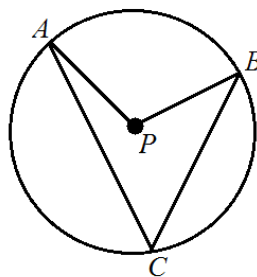
A. $244°$ B. $30.5°$ C. $61°$ D. $24°$ E. $45.75°$

49. Factor completely: $6x^4 + 14x^3 + 4x^2$
A. $2x^2(3x^2 + 7x + 2)$ B. $2x^2(3x + 2)(x + 1)$ C. $2x^2(3x + 1)(x + 2)$ D. $(6x^3 + 2x^2)(x + 2)$ E. $(2x^3 + 4x^2)(3x + 1)$

50. If the graph of the quadratic function $f(x) = x^2 - 2x - 3$ is translated to the right five units, what are the new coordinates of its vertex?
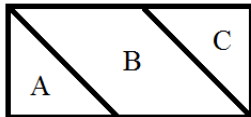A. (7, -3)   B. (5, -3)   C. (6, -4)   D. (7, -4)   E. (-4, -4)

2015 – 2016 TMSCA Middle School Mathematics Test #4 Answer Key

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

7. First, assign variables to each region of the rectangle, as below.

A quadrilateral is a polygon with four sides. We can see that region B is a quadrilateral. Regions AB and BC each create a quadrilateral and so does regions ABC. Thus we have the following quadrilaterals, B, AB, BC and ABC, which equals four quadrilaterals.

30. If a rectangular prism $1\ cm \times 2\ cm \times 3\ cm$ is enlarged by a scale factor of 2, the new dimensions are $2\ cm \times 4\ cm \times 6\ cm$. The new volume of the rectangular prism is $2 \cdot 4 \cdot 6 = 48$ cm^3.

36. First, assign variables to the rectangles as below.
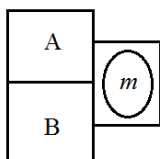
Next, if you play with the numbers, we see the rule is ½ A + ⅓ B = m. Check to make sure,
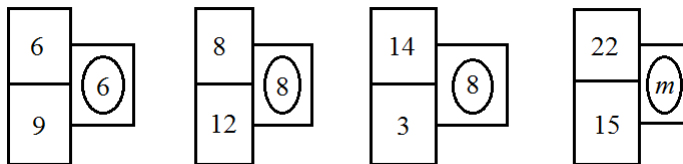
½ (6) + ⅓(9) = 6, ½(8) + ⅓(12) = 8, ½(14) + ⅓(3) = 8. Since the rule works, ½(22) + ⅓(15) = 16.

40. We first need to see that $x^{\frac{1}{2}} = \sqrt{x}$. We are given $169^{0.5}$. Remember that $0.5 = ½$. So,

$169^{0.5} = 169^{\frac{1}{2}} = \sqrt{169} = 13$.

47. $4\sqrt{11} = \sqrt{16 \cdot 11} = \sqrt{176}$.