

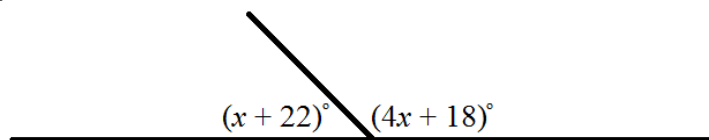
**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #9 ©
JANUARY 30, 2016**

GENERAL DIRECTIONS

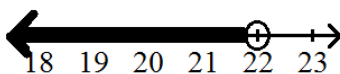
1. About this test:
 - A. You will be given 40 minutes to take this test.
 - B. There are 50 problems on this test.
2. All answers must be written on the answer sheet/Scantron form/Chatsworth card provided. If you are using an answer sheet be sure to use **BLOCK CAPITAL LETTERS**. Clean erasures are 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.

2015 – 2016 TMSCA Middle School Mathematics Test #9

1. $123 - 598 =$ _____
 A. -475 B. -455 C. 425 D. -425 E. 475
2. $14\frac{2}{5} - 6\frac{4}{5} =$ _____
 A. $8\frac{2}{5}$ B. $8\frac{3}{5}$ C. $7\frac{2}{5}$ D. $-7\frac{2}{5}$ E. $7\frac{3}{5}$
3. What is the product of 45.9 and 14.11 rounded to the nearest tenth?
 A. 648 B. 650 C. 647.6 D. 647.7 E. 647.65
4. $2,845 \div 3$ has a remainder of what value?
 A. 0 B. 1 C. 2 D. 3 E. 4
5. 40 quarters + 100 dimes + 100 nickels + 37 pennies = _____
 A. \$22.62 B. \$23.37 C. \$24.67 D. \$25.37 E. \$25.22
6. What is the sum of degrees in a regular quadrilateral and a regular hexagon?
 A. $1,080^\circ$ B. 960° C. 720° D. $1,260^\circ$ E. $1,440^\circ$
7. Find the value of x in the picture below.



- A. 42 B. 18 C. 34 D. 12 E. 28
8. $17^3 =$ _____
 A. 4,319 B. 4,293 C. 4,813 D. 4,743 E. 4,913
9. A new fishing pole is priced \$75.40 and is on a rack with a sign reading “30% off TODAY ONLY!”. How much will be saved is buying the fishing pole on sale?
 A. \$22.12 B. \$22.42 C. \$22.46 D. \$22.62 E. \$22.84
10. $DCIX + CCCXLV =$ _____ (Arabic number)
 A. 939 B. 754 C. 2,246 D. 954 E. 936
11. If a dozen eggs cost \$3.48, how much do five eggs cost?
 A. \$1.29 B. \$0.89 C. \$1.45 D. \$1.53 E. \$1.37
12. Which inequality matches the graph below?



- A. $x > 22$ B. $x < 22$ C. $x \geq 22$ D. $x \leq 22$ E. $18 < x < 22$
13. Which expression can produce the next term in the sequence? 14, 17, 20, 23, 26, ...
 A. $x + 14$ B. $2x + 12$ C. $x + 3$ D. $3x + 11$ E. $4x + 10$

14. $\frac{1}{30} + \frac{1}{42} + \frac{1}{56} =$ _____

- A. $\frac{3}{40}$ B. $\frac{1}{14}$ C. $\frac{3}{28}$ D. $\frac{1}{32}$ E. $\frac{1}{18}$

15. Let the LCM of 12 and 14 equal A. Find the value of the GCF of A and 36.

- A. 12 B. 9 C. 18 D. 7 E. 14

16. If you roll a pair of dice, what is the probability of rolling a sum of 8, in ratio form?

- A. 5:36 B. 1:3 C. 5:18 D. 5:9 E. 11:18

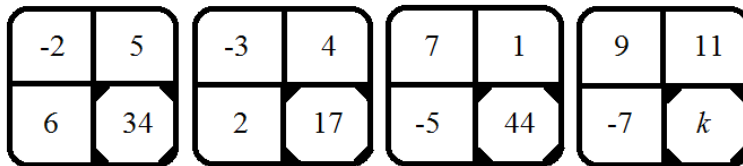
17. What is the prime factorization of the number 558?

- A. $2^3 \cdot 3 \cdot 37$ B. $2 \cdot 3^2 \cdot 31$ C. $2^2 \cdot 3^2 \cdot 29$ D. $2 \cdot 3^2 \cdot 7 \cdot 23$ E. $2^3 \cdot 7 \cdot 37$

18. $(2.5 \times 10^5)(4.2 \times 10^3) =$ _____ $\times 10^9$ (scientific notation).

- A. 10.5 B. 0.105 C. 1.05 D. 1.005 E. 1.5

19. Use the examples below to find the value of k.



- A. 158 B. 76 C. 87 D. 6 E. 4

20. Which of the following equations is the parent function of all linear equations?

- A. $y = mx + b$ B. $y = \sqrt{x}$ C. $y = x$ D. $y = a \cdot b^x$ E. $y = x^2$

21. How many improper subsets does the set $\{M, A, T, H\}$ have?

- A. 16 B. 8 C. 4 D. 2 E. 1

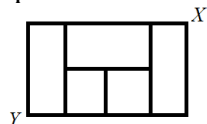
22. If the number $1,0n8$ is divisible by 7, and $n > 0$, what is the value of $5n$?

- A. 56 B. 35 C. 10 D. 42 E. 49

23. Calculate the percent of change when the quantity 120 changes to 45.

- A. 62.5% decrease B. 87.5% decrease C. 72.5% increase D. 67.5% decrease E. 68.25% decrease

24. Moving only left or down, how many different paths are there from X to Y?



- A. 6 B. 8 C. 10 D. 5 E. 7

25. $110100_2 =$ _____₄

- A. 311 B. 301 C. 310 D. 321 E. 320

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

- A. $a^{15}b^4$ B. $\frac{a^{23}}{b^2}$ C. $\frac{a^{16}}{b^3}$ D. $a^{23}b^6$ E. $\frac{a^{23}}{b^6}$

27. What is the domain of the graph of the linear function $y = \frac{1}{4}x - 13$?
 A. $y > 13$ B. $y < 13$ C. $x < 13$ D. $x > 13$ E. all real numbers

28. Find the amount of $3 \text{ in} \times 3 \text{ in}$ tiles that can fit in a $1 \text{ ft} \times 3 \text{ ft}$ area.
 A. 36 B. 132 C. 64 D. 81 E. 48

29. Melissa opened a book and added the two page numbers facing her. Her total was 235. What page number is five less than the smaller of the page numbers that Melissa opened to?
 A. 112 B. 113 C. 114 D. 111 E. 115

30. What is the volume of a cylinder that has a height of 12 inches and a diameter of 8 inches, in terms of π ?
 A. $288\pi \text{ in}^3$ B. $192\pi \text{ in}^3$ C. $96\pi \text{ in}^3$ D. $768\pi \text{ in}^3$ E. $128\pi \text{ in}^3$

31. Find the domain of the function $y = 4x - 11$ when the range is $\{-15, -7, 5\}$.
 A. $\{-71, -39, 9\}$ B. $\{-71, -39, -2\}$ C. $\{-1, 1, 7\}$ D. $\{-1, 1, 4\}$ E. $\{-1, -39, 7\}$

32. A direct variation passes through the points $(14, 56)$ and $(20, y)$. Find the value of y .
 A. 5 B. 10 C. 62 D. 72 E. 80

33. Simplify: $(2\sqrt{6} + \sqrt{2})(4\sqrt{12} + \sqrt{3}) - 9\sqrt{6}$
 A. $54\sqrt{2} - \sqrt{6}$ B. $54\sqrt{2} - 9\sqrt{6}$ C. $54\sqrt{2}$ D. $42\sqrt{2}$ E. $42\sqrt{2} - \sqrt{6}$

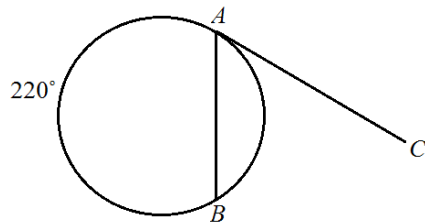
34. Convert 360° into a radian measure.
 A. $\frac{3\pi}{2}$ B. π C. 2π D. $\frac{8\pi}{3}$ E. $\frac{\pi}{2}$

35. If the table below is an example of a quadratic function, what is the value of n ?

x	-1	0	1	2
y	7	4	7	n

A. 16 B. 21 C. 10 D. 18 E. 9

36. In the picture below, major arc $AB = 220^\circ$ and \overline{AC} is tangent to the circle at A , find the measure of $\angle BAC$.



A. 140° B. 110° C. 55° D. 60° E. 70°

37. Which function below models a population of 36,000 decreasing at a rate of 2% each year?
 A. $y = 36,000(0.02)^x$ B. $y = 36,000(0.98)^x$ C. $y = 36,000(1.02)^x$ D. $y = 36,000(98)^x$ E. $y = 36,000(0.2)^x$

38. What is the maximum point of the graph of the quadratic equation $y = -(x - 2)^2 + 5$?
 A. $(-2, 5)$ B. $(5, -2)$ C. $(5, 2)$ D. $(2, -5)$ E. $(2, 5)$

39. If a leg of a 45-45-90 right triangle measure 14 inches, how long is the hypotenuse?

- A. 28 inches B. $14\sqrt{2}$ inches C. $14\sqrt{3}$ inches D. $28\sqrt{2}$ inches E. $28\sqrt{3}$ inches

40. Rationalize the denominator: $\frac{2\sqrt{2}}{\sqrt{32}}$

- A. $\frac{\sqrt{2}}{2}$ B. $\frac{1}{2}$ C. $\frac{\sqrt{2}}{4}$ D. $\frac{1}{\sqrt{2}}$ E. 2

41. A trapezoid has bases measuring 14 inches and 30 inches and a height measuring 16 inches. What is the measure of the median of the trapezoid?

- A. 23 inches B. 15 inches C. 22 inches D. 18 inches E. 24 inches

42. Find the sum of the following: $\log_2 8 + \log_4 64$

- A. 9 B. 3 C. 6 D. 72 E. 12

43. $4 \begin{bmatrix} 41 & -8 \\ -24 & -13 \end{bmatrix} =$

- A. $\begin{bmatrix} 45 & -4 \\ -20 & -9 \end{bmatrix}$ B. $\begin{bmatrix} -4 & 45 \\ -9 & -20 \end{bmatrix}$ C. $\begin{bmatrix} 164 & -32 \\ -96 & -52 \end{bmatrix}$ D. $\begin{bmatrix} 10.25 & -2 \\ -6 & -3.25 \end{bmatrix}$ E. $\begin{bmatrix} 45 & -12 \\ -28 & -17 \end{bmatrix}$

44. What is the diameter of a circle with the equation $(x - 7)^2 + (y + 4)^2 = 361$?

- A. 19 units B. 9.5 units C. 38 units D. 19π units E. 38π units

45. What is the value of the x -intercept of the linear equation $y = \frac{2}{3}x - 10$?

- A. $6\frac{2}{3}$ B. -10 C. 15 D. $10\frac{2}{3}$ E. 10

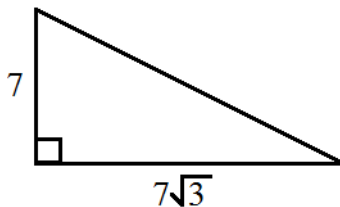
46. If $(4x - 7)(6x - 5) = 24x^2 + Bx + 35$, what is the value of $B - 10$?

- A. -72 B. -52 C. -62 D. -32 E. -22

47. How many permutations can be made from 42 items taken 1 at a time?

- A. 861 B. 42 C. 1,722 D. 287 E. 7

48. What is the measure of the hypotenuse of the right triangle below?



- A. 7 units B. $7\sqrt{3}$ units C. $14\sqrt{3}$ units D. 14 units E. $\sqrt{147}$ units

49. Kennedy wants to mix two acid solutions to make one acid solution of 80 liters. How much of solution A, which is 70% acid, must Kennedy mix with solution B, which is 30% acid, to make a 60% acid solution?

- A. 20 liters B. 40 liters C. 60 liters D. 80 liters E. 45 liters

50. If $f(x) = 2x^2 + 3x$, then find $f(a + 1)$.

- A. $2a^2 + 2a + 1$ B. $2a^2 + 4a + 5$ C. $2a^2 + 3a + 5$ D. $2a^2 + 7a + 5$ E. $2a^2 + 7a + 3$

2015 – 2016 TMSCA Middle School Mathematics Test #9 Answer Key

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

2015 – 2016 TMSCA Middle School Mathematics Test #9 Selected Answers

5. Remember the value of each coin. 40 quarters + 100 dimes + 100 nickels + 37 pennies =
 $40 \cdot 0.25 + 100 \cdot 0.10 + 100 \cdot 0.05 + 37 \cdot 0.01 = \21.85 .

21. The number of improper sets of any set is equal to one. Therefore, the number of improper sets of the given set $\{M, A, T, H\}$ is 1.

28. We have a $1 \text{ ft} \times 3 \text{ ft}$ area that we need to change into inches. Our area now becomes a $12 \text{ in} \times 36 \text{ in}$ and its total area is equal to 432 in^2 . Our $3 \text{ in} \times 3 \text{ in}$ tiles have an area of 9 in^2 . Now we must divide 432 by 9 to get $432 \div 9 = 48$ tiles needed.

30. The formula to find the volume of a cylinder is $V = \pi r^2 h$, where r is the radius of the cylinder and h is the height of the cylinder. We are given a diameter of 8 inches, so we must half that to find our radius to be 4 inches. Our height is given to be 12 inches. It also states to leave our answer in terms of π , so we have $V = \pi r^2 h = \pi 4^2 \cdot 12 = 16\pi \cdot 12 = 192\pi \text{ in}^3$.

40. A rationalized denominator is one with no radical in it. We are given $\frac{2\sqrt{2}}{\sqrt{32}}$, so we must first simplify the denominator and then rationalize it. $\frac{2\sqrt{2}}{\sqrt{32}} = \frac{2\sqrt{2}}{\sqrt{16 \cdot 2}} = \frac{2\sqrt{2}}{4\sqrt{2}} = \frac{1}{2}$. Since our fraction could be reduced to $\frac{1}{2}$, we did not have to rationalize it any further.

41. The median of a trapezoid is equal to half the sum of its two bases. We are given the base lengths of 14 and 30 inches. Therefore, our median length is equal to $\frac{14+30}{2} = \frac{44}{2} = 22$ inches.