

**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #3 ©
NOVEMBER 2, 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. $5,014 - 3,976 =$ _____ (nearest ten)
 A. 1,032 B. 1,030 C. 1,040 D. 1,000 E. 1,100.0

2. $29.83 + 17.91 =$ _____
 A. 47.74 B. 11.92 C. 47.92 D. 45.72 E. 47.14

3. $17.5 \times 3.4 =$ _____
 A. 59.25 B. 59.5 C. 58.5 D. 58.25 E. 58.75

4. $200 \div 13\frac{1}{3} =$ _____
 A. $15\frac{1}{3}$ B. $15\frac{2}{3}$ C. 15 D. $16\frac{1}{3}$ E. $16\frac{2}{3}$

5. What is the additive inverse of the number 3?
 A. $\frac{1}{3}$ B. 0.3 C. 3.0 D. -3 E. $\sqrt{3}$

6. Mary is at the store buying a pair of shoes for \$29.95, a shirt for \$14.50, a mug for \$8.90, a pencil for \$2.75 and an eraser for 79¢. Assuming there is no tax, if Mary pays with a \$100, how much change will Mary receive?
 A. \$43.11 B. \$56.89 C. \$42.81 D. \$51.23 E. \$44.16

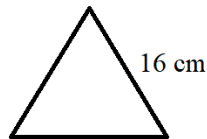
7. What is the greatest palindrome less than 200?
 A. 202 B. 999 C. 191 D. 101 E. 99

8. Evaluate $|a - b + c|$, if $a = 8$, $b = 6$ and $c = -4$.
 A. -2 B. 2 C. 6 D. 18 E. -6

9. What number when divided by 8, gives a quotient of 22 with a remainder of 6?
 A. 114 B. 194 C. 176 D. 178 E. 182

10. $23\frac{5}{8} =$ _____ (decimal)
 A. 23.63 B. 23.675 C. 23.615 D. 23.625 E. 23.68

11. If the equilateral triangle below is dilated by a scale factor of 1.5, what will be the new perimeter?



A. 32 cm B. 48 cm C. 64 cm D. 72 cm E. 96 cm

12. What is the value of 16% of 340?
 A. 56.2 B. 52.8 C. 54.8 D. 56.4 E. 54.4

13. DXXIV = _____ (Arabic number)
 A. 1,026 B. 1,226 C. 124 D. 524 E. 704

14. What is the value of the mean of the set of numbers 27, 32, 45, 19, 11, 8, and 5?
 A. 19 B. 21 C. 40 D. 32 E. 26

15. 18% of 370 is what value?
 A. $66.\bar{6}$ B. 66.67 C. 66.7 D. 66.6 E. 67

16. Mike and Juan both started a bicycle race at 7:20 am. Mike finished the race in 2 hours and 45 minutes. Juan finished the race fifteen minutes before Mike. At what time did Juan finish the race?

- A. 10:05 am B. 10:15 am C. 9:55 am D. 9:50 am E. 9:45 am

17. *Techtronics Unlimited* gets a shipment of new phones every month. In each shipment, 2 out of every 9 phones are defective. If *Techtronics Unlimited's* next shipment consists of 342 new phones, how many will not be defective?

- A. 76 B. 190 C. 266 D. 304 E. 228

18. If every letter of the alphabet were placed in a bag, what is the probability of reaching in the bag and drawing out a vowel or the letters A, B, or C?

- A. $\frac{7}{26}$ B. $\frac{4}{13}$ C. $\frac{5}{13}$ D. $\frac{3}{13}$ E. $\frac{5}{26}$

19. one cubic yard = _____ cubic feet

- A. 3 B. 9 C. 18 D. 27 E. 36

20. What is the range for the set of numbers 119, 234, 267, 174, 177, 204, 269, 211, and 183?

- A. 168 B. 150 C. 87 D. 160 E. 157

21. Solve for n : $-n < 15 + 88$

- A. $n < 103$ B. $n < -103$ C. $n < 73$ D. $n > 103$ E. $n > -103$

22. $105_8 = \text{_____}_{10}$

- A. 91 B. 75 C. 81 D. 69 E. 73

23. 1,240,000 millimeters = _____ meters

- A. 124 B. 1,240 C. 12.4 D. 1.24 E. 12,400

24. Simplify: $(5^3 - 6^2 - 7^2) \div 4$

- A. 8 B. 12 C. 10 D. 14 E. 16

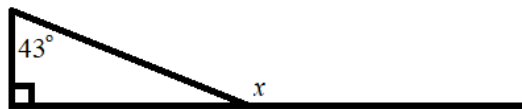
25. A rectangular prism has a volume of 882 cm^3 . If the height of the prism is 9 cm and the width is 7 cm, what is the measure of the length of the prism?

- A. 16 cm B. 22 cm C. 14 cm D. 8 cm E. 18 cm

26. If $\triangle ABC \cong \triangle XYZ$, which of the following is not true?

- A. $\angle B \cong \angle Y$ B. $\overline{AC} \cong \overline{XZ}$ C. $m\angle C = m\angle Z$ D. $\overline{BC} \cong \overline{XZ}$ E. $\angle C \cong \angle Z$

27. What is the supplement to $\angle x$ below?



- A. 47° B. 133° C. 57° D. 123° E. 43°

28. What is the slope of the line that passes through the points (14.8, 5.8) and (-7.2, -1.2)?

- A. $\frac{5}{24}$ B. $\frac{5}{18}$ C. $\frac{6}{23}$ D. $\frac{7}{22}$ E. $\frac{8}{25}$

29. If $h(x) = \frac{4x}{3}$, then what is the value of $h\left(\frac{3}{2}\right)$?

- A. $\frac{1}{2}$ B. $\frac{3}{4}$ C. 1 D. 2 E. $1\frac{1}{2}$

30. What is the equation $\frac{m+n}{w} = T$ solved for n ?

- A. $n = Tw - m$ B. $n = w(T - m)$ C. $n = Tw + m$ D. $n = w(T + m)$ E. $n = T - mw$

31. Sara is dropped off at summer camp at 9:30 am. Her mother will pick her up in 104 hours. At what time will Sara’s mom pick her up?

- A. 4:30 pm B. 3:30 pm C. 5:30 pm D. 2:30 pm E. 6:30 pm

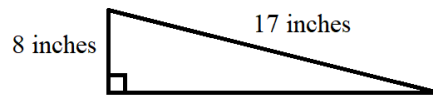
32. Simplify: $3(2x - 7) + 2(x - 4) - 4x^2$

- A. $6x^2 - 29$ B. $-4x^2 + 6x - 29$ C. $-4x^2 + 8x - 13$ D. $-4x^2 + 4x - 13$ E. $-4x^2 + 8x - 29$

33. Which of the following equations represents an exponential decay function?

- A. $y = 0.74(3)^x$ B. $y = x + 0.04^2$ C. $y = 1.1\left(\frac{3}{2}\right)^x$ D. $y = 271(0.2)^x$ E. $y = (2x - 7)^2$

34. What is the area of the triangle below?



- A. 60 in^2 B. 68 in^2 C. 40 in^2 D. 80 in^2 E. 74 in^2

35. Your car has an 18-gallon gas tank, but is only $\frac{2}{3}$ full. If gas costs \$3.15, how much will it cost to fill your gas tank?

- A. \$22.05 B. \$18.90 C. \$25.20 D. \$15.75 E. \$19.35

36. What is the x -intercept of the linear function $24x - 8y = 48$?

- A. $\frac{1}{2}$ B. -6 C. $-\frac{1}{6}$ D. $-\frac{1}{2}$ E. 2

37. What is the area of a square with a diagonal of 18 inches?

- A. 324 in^2 B. 72 in^2 C. 162 in^2 D. 144 in^2 E. 216 in^2

38. What is the value of the y -coordinate of the solution to the system of linear equations?

$$\begin{cases} 12x + 16y = 4 \\ 3x = -24y + 8\frac{1}{2} \end{cases}$$

- A. $\frac{5}{8}$ B. $\frac{3}{8}$ C. $-\frac{1}{6}$ D. $\frac{5}{6}$ E. $-\frac{3}{4}$

39. There are nine runners in the 100 meter-dash. Medals are given to 1st, 2nd and 3rd place finishers. In how many different ways can the medals be awarded?

- A. 84 B. 504 C. 336 D. 168 E. 672

40. Anna is buying two shirts for \$12.00 each, a skirt for \$18.00 and a hair bow for \$5.00. What is Anna’s total bill if the tax rate is 9%?

- A. \$64.31 B. \$38.15 C. \$43.60 D. \$51.23 E. \$47.79

41. What is the probability of rolling a pair of dice and getting a sum of 9, in ratio form?

- A. 1:6 B. 1:4 C. 1:2 D. 5:36 E. 1:9

42. What is the value of the discriminant of the quadratic equation $2x^2 = 8 + 7x$?

- A. -15 B. 113 C. -50 D. 78 E. 120

43. What is the sum of the coordinates of the midpoint between the points $(-19,7)$ and $(-13,-21)$?

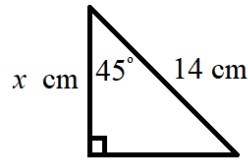
- A. -12 B. -23 C. -34 D. -9 E. -10

44. What is the volume of a rectangular prism whose faces have areas of 6 units², 15 units², and 10 units²?
 A. 900 units³ B. 450 units³ C. 30 units³ D. 90 units³ E. 62 units³

45. $\frac{4a^2b^{-4}}{3a^5b^2} \cdot \frac{12a^2b^3}{3(a^2b)^{-2}} =$ _____

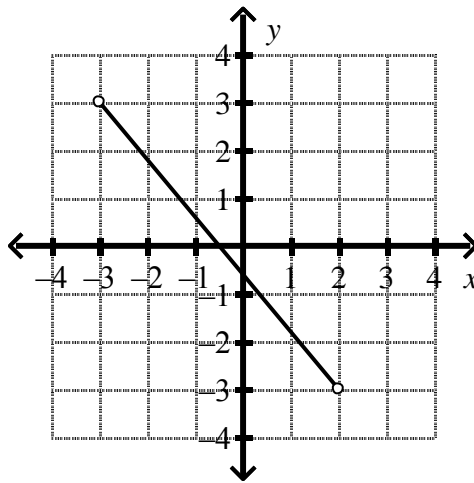
- A. $\frac{16a^3}{3b}$ B. $\frac{16a^3b^7}{3}$ C. $\frac{16}{3a^3b^5}$ D. $\frac{16}{3a^3b^3}$ E. $\frac{16b}{3a^3}$

46. What is the value of x below?



- A. 7 B. $7\sqrt{3}$ C. $7\sqrt{2}$ D. $7\sqrt{6}$ E. $6\sqrt{3}$

47. What is the domain of the graph?



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

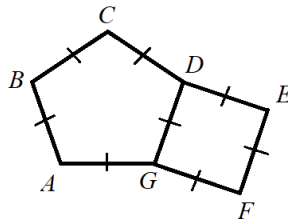
48. Francine has pigs and chickens on her farm. If Francine observes that the number of legs of her animals is 14 more than twice the number of heads, how many pigs does Francine have?

- A. 12 B. 9 C. 8 D. 7 E. 10

49. If $A = 2\sqrt{250}$ and $B = 3\sqrt{640}$, in simplified radical form, what is the value of $A - B$?

- A. $6\sqrt{890}$ B. $-6\sqrt{10}$ C. $-14\sqrt{10}$ D. $16\sqrt{10}$ E. $-16\sqrt{10}$

50. Regular pentagon $ABCDG$ and square $DEFG$ share a common side, as shown below. What is the measure of $\angle DCE$?



- A. 12° B. 12.5° C. 9° D. 18° E. 15°

2019 – 2020 TMSCA Middle School Mathematics Test #3 Answer Key

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

5. The additive inverse of a number is just its opposite. Therefore, the additive inverse of 3 is -3 .

8. If $a = 8$, $b = 6$ and $c = -4$, then $|a - b + c| = |8 - 6 + (-4)| = |2 - 4| = |-2| = 2$.

31. There are 24 hours in a day. 104 hours is equal to $104 \div 24 = 4\frac{1}{3}$ days. $\frac{1}{3}$ of 24 is 8, so Sara's mom will pick her up 4 days 8 hours after she drops her off. 8 hours after 9:30 am is 5:30 pm.

32. $3(2x - 7) + 2(x - 4) - 4x^2 = 6x - 21 + 2x - 8 - 4x^2 = -4x^2 + 8x - 29$.

35. If your car has an 18-gallon gas tank and is only $\frac{2}{3}$ full, then it needs to fill $\frac{1}{3}$ of the tank. $\frac{1}{3}$ of 18 gallons is equal to 6 gallons. Therefore, it will cost $6(3.15) = \$18.90$ to fill the gas tank.

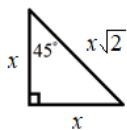
36. The x -intercept of a linear function in standard form $Ax + By = C$ is found by $\frac{C}{A}$. We are given the linear function $24x - 8y = 48$, so its graph has an x -intercept of $\frac{48}{24} = 2$.

37. The formula for area of a square given the diagonal, d , is $\frac{d^2}{2}$. Therefore, the area of a square with a diagonal of 18 inches is $\frac{18^2}{2} = \frac{324}{2} = 162 \text{ in}^2$.

40. The value of the clothes Anna is buying is equal to $2(12) + 18 + 5 = \$47.00$. Because there is a 9% sales tax, the total bill Anna will have to pay is $1.09(47) = \$51.23$.

41. There are 36 possible outcomes when rolling a pair of dice. There are four ways to get a sum of 9, which are (3, 6), (6, 3), (4,5), and (5, 4). Therefore, 4 out of 36 is equal to $4:36 = 1:9$.

46. In a special 45-45-90 right triangle, the sides are in a $x: x: x\sqrt{2}$ ratio, as shown.



We are given a triangle with a hypotenuse of 14 cm and are asked to find the length of one of the legs. We make the equation $14 = x\sqrt{2}$. Divide both sides by $\sqrt{2}$ to get $x = \frac{14}{\sqrt{2}}$. We must

rationalize the denominator by multiplying by $\frac{\sqrt{2}}{\sqrt{2}}$. So, $x = \frac{14}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{14\sqrt{2}}{2} = 7\sqrt{2}$. Thus, the length of one of the legs of the triangle is $7\sqrt{2}$ cm.

47. The domain of a graph consists of all the input values shown on the x -axis. The segment in the graph has endpoints with open circles, so we need $<$ symbols. The domain of the graph of the segment is $-3 < x < 2$.

48. First, if $l =$ legs and $h =$ heads, we make the equation $l = 2h + 14$. A chicken has 2 legs and a pig has 4 legs, so l is equal to $2c + 4p$, and $h = c + p$. Substitute into the original equation and we have $2c + 4p = 2(c + p) + 14$. Distribute the 2, and we have $2c + 4p = 2c + 2p + 14$. Subtract $2c$ from both sides and we have $4p = 2p + 14$. Subtract $2p$ from both sides and we get $2p = 14$. Divide by 2 to each side and we get $p = 7$. Francine has a total of 7 pigs on her farm.