

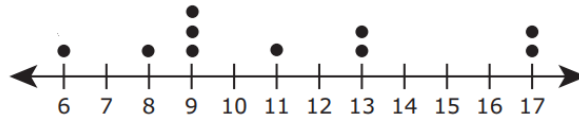


**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #5 ©
NOVEMBER 16, 2019**

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 on Scantrons and Chatsworth cards.
- If you are using a Chatsworth or Scantron card, please follow the specific instructions given at your particular meet.
- 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.

1. $62\frac{3}{4} + 17\frac{1}{2} =$ _____
 A. $79\frac{1}{4}$ B. $79\frac{1}{2}$ C. $79\frac{3}{4}$ D. $80\frac{1}{4}$ E. $80\frac{1}{2}$
2. $50.003 - 17.56 =$ _____ (nearest hundredth)
 A. 33.54 B. 33.44 C. 32.44 D. 32.43 E. 32.54
3. $12\frac{3}{5} \times 7.7 =$ _____
 A. 88.24 B. 93.52 C. 97.02 D. 98.14 E. 96.72
4. $(561 + 711) \div 2 =$ _____
 A. 636 B. 648 C. 626 D. 616 E. 628
5. What is the unit rate of buying 13 tickets for \$82.94?
 A. \$5.48 B. \$5.98 C. \$6.68 D. \$6.88 E. \$6.38
6. Which set of numbers below does not have a sum of 2?
 A. $(\frac{3}{4}, \frac{6}{5}, \frac{1}{20})$ B. $(\frac{1}{3}, \frac{2}{5}, \frac{19}{15})$ C. $(\frac{4}{5}, \frac{7}{20}, \frac{3}{4})$ D. $(\frac{6}{5}, \frac{3}{10}, \frac{1}{2})$ E. $(\frac{1}{8}, \frac{19}{40}, \frac{7}{5})$
7. What is the median of the data in the dot-plot below?



- A. 10 B. 11.2 C. 9 D. 11 E. 23
8. If $A = 17 - 31 + 2$, what is the additive inverse of A ?
 A. 12 B. 50 C. 16 D. -14 E. -12
9. Simplify: $3(8 + 3)^2 - 5(12 - 8)^2$
 A. 135 B. -46 C. 287 D. 283 E. 443
10. The center of a circle is located at $(5, 0)$ on a coordinate grid. If the circle is translated nine units to the left and down seven units, what are the coordinates of the circle's center after the translation?
 A. $(-4, 7)$ B. $(14, 7)$ C. $(14, -7)$ D. $(-14, -7)$ E. $(-4, -7)$
11. What is the sum of the next three terms of the sequence 7, 13, 20, 33, 53, ...?
 A. 728 B. 364 C. 450 D. 278 E. 351
12. $\$24.19 = 72$ quarters + 24 dimes + 56 nickels + _____ pennies
 A. 99 B. 79 C. 89 D. 109 E. 69
13. 4 gallons = _____ ounces
 A. 248 B. 384 C. 512 D. 640 E. 496
14. 49 is what percent of 140?
 A. 28% B. 35% C. 32% D. 37.5% E. 32.5%
15. $368 + 119 =$ _____ (Roman numeral)
 A. CDLXXXVII B. CCCCLXXXVII C. DCLXXXVII D. CDMXXXVII E. CCCLXXXVII

16. On a map, 1 inch is equivalent to 32 miles. How many inches on the map represent a distance of 144 miles?
 A. 4.75 B. 5.5 C. 6.25 D. 6.5 E. 4.5

17. A circle has a diameter of 16 cm. A square has a side length of 6 cm. If $\pi = 3$, how much larger is the area of the circle than the area of the square?
 A. 128 cm^2 B. 732 cm^2 C. 60 cm^2 D. 156 cm^2 E. 28 cm^2

18. Two basketball teams played against each other and had a total of 231 points. One of the teams won by 7 points. What was the score of the team that won?
 A. 107 B. 115 C. 119 D. 108 E. 121

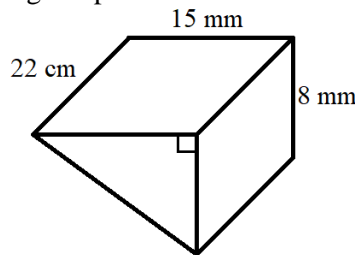
19. $1010111_2 = \text{_____}_8$
 A. 127 B. 115 C. 113 D. 123 E. 121

20. $4\frac{5}{6}$ years = _____ months
 A. 54 B. 58 C. 62 D. 50 E. 56

21. Carlos scored an 88, 82 and 96 on his first three Algebra tests. What must Carlos score on his next test to have an average of 91?
 A. 98 B. 97 C. 91 D. 95 E. 96

22. How many subsets can be formed from the set $\{v, w, x, y, z\}$?
 A. 10 B. 120 C. 32 D. 64 E. 16

23. What is the perimeter of the base of the triangular prism below?



A. 45 mm B. 23 mm C. 30 mm D. 37 mm E. 40 mm

24. What is the supplement of an angle measuring 31.17° ?
 A. 28.83° B. 58.83° C. 158.83° D. 328.83° E. 148.83°

25. If 5 tickets cost \$67.25, how much will 9 tickets cost?
 A. \$161.40 B. \$107.60 C. \$188.30 D. \$94.15 E. \$121.05

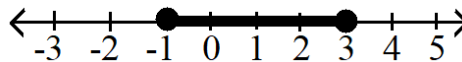
26. 75 miles/hour = _____ feet/second
 A. 112 B. 96 C. 92 D. 110 E. 116

27. What is the probability of rolling a pair of dice and having an odd number facing up on one die and an even number facing up on the second die?
 A. $\frac{4}{9}$ B. $\frac{1}{4}$ C. $\frac{1}{2}$ D. $\frac{5}{8}$ E. $\frac{1}{3}$

28. What is the slope of the line that passes through the point $(-23, -19)$ and is parallel to the x -axis?
 A. $x = -23$ B. $y = -19$ C. zero-slope D. undefined slope E. $\frac{19}{23}$

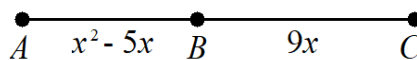
29. If $a \clubsuit b = 3a - 4b + 17$ what is the value of $(3 \clubsuit 4) \clubsuit 7$?
 A. 10 B. 19 C. 17 D. 23 E. 27
30. Twice the number 45,000,000,000 = _____ (scientific notation)
 A. 9×10^{10} B. 9×10^9 C. 2.5×10^{10} D. 2.5×10^9 E. 9×10^{-9}
31. Which linear equation is written in point-slope form?
 A. $2x - 4y = 9$ B. $y = 4x - 1$ C. $y = x$ D. $y - 1 = 2(x + 2)$ E. $y = (x - 1)^2 + 3$
32. What is the percent of change if 40 increases to 65?
 A. 25% B. 67.5% C. 42.5% D. 40% E. 62.5%
33. What is the equation $4b = c - d$ solved for d ?
 A. $d = -4b - c$ B. $d = 4b + c$ C. $c = \frac{4b}{c}$ D. $d = -c - 4b$ E. $d = c - 4b$
34. What is the decay factor of the exponential decay function $f(x) = 93.7(0.16)^x$?
 A. 0.16 B. 0.84 C. 0.937 D. 93.7 E. 1.16
35. If $g(x) = 19 - 3x$ and $h(x) = 4x - 1$, then what is the value of $g(h(11))$?
 A. -57 B. 95 C. -110 D. 148 E. -116
36. What is the value of the discriminant of the quadratic equation $9x^2 - 14 = 0$?
 A. 504 B. 160 C. 1,134 D. 585 E. 324
37. What is the least dimension length of a rectangular prism whose faces have areas of 6 units², 8 units², and 12 units²?
 A. 20 units B. 14 units C. 4 units D. 2 units E. 26 units
38. What is the direct variation equation that passes through the point (12, 4)?
 A. $y = -\frac{1}{3}x$ B. $y = \frac{1}{3}x$ C. $y = 3x$ D. $y = -3x$ E. $y = 48x$
39. A parabola has the equation $-x^2 + 6x - 5 = y$. If the parabola is translated 8 units to the left, what are the new coordinates of its vertex?
 A. (11, 4) B. (3, 12) C. (-5, 4) D. (3, -4) E. (8, -4)

40. The graph is the solution to which of the following inequalities?



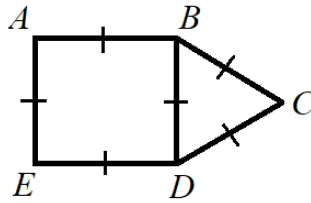
- A. $-3 \geq n - 2 \geq 1$ B. $-4 \leq n - 3 \leq 0$ C. $-1 \leq n + 2 \leq 3$ D. $-4 \geq -4n \geq 12$ E. $1 < n + 2 < 5$
41. How much longer is 5% of one hour than 20% of one minute?
 A. 168 seconds B. 140 seconds C. 128 seconds D. 176 seconds E. 156 seconds
42. What is the value of $17n$, if $-5\sqrt{80} + \sqrt{125} + 10\sqrt{45} = 15\sqrt{n}$.
 A. 85 B. 255 C. 102 D. 119 E. 136

43. What is the measure of AB , if $AC = 96$ inches.



- A. 54 inches B. 8 inches C. 24 inches D. 32 inches E. 6 inches

44. Square $ABDE$ and equilateral triangle BCD share a common side as pictured below. What is the measure of $\angle BAC$?



- A. 25° B. 15° C. 30° D. 10° E. 12.5°

45. Solve for x . $|2x - 5| = 17$

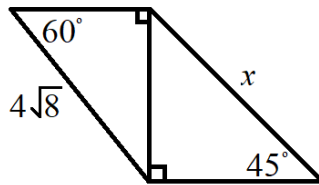
- A. $\{-6\}$ B. $\{6\}$ C. $\{6,11\}$ D. $\{\pm 13.5\}$ E. $\{-6,11\}$

46. What is the product of the coordinates of the solution to the system of linear equations?

$$\begin{cases} 4x = -y + 21 \\ -12x - \frac{1}{6}y = 5 \end{cases}$$

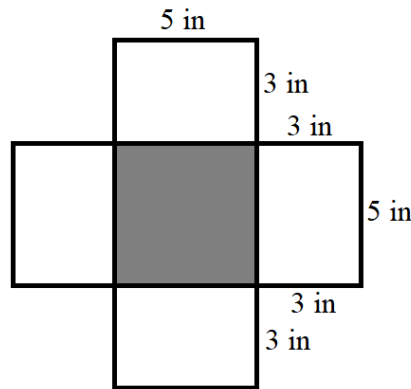
- A. -12 B. -36 C. -24 D. -18 E. -4

47. What is the length of x below?



- A. $4\sqrt{6}$ B. $6\sqrt{6}$ C. $6\sqrt{3}$ D. $8\sqrt{3}$ E. $8\sqrt{2}$

48. A dart is thrown at the shape below. What is the probability the dart will land in the shaded region?



- A. 5:17 B. 1:5 C. 1:2 D. 9:32 E. 25:44

49. To celebrate π -Day, Billy is buying pies for his friends. How many pies, which cost \$5.48 each plus 8% sales tax, can Billy buy with \$40?

- A. 8 B. 7 C. 6 D. 5 E. 4

50. The formula to find the area of a regular octagon, given side length a , is $A = 2a^2(1 + \sqrt{2})$. What is the area of a regular octagon that has a side length of $6\sqrt{2}$ inches?

- A. $(72\sqrt{2} + 72) \text{ in}^2$ B. $(36\sqrt{2} + 36) \text{ in}^2$ C. $(144\sqrt{2} + 144) \text{ in}^2$ D. $(24\sqrt{2} + 24) \text{ in}^2$ E. $(96\sqrt{2} + 96) \text{ in}^2$

2019 – 2020 TMSCA Middle School Mathematics Test #5 Answer Key

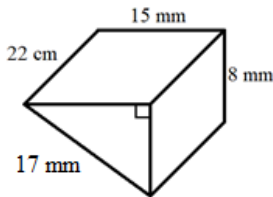
1. D	18. C	35. C
2. C	19. A	36. A
3. C	20. B	37. D
4. A	21. A	38. B
5. E	22. C	39. C
6. C	23. E	40. B
7. A	24. E	41. A
8. A	25. E	42. A
9. D	26. D	43. C
10. E	27. C	44. B
11. C	28. C	45. E
12. A	29. B	46. D
13. C	30. A	47. D
14. B	31. D	48. A
15. A	32. E	49. C
16. E	33. E	50. C
17. D	34. A	

10. The center of the circle has coordinates $(5, 0)$. If it is translated nine units to the left and down seven units, we can express this as $(x, y) \rightarrow (x - 9, y - 7)$. So, $(5, 0) \rightarrow (x - 9, y - 7) = (5 - 9, 0 - 7) = (-4, -7)$.

11. In the sequence 7, 13, 20, 33, 53, ..., the next term after the second term is the sum of the two previous terms. The 6th term is $33 + 53 = 86$, the 7th term is $53 + 86 = 139$, and the 8th term is $86 + 139 = 225$. Therefore, the sum of the next three terms is $86 + 139 + 225 = 450$.

13. There are 128 ounces in 1 gallon. Therefore, 4 gallons = $4(128) = 512$ ounces.

23. The base of the right triangular prism is the triangular face. Only the legs are given, so we must find the



length of the hypotenuse using the Pythagorean Theorem, $a^2 + b^2 = c^2$. Substituting, and we get $8^2 + 15^2 = c^2$, and then $c^2 = 289$. Square root both sides and get $c = 17$. Therefore, the perimeter of the base of the prism is $8 + 15 + 17 = 40$ mm.

28. The x -axis is a horizontal line. Every horizontal line has a zero-slope. Therefore, any line parallel to the x -axis also has a zero-slope.

31. Point-slope form of a linear equation is $y - y_1 = m(x - x_1)$, so the answer is D. $y - 1 = 2(x + 2)$.

33. If given $4b = c - d$, to solve for d , first subtract c from both sides to get $4b - c = -d$. Now, divide both sides by -1 to get $d = -4b + c$, or $d = c - 4b$.

35. If $g(x) = 19 - 3x$ and $h(x) = 4x - 1$, then to find the value of $g(h(11))$, using order of operations, work from the inside out. First, find $h(11)$, which is $h(11) = 4(11) - 1 = 43$. Now, find $g(43)$, which will give us $g(43) = 19 - 3(43) = -110$. Thus, if $g(x) = 19 - 3x$ and $h(x) = 4x - 1$, then $g(h(11)) = -110$.

38. A direct variation is in the form $y = kx$, and $k = \frac{y}{x}$. If we are given the point $(12, 4)$, the direct variation equation will be $y = \frac{4}{12}x$, which simplifies to $y = \frac{1}{3}x$.

41. Since there are 60 minutes in 1 hour, 5% of 1 hour = $0.05(60) = 3$ minutes. Since there are 60 seconds in 1 minute, 3 minutes = $3(60) = 180$ seconds. 20% of 1 minute = $0.2(60) = 12$ seconds. Therefore, 5% of one hour is $180 - 12 = 168$ seconds more than 20% of 1 minute.

44. Since $m\angle ABD = 90^\circ$ and $m\angle DBC = 60^\circ$, then $m\angle ABC = 90 + 60 = 150^\circ$. Since $\triangle ABC$ is an isosceles triangle, $m\angle BAC = m\angle BCA$. Therefore, $180^\circ - 150^\circ = 30^\circ$, and $30^\circ \div 2 = 15^\circ$. The measure of $\angle BAC$ is 15° .

48. The shaded region is a 5×5 square, that has an area of 25 in^2 . There are four 3×5 squares, each with an area of 15 in^2 . The total area of the shape is $25 + 4(15) = 25 + 60 = 85 \text{ in}^2$. Therefore, the probability that a dart will land in the shaded region is $25:85 = 5:17$.