

**TMSCA MIDDLE SCHOOL
MATHEMATICS
TEST #7 ©
JANUARY 13, 2018**

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. $123.76 + 321.78 =$ _____ (nearest tenth)

- A. 445.6 B. 445.5 C. 445.4 D. 445 E. 446

2. $1,001 - 388 =$ _____ (nearest ten)

- A. -610 B. 600 C. 613 D. 610 E. 620

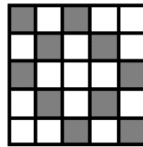
3. $45.2 \times 76.3 =$ _____ (nearest integer)

- A. 3,448.76 B. 3,448.8 C. 3,450 D. 3,400 E. 3,449

4. $11\frac{1}{10} \div (-0.3) =$ _____

- A. -3.7 B. -0.37 C. -37 D. -370 E. -0.037

5. What percentage of the square below is shaded?



- A. 35% B. 40% C. 45% D. 37.5% E. 30%

6. A factory can make 3×10^4 t-shirts in one day. How many t-shirts can the factory make in 20 days?

- A. 2×10^5 B. 2×10^6 C. 6×10^5 D. 6×10^6 E. 6×10^7

7. How many positive integral divisors does the number 780 have?

- A. 48 B. 18 C. 28 D. 24 E. 32

8. Marquez weighed himself, but his scale was set to measure in ounces, not pounds. If Marquez recorded his weight to be 1,352 ounces, how many pounds does Marquez weigh?

- A. $83\frac{3}{8}$ pounds B. $84\frac{1}{4}$ pounds C. $84\frac{1}{8}$ pounds D. $84\frac{3}{4}$ pounds E. $84\frac{1}{2}$ pounds

9. If three dozen mechanical pencils cost \$42.12, how much do ten mechanical pencils cost?

- A. \$14.70 B. \$4.21 C. \$14.21 D. \$11.70 E. \$11.21

10. $1,054 - 191 - 376 =$ _____

- A. CDXLVII B. CDLXXXVII C. CDLXXIV D. CCCXXXVIII E. CDLXXXII

11. The measure of an angle is six more than twice the measure of its complement. Find the measure of the supplement of the larger angle.

- A. 118° B. 110° C. 98° D. 114° E. 106°

12. Luis has \$320 and is going shopping. If he spends 24% of his money, how much does he have remaining?

- A. \$243.20 B. \$76.80 C. \$274.80 D. \$248.20 E. \$272.60

13. Simplify: $4\left(\frac{7}{4} - \frac{1}{2}\right) - 8\left(\frac{1}{2} - \frac{3}{8}\right)$

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

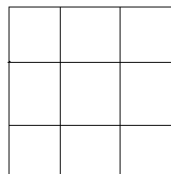
14. Which set of numbers below has the largest median?

- A. 18, 5, 12 B. 32, 1, 1 C. 480, 7, 9 D. 9, 10, 45 E. 7.4, 2.1, 18

15. What is the sum of the first twelve positive odd integers?

- A. 136 B. 156 C. 144 D. 148 E. 152

16. Which of the following is the solution to the inequality $3n + 5 < n + 17$?
 A. $n < -6$ B. $n > 6$ C. $n = 6$ D. $n < 6$ E. $n > -6$
17. Evaluate the expression $|3m + 2n^2|$ for $m = -2$ and $n = -4$.
 A. -18 B. 38 C. 2 D. 20 E. 26
18. What is the perimeter of a rectangle with a length of 37 inches and a width 19 inches less than its length?
 A. 162 inches B. 110 inches C. 112 inches D. 186 inches E. 116 inches
19. What are the odds of rolling a number cube labeled 1 – 6 and it landing with a 5 facing up?
 A. 1:6 B. 1:3 C. 1:5 D. 1:4 E. 1:2
20. Let A and B be positive integers, such that $\frac{A}{2} = \frac{B}{3}$. C is the LCM of A and B , and D is the GCF of A and B , and $CD = 96$. What is the value of $\frac{1}{2}B + A$?
 A. 12 B. 14 C. 20 D. 18 E. 16
21. There are 11 offensive football players on the field at the same time. In how many ways can the coach choose players for quarterback and center?
 A. 21 B. 132 C. 110 D. 121 E. 42
22. Becky is making cookie platters for her friends. Becky has 24 chocolate chip cookies, 42 lemon cookies and 36 peanut butter cookies. What is the greatest number of cookie platters Becky can make if she uses all of these cookies and all the platters are identical?
 A. 8 B. 6 C. 10 D. 12 E. 9
23. What is the product of the additive inverse of 18 and the reciprocal of $\frac{2}{3}$?
 A. -27 B. -12 C. 12 D. $-\frac{1}{12}$ E. 27
24. If $\triangle ABC \sim \triangle XYZ$, then $\frac{AB}{AC}$ is proportional to which of the following?
 A. $\frac{XY}{XZ}$ B. $\frac{XY}{YZ}$ C. $\frac{BC}{AC}$ D. $\frac{XY}{AB}$ E. $\frac{AC}{XZ}$
25. 135° is the measure of an interior angle of any regular _____.
 A. hexagon B. nonagon C. octagon D. decagon E. dodecagon
26. What is the range of the function $f(x) = 17 - 3x$, given the domain of $\{-2, \frac{1}{3}, 9\}$?
 A. $\{11, 16, 5\}$ B. $\{11, 16, -10\}$ C. $\{23, 14, 5\}$ D. $\{23, 14, -10\}$ E. $\{23, 16, -10\}$
27. What is the simple interest earned when depositing \$1,200.00 at 4% for 18 months?
 A. \$48.00 B. \$96.00 C. \$72.00 D. \$64.00 E. \$86.00
28. Nine unit squares are arranged to form a square array as shown below. What is the maximum number of diagonals of length $\sqrt{2}$ that can be drawn in these unit squares so that no two diagonals share a common point, including endpoints?



- A. 9 B. 12 C. 4 D. 6 E. 3

29. What is the height of a rectangular prism with a length of 4.8 inches, a width of 5 inches and a volume of 216 in^3 ?
 A. 5,184 inches B. 11.5 inches C. 7 inches D. 9 inches E. 12 inches

30. Mrs. Spell told her math class that students tend to forget one-fifth of the strategies they learned the previous week. If the students learn twenty-five strategies, which equation represents the number of strategies forgotten after x weeks?

A. $y = \frac{1}{5}(25)^x$ B. $y = 25(0.8)^x$ C. $y = 25(0.4)^x$ D. $y = \frac{4}{5}(25)^x$ E. $y = 25\left(\frac{1}{5}\right)^x$

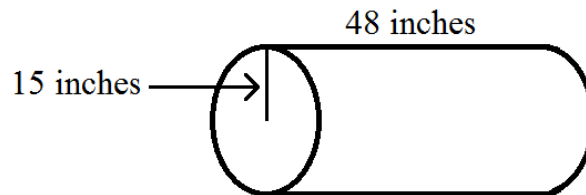
31. $14_7 + 33_7 = \underline{\hspace{2cm}}$ (base 10)

A. 42 B. 37 C. 35 D. 31 E. 33

32. Simplify: $\frac{4n^2m^4}{3n^{-3}m}$

A. $\frac{n^6}{m^3}$ B. n^6m^3 C. $\frac{4n^6}{3m^3}$ D. $\frac{4n^5m^4}{3}$ E. $\frac{4n^5m^3}{3}$

33. What is the lateral surface area of the cylinder? Let $\pi = 3$.



A. $4,310 \text{ in}^2$ B. $5,670 \text{ in}^2$ C. $2,835 \text{ in}^2$ D. $4,340 \text{ in}^2$ E. $4,320 \text{ in}^2$

34. A $3 \times 3 \times 3$ cube has all of its faces painted red. If the cube is separated into 27 unit cubes, how many of the unit cubes have exactly two of its faces painted red?

A. 20 B. 8 C. 12 D. 6 E. 14

35. The point (9, 8) is the midpoint between the points (10, 4) and (8, n). What is the value of n ?

A. 6 B. 8 C. 14 D. 12 E. 4

36. Mary had a bowl of five large strawberries. The average mass of the five strawberries was 40 grams. Mary ate one of the strawberries and the average mass of the four remaining strawberries was 30 grams. What was the mass of the strawberry Mary ate?

A. 80 grams B. 25 grams C. 35 grams D. 90 grams E. 75 grams

37. What is the area of a 30-60-90 triangle with a hypotenuse of 40 inches?

A. $200\sqrt{2} \text{ in}^2$ B. $200\sqrt{3} \text{ in}^2$ C. $400\sqrt{2} \text{ in}^2$ D. $400\sqrt{3} \text{ in}^2$ E. $\frac{400\sqrt{3}}{3} \text{ in}^2$

38. There are seven books labeled alphabetically A – G on a shelf. Lucas will choose two of the books. What is the probability that Lucas chooses the books that are labeled A and B, in either order?

A. $\frac{1}{42}$ B. $\frac{2}{7}$ C. $\frac{1}{7}$ D. $\frac{1}{14}$ E. $\frac{1}{21}$

39. The mean absolute deviation of the numbers 17, 16, 22, 19 and 31 is which of the following?

A. 2.1 B. 4.2 C. 4.4 D. 5.2 E. 3.8

40. What is the range of the graph of the quadratic equation $y = 3x^2 + 6x - 4$?

A. all real numbers B. $y \geq -4$ C. $y \leq -4$ D. $y \geq -7$ E. $y \geq 5$

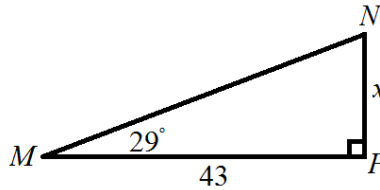
41. A line with an equation of $4x + 6y = 7$ is parallel to a line with an equation of $-2x + By = -1$. What is the value of B ?

- A. 12 B. $-\frac{1}{3}$ C. 3 D. -9 E. -3

42. Which of the following is the solution of the system $\begin{cases} 3a + 2b = 18 \\ 4b = -6a + 36 \end{cases}$?

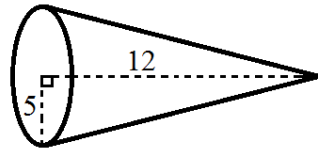
- A. infinitely many solution B. no solution C. (2, 6) D. (10, -6) E. (-6, 18)

43. Which equation can be used to solve for x ?



- A. $\sin(29) = \frac{x}{43}$ B. $\cos(29) = \frac{43}{x}$ C. $\cos(29) = \frac{x}{43}$ D. $\tan(29) = \frac{43}{x}$ E. $\tan(29) = \frac{x}{43}$

44. If $\pi = 3$, what is the total surface area of the cone?



- A. 270 units² B. 195 units² C. 255 units² D. 290 units² E. 260 units²

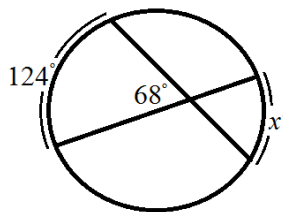
45. Simplify: $6\sqrt{8} + \sqrt{98} - 5\sqrt{2}$

- A. $14\sqrt{2}$ B. $6\sqrt{2}$ C. $4\sqrt{2}$ D. $24\sqrt{2}$ E. $10\sqrt{2}$

46. Factor completely: $40w^2 - 60w - 8w + 12$

- A. $(8w - 12)(5w - 1)$ B. $(2w - 3)(20w - 4)$ C. $2(2w - 3)(10w - 2)$ D. $2(4w - 6)(5w - 1)$ E. $4(2w - 3)(5w - 1)$

47. In the picture, what is the value of x ?



- A. 12 B. 56 C. 22 D. 34 E. 16

48. Subtract: $\frac{3m}{m+2} - \frac{m-4}{m+2}$

- A. 2 C. $\frac{1}{2}$ D. $\frac{2}{m+2}$ E. $\frac{2m-4}{m+2}$

49. Chelsea is $1\frac{1}{3}$ times as old as her brother Martin. Five years ago, Chelsea's age was $1\frac{1}{2}$ times as Martin's. How old is Chelsea currently?

- A. 25 C. 15 D. 10 E. 18

50. If $7^x = 54$, what is the value of 7^{x+1} ?

- A. 55 C. 108 D. 343 E. 378

2017 – 2018 TMSCA Middle School Mathematics Test #7 Answer Key

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

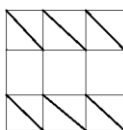
2017-2018 TMSCA Middle School Mathematics Test #7 Selected Answers

10. $1,054 - 191 - 376 = 487 = 400 + 80 + 7$. $400 = CD$, $80 = LXXX$ and $7 = VII$. Therefore, $487 = CDLXXXVII$.

15. To find the sum of the first n positive odd integers, use n^2 , where n is the number of integers we want the sum of. We are asked to find the sum of the first twelve positive odd integers, so $12^2 = 144$.

26. The range values of the function $f(x) = 17 - 3x$ when the domain is $\{-2, \frac{1}{3}, 9\}$ can be found by substituting each domain value into the equation individually and finding the output, or range, values. $f(-2) = 17 - 3(-2) = 23$, $f(\frac{1}{3}) = 17 - 3(\frac{1}{3}) = 16$ and $f(9) = 17 - 3(9) = -10$. The range values of the function $f(x) = 17 - 3x$ when the domain is $\{-2, \frac{1}{3}, 9\}$ are $\{23, 16, -10\}$.

28. There are six diagonals that can be drawn in the unit squares so that no two diagonals share a common point, including endpoints.



31. We want to find out what $14_7 + 33_7$ in base 10. $14_7 = 1 \cdot 7^1 + 4 \cdot 7^0 = 11_{10}$ and $33_7 = 3 \cdot 7^1 + 3 \cdot 7^0 = 24_{10}$. Therefore, $11 + 24 = 35$ and $14_7 + 33_7 = 35_{10}$.

36. If the average mass of five strawberries was 40 grams, then the five strawberries had a total of $5(40) = 200$ grams. The average mass of the four remaining strawberries was 30 grams, so the four remaining strawberries had a total mass of $4(30) = 120$ grams. To find the mass of the strawberry Mary ate, subtract the 120 grams from the 200 grams. $200 - 120 = 80$ grams, which is the mass of the strawberry Mary ate.

38. There are seven books. Lucas is choosing two books, so there are $7 \cdot 6 = 42$ different ways he can choose the two books. He can choose A then B, or he can choose B then A, which is two different ways of choose either A and B. So, the probability Lucas chooses books labeled A and B is $\frac{2}{42} = \frac{1}{21}$.

40. A quadratic equation in standard form $y = Ax^2 + Bx + C$ opens up when $A > 0$ and down when $A < 0$. We are given the equation $y = 3x^2 + 6x - 4$, and since $A = 3$, the parabola opens upward. We need to find the vertex, using $\frac{-B}{2A}$ to find the x -coordinate of the vertex. Since $B = 6$, then $\frac{-6}{2(3)} = \frac{-6}{6} = -1$, which is our x -coordinate of the vertex. Substitute -1 into the equation gives us $y = 3(-1)^2 + 6(-1) - 4 = -7$, which is the y -coordinate of the vertex. Since the vertex $(-1, -7)$ is also the minimum of the parabola, the range, or y -values the graph spans, is then $y \geq -7$.

44. The formula to find the total surface area of a cone is $SA = \pi r^2 + \pi r l$, where r is the radius of the cone and l is the slant height of the cone. First we need to find the slant height of the cone, using the Pythagorean Theorem, $a^2 + b^2 = c^2$. $5^2 + 12^2 = 25 + 144 = 169 = c^2$, so $c = 13$. Substitute $\pi = 3$, $r = 5$ and $l = 13$, and $SA = \pi r^2 + \pi r l = 3(5^2) + 3(5)(13) = 270$ units².

45. $6\sqrt{8} + \sqrt{98} - 5\sqrt{2} = 6 \cdot \sqrt{4 \cdot 2} + \sqrt{49 \cdot 2} - 5\sqrt{2} = 6 \cdot 2\sqrt{2} + 7\sqrt{2} - 5\sqrt{2} = 12\sqrt{2} + 7\sqrt{2} - 5\sqrt{2} = 14\sqrt{2}$.

48. $\frac{3m}{m+2} - \frac{m-4}{m+2} = \frac{3m-(m-4)}{m+2} = \frac{3m-m+4}{m+2} = \frac{2m+4}{m+2} = \frac{2(m+2)}{m+2} = \frac{2\cancel{m+2}}{\cancel{m+2}} = 2$.

50. Using exponent rules, we know that $7^{x+1} = 7^x \cdot 7^1$. Since $7^x = 54$, then $7^{x+1} = 54 \cdot 7^1 = 378$.

