



**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #12 ©
FEBRUARY 21, 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.

[illegible]

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1. $84,521 - 7,658 =$ _____ (nearest ten)

- A. 76,870 B. 76,900 C. 76,860 D. 77,000 E. 76,840

2. $68.5 + 1.112 =$ _____ (nearest hundredth)

- A. 70.0 B. 69.62 C. 69.612 D. 69.6 E. 69.61

3. $16\frac{1}{2} \cdot 7\frac{1}{4} =$ _____ (nearest whole number)

- A. 120 B. 119 C. 118 D. 118.5 E. 121

4. $10.48 \div 0.4 =$ _____

- A. 26 B. 2.52 C. 25.2 D. 26.2 E. 24.2

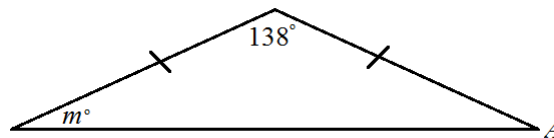
5. Find the value of $A + B + C$, if $560 = 2^A \cdot 5^B \cdot 7^C$.

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

6. 5,280 yards + 2,640 feet = _____ miles

- A. 5.5 B. 5 C. 4.5 D. 4 E. 3.5

7. Find the measure of $\angle A$ using the picture below.



- A. 42° B. 84° C. 48° D. 21° E. 24°

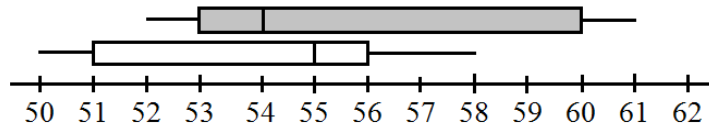
8. 87 is what percent of 435?

- A. 15% B. 20% C. 25% D. 18% E. 24%

9. Simplify: $|5^2 + 4^2 - 7^2|$

- A. 4 B. 8 C. 16 D. -8 E. $\frac{1}{8}$

10. Using the picture below, what is the positive difference of the inter-quartile ranges of the two box-and-whisker plots?



- A. 4 B. 5 C. 7 D. 3 E. 2

11. What is the sum of the number of edges, vertices and faces of a hexagonal prism?

- A. 42 B. 38 C. 34 D. 30 E. 26

12. Billy is four feet tall and casts a seven foot shadow. How long will a tree cast a shadow if the tree is seventeen feet tall?

- A. $29\frac{1}{2}$ ft B. $29\frac{3}{4}$ ft C. $30\frac{1}{4}$ ft D. $32\frac{1}{2}$ ft E. $32\frac{1}{8}$ ft

13. Find the product of the GCF of 17 and 29 and the LCM of 100 and 34.

- A. 28,900 B. 16,762 C. 1,700 D. 986 E. 493

14. 34,000 decimeters = _____ hectometers

- A. 34 B. 340 C. 340,000,000 D. 3.4 E. 0.34

15. $\angle B$ and $\angle D$ are corresponding angles. If the complement of $\angle B$ equals 39° , then the supplement to $\angle D$ is equal to _____.

- A. 129 B. 51 C. 141 D. 78 E. 168

16. Solve: $\frac{n}{3} - 26 \geq -11$

- A. $n \geq 3$ B. $n \geq 5$ C. $n \leq -7$ D. $n \geq 45$ E. $n \leq 15$

17. $\frac{7}{15} =$ _____ (decimal)

- A. 0.46 B. 0.467 C. 0.57 D. $0.4\overline{6}$ E. $0.4\overline{67}$

18. $MCDXLV + DLXVIII =$ _____ (Arabic number)

- A. 2,013 B. 2,103 C. 2,131 D. 1,590 E. 1,513

19. Cody is three years younger than Kaylin. Kaylin's age is half of Dave's age. Dave is four years younger than Freddie. If Freddie is 40 years old, how old is Cody?

- A. 12 B. 15 C. 18 D. 16 E. 8

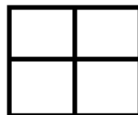
20. 1 day + 2.5 hours + $\frac{1}{4}$ hour = _____ minutes

- A. 1,600 B. 1,240 C. 1,605 D. 1,525 E. 1,645

21. The sum of seven consecutive positive integers is 35. What value is five more than the mean of these numbers?

- A. 7 B. 12 C. 13 D. 9 E. 10

22. How many rectangles can be found in the picture below?



- A. 5 B. 8 C. 9 D. 10 E. 6

23. What is the probability of drawing a red four and then, without replacement, drawing a two from a standard deck of cards?

- A. $\frac{2}{1,326}$ B. $\frac{2}{663}$ C. $\frac{2}{331}$ D. $\frac{8}{51}$ E. $\frac{2}{51}$

24. In which direction does the graph of the quadratic function $f(x) = (3x + 2)(x - 1)$ open?

- A. Up B. Down C. Left D. Right E. Adjacent

25. In her new house, Linex wants to put $9\text{ in} \times 9\text{ in}$ square tiles in her $3\text{ ft} \times 3\text{ ft}$ entrance way. How many tiles can she put in her entrance way?

- A. 81 B. 27 C. 24 D. 16 E. 12

26. Find the midpoint between the points $(-5a, 8b)$ and $(25a, 16b)$?

- A. $(10a, 12b)$ B. $(4a, 8b)$ C. $(10a, 6b)$ D. $(12a, 8b)$ E. $(10a, -12b)$

27. What is the sum of the digits of the sum of $1,999 + 458$?

- A. 16 B. 17 C. 18 D. 19 E. 20

28. Letting $\pi = 3$, what is the total surface area of a sphere with a radius of 9 cm?

- A. 486 cm^2 B. 216 cm^2 C. 567 cm^2 D. $1,944\text{ cm}^2$ E. 972 cm^2

29. $3^{\frac{1}{2}} \cdot 3^{\frac{3}{2}} = \underline{\hspace{2cm}}$

- A. $\frac{1}{3}$ B. $-\frac{1}{3}$ C. 3 D. 9 E. 27

30. If the point $(-11, 7)$ is rotated 180° counter-clockwise about the origin, what are its new coordinates?

- A. $(-11, -7)$ B. $(7, -11)$ C. $(-7, 11)$ D. $(11, -7)$ E. $(-11, 7)$

31. $33_5 \times 21_5 = \underline{\hspace{2cm}}_5$

- A. 1243 B. 1123 C. 1221 D. 1313 E. 1103

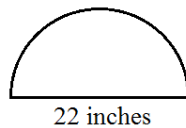
32. If $f(x) = 3x^2 + 1$ and $g(x) = 5x - 7$, find the value of $f(6) + g(10)$.

- A. 157 B. 163 C. 152 D. 80 E. 87

33. $(3\sqrt{6})(4\sqrt{3}) = \underline{\hspace{2cm}}$

- A. $12\sqrt{6}$ B. $12\sqrt{3}$ C. $36\sqrt{3}$ D. $36\sqrt{2}$ E. $72\sqrt{3}$

34. What is the perimeter of the semi-circle below, letting $\pi = 3$?



- A. 66 inches B. 33 inches C. 44 inches D. 77 inches E. 55 inches

35. Tickets for a school basketball game were \$4 for adults and \$2 for students. If 150 people attended the game and tickets sales totaled \$520, how many more adults attended the game than students?

- A. 40 B. 60 C. 50 D. 70 E. 80

36. Which formula below can be used to find the area of a regular polygon when given its apothem (a = apothem and P = perimeter)?

- A. $A = 2aP$ B. $A = \frac{2P}{a}$ C. $A = \frac{2a}{P}$ D. $A = \frac{aP}{2}$ E. $A = 4aP$

37. The distance from the point $(-50, -8)$ to the point $(-54, -11)$ is units. (simplest radical form)

- A. 5 B. $6\sqrt{3}$ C. $6\sqrt{2}$ D. 4 E. $5\sqrt{2}$

38. What is the value of the mean absolute deviation for the data set 120, 132, 148, 150 and 175?

- A. 145 B. 145.5 C. 15.2 D. 14.8 E. 16.4

39. The antelope population is 1,200 in Antler City and is decreasing at a rate of 1.6% per year. Which exponential function below models this situation?

- A. $y = 1200(1.6)^x$ B. $y = 1200(2.6)^x$ C. $y = 1200(0.6)^x$ D. $y = 1200(0.984)^x$ E. $y = 1200(0.84)^x$

40. If $3m + n = 5$, the perimeter of a square with a side length of $18m^2 + 12mn + 2n^2$ is equal to _____ units.

- A. 200 B. 510 C. 100 D. 256 E. 400

41. What is the area of an octagon with its vertices located at $(-3, 2)$, $(-3, 0)$, $(-1, -1)$, $(1, 1)$, $(3, 0)$, $(3, 2)$, $(2, 4)$ and $(-2, 4)$?

- A. 28 units² B. 32 units² C. 54 units² D. 18 units² E. 22 units²

42. How many permutations can be made from twelve objects taken two at a time?

- A. 4,096 B. 2,048 C. 132 D. 128 E. 66

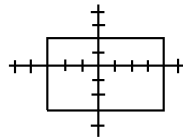
43. What is the slope of any line that is perpendicular to the line with the equation $4x - 28y = 9$?

- A. $\frac{1}{7}$ B. $-\frac{1}{7}$ C. 7 D. -7 E. 1.7

44. Multiply: $(w^2 + w + 1)(w - 1)$

- A. $w^3 - w^2 - w - 1$ B. $w^3 - w^2 + w - 1$ C. $w^3 - 1$ D. $w^3 - w^2 - 1$ E. $w^3 + w^2 - 1$

45. State the domain of the graph below.



- A. $-3 \leq x < 3$ B. $-3 \leq x \leq 2$ C. $x \geq -3$ D. $-3 \leq x \leq 4$ E. $x \leq 4$

46. The measure of a central angle of a regular dodecagon is equal to _____°.

- A. 1,800 B. 36 C. 30 D. 20 E. 150

47. The solution to the system with the equations $5x + 4y = 40$ and $x - 2y = -6$ is (x, y) . Find the value of $x^3 + y^3$.

- A. 8,000 B. 189 C. 180 D. 1,500 E. 227

48. Simplify: $\left(\frac{8n^{20}}{m}\right)\left(\left(\frac{16m^2n^3}{8m^4n^{-2}}\right)^{-1}\right)^2$

- A. $\frac{m^4}{4n^{10}}$ B. $2m^3n^{10}$ C. $2m^4n^{20}$ D. $\frac{m^4}{2n^{10}}$ E. $\frac{2m^{10}}{n^4}$

49. What is the sum of the coordinates of the vertex of the graph of the quadratic equation $y = x^2 - 14x + 10$?

- A. -32 B. 40 C. -24 D. 24 E. -17

50. The sum of $\frac{3x}{x-4} + \frac{2x}{x-3}$ produces a fraction with a numerator of which of the following?

- A. $5x^2 - 17x$ B. $5x^2 - x$ C. $6x^2 - x$ D. $6x^2 + x$ E. $5x + 1$

2014-2015 TMSCA Middle School Mathematics Test #12 Answer Key

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

2014-2015 TMSCA Middle School Mathematics Test #12 Selected Answers

24. The quadratic function $f(x) = (3x + 2)(x - 1) = 3x^2 - x - 2$. Since 3 is positive, the graph opens up.

25. $3 \text{ ft} \times 3 \text{ ft} = 36 \text{ in} \times 36 \text{ in} = 1,296 \text{ in}^2$. $9 \text{ in} \times 9 \text{ in} = 81 \text{ in}^2$. Now we must divide $1,296 \text{ in}^2$ by 81 in^2 , $1,296 \div 81 = 16$. Thus, Linex can place 16 tiles in her entrance way.

29. $3^{\frac{1}{2}} \cdot 3^{\frac{3}{2}} = 3^{\frac{1}{2} + \frac{3}{2}} = 3^{\frac{4}{2}} = 3^2 = 9$.

40. If a side length of a square is $18m^2 + 12mn + 2n^2$, then it is also equivalent to $18m^2 + 12mn + 2n^2 = 2(9m^2 + 6mn + n^2) = 2(3m + n)(3m + n) = 2(3m + n)^2$. It was given that $3m + n = 5$, so $2(3m + n)^2 = 2(5)^2 = 2(25) = 50$. The square has a side length of 50 units. Therefore, the perimeter of the square is equal to $4(50) = 200$ units.

44. One way to multiply $(w^2 + w + 1)(w - 1)$ is to use a box, such as below.

	w^2	$+ w$	$+ 1$
w	w^3	w^2	w
-1	$-w^2$	$-w$	-1

From the box, we get $w^3 + w^2 - w^2 + w - w - 1 = w^3 - 1$.

50. In order to add $\frac{3x}{x-4} + \frac{2x}{x-3}$, you must have common denominators. The common denominator is $(x - 4)(x - 3)$. So, in order to create the fractions with this common denominator, you must multiply the first fraction by $\frac{x-3}{x-3}$ and the second fraction by $\frac{x-4}{x-4}$. $\frac{3x}{x-4} \cdot \frac{x-3}{x-3} + \frac{2x}{x-3} \cdot \frac{x-4}{x-4} = \frac{3x(x-3)}{(x-3)(x-4)} + \frac{2x(x-4)}{(x-3)(x-4)} = \frac{3x^2 - 9x}{(x-3)(x-4)} + \frac{2x^2 - 8x}{(x-3)(x-4)} = \frac{5x^2 - 17x}{(x-3)(x-4)}$. So, the numerator we are looking for is $5x^2 - 17x$.