

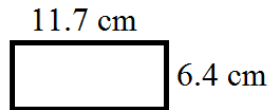
**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #3 ©
NOVEMBER 4, 2017**

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.

2017 – 2018 TMSCA Middle School Mathematics Test #3

1. $98 - 124 =$ _____
 A. 26 B. 222 C. -24 D. -36 E. -26
2. $-34 + (-49) =$ _____
 A. -83 B. -76 C. 15 D. -15 E. -73
3. $12.6 \times 7.8 =$ _____
 A. 96.28 B. 98.28 C. 96.88 D. 98.48 E. 98.68
4. $50 \div 1.2 =$ _____
 A. 41.6 B. $40.\bar{8}$ C. $40.\bar{6}$ D. $41.\bar{6}$ E. $41.\bar{3}$
5. Mitchel listed his friends' favorite numbers as 48, 278, 5, 15 and 132. What is the median of the numbers?
 A. 95.6 B. 48 C. 72 D. 127 E. 272
6. 90 is 30% of what number?
 A. 120 B. 270 C. 300 D. 240 E. 360
7. What is the sum of the next two terms in the sequence? 76, 68, 60, 52, ...
 A. 80 B. 84 C. 96 D. 88 E. 76
8. Michael threw a football 168 feet. How many yards long was Michael's pass?
 A. 46 yards B. 24 yards C. 52 yards D. 62 yards E. 56 yards
9. Calculate the sum of the digits of the product of $7 \times 7 \times 9 \times 9$.
 A. 18 B. 27 C. 32 D. 12 E. 23
10. Mark has \$17.52, Humza has \$132.19 and Farhan has \$67.13. If all three boys combined their money and then split the total evenly, how much more money will Mark now have than when he started?
 A. \$72.28 B. \$24.08 C. \$5.15 D. \$48.22 E. \$54.76
11. Marcel has a piece of rope that is 4 meters long. If Marcel cuts off a piece of rope that is 2,300 millimeters long, how much rope is remaining?
 A. 17 meters B. 170 centimeters C. 170 millimeters D. 1.7 centimeters E. 1,700 centimeters
12. If $a \Delta b = a^3 + b$, then find the value of $-3 \Delta 5$.
 A. -32 B. 32 C. 14 D. -22 E. -4
13. Simplify: $(15 - 12 - 8)^2 - (5^2 + 16 + 13)$
 A. -29 B. -61 C. -57 D. -43 E. -54
14. In 2012, German freediver Tom Sietas held his breath underwater for 22 minutes and 22 seconds. An alligator can hold its breath for up to two hours underwater. How much longer can an alligator hold its breath underwater than Tom Sietas?
 A. 1 hr 37 min 38 sec B. 1 hr 19 min 38 sec C. 1 hr 39 min 38 sec D. 1 hr 38 min 38 sec E. 1 hr 37 min 19 sec
15. To the nearest tenth, what is the area of the rectangle?



- A. 75.6 cm^2 B. 74.7 cm^2 C. 75.0 cm^2 D. 75.2 cm^2 E. 74.9 cm^2

16. $(0.008)^2 =$ _____ (scientific notation)
 A. 6.4×10^{-5} B. 6.4×10^{-6} C. 6.4×10^{-4} D. 6.4×10^5 E. 6.4×10^6

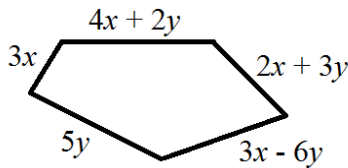
17. If $x \odot y = -x - y$, then what is the value of $(-12) \odot 21$?
 A. 9 B. -33 C. -9 D. 33 E. 1

18. $99 =$ _____ (Roman numeral)
 A. XCIX B. IC C. XDIX D. ID E. IL

19. $4\frac{5}{8} + 3\frac{1}{2} + 11\frac{3}{4} =$ _____
 A. $18\frac{9}{14}$ B. $18\frac{7}{8}$ C. $19\frac{1}{8}$ D. $19\frac{7}{8}$ E. $19\frac{3}{8}$

20. Christy closed her eyes and then opened her book. When she opened her eyes, the sum of the two pages of her open book was 171. What is the product of the two page numbers?
 A. 8,556 B. 7,310 C. 7,140 D. 7,482 E. 7,395

21. What is the perimeter of the pentagon?



A. $16xy$ B. $12x4y$ C. $16x + 4y$ D. $12x + 4y$ E. $12x + 16y$

22. Which of the following relations is not a function?
 A. $\{(1, 2), (2, 3), (3, 4)\}$ B. $\{(1, 1), (2, 2), (3, 3)\}$ C. $\{(1, 1), (2, 1), (3, 1)\}$ D. $\{(1, 1), (1, 2), (1, 3)\}$ E. all are functions

23. What is the sum of the distinct prime divisors of the number 910?
 A. 27 B. 29 C. 19 D. 28 E. 25

24. What are the new coordinates of the point $(-31, -19)$ after it is reflected across the y-axis?
 A. $(-31, 19)$ B. $(31, -19)$ C. $(31, 19)$ D. $(-19, -31)$ E. $(-19, 31)$

25. Kermit has a bag of 30 marbles that are red, blue and green. 12 of the marbles are red and 8 of the marbles are green. What is the probability Kermit reaches into his bag and pulls out a blue marble?
 A. $\frac{2}{5}$ B. $\frac{4}{15}$ C. $\frac{1}{3}$ D. $\frac{2}{3}$ E. $\frac{3}{5}$

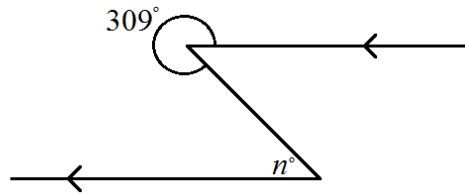
26. Simplify: $(3w^5)^3$
 A. $9w^8$ B. $9w^{15}$ C. $6w^{15}$ D. $27w^8$ E. $27w^{15}$

27. What is the additive inverse of the LCM of the numbers 45 and 20?
 A. -180 B. 5 C. -5 D. 900 E. 180

28. If Marcel writes down the word FRACTION 27 times, what will be the 90th letter he writes down?
 A. T B. R C. O D. C E. T

29. With a straight edge and compass, Neil constructed a regular 18-sided polygon. Neil is curious and measures the interior angle of his polygon. What was the measure of the interior angle of Neil's polygon?
 A. 145° B. 130° C. 140° D. 175° E. 160°

30. What is the value of n ?



- A. 39 B. 129 C. 29 D. 51 E. 71

31. $103_4 = \underline{\hspace{2cm}}$ (base 10)

- A. 19 B. 63 C. 67 D. 66 E. 69

32. If $f(x) = \frac{12x-7}{5}$, then find the value of $f(11)$.

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

33. Three years ago, Tony deposited \$800 into a simple interest account with a rate of 4%. If Tony doesn't withdraw any money out of his account, how much interest will Tony have acquired, in total, after four more years?

- A. \$96.00 B. \$128.00 C. \$928.00 D. \$896.00 E. \$224.00

34. Which of the following polynomials is a quadratic trinomial?

- A. $4x^2 - 2$ B. $3x^3 + 5x - 1$ C. $4x^2 - x - 2$ D. $5x^4 - 4x + 6$ E. $4x + 4$

35. The ratio of red roses to yellow roses is 4:15. If there are 120 yellow roses, how many red roses are there?

- A. 450 red roses B. 32 red roses C. 48 red roses D. 90 red roses E. 42 red roses

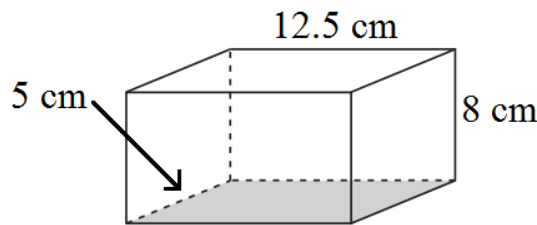
36. $\{12, 14, 16, 18, 20, 22, 24\} \cap \{4, 8, 12, 16, 20, 24, 28\} \cap \{2, 4, 6, 8, 10, 12\}$ has _____ element(s).

- A. 6 B. 4 C. 8 D. 12 E. 1

37. Which of the following is the decay factor of the exponential decay function $y = 0.75(0.115)^x$?

- A. 0.115 B. 0.75 C. 75 D. 11.5 E. 0.885

38. To the nearest whole number, what is the lateral surface area of the rectangular prism?



- A. 405 cm^2 B. 280 cm^2 C. 500 cm^2 D. 250 cm^2 E. 320 cm^2

39. If a triangle has side lengths of 20, 21 and 29 units long, then the triangle must be which of the following?

- A. acute B. obtuse C. right D. isosceles E. equilateral

40. What is the slope of a line that passes through the points $(12.2, 1.8)$ and $(4.2, -3.2)$?

- A. $\frac{3}{8}$ B. $\frac{1}{2}$ C. $\frac{1}{4}$ D. $\frac{5}{8}$ E. $\frac{7}{8}$

41. The vertex of the quadratic equation $0 = 3x^2 + 12x - 8$ has coordinates (a, b) . If the vertex is translated nine units to the right and up fifteen units, what are its new coordinates?

- A. $(4, 10)$ B. $(-2, 9)$ C. $(2, -9)$ D. $(7, -5)$ E. $(6, -6)$

42. Which of the following is not a solution to the inequality $\frac{2}{3}(6x - 9) \leq -3x + 4$?

- A. 2 B. -10 C. $\frac{1}{2}$ D. 0 E. $-\frac{3}{8}$

43. At a school dinner fundraiser, adult tickets cost \$7 and child tickets cost \$5. If 90 people attended the dinner and the total money raised was \$554, how many adults attended the dinner?

- A. 48 B. 52 C. 50 D. 54 E. 46

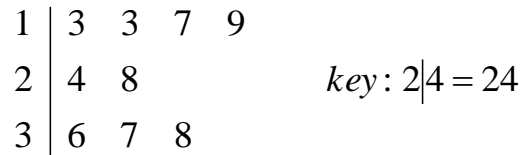
44. Factor completely: $49n^2 - 64$

- A. $(7n - 8)^2$ B. $(7n + 8)^2$ C. $(7n - 8)(7n + 8)$ D. not factorable E. $(7n - 32)(7n + 32)$

45. In a 30-60-90 right triangle, if the hypotenuse measures 44 cm, what is the measure of its long leg?

- A. 22 cm B. $22\sqrt{2}$ cm C. $22\sqrt{3}$ cm D. $\frac{22\sqrt{3}}{3}$ cm E. $\frac{22\sqrt{2}}{3}$ cm

46. What is the value of the upper quartile of the stem-and-leaf plot?



- A. 36.5 B. 34.5 C. 38 D. 25 E. 25.5

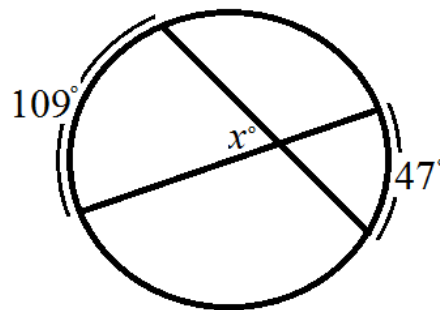
47. In terms of π , what is the circumference of the circle with the equation $(x + 12)^2 + (y - 8)^2 = 289$?

- A. 289π units B. 17π units C. 34π units D. 145.5π units E. 8.5π units

48. Simplify: $\frac{5}{\sqrt{6}}$

- A. $\sqrt{30}$ B. $\frac{\sqrt{6}}{5}$ C. $\frac{\sqrt{30}}{6}$ D. $\frac{5\sqrt{6}}{6}$ E. $\frac{5+\sqrt{6}}{6}$

49. What is the value of x in the picture?



- A. 64 B. 82 C. 71 D. 43 E. 78

50. Solve for n : $\frac{1}{2}(4n - 7) = \frac{7}{4}n$

- A. $n = 8$ B. $n = 21$ C. $n = 14$ D. $n = 28$ E. $n = -7$

2017 – 2018 TMSCA Middle School Mathematics Test #3 Answer Key

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

7. Because there is a common difference between the terms, the sequence 76, 68, 60, 52, ... is an arithmetic sequence. So, the common difference is -8 . If -8 is added to each term, you find the next term. Therefore, the sequence is 76, 68, 60, 52, 44, 36, ... The sum of 44 and 36 is 80.

9. $7 \times 7 \times 9 \times 9 = 3,969$, and $3 + 9 + 6 + 9 = 27$.

16. $(0.008)^2 = 0.000064 = 6.4 \times 10^{-5}$ (scientific notation).

21. To find the perimeter of the shape, add together all the side lengths and then combine like terms. Remember, if the terms are not alike, they cannot be combined. $4x + 2y + 3x + 5y + 3x - 6y + 2x + 3y = 12x + 4y$.

26. The power rule of exponents states that to raise a power to a power, you need to multiply the exponents. Algebraically, the rule is $(a^m)^n = a^{m \cdot n}$. We are given $(3w^5)^3$, so by using the power rule, $(3w^5)^3 = 3^3 \cdot (w^5)^3 = 27 \cdot w^{5 \cdot 3} = 27w^{15}$.

28. The word FRACTION has 8 letters. We want to know what the 90th letter will be that is written down. 90 divided by 8 is equal to 11 with a remainder of 2. Therefore, the 90th letter written down will be the second letter of the word FRACTION, which is the letter R.

29. To find the interior angle of a regular polygon, find the total degrees of the polygon and then divide by the number of sides. Recall that the formula to find the total degrees of a polygon is $(n - 2)180$. Neil's polygon has 18 sides, so $(18 - 2)180 = 16(180) = 2,880^\circ$. Now divide the total degrees by 18 and $\frac{2880}{18} = 160^\circ$. The interior angle measure of an 18-sided polygon is 160° .

39. We use the Pythagorean Theorem to classify triangles. a and b will always be the shortest sides. If $a^2 + b^2 = c^2$, then the triangle is right, if $a^2 + b^2 < c^2$, then the triangle is obtuse, if $a^2 + b^2 > c^2$, then the triangle is acute. $20^2 + 21^2 = 400 + 441 = 841$ and $29^2 = 841$, so therefore the triangle is a right triangle.

41. A quadratic equation is in the form $y = Ax^2 + Bx + C$. To find the vertex, use $\left(\frac{-B}{2A}, f\left(\frac{-B}{2A}\right)\right)$. We are given the equation $0 = 3x^2 + 12x - 8$, so $A = 3$ and $B = 12$. The x coordinate is $\frac{-B}{2A} = \frac{-12}{2 \cdot 3} = \frac{-12}{6} = -2$. To find the y -coordinate, substitute the x -coordinate into the equation and simplify, $y = 3(-2)^2 + 12(-2) - 8 = 3 \cdot 4 + 12(-2) - 8 = -20$. The vertex of the quadratic equation is $(-2, -20)$. The translation is $(x, y) \rightarrow (x + 9, y + 15)$, so $(-2, -20) \rightarrow (-2 + 9, -20 + 15) \rightarrow (7, -5)$. The new coordinates of the vertex, after the translation, are $(7, -5)$.

44. $49n^2 - 64$ is a difference of squares. To factor a difference of squares, follow $a^2 - b^2 = (a + b)(a - b)$. Therefore, if we have $49n^2 - 64$, then $a = 7n$ and $b = 8$. Factor to get $49n^2 - 64 = (7n + 8)(7n - 8)$.

48. You cannot have a radical in the denominator of a fraction. In order to eliminate the radical in the denominator, multiply by 1. We know that 1 is equal to any number divided by itself, so $1 = \frac{\sqrt{6}}{\sqrt{6}}$. Multiply $\frac{5}{\sqrt{6}}$ by $\frac{\sqrt{6}}{\sqrt{6}}$ and we get $\frac{5}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{5\sqrt{6}}{\sqrt{36}} = \frac{5\sqrt{6}}{6}$.

49. An angle formed by two intersecting chords is equal to one-half the sum of the intercepted arcs. Therefore, $m\angle x = \frac{1}{2}(109 + 47) = \frac{1}{2}(156) = 78^\circ$. The value of x is 78.