



**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #10 ©
FEBRUARY 6, 2016**

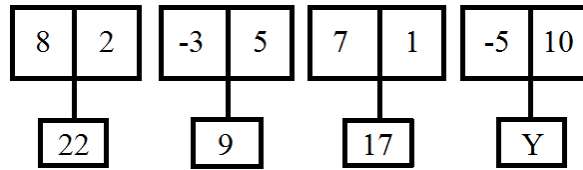
GENERAL DIRECTIONS

- 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.
- If using a scantron answer form be sure to correctly denote the number of problems not attempted.
- 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.

2015 – 2016 TMSCA Middle School Mathematics Test #10

1. $21\frac{3}{4} + 7\frac{1}{2} =$ _____
 A. $28\frac{5}{8}$ B. $29\frac{5}{8}$ C. $29\frac{1}{4}$ D. $29\frac{1}{2}$ E. $29\frac{2}{3}$
2. $25.4 - 4\frac{2}{5} =$ _____
 A. 21.2 B. 21.1 C. 21.0 D. 20.8 E. 20.2
3. Shareq has 744 pieces of candy he wants to split evenly with three friends and himself. After Shareq distributes the candy, how many pieces of candy will he and one friend have together?
 A. 186 pieces B. 558 pieces C. 93 pieces D. 372 pieces E. 279 pieces
4. What is the product of 29.6 and 32.1 after each number is rounded to the nearest whole number?
 A. 960 B. 900 C. 950 D. 951 E. 928
5. What is the value of $\frac{1}{2}\%$ of the number 240?
 A. 2.4 B. 4.8 C. 1.2 D. 12 E. 24
6. Using only quarters, dimes, nickels and pennies, what is the fewest number of coins needed to make \$5.34?
 A. 24 B. 25 C. 22 D. 26 E. 28
7. What is the supplement of an angle that measures 6.39° ?
 A. 84.61° B. 82.61° C. 174.61° D. 173.61° E. 96.61°
8. What is the sum of the GCF of the numbers 45 and 108 and the LCM of the numbers 144 and 108?
 A. 116 B. 441 C. 536 D. 540 E. 682
9. Simplify: $-3|14 - 31| + (-6) - 13$
 A. -44 B. -114 C. -70 D. 36 E. 32
10. What is the volume of a rectangular prism that measures $5\text{ cm} \times 6\text{ cm} \times 11\text{ cm}$?
 A. 22 cm^3 B. 41 cm^3 C. 302 cm^3 D. 156 cm^3 E. 330 cm^3
11. Round the number 3,450,000,000 to the nearest hundred million and express it in scientific notation.
 A. 3.45×10^8 B. 3.45×10^9 C. 3×10^9 D. 3.4×10^9 E. 3.5×10^9
12. What is the probability of rolling a pair of dice and getting a sum divisible by 4?
 A. $\frac{1}{4}$ B. $\frac{1}{2}$ C. $\frac{1}{3}$ D. $\frac{3}{4}$ E. $\frac{2}{3}$
13. Heather's cookie recipe makes two-dozen cookies of fifty calories each. For a party, Heather decided to make two and a half times the amount in her recipe. How many calories are in Heather's batch of cookies?
 A. 1,500 B. 1,250 C. 3,000 D. 3,550 E. 3,800
14. 1 square foot = _____ square inches
 A. 72 B. 36 C. 144 D. 288 E. 48
15. $544 \div 4 =$ _____ (Roman numeral)
 A. *CXXVII* B. *CXXXVI* C. *LIXVI* D. *DXXXVI* E. *MXXXVI*
16. How many total degrees are there in a regular polygon with seven sides?
 A. 900° B. 720° C. $1,080^\circ$ D. 1260° E. $1,180^\circ$

17. Use the examples below to find the value of Y.



- A. 50 B. -18 C. 20 D. 45 E. 30

18. Square A and an area of 64 in^2 and square B has an area of 121 in^2 . If the two square are placed side by side where they are touching on one side, what is the perimeter of the hexagon that is created?

- A. 88 inches B. 57 inches C. 60 inches D. 92.5 inches E. 76 inches

19. The ratio of red marbles to blue marbles in a bag is 4:5. If there are 48 red marbles in the bag, how many blue marbles are there in the bag?

- A. 60 B. 72 C. 54 D. 56 E. 64

20. Which of the following linear equations are written in slope-intercept form?

- I. $y = x$ II. $y = \frac{1}{2}x + 3$ III. $y - 4 = 3(x - 2)$ IV. $3x + 7y = 11$

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

21. Find the value of $205^2 - 203^2$.

- A. 808 B. 816 C. 1,012 D. 42,025 E. 822

22. For her lunch, Danielle can choose from four kinds of fruit, four different sandwiches, three different bags of chips and three different drinks. If Danielle must choose one of each, how many different lunch combinations are there that Danielle can choose from?

- A. 144 B. 14 C. 384 D. 108 E. 196

23. If $a = 4$, $b = 6$, $c = 18$ and $d = 12$, evaluate: $\frac{(cd) \div (ab)}{2}$

- A. 6.5 B. 9 C. 4.5 D. 2.25 E. 12

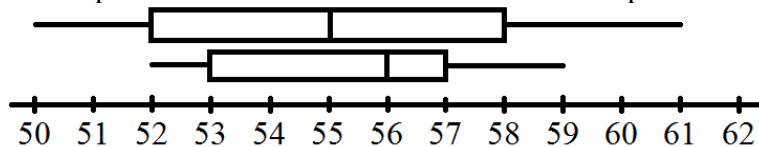
24. Simplify: $10(3x - 2) - (-14x) - (18x + 5)$

- A. $26x - 15$ B. $26x - 25$ C. $9x + 3$ D. $9x - 7$ E. $-19x + 3$

25. What is the sum of the digits of $6!$?

- A. 3 B. 21 C. 15 D. 9 E. 12

26. In the picture below, what is the positive difference of the medians of the box plots?



- A. 111 B. 11 C. 1 D. 2 E. 10

27. A(n) _____ is a composition of two reflections over parallel lines.

- A. reflection B. rotation C. translation D. glide reflection E. dilation

28. If $3(11x - 4)(5x + 2) = 165x^2 + Bx - 24$, what is the value of $6B$?

- A. 36 B. 24 C. 10 D. 48 E. -30

29. How many $1\text{ ft} \times 1\text{ ft}$ square tiles can fill a $36\text{ in} \times 24\text{ in}$ area?

- A. 864 B. 6 C. 12 D. 60 E. 4

30. A horizontal line passes through points A and B . Point A has coordinates $(-14, 8)$. If the distance between A and B is 24 units, which two coordinate pairs could be the coordinates for the midpoint between A and B ?

- A. $(-2, 8)$ & $(-26, 8)$ B. $(-14, 20)$ & $(-14, -4)$ C. $(10, 8)$ & $(-38, 8)$ D. $(-14, 32)$ & $(-14, -4)$ E. $(-2, 8)$ & $(-14, 20)$

31. Solve: $-\frac{2}{3}x < 18$

- A. $x < -27$ B. $x < -12$ C. $x > 12$ D. $x > -12$ E. $x > -27$

32. If $g(x) = -x^2 + 4$, find the value of $2g(7)$.

- A. -94 B. 102 C. 106 D. -90 E. 42

33. How many digits make up the word that is used to name the graph of a quadratic equation?

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

34. Find the slope of the line that passes through the points $(4, 19)$ and $(4, -7)$.

- A. undefined B. zero C. 26 D. $\frac{1}{26}$ E. -13

35. What is the value of 2^x , if $2^{x+3} = 24$?

- A. 8 B. 5 C. 3 D. 7 E. 18

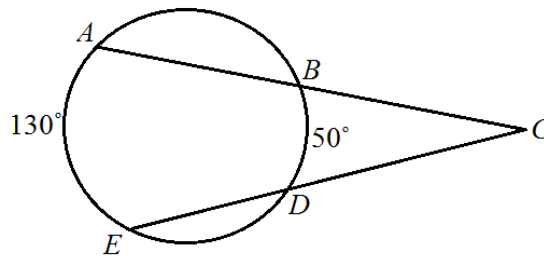
36. A regular hexagon has nine total diagonals. If it is cut along each of those diagonals, twenty-four non-overlapping regions are created. Of those twenty-four regions, how many are triangles?

- A. 16 B. 18 C. 20 D. 22 E. 24

37. Find the growth rate of the exponential growth function $y = 3(8.2)^x$.

- A. 720% B. 820% C. 82% D. 300% E. 382%

38. In the picture below, minor arc $BD = 50^\circ$ and minor arc $AE = 130^\circ$. The measure of $\angle BCD = \underline{\hspace{2cm}}^\circ$.



- A. 25 B. 65 C. 90 D. 40 E. 80

39. Which of the following equations below is an example of an exponential function?

- A. $y = 4x + 5$ B. $y = 2x \cdot 3^2$ C. $y = x(1 + 0.5)^2$ D. $y = 4^x$ E. $y^2 = x^2$

40. Let $m = x^2 + 2$. Which equation is equivalent to $(x^2 + 2)^2 + 11 = 7x^2 + 14$ in terms of m ?

- A. $m^2 + 7m + 25 = 0$ B. $m^2 - 7m + 11 = 0$ C. $m^2 + 25 = 0$ D. $m^2 - 7m = 0$ E. $m^2 + 25m - 7$

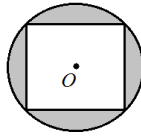
41. Simplify: $\sqrt{164}$

- A. $2\sqrt{41}$ B. $2\sqrt{82}$ C. $4\sqrt{41}$ D. $4\sqrt{82}$ E. $16\sqrt{6}$

42. What are the roots of the quadratic equation $0 = 3x + x^2 - 28$?

- A. $\{-4, -7\}$ B. $\{-3\}$ C. $\{-4, 7\}$ D. $\{3, -28\}$ E. $\{-7, 4\}$

43. The circle below has an area of 36π units². Calculate the area of the square.



- A. 84 units² B. 72 units² C. 36 units² D. 144 units² E. 96 units²

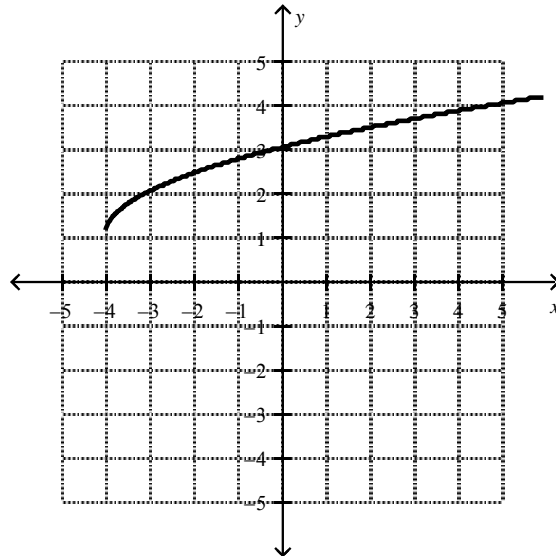
44. If $\log_{10}A - \log_{10}B = \log_{10}\frac{A}{B}$, then which of the following is equivalent to $\log_8 24 - \log_8 6$?

- A. $\log_8 \frac{1}{4}$ B. $\log_8 \frac{1}{6}$ C. $\log_8 18$ D. $\log_8 4$ E. $\log_8 6$

45. If $-6 \begin{bmatrix} 3 & -2 \\ -6 & 4 \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then find the value of $ad - bc + 7$.

- A. 7 B. 0 C. -42 D. 48 E. -8

46. State the domain of the graph below.



- A. $y \geq 1$ B. $x \geq -4$ C. $y \geq -4$ D. $x \leq 3$ E. $-4 \leq x \leq 5$

47. Rationalize the denominator: $\frac{4}{2-\sqrt{2}}$

- A. $\frac{4+\sqrt{2}}{3}$ B. $16 + 4\sqrt{2}$ C. $4 + 16\sqrt{2}$ D. $2 + 4\sqrt{2}$ E. $4 + 2\sqrt{2}$

48. $6 + 12 + 18 + \dots + 42 + 48 =$ _____

- A. 212 B. 214 C. 216 D. 218 E. 220

49. Convert $\frac{71\pi}{36}$ radians into a degree measure.

- A. 330° B. 350° C. 345° D. 335° E. 355°

50. $34_5 \times 23_5 =$ _____₅

- A. 1432 B. 1442 C. 1234 D. 1232 E. 1422

2015 – 2016 TMSCA Middle School Mathematics Test #10 Answer Key

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

2015 – 2016 TMSCA Middle School Mathematics Test #10 Selected Answers

14. 1 square foot = 1 *ft* × 1 *ft* = 12 *in* × 12 *in* = 144 square inches.

21. To solve this you can use the difference of squares method. $a^2 - b^2 = (a - b)(a + b)$. We are asked to find $205^2 - 203^2$, so we can substitute and see that $205^2 - 203^2 = (205 - 203)(205 + 203) = (2)(408) = 816$.

30. Since a horizontal line passes through *A* and *B* and the distance between *A* and *B* is 24 units, the midpoint is 12 units away. The coordinates of *A* are (-14, 8). We must now calculate 12 units to the left and right of point *A*. The two possible coordinates of the midpoint are (-14 + 12, 8) and (-14 - 12, 8), which give us (-2, 8) and (-26, 8).

33. The graph of a quadratic equation is called a parabola. Parabola has 8 letters.

35. We are given $2^{x+3} = 24$. Using exponent rules, we know that $2^{x+3} = 2^x \cdot 2^3 = 2^x \cdot 8$. Since $2^x \cdot 8 = 24$, we divide both side by 8 and get $2^x = 3$.

47. To rationalize the given denominator, we must multiply by its conjugate.

$$\frac{4}{2-\sqrt{2}} \cdot \frac{2+\sqrt{2}}{2+\sqrt{2}} = \frac{8+4\sqrt{2}}{4+2\sqrt{2}-2\sqrt{2}-2} = \frac{8+4\sqrt{2}}{2} = 4 + 2\sqrt{2}.$$