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M A T H E M A T I C S

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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. $11.8 + 7.4 =$ _____
A. $19\frac{2}{5}$ B. $19\frac{1}{5}$ C. $18\frac{1}{5}$ D. $18\frac{2}{5}$ E. $19\frac{1}{10}$

2. $34\frac{1}{6} - 13\frac{2}{3} =$ _____
A. 20.5   B. 21.5   C. 20.25   D. 21.75   E. 21.25

3. What is the product of 12 and $1.\overline{3}$?
A. $15.\overline{3}$ B. $15.\overline{6}$ C. 16   D. $16.\overline{3}$ E. $16.\overline{6}$

4. $14\frac{1}{2} \div \frac{1}{2} =$ _____
A. 7.25   B. 7.5   C. 28.5   D. 29   E. 7.75

5. Lisa started watching a movie at 5:20 pm. The movie was 100 minutes long. She had to pause the movie for ten minutes to make herself some popcorn. Later, Lisa had to pause the movie again to go to the restroom, which lasted twenty minutes. At what time did Lisa finish her movie?
A. 7:10 pm   B. 7:30 pm   C. 6:50 pm   D. 7:15 pm   E. 7:40 pm

6. $|6 - 43| - 87 =$ _____
A. -50   B. 124   C. 38   D. 50   E. -124

7. *MMDCCXXVII* = _____ (Arabic number)
A. 2,227   B. 2,127   C. 2,117   D. 2,724   E. 2,727

8. Moving only to the right or down, how many different paths are there from *A* to *B*?
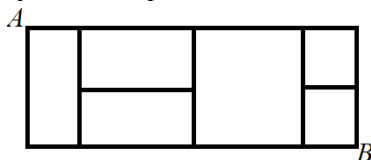
A. 8   B. 7   C. 6   D. 5   E. 4

9. 1 cubic foot = _____ cubic inches
A. 1,642   B. 1,296   C. 1,964   D. 1,728   E. 1,948

10. Sara is buying a skirt and her subtotal comes out to be $26.50. If there is an 8% tax, how much will Sara total bill be?
A. $28.62   B. $28.12   C. $28.54   D. $28.50   E. $27.64

11. The ratio of two complementary angles are in a ratio of 3:7. What is the measure of the larger angle?
A. $27°$ B. $54°$ C. $45°$ D. $72°$ E. $63°$

12. Of the eleven non-overlapping regions created by the five diagonals in a regular pentagon, how many are triangles?
A. 11   B. 10   C. 9   D. 8   E. 7

13. $\frac{1}{6\cdot7} + \frac{1}{7\cdot8} + \frac{1}{8\cdot9} =$ _____
A. $\frac{1}{54}$ B. $\frac{3}{56}$ C. $\frac{1}{18}$ D. $\frac{1}{8}$ E. $\frac{3}{70}$

14. Find the LCM of the number 14, 20, and 24.
A. 976   B. 248   C. 640   D. 840   E. 720

15. Chelsea's car can hold twenty-four gallons of gasoline. How many gallons of gasoline are in Chelsea's car if it is one-fourth full?
A. 8 gallons   B. 18 gallons   C. 12 gallons   D. 6 gallons   E. 4 gallons

16. Let *A* equal the set of numbers {3, 4, 5, 15, 33} and *B* equal the set of numbers {1, 1, 4, 18, 21}. What is the positive difference of the means of *A* and *B*?
A. 3   B. 6   C. 9   D. 12   E. 15

17. If driving on the *Grand Parkway 99* toll road, it costs $2.50 every five miles. What is the toll amount paid for a distance one hundred twenty miles on the toll road?
A. $24.00   B. $50.00   C. $48.00   D. $64.00   E. $60.00

18. How do you classify the following polynomial? $4x^2 - 7x$
A. linear binomial   B. linear monomial   C. cubic binomial   D. quadratic binomial   E. quadratic trinomial

19. Calculate the lateral surface area of the cylinder below, letting $\pi = 3$.

12 cm

14 cm
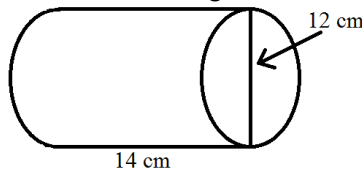
A. 504 cm^2 B. 1,008 cm^2 C. 720 cm^2 D. 612 cm^2 E. 640 cm^2

20. Point *W* has coordinates (-5, -3) and is translated over the *x*-axis and then to the right two units. What are the new coordinates of point *B*?
A. (-5, -3)   B. (-5, 3)   C. (-3, 3)   D. (-7, -3)   E. (7, -3)

21. $5,600 \cdot 45,000 =$ _____ (scientific notation)
A. 2.52×10^8 B. 1.26×10^8 C. 1.01×10^8 D. 2.52×10^9 E. 1.26×10^7

22. What is the 21st term in the sequence, 3, 12, 21, 30, …?
A. 179   B. 180   C. 181   D. 182   E. 183

23. What is the prime factorization of the number 1,456?
A. $2^4 \cdot 7 \cdot 13$ B. $2^3 \cdot 3 \cdot 13$ C. $2^4 \cdot 11 \cdot 13$ D. $2^5 \cdot 7 \cdot 19$ E. $2^3 \cdot 7 \cdot 26$

24. Which formula below is used to calculate the surface area of a sphere, if *r* = radius and *d* = diameter?
A. $SA = \frac{4}{3}\pi r^2$ B. $SA = 4\pi r^3$ C. $SA = \pi r^2$ D. $SA = 2\pi r^2 + 2\pi rh$ E. $SA = 4\pi r^2$

25. $(5x - 16)(2x + 3) = 10x^2 + Bx - 48$, find the value of ½(4B)?
A. -28   B. -36   C. -64   D. 48   E. -34

26. How many subsets does the set {*T, M, S, C, A*} have?
A. 16   B. 5   C. 36   D. 31   E. 32

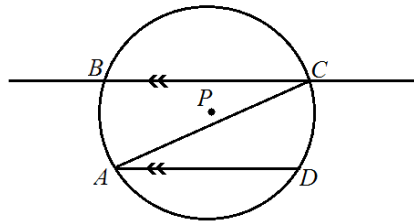27. Multiply: $(6 - \sqrt{3})(6 + \sqrt{3})$
A. $36 - 6\sqrt{3}$ B. 9   C. 33   D. 12   E. $36 - \sqrt{3}$

28. What are the odds of rolling a pair of dice and getting a 1 or a 2 facing up?
A. 5:4   B. 5:9   C. 9:5   D. 1:2   E. 5:8

29. In the picture below, $m\angle CAD = 34°$ and the measure of minor arc $BC = 140°$. The measure of arc $ABC =$ ____°.

A. 208   B. 174   C. 106   D. 220   E. 226

30. The product of 4^3 and 5^6 will end in how many zeros?
A. 3   B. 4   C. 5   D. 6   E. 8

31. What is the amount of money in a bank account that opened a simple interest account depositing $2,000 at 4% for twenty-four months?
A. $2,140   B. $2,080   C. $2,240   D. $2,200   E. $2,160

32. What is the percent of decrease if the quantity 20 changes to the quantity 6?
A. 14%   B. 70%   C. 84%   D. 68%   E. 60%

33. Which linear equation below has a y-intercept of -5?
A. $y = ½ x + 5$ B. $3x - y = 5$ C. $4x - 5y = 1$ D. $x = y - 5$ E. $x = -5$

34. State the range of the graph below.
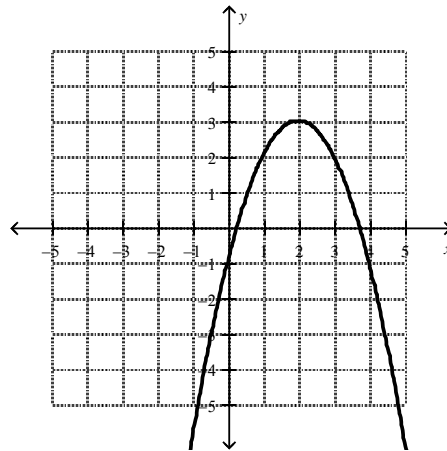
A. $y \leq 3$ B. $-1 \leq x \leq 5$ C. all real numbers   D. $y \geq 3$ E. $0 \leq y \leq 3$

35. Convert $22°$ into a radian measure.
A. $\frac{11\pi}{180}$ B. $\frac{11\pi}{90}$ C. $\frac{11\pi}{45}$ D. $\frac{23\pi}{180}$ E. $\frac{23\pi}{90}$

36. Find the rate of decay of the exponential decay function $y = 9(0.004)^x$.
A. 96%   B. 9.4%   C. 94%   D. 96.6%   E. 99.6%

37. Which of the following is equivalent to $\log_7 120 - \log_7 20 - \log_7 2$?
A. $\log_7 30$ B. $\log_7 3$ C. $\log_7 6$ D. $\log_7 98$ E. $\log_7 15$

38. If you add all the lengths of the edges of a cube, the sum is 36 cm. What is the surface area of this cube?
A. 144 cm^2 B. 72 cm^2 C. 54 cm^2 D. 27 cm^2 E. 36 cm^2

39. Which of the following linear equations are parallel?

      I. $y = \frac{1}{2}x + 7$ II. $4x - 2y = 7$ III. $y - 1 = -2(x + 5)$ IV. $3x - 6y = 32$

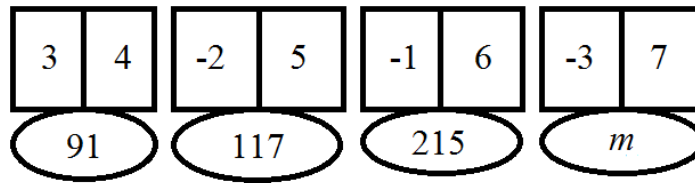A. I and II   B. I and IV   C. II and III   D. II and IV   E. III and IV

40. If $2^x = 9$, what is the value of 2^{2x}?

A. 18   B. 262,144   C. 24   D. 36   E. 81

41. If $g(x) = 3x^2 - 1$, what is the positive value of x for which $g(x) = 299$?

A. 5   B. 8   C. 10   D. 13   E. 14

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

3	4		-2	5		-1	6		-3	7
	91			117			215			m

A. 370   B. 334   C. 316   D. 373   E. 312

43. $54_7 + 201_3 + 110_2 = \underline{\hspace{2cm}}_{10}$

A. 63   B. 64   C. 65   D. 66   E. 67

44. A line passes through the points (5, -3) and (7, y) and has a slope of -3. What is the value of y?

A. -9   B. 6   C. -6   D. $\frac{1}{3}$ E. -12

45. Simplify: $\left(\sqrt{2x^2}\right)^4$

A. $2x^4$ B. $6x^2$ C. $4x^4$ D. $4x^8$ E. $8x^4$

46. If $\frac{2}{3}\begin{bmatrix} -9 & 42 \\ 15 & -24 \end{bmatrix} = \begin{bmatrix} a & d \\ b & c \end{bmatrix}$, then find the value of $\frac{c+d}{a} + b$.

A. -6   B. 4   C. 14   D. 8   E. -12

47. When working together, two painters can paint ten walls in five hours. How many hours would it take three painters to paint fifteen walls at this rate?

A. 3 hrs   B. 4 hrs   C. 5 hrs   D. 4.5 hrs   E. 3.5 hrs

48. What is the area of the quadrilateral with its vertices located at (-3, -2), (3, -50, (7, 2) and (-4, 5)?

A. 72 units^2 B. 81 units^2 C. 58 units^2 D. 60 units^2 E. 64 units^2

49. What is the product of the coordinates of the solution to the system of equations? $\begin{cases} x + 5y = 5 \\ 10y - 2x = -2 \end{cases}$

A. $\frac{8}{5}$ B. $\frac{6}{5}$ C. $\frac{9}{8}$ D. $\frac{11}{10}$ E. $\frac{13}{10}$

50. Simplify: $(a^3b^4)^{-2}(a^7b^5)^3$

A. $a^{15}b^7$ B. $a^{11}b^{10}$ C. $\frac{a^{10}}{b^7}$ D. $\frac{b^7}{a^{10}}$ E. $\frac{b^7}{a^{15}}$

2015 – 2016 TMSCA Middle School Mathematics Test #11 Answer Key

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

3. $1.\overline{3} = 1\frac{1}{3}$. The product of 12 and $1\frac{1}{3}$ is $12 \cdot 1\frac{1}{3} = \frac{12}{1} \cdot \frac{4}{3} = \frac{48}{3} = 16$.

12. First, draw a regular pentagon with its diagonals and number each region, as the example below shows.
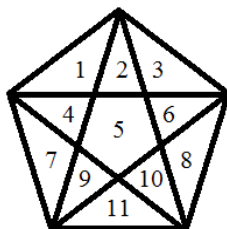
We can now see the triangular regions are 1, 2, 3, 4, 6, 7, 8, 9, 10 and 11. So, there are 10 regions out of the 11 created by the diagonals that are triangles.

35. $22° = \frac{22}{1} \cdot \frac{\pi}{180} = \frac{22\pi}{180} = \frac{11\pi}{90}$.

39. Parallel lines have the same slope. Identify the slopes of each choice.

        I. $y = ½ x + 7$ has a slope of ½   II. $4x – 2y = 7$ has a slope of 2

        III. $y – 1 = -2(x + 5)$ has a slope of -2   IV. $3x – 6y = 32$ has a slope of ½

Therefore, only I and IV are parallel, because they each have a slope of ½.

45. $\left(\sqrt{2x^2}\right)^4 = (2x^2)^{\frac{4}{2}} = (2x^2)^2 = 4x^4$.

50. $(a^3b^4)^{-2}(a^7b^5)^3 = \frac{(a^7b^5)^3}{(a^3b^4)^2} = \frac{a^{21}b^{15}}{a^6b^8} = a^{15}b^7$.