T M S C A M I D D L E S C H O O L

M A T H E M A T I C S

T E S T # 3 ©

O C T O B E R 3 1 , 2 0 2 0

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.

2020 – 2021 TMSCA Middle School Mathematics Test #3

1. 32.01 – 12.76 = _____
A. 19.25 B. 20.25 C. 19.34 D. 44.77 E. 19.75

2. 7,872 + 299 = _____ (nearest hundred)
A. 8,100 B. 8,000 C. 8170.10 D. 8,200 E. 10,000

3. 89×94 = _____
A. 8,376 B. 8,266 C. 8,367 D. 8,276 E. 8,366

4. $282.8 \div 0.2$ = _____
A. 1,414 B. 141.4 C. 14.14 D. 0.1414 E. 1,414

5. $2(4x - 3y) + y$ is equivalent to which of the following?
A. $8x - 6y$ B. $6x - 6y$ C. $6x - 7y$ D. $8x - 5y$ E. $8x - 7y$

6. Evaluate $-4d^2$ for $d = -26$.
A. 2,704 B. 208 C. 10,816 D. $-2{,}704$ E. $-10{,}816$

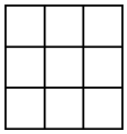
7. What is the reciprocal of ⅕?
A. 0.2 B. $-⅕$ C. -0.2 D. 5 E. -5

8. What is the perimeter of a square that has an area of 25 cm^2?
A. 100 cm B. 20 cm C. 625 cm D. 5 cm E. 125 cm

9. 123 = _____ (Roman numeral)
A. CXXVIII B. CVVIII C. CCXXIII D. CXVII E. CXXIII

10. 24 is what percent of 200?
A. 16% B. 14% C. 12% D. 8% E. 18%

11. How many squares can be found in the 3×3 square grid below?



A. 10 B. 9 C. 13 D. 14 E. 12

12. 64,000,000 + 36,000,000 = _____ (scientific notation)
A. 1×10^6 B. 1×10^7 C. 1×10^8 D. 1×10^9 E. 1×10^{10}

13. What is the 10^{th} term of the sequence 38, 47, 56, 65, …?
A. 103 B. 107 C. 119 D. 128 E. 110

14. ΔABC has vertices $A(16, 18)$, $B(7, 2)$, and $C(0, 10)$. If ΔABC is translated down 5 units, what is the sum of the coordinates of points B and C?
A. 15 B. 9 C. 19 D. 29 E. 14

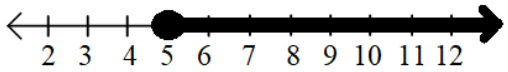
15. If $15 - x = 7$, then what is the value of $4x - 1$?
A. 31 B. -33 C. 87 D. -89 E. 11

16. Simplify: $(-5 + 12)^2 - (-2)^3$
A. 57 B. 41 C. 281 D. 42 E. 43

17. Andy got into an elevator on the 11th floor. If he rode up 4 floors, down 9 floors, up 12 floors, and then down 6 floors, what floor is he now on?
A. 13th floor B. 10th floor C. 9th floor D. 11th floor E. 12th floor

18. ΔWXY has a perimeter of 172 cm. If two of the side lengths are 43cm and 46 cm, what is the measure of the third side of the triangle?
A. 85 cm B. 89 cm C. 81 cm D. 83 cm E. 84 cm

19. Which inequality represents the graph below?



A. $n > 5$ B. $n > 2$ C. $5 < n < 12$ D. $n \geq 5$ E. $n \geq 2$

20. Evaluate $\frac{x^2+6}{x}$, for $x = 5$.
A. 6.2 B. 3.2 C. 1.6 D. 24.2 E. 4.2

21. Trey is buying a 32-inch tv for $76.24, a pair of earbuds for $16.99 and a charging cable for $5.48. If Trey pays with a $100 bill, how much change will he get, assuming there is no tax?
A. $1.34 B. $1.39 C. $1.19 D. $1.09 E. $1.29

22. 123_4 = _____ (base 10)
A. 34 B. 33 C. 31 D. 29 E. 27

23. Marissa has 16 more marbles than Susan. Susan has 8 fewer marbles than Mitchel. Mitchel has 6 times as many marbles as Fred. Fred has 14 marbles. How many marbles do all four people have together?
A. 254 B. 266 C. 274 D. 278 E. 272

24. When Marco started working out, he could only use the 12-pound weights. After working out for a whole year, Marco was able to increase the pounds of the weights by 350%. What is the increase in weight Marco is lifting now?
A. 38 lb. B. 42 lb. C. 45 lb. D. 36 lb. E. 34 lb.

25. If $a \Delta b = 4a - 6b$, then what is the value of $-3 \Delta 9$?
A. -2 B. -42 C. -66 D. -22 E. -54

26. What is the third triangular number?
A. 9 B. 12 C. 10 D. 6 E. 15

27. 88 *ft/sec* = _____ *mi/hr*
A. 60 B. 44 C. 176 D. 55 E. 45

28. Every horizontal line has a _____ slope.
A. positive B. undefined C. zero D. curved E. negative

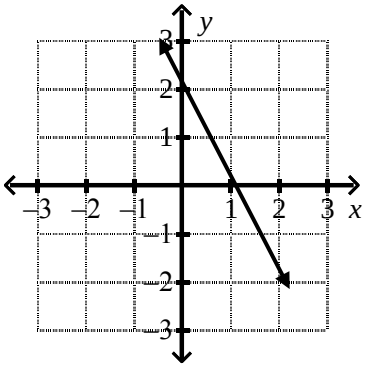
29. Aneesh noticed the time was 10:11 am on his digital clock. How many times during a twelve-hour period will the sum of the digits on Aneesh's clock be equal to 3?
A. 24 times B. 6 times C. 2 times D. 12 times E. 48 times

30. What is the midpoint between the points $(26, -8)$ and $(-20, -44)$?
A. (6, 18) B. $(3, -26)$ C. $(6, -26)$ D. $(3, -18)$ E. $(3, -52)$

31. Let A be equal to the product of $4a^2b$ and $10ab^5$. What is the degree of A?
A. 9 B. 6 C. 3 D. 40 E. 7

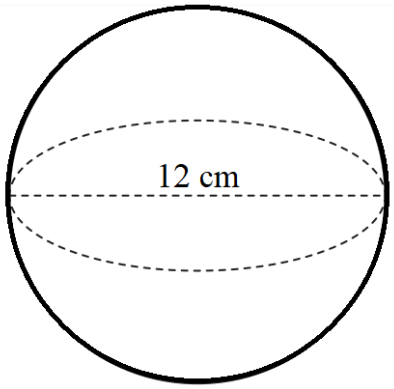
32. 9 quarters + 5 dimes – 13 nickels = _____
A. \$2.70 B. \$3.40 C. \$2.40 D. \$3.30 E. \$2.10

33. Which of the following is the equation of the line graphed below?



A. $y = 2x + 2$ B. $y = 2x - 2$ C. $y = -2x + 2$ D. $y = ½x + 2$ E. $y = -½x + 2$

34. In terms of π, what is the total surface area of the sphere below?



A. 576π cm^2 B. 144π cm^2 C. 2,304π cm^2 D. 288π cm^2 E. 96π cm^2

35. Connie deposits \$1,200 into a simple interest account at 6%. If Connie doesn't deposit any more money into the account, how much money will be in the account after 7 years?
A. \$509.00 B. \$504.00 C. \$1,709.00 D. \$5,160.00 E. \$1,704.00

36. What is the next number in the sequence 0, 3, 3, 6, 9, 15, 24, 39, …?
A. 53 B. 63 C. 59 D. 61 E. 57

37. Given the set, 87, 45, 53, 34, 87, 19, and 55, what is the value of the median subtracted from the mode?
A. 34 B. 53 C. 74 D. -13 E. -28

38. Mike scored an 87, 82, and an 84 on his first three quizzes. What must Mike score on his fourth quiz to have an average of 85?
A. 89 B. 88 C. 87 D. 86 E. 91

39. In the student body, the ratio of boys to girls is 4 to 7. If there are 240 boys, how many girls are there?
A. 180 B. 220 C. 240 D. 420 E. 490

40. Which of the following is equivalent to i^{37}?

A. 1 B. i C. 0 D. -1 E. $-i$

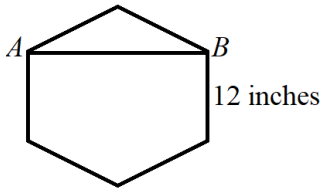
41. $54_6 - 25_6$ = _____ (base 6)

A. 25 B. 24 C. 31 D. 30 E. 29

42. $\begin{bmatrix} 17 & 23 \\ -11 & -6 \end{bmatrix} - \begin{bmatrix} -13 & -16 \\ 13 & -1 \end{bmatrix}$ = _____

A. $\begin{bmatrix} 4 & 7 \\ 2 & -5 \end{bmatrix}$ B. $\begin{bmatrix} 30 & 39 \\ -24 & -5 \end{bmatrix}$ C. $\begin{bmatrix} 4 & 7 \\ 2 & -7 \end{bmatrix}$ D. $\begin{bmatrix} 30 & 39 \\ -24 & -7 \end{bmatrix}$ E. $\begin{bmatrix} 30 & 7 \\ -24 & -5 \end{bmatrix}$

43. A regular hexagon is drawn below. What is the measure of $\overline{AB}$?



A. 14 inches B. $14\sqrt{2}$ inches C. $15\sqrt{3}$ inches D. $12\sqrt{2}$ inches E. $12\sqrt{3}$ inches

44. If $(4x - 3)(x - 7) = Ax^2 + Bx + C$, what is the value of $AC - B$?

A. 106 B. 53 C. 115 D. -25 E. -12

45. 114 people were asked if they liked pepperoni, sausage, or both on their pizza. 59 people said they like pepperoni, 52 people said they liked sausage, and 13 people said they liked both. How many people liked neither of the choices?

A. 24 B. 18 C. 22 D. 16 E. 3

46. $0.0\overline{6}$ = _____ (fraction)

A. $\frac{1}{15}$ B. $\frac{2}{33}$ C. $\frac{4}{33}$ D. $\frac{3}{5}$ E. $\frac{2}{3}$

47. What is the standard form linear equation $4x - 12y = 36$ changed into slope-intercept form?

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

48. $\frac{16a^3}{7a^2} \cdot \frac{4a}{2a^2} \cdot \frac{14a^4}{a}$ = _____

A. $128a^2$ B. $128a^3$ C. $64a^3$ D. $64a$ E. $64a^2$

49. A circle with an equation of $(x - 3)^2 + (y + 7)^2 = 289$, what is the measure of the circle's diameter?

A. 37 units B. 289 units C. 17 units D. 51 units E. 34 units

50. Demetrius has a collection of coins consisting of quarters and dimes worth \$2.25. He has 2 more quarters than dimes. If Nesslea has nine more quarters than Demetrius, how many quarters does Nesslea have?

A. 14 B. 13 C. 17 D. 16 E. 15

2020 – 2021 TMSCA Middle School Mathematics Test #3 Answer Key

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

2020 – 2021 TMSCA Middle School Mathematics Test #3 Selected Answers

9. 123 = 100 + 20 + 3. Using Roman numerals, 100 = C, 20 = XX and 3 = III. Therefore, using Roman numerals, the number 123 is equal to CXXIII.

11. Lael the square as such:

a	b	c
d	e	f
g	h	i

From the diagram, we see there are nine 1×1 squares; a, b, c, d, e, f, g, h and i. There are four 2×2 squares; abed, bcfe, dehg and efih. There is one 3×3 square; abcdefghi. Therefore, there are 9 + 4 + 1 = 14 squares that can be found in the picture.

12. 64,000,000 + 36,000,000 = 100,000,000 = 1×10^8.

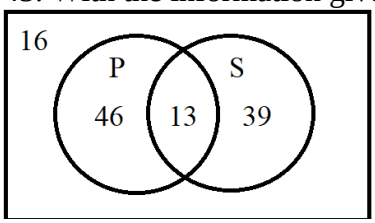
28. Every horizontal line has a zero-slope.

31. the product of $4a^2b$ and $10ab^5$ is equal to $4(10)a^{2+1}b^{1+5} = 40a^3b^6$. The degree of a monomial is the sum of the exponents of the monomial. So, the degree of $40a^3b^6$ is equal to 3 + 6 = 9.

34. The formula to find the surface area of a sphere is $SA = 4\pi r^2$. From our given sphere, we have a diameter of 12 cm, so the radius is ½ of 12 = 6 cm. Plugging into our formula and we get $SA = 4\pi(6^2) = 4\pi \cdot 36$, so therefore the surface area of the sphere is $SA = 144\pi$ cm^2.

44. $(4x - 3)(x - 7) = 4x^2 - 31x + 21$, so the value of $AC - B = 4(21) - (-31) = 84 + 31 = 115$.

45. With the information given, we know that if 13 people like pepperoni and sausage, then 59 – 13 = 46 people Only like pepperoni and 52 – 13 = 39 people that only like sausage. We can create a Venn diagram as shown. From the diagram, we see that a total of 46 + 13 + 39 = 98 people that like pepperoni, sausage, or both. This means that 114 – 98 = 16 people that like neither of the choices.



47. To change the standard form linear equation $4x - 12y = 36$ into slope-intercept form, we must solve for y. First, subtract $4x$ from both sides of the equation and get $4x - 12y - 4x = 36 - 4x$, which becomes, $-12y = -4x + 36$. Now, divide both sides of the equation by -12 and we get $\frac{-12y}{-12} = \frac{-4x}{-12} + \frac{36}{-12}$, which becomes, $y = \frac{1}{3}x - 3$.

48. Using the exponent rules $a^m \cdot a^n = a^{m+n}$ and $\frac{a^m}{a^n} = a^{m-n}$, $\frac{16a^3}{7a^2} \cdot \frac{4a}{2a^2} \cdot \frac{14a^4}{a} = \frac{16(4)(14)a^{3+1+4}}{7(2)a^{2+2+1}} = \frac{896a^8}{14a^5} = 64a^{8-5} = 64a^3$.

49. The equation of a circle is $(x - h)^2 + (y - k)^2 = r^2$, where (h, k) is the circle's center and r is the radius. We are given the equation $(x - 3)^2 + (y + 7)^2 = 289$, so the radius is $r = \sqrt{289} = 17$. Therefore, the diameter of the circle is 2(17) = 34 units.