



TMSCA MIDDLE SCHOOL MATHEMATICS

TEST #13 ©

MARCH 13, 2021

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.

[illegible]

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1. $65,810 + 76,827 =$ _____ (nearest thousand)
 A. 144,000 B. 143,000 C. 142,000 D. 140,000 E. 141,000

2. $-91.8 - 76.44 =$ _____ (nearest tenth)
 A. -172.2 B. -166.4 C. -176.2 D. -166.2 E. -168.2

3. $995 \times 995 =$ _____
 A. 990,125 B. 991,025 C. 990,225 D. 990,025 E. 991,225

4. $100,768 \div (-16) =$ _____
 A. 6,498 B. $-6,498$ C. $-6,298$ D. 6,478 E. $-6,248$

5. Evaluate $\frac{5}{4}a + \frac{3}{2}b - \frac{2}{5}c$ for $a = -6$, $b = -7$ and $c = 15$.
 A. -3 B. -24 C. 12 D. -9 E. -18

6. Express the ratio $\frac{7}{20}$ to 7 as a common ratio.
 A. $\frac{1}{10}$ B. $\frac{1}{20}$ C. $\frac{1}{5}$ D. $\frac{1}{7}$ E. $\frac{1}{4}$

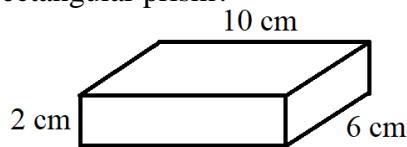
7. What is the smallest positive integer that can be added to 7,364,116 to make a multiple of 3?
 A. 2 B. 4 C. 1 D. 5 E. 7

8. 408 minutes = _____ hours
 A. $5\frac{7}{8}$ B. $6\frac{3}{4}$ C. $6\frac{4}{5}$ D. $6\frac{2}{3}$ E. $6\frac{1}{3}$

9. CCXXXVII + CDLXIX + DCCV = _____ (Arabic number)
 A. 1,267 B. 1,317 C. 1,521 D. 1,371 E. 1,411

10. What is $\frac{1}{2}\%$ of 260?
 A. 2.6 B. 0.52 C. 0.052 D. 1.3 E. 5.2

11. What is the total surface area of the rectangular prism?



A. 64 cm^2 B. 124 cm^2 C. 184 cm^2 D. 120 cm^2 E. 224 cm^2

12. What is the positive difference of 7^2 and 19^2 ?
 A. 312 B. 354 C. 347 D. 332 E. 318

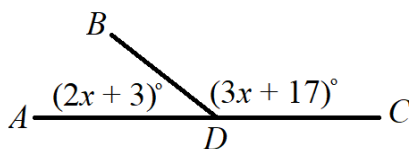
13. The value of 15 quarters and 17 nickels is the same as _____ dimes and 250 pennies.
 A. 24 B. 17 C. 16 D. 19 E. 21

14. How many positive integers are less than 12π ?
 A. 38 B. 36 C. 37 D. 15 E. 18

15. What is the unit rate of spending \$525.36 for 8 items?

- A. \$64.47 B. \$65.27 C. \$64.87 D. \$66.17 E. \$65.67

16. What is the complement to $\angle BDA$?



- A. 47° B. 62° C. 23° D. 7° E. 39°

17. What is the positive difference of the GCF of the numbers 56 and 140 and the LCM of the numbers 320 and 64?

- A. 292 B. 256 C. 196 D. 348 E. 248

18. In how many ways can a student randomly guess a complete set of answers to a four-question multiple choice quiz if there are four answer choices per question?

- A. 64 B. 16 C. 128 D. 512 E. 256

19. The table below models which of the following functions?

x	-16	-7	2	23
$f(x)$	-14	-6.5	1	18.5

- A. $y = \frac{5}{6}x + \frac{1}{4}$ B. $y = \frac{2}{3}x - \frac{1}{3}$ C. $y = \frac{3}{4}x + \frac{4}{5}$ D. $y = \frac{5}{6}x - \frac{2}{3}$ E. $y = \frac{4}{3}x - \frac{2}{5}$

20. A six-sided die is rolled five times. What is the probability the that the die will show an odd number exactly three times?

- A. $\frac{9}{32}$ B. $\frac{5}{16}$ C. $\frac{5}{8}$ D. $\frac{3}{8}$ E. $\frac{15}{32}$

21. 179 is the _____ term of the arithmetic sequence 999, 917, 835, 753,

- A. 12th B. 11th C. 13th D. 15th E. 14th

22. If $a \clubsuit b = -a^3 + \frac{b^2}{2}$, then what is the value of $(-3 \clubsuit 8)$?

- A. 63 B. 59 C. 67 D. 61 E. 65

23. If two prime numbers have a product of 323, what is the sum of these two prime numbers?

- A. 36 B. 30 C. 32 D. 42 E. 28

24. $12^3 =$ _____

- A. 1,254 B. 1,258 C. 1,648 D. 1,748 E. 1,728

25. $\triangle XYZ$ has vertices $X(18, 6)$, $Y(4, -9)$, and $Z(-3, 8)$. If $\triangle XYZ$ is dilated by a scale factor of $\frac{4}{5}$, what are the coordinates of point Y ?

- A. $(3.2, -7.2)$ B. $(4.8, -9.8)$ C. $(4.8, -8.2)$ D. $(7.2, -16.2)$ E. $(4, -11.25)$

26. $217_9 =$ _____ (base 3)

- A. 21121 B. 21123 C. 21113 D. 20121 E. 20211

27. $\frac{1+3+5+\cdots+31+33+35}{37+39+41+\cdots+67+69+71} = \underline{\hspace{2cm}}$

- A. $\frac{5}{6}$ B. $\frac{2}{3}$ C. $\frac{5}{6}$ D. $\frac{2}{5}$ E. $\frac{1}{3}$

28. Forty percent of 60% of 300 is equal to what percent of 45% of 200?

- A. 120 B. 60 C. 75 D. 80 E. 40

29. \overrightarrow{MN} bisects $\angle LMP$, $m\angle LMN = (7x - 30)^\circ$, and $m\angle PMN = (3x + 18)^\circ$. Find $m\angle LMP$.

- A. 96° B. 108° C. 84° D. 92° E. 106°

30. On a number line, the distance from point A to point B is 67 units. Point A has the coordinate of 6. What is the sum of all possible values of point B ?

- A. 16 B. 12 C. 28 D. 26 E. 24

31. Anhita is planting a rectangular vegetable garden measuring 4×10^3 feet by 6×10^5 feet. Anhita is also planting a flower bed measuring 2×10^4 feet by 8×10^4 feet. How much larger is Anhita's vegetable garden than her flower bed? Answer in scientific notation.

- A. $8 \times 10^8 \text{ ft}^2$ larger B. $1.4 \times 10^{10} \text{ ft}^2$ larger C. $6 \times 10^8 \text{ ft}^2$ larger D. $4 \times 10^{10} \text{ ft}^2$ larger E. $2 \times 10^8 \text{ ft}^2$ larger

32. A pool float is marked down \$8.64. If this is an 18% decrease, what is the sale price of the pool float?

- A. \$39.36 B. \$39.76 C. \$40.16 D. \$40.26 E. \$40.46

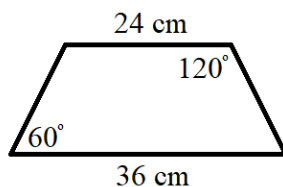
33. Line A passes through the points (22, 24) and (28, 18). Line B passes through the points (15, 17) and $(x, 7)$. If lines A and B are parallel, what is the value of x ?

- A. -17 B. -19 C. 33 D. 21 E. 25

34. $10^3 = 1,000$. Not including 1,000, how many other 4-digit numbers are also perfect cubes?

- A. 14 B. 13 C. 12 D. 11 E. 10

35. What is the perimeter of the isosceles trapezoid?



- A. $60 + 12\sqrt{3}$ cm B. $60 + 24\sqrt{3}$ cm C. 120 cm D. 72 cm E. 84 cm

36. Solve for a : $\frac{3}{2}(2a - b) = 9(a - b)$

- A. $a = \frac{3}{4}b$ B. $a = \frac{5}{4}b$ C. $a = \frac{5}{2}b$ D. $a = \frac{7}{4}b$ E. $a = \frac{2}{3}b$

37. $0.04\overline{6} = \underline{\hspace{2cm}}$ (fraction)

- A. $\frac{23}{500}$ B. $\frac{23}{50}$ C. $\frac{7}{150}$ D. $\frac{23}{495}$ E. $\frac{23}{450}$

38. Four consecutive integers sum to 498. What is the median of these four integers?

- A. 132.5 B. 126.5 C. 124.5 D. 130.5 E. 128.5

39. If $x - \frac{1}{x} = 8$, then what is the value of $x^2 + \frac{1}{x^2}$?

- A. 68 B. 62 C. 64 D. 65 E. 66

40. What is the product of the roots of the quadratic equation $22x - 16 = 16 - 4x^2$?

- A. 0 B. -8 C. -4 D. $-\frac{11}{2}$ E. $\frac{2}{11}$

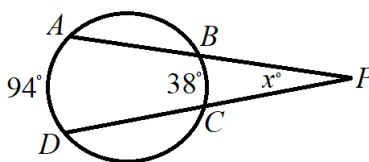
41. $310_9 \div 3_9 = \underline{\hspace{2cm}}$ (base 10)

- A. 101 B. 103 C. 76 D. 84 E. 74

42. The roots of the equation $3x^2 - 45x = -150$ are the lengths of the legs of a right triangle. What is the hypotenuse of the right triangle?

- A. $5\sqrt{5}$ B. $5\sqrt{3}$ C. $10\sqrt{2}$ D. $10\sqrt{5}$ E. $10\sqrt{3}$

43. What is the value of x in the circle, if minor arc $AD = 94^\circ$ and minor arc $BC = 38^\circ$?



- A. 56 B. 17 C. 47 D. 48 E. 28

44. Simplify by rationalizing the denominator: $\frac{6+\sqrt{2}}{3-\sqrt{2}}$

- A. $18 - 6\sqrt{2}$ B. $6 - 2\sqrt{2}$ C. $\frac{3\sqrt{2}+20}{7}$ D. $\frac{18\sqrt{2}+20}{7}$ E. $\frac{9\sqrt{2}+20}{7}$

45. Which of the following is equivalent to $\log_8 42$?

- A. $\log_8 50 - \log_8 8$ B. $\log_8 6(\log_8 7)$ C. $\log_8 14 + \log_8 3$ D. $\log_8 40 + \log_8 2$ E. $\log_8 21^2$

46. What is the equation of the perpendicular bisector of \overline{AB} with endpoints $A(3, 6)$ and $B(7, -2)$?

- A. $y = \frac{2}{3}x - \frac{3}{2}$ B. $y = -\frac{2}{3}x + \frac{3}{2}$ C. $y = \frac{1}{2}x - \frac{1}{2}$ D. $y = \frac{1}{2}x + \frac{3}{2}$ E. $y = -\frac{1}{2}x + \frac{3}{2}$

47. Which of the following is the solution to the inequality $|2x - 7| < 15$?

- A. $x < -4$ or $x > 11$ B. $x < 2$ or $x > 22$ C. $-4 < x < 22$ D. $-4 < x < 11$ E. $2 < x < 22$

48. $\frac{8x^3+28x^2+12x}{6x} \cdot \frac{3x}{4x^2+2x} = \underline{\hspace{2cm}}$

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

49. The hypotenuse of a 30-60-90 right triangle is $36\sqrt{3}$ inches. What is the area of the triangle?

- A. $324\sqrt{3} \text{ in}^2$ B. $486\sqrt{3} \text{ in}^2$ C. $288\sqrt{3} \text{ in}^2$ D. $512\sqrt{3} \text{ in}^2$ E. $556\sqrt{3} \text{ in}^2$

50. At a local zoo, there are zebras and flamingos. If there are a total of 116 feet and 38 heads, how many more zebras are there than flamingos?

- A. 12 B. 6 C. 7 D. 11 E. 2

2020 – 2021 TMSCA Middle School Mathematics Test #13 Answer Key

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

10. $\frac{1}{2}\%$ of $260 = 0.005(260) = 1.3$

14. $12\pi \approx 37.69 \dots$ This means there are 37 positive integers less than 12π .

18. There are $4 \cdot 4 \cdot 4 \cdot 4 = 256$ different ways of answering the multiple-choice quiz.

25. $\triangle XYZ$ has vertices $X(18, 6)$, $Y(4, -9)$, and $Z(-3, 8)$. If $\triangle XYZ$ is dilated by a scale factor of $\frac{4}{5}$, then the coordinates of point Y are $\left(\frac{4}{5}(4), \frac{4}{5}(-9)\right) = \left(\frac{16}{5}, -\frac{36}{5}\right) = (3.2, -7.2)$.

29. If \overline{MN} bisects $\angle LMP$, then $m\angle LMN = m\angle PMN$. Therefore, $7x - 30 = 3x + 18$. Subtracting $3x$ from both sides gives us $4x - 30 = 18$. Adding 30 to both sides gives us $4x = 48$, which means $x = 12$. Substituting 12 for x in $m\angle LMN = (7x - 30)^\circ$, gives us $7(12) - 30 = 84 - 30 = 54$. Therefore, $m\angle LMP = 2(54) = 108^\circ$.

30. On a number line, the distance from point A to point B is 67 units. Point A has the coordinate of 6. The possible values of B are then $6 + 67 = 73$ and $6 - 67 = -61$. The sum of these values is $73 + (-61) = 12$.

34. We know that $10^3 = 1,000$. We can narrow our search by finding 20^3 , which equals 8,000. We can continue and see that, $21^3 = 9,261$ and $22^3 = 10,648$. So, we see that we will have $11^3, 12^3, 13^3, 14^3, 15^3, 16^3, 17^3, 18^3, 19^3, 20^3$, and 21^3 all equal to a 4-digit number. So, there are 11 numbers other than 1,000 that are 4-digit perfect cubes.

38. Four consecutive integers can be represented by $x, x + 1, x + 2, x + 3$. We use this to make the equation $x + x + 1 + x + 2 + x + 3 = 4x + 6 = 498$. Subtract 6 and then divide by 4 to the equation and we get $x = 123$. So, the four consecutive integers are 123, 124, 125, and 126. The median of the integers is then $\frac{124+125}{2} = 124.5$.

39. Given $x - \frac{1}{x} = 8$, we must square both sides. $\left(x - \frac{1}{x}\right)^2 = 8^2$, which becomes $x^2 - \frac{x}{x} - \frac{x}{x} + \frac{1}{x^2} = x^2 - 2 + \frac{1}{x^2} = 64$. Adding 2 to both sides gives us $x^2 + \frac{1}{x^2} = 66$.

40. The standard form of a quadratic equation is $0 = Ax^2 + Bx + C$. To find the product of the roots, use $\frac{C}{A}$. We are given the equation $22x - 16 = 16 - 4x^2$, which will be $4x^2 + 22x - 32 = 0$ in standard form. Therefore, the product of the roots is then $\frac{-32}{4} = -8$.

47. To solve $|2x - 7| < 15$, we must create two inequalities, $2x - 7 < 15$ and $2x - 7 > -15$. To solve each, add 7 to both sides and then divide by 2. This will give us $x < 11$ and $x > -4$. The two inequality statements can be combined to form the compound inequality $-4 < x < 11$.

48. $\frac{8x^3+28x^2+12x}{6x} \cdot \frac{3x}{4x^2+2x} = \frac{4x(2x+1)(x+3)}{6x} \cdot \frac{3x}{2x(2x+1)} = \frac{\cancel{12x^2}(2x+1)(x+3)}{\cancel{12x^2}(2x+1)} = x + 3$.