



TMSCA MIDDLE SCHOOL MATHEMATICS TEST #8 © JANUARY 25, 2020

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

1. $1.112 + 8.076 + 3.039 =$ _____ (nearest hundredth)

- A. 12.22 B. 11.24 C. 11.21 D. 12.23 E. 12.14

2. $402 + (-318) =$ _____

- A. 84 B. 278 C. 720 D. 96 E. 108

3. $\frac{4}{5} \times \frac{3}{4} \times 1\frac{1}{3} =$ _____

- A. $0.\bar{3}$ B. $0.\bar{6}$ C. 0.8 D. 0.4 E. $1.\bar{6}$

4. $214 \div \frac{2}{3} =$ _____

- A. 642 B. 427 C. 321 D. 367 E. 289

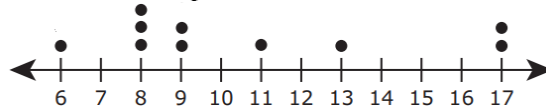
5. What is the GCF of the numbers 72, 124 and 256?

- A. 12 B. 4 C. 24 D. 6 E. 2

6. Tonya went to Chunky Cheese with her family. At Chunky Cheese, Tonya bought \$12.50 worth of tokens. If tokens are worth nine for \$1.50, how many tokens did Tonya get?

- A. 112 B. 75 C. 80 D. 78 E. 85

7. What is the value of the mean of the data in the dot-plot below?



- A. 8.7 B. 9.8 C. 11.1 D. 9.9 E. 10.6

8. Solve for n : $\frac{2}{3}n > -72$

- A. $n > -108$ B. $n > -48$ C. $n < -108$ D. $n < -48$ E. $n > 48$

9. $2 \cdot 3^3 \cdot 5^2 \cdot 23$ is the prime factorization for which number?

- A. 124,200 B. 31,050 C. 4,140 D. 12,420 E. 62,100

10. 125% of 64 = _____ + 10

- A. 76 B. 80 C. 72 D. 70 E. 78

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

- A. 148 in^2 B. 162 in^2 C. 72 in^2 D. 144 in^2 E. 288 in^2

12. $3 + 4 + \dots + 9 + 10 + 10 + 9 + \dots + 4 + 3 =$ _____

- A. 104 B. 96 C. 112 D. 106 E. 108

13. Josh rolls three dice and a 3, 2, and 6 are facing up. What is the sum of the faces of the dice facing down?

- A. 11 B. 9 C. 8 D. 7 E. 10

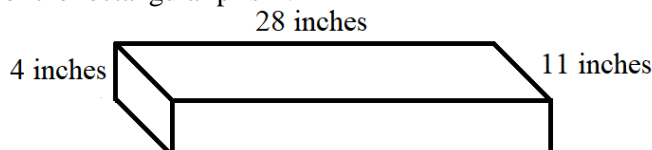
14. Simplify: $2(15 - 3) \div \frac{3}{2} + ((8 + 2)^2 + 3)^0$

- A. 0 B. 17 C. 16 D. 24 E. 15

15. Alice is $2\frac{1}{2}$ times as old as Brett. David is half as old as the sum of Brett and Claudia's ages. If David is 17 and Claudia is 12, how old is Alice?

- A. 34 B. 32 C. 48 D. 55 E. 64

16. What is the lateral surface area of the rectangular prism?



- A. 928 in^2 B. 616 in^2 C. 312 in^2 D. 172 in^2 E. 348 in^2

17. 18% of $300 = 20\%$ of _____

- A. 270 B. 320 C. 280 D. 260 E. 310

18. At Leonard Park, the parking garage charges \$9.25 to park a car for the first hour and \$3.75 for each additional hour or part of an hour after the first hour. What is the total charge for parking a car for 5 hours and 11 minutes in this garage?

- A. \$28.00 B. \$28.50 C. \$28.25 D. \$27.50 E. \$27.75

19. Derick has seventeen more dollars than Emily, Emily has twice as much money as Felicia, and Felicia has \$16.00. How much money do all the people have together?

- A. \$48.00 B. \$66.00 C. \$113.00 D. \$97.00 E. \$92.00

20. If $\frac{3}{7} = \frac{m}{28} = \frac{36}{n}$, then what is the value of $n - m$?

- A. 96 B. 8 C. 60 D. 72 E. 84

21. What is the inter-quartile range of the set of numbers 107, 67, 85, 72, 73, 91 and 73?

- A. 40 B. 81.5 C. 73 D. 34 E. 19

22. What is the product of the number of faces, edges and vertices of a pentagonal prism?

- A. 220 B. 160 C. 1,050 D. 1,728 E. 1,152

23. Olivia is making a triangle using quarters. The bottom row of Olivia's triangle has 5 quarters. The next row above the base row has 1 fewer quarter and each successive row contains one fewer quarter. The top row has only one quarter. How much money does Olivia need to make her triangle?

- A. \$3.25 B. \$4.25 C. \$4.00 D. \$3.75 E. \$3.50

24. $3,724 =$ _____ (Roman numeral)

- A. MMMDCCIV B. MMMLCCXXIV C. CCXXIV D. MMMDCCXXVI E. MMMDCCXXIV

25. Kelsey has a standard deck of cards, in which she will draw one card. What is the probability she draws out a red face card?

- A. $\frac{3}{13}$ B. $\frac{6}{13}$ C. $\frac{4}{13}$ D. $\frac{5}{26}$ E. $\frac{3}{26}$

26. $112_{10} + 42_{10} =$ _____₇

- A. 310 B. 266 C. 265 D. 325 E. 322

27. Line A passes through the points (14, 17) and (−4, −11). What is the slope of line B, if line B is parallel to line A?

- A. $\frac{14}{9}$ B. $-\frac{14}{9}$ C. $\frac{9}{14}$ D. $-\frac{9}{14}$ E. $\frac{3}{5}$

28. If $A = 3.4 \times 10^6$ and $B = 4.5 \times 10^3$, how many zeros will the product of A and B end in?

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

29. What is the linear equation $2x - 11y = 44$ written in slope-intercept form?

- A. $y = -\frac{11}{2}x - 4$ B. $y = -\frac{2}{11}x - 4$ C. $y = \frac{11}{2}x - 4$ D. $y = \frac{2}{11}x - 4$ E. $y = \frac{11}{2}x - 22$

30. Which of the following is not divisible by 12?

- A. 216 B. 322 C. 84 D. 384 E. 420

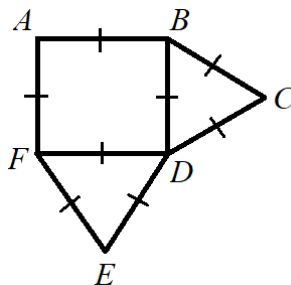
31. What is the equation $\frac{mP}{c} = 2P$ solved for c ?

- A. $c = 2P^2m$ B. $c = \frac{2P^2}{m}$ C. $c = \frac{m}{2}$ D. $c = \frac{mP}{2}$ E. $c = \frac{2}{mP}$

32. One of the zip codes in Dallas is 75225. How many permutations are there of the numbers in that zip code?

- A. 30 B. 40 C. 25 D. 35 E. 20

33. Square $ABDF$ shares a common side with each equilateral triangle BCD and DEF as in the picture below. What is the measure of $\angle EDC$?



- A. 120° B. 135° C. 115° D. 165° E. 150°

34. How many solutions does the quadratic equation $0 = -15x^2 + 2$ have?

- A. 0 B. 1 C. 2 D. 3 E. 4

35. Let A equal the sum of 5 consecutive odd integers and let B equal the sum of the next 5 consecutive odd integers. What is the value of $B - A$?

- A. 5 B. 10 C. 50 D. 100 E. 200

36. The angles in a quadrilateral are in a ratio of 5:12:24:31. What is the measure of the largest angle?

- A. 165° B. 186° C. 124° D. 155° E. 93°

37. What is the rate of decay of the exponential decay function $y = \frac{1}{3}\left(\frac{1}{8}\right)^x$?

- A. $33\frac{1}{3}\%$ B. $66\frac{2}{3}\%$ C. 0.125% D. 12.5% E. 87.5%

38. Multiply: $(2 + \sqrt{3})(2 - \sqrt{3})$

- A. $4 - \sqrt{3}$ B. 1 C. $\sqrt{3}$ D. 4 E. $4 + \sqrt{3}$

39. Solve for n : $-6 \leq \frac{n}{4} + 2 < 5$

- A. $-16 \leq n < 5$ B. $-16 \leq n < 28$ C. $-16 \leq n < 12$ D. $-32 \leq n \leq 28$ E. $-32 \leq n < 12$

40. One gallon of paint costs \$37.50 and can cover 250 square feet. How much will it cost to paint one rectangular wall of a building measuring $24 \text{ ft} \times 34 \text{ ft}$?

- A. \$150.00 B. \$112.50 C. \$187.50 D. \$225.00 E. \$192.50

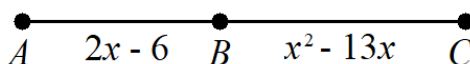
41. What is the sum of the coordinates of the vertex of the parabola with the equation $y - 2x^2 - 9 = 20x$?
 A. 43 B. -36 C. 51 D. -46 E. 48

42. What is the unit's digit of 4^{10} ?
 A. 2 B. 8 C. 4 D. 0 E. 6

43. Tito has a total of 93 bills in fives and ones hidden in his dresser drawer. The total value of his money is \$257. How many five-dollar bills does Tito have?
 A. 37 B. 39 C. 41 D. 56 E. 52

44. If $f(x) = 4x - 7$ and $g(x) = 3x + 5$, what is $f(g(x))$?
 A. $12x + 13$ B. $7x - 2$ C. $12x^2 - x - 35$ D. $12x - 16$ E. $7x - 35$

45. If $AC = 36$ inches, what is the measure of AB ?

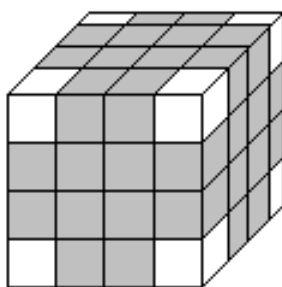


A. 14 inches B. 18 inches C. 16 inches D. 24 inches E. 22 inches

46. What is the simple interest when depositing \$2,000 at 0.5% for 150 months?
 A. \$1,500.00 B. \$125.00 C. \$675.00 D. \$1,250.00 E. \$1,675.00

47. What is the area of the quadrilateral with its vertices located at $(8, -2)$, $(-1, -4)$, $(-5, -1)$ and $(2, 4)$?
 A. 48.5 units² B. 47.5 units² C. 51.5 units² D. 53.5 units² E. 57.5 units²

48. A $4\text{ cm} \times 4\text{ cm} \times 4\text{ cm}$ cube is created using $1\text{ cm} \times 1\text{ cm} \times 1\text{ cm}$ cubes and is painted gray except for its corners, as seen below. What percentage of all the small cubes used have exactly two of their faces painted?



A. 35% B. 42.5% C. 37.5% D. 32.5% E. 50%

49. $\frac{5a^3b^5}{10a^{-4}b} \cdot \left(\frac{6a^2b^0}{a^{-4}b^{-2}}\right)^2 =$ _____

A. $\frac{18a^{12}}{b^6}$ B. $\frac{9a^{15}}{b}$ C. $\frac{9a^{13}}{b^8}$ D. $9a^{13}b^8$ E. $18a^{19}b^8$

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 with a side length equal to the side length of a square with an area of 200 cm^2 ?
 A. $400\sqrt{2} + 400\text{ cm}^2$ B. $800\sqrt{2} + 800\text{ cm}^2$ C. $200\sqrt{2} + 200\text{ cm}^2$ D. $100\sqrt{2} + 100\text{ cm}^2$ E. $1,600\sqrt{2} + 1,600\text{ cm}^2$

2019 – 2020 TMSCA Middle School Mathematics Test #8 Answer Key

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

6. Make the proportion $\frac{9}{1.50} = \frac{x}{12.50}$. Cross multiply and get $9(12.5) = 1.5x$. This simplifies to $112.5 = 1.5x$. Divide both sides by 1.5 and $x = \frac{112.5}{1.5} = 75$. Tonya received 75 tokens for \$12.50.

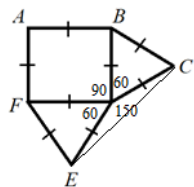
13. On a standard die, opposite faces sum to 7. Josh rolls three dice and a 3, 2, and 6 are facing up. This means a 4, 5 and 1 are facing down, and $4 + 5 + 1 = 10$.

21. The inter-quartile range is the difference of the upper quartile minus the lower quartile. We are given the set of numbers 107, 67, 85, 72, 73, 91 and 73. From least to greatest, the list is 67, 72, 73, 73, 85, 91, and 107. The median is 73. The lower quartile is 72 and the upper quartile is 91. The inter-quartile range is then $91 - 72 = 19$.

28. If $A = 3.4 \times 10^6$ and $B = 4.5 \times 10^3$, then $AB = (3,400,000)(4,500) = 15300000000$. Therefore, AB will end in 8 zeros.

29. Slope-intercept form of a linear equation is $y = mx + b$. We are given the equation $2x - 11y = 44$, so we must solve for y . First, subtract $2x$ from both sides and get $-11y = -2x + 44$. Now divide both sides by -11 and get $y = \frac{2}{11}x - 4$.

33. There are 360° in a circle.



So, the measure of $\angle EDC$ is equal to $360 - 90 - 60 - 60 - 60 = 150^\circ$.

38. $(2 + \sqrt{3})(2 - \sqrt{3}) = 2(2) - 2\sqrt{3} + 2\sqrt{3} - (\sqrt{3})(\sqrt{3}) = 4 - 3 = 1$.

40. $24 \times 34 = 816$ square feet of wall that needs to be painted. A gallon of paint covers 250 square feet, so $816 \div 250 = 3.264$. Since the amount is more than 3, 4 gallons of paint are needed. The cost of 4 gallons of paint will be $4(37.5) = \$150.00$.

42. Using $4^1 = 4$, $4^2 = 16$, $4^3 = 64$, $4^4 = 256$ and so on, we see that any power of 4 end in the unit's digit being a 4 or 6. We also see every positive odd integer, n , of 4^n ends in a 4 and every positive even integer, n , ends in a 6. Since 10 is an even number, 4^{10} will end in a 6.

48. There are a total of $4 \times 4 \times 4 = 64$ $1\text{ cm} \times 1\text{ cm} \times 1\text{ cm}$ cubes used. The 8 corners are not painted. This leaves $64 - 8 = 52$ cubes remaining. There are $2 \times 2 \times 2 = 8$ interior cubes that have no faces painted. This leaves $52 - 8 = 44$ cubes remaining. There are 24 cubes that have one face painted. This leaves $44 - 24 = 20$ cubes. So, there are exactly 24 cubes with two of their faces painted, which is $\frac{24}{64} = \frac{3}{8} = 0.375 = 37.5\%$.

50. A square with an area of 200 cm^2 has a side length of $\sqrt{200} = 10\sqrt{2}\text{ cm}$. Substitute $10\sqrt{2}$ into the formula for area of a regular octagon as the side length a , and $A = 2a^2(1 + \sqrt{2}) = 2(10\sqrt{2})^2(1 + \sqrt{2}) = 2(200)(1 + \sqrt{2}) = 400(1 + \sqrt{2}) = 400 + 400\sqrt{2}$. The area of the regular octagon is then $400\sqrt{2} + 400\text{ cm}^2$.