



TMSCA MIDDLE SCHOOL MATHEMATICS KICK-OFF TEST © 2021 - 2022

GENERAL DIRECTIONS

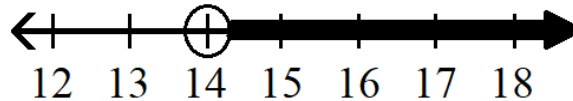
1. About this test:
 - A. You will be given 40 minutes to take this test.
 - B. There are 50 problems on this test.
2. All answers must be written on the answer sheet/Scantron form/Chatsworth card provided. If you are using an answer sheet be sure to use **BLOCK CAPITAL LETTERS**. Clean erasures are 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.

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2021 – 2022 TMSCA Middle School Mathematics Kick-Off Test

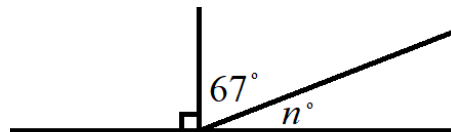
1. $287 + 157 =$ _____
 A. 130 B. 45,059 C. 449 D. 444 E. 384
2. $99 - 67 =$ _____
 A. 32 B. 42 C. 166 D. 156 E. 6,633
3. $15 \times 18 =$ _____
 A. 370 B. 290 C. 270 D. 33 E. 1,215
4. $164 \div 4 =$ _____
 A. 44 B. 160 C. 168 D. 121 E. 41
5. Which expression represents the sum of a number and nineteen?
 A. $19n$ B. $n - 19$ C. $n + 19$ D. $\frac{n}{19}$ E. $\frac{19}{n}$
6. How many distinct prime factors does the number 56 have?
 A. 4 B. 3 C. 2 D. 1 E. 5
7. What is the reciprocal of the number $3\frac{2}{3}$?
 A. $\frac{3}{11}$ B. $-\frac{11}{3}$ C. $-3\frac{2}{3}$ D. $-3.\bar{6}$ E. $\frac{11}{3}$

8. The graph below represents which of the following inequalities?



- A. $n < 14$ B. $n > 14$ C. $n \leq 14$ D. $n \geq 14$ E. $n = 14$
9. What is the greatest common factor, or GCF, of the numbers 42 and 63?
 A. 14 B. 7 C. 21 D. 105 E. 126
 10. What is the next term in the sequence 25, 31, 37, ...?
 A. 42 B. 43 C. 45 D. 44 E. 49

11. What is the value of n in the picture below?



- A. 113 B. 83 C. 13 D. 63 E. 23
12. $29 =$ _____ (Roman numeral)
 A. CCIC B. XXVIII C. XXIX D. IXXX E. XXIV
 13. The number 5.4 is only a member of which of the following?
 A. whole number B. natural number C. counting number D. integer E. rational number

14. In which quadrant is the point $(-5, 8)$ plotted in?

- A. Quadrant I B. Quadrant II C. Quadrant III D. Quadrant IV E. Quadrant V

15. What value is 50% of the sum of 54 and 78?

- A. 74 B. 52 C. 66 D. 64 E. 68

16. What is the mean of the set of numbers 73, 23, 55, 13, and 61?

- A. 41 B. 55 C. 37 D. 45 E. 39

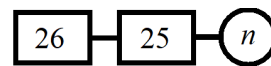
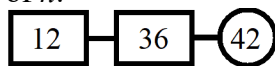
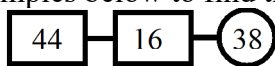
17. Convert 4,560 into scientific notation.

- A. 456×10^1 B. 0.456×10^4 C. 4.56×10^3 D. 4.56×10^{-3} E. 45.6×10^2

18. Which value of x makes the equation $4x - 7 = 37$ true?

- A. 11 B. 12 C. 7.5 D. 14 E. 10.5

19. Use the examples below to find the value of n .



- A. 51 B. 30 C. 31 D. 38 E. 48

20. Which of the following values is seven more than the largest prime number less than 40?

- A. 37 B. 30 C. 38 D. 44 E. 50

21. 17 quarters = _____

- A. \$5.25 B. \$4.50 C. \$4.75 D. \$4.25 E. \$5.50

22. If $a \blacksquare b = 3a + 5b$, then what is the value of $4 \blacksquare 9$?

- A. 21 B. 47 C. 57 D. 104 E. 93

23. $\angle K$ is the complement of $\angle L$. If the measure of $\angle L = 77^\circ$, then what is the measure of $\angle K$?

- A. 13° B. 23° C. 103° D. 93° E. 113°

24. What is the unit rate of buying 9 theater tickets for \$58.50?

- A. \$49.50 B. \$6.50 C. \$12.50 D. \$8.50 E. \$67.50

25. $57_9 = \underline{\hspace{2cm}}$ (base 10)

- A. 570 B. 54 C. 52 D. 49 E. 51

26. If $f(x) = 4x - 9$, then find $f(13)$.

- A. 8 B. 404 C. 39 D. 43 E. 52

27. If $A = \{1, 2, 3, 4, 5\}$ and $B = \{3, 4, 5, 6, 7\}$, how many elements are in $A \cap B$?

- A. 7 B. 10 C. 0 D. 3 E. 4

28. $\frac{7}{9} = \underline{\hspace{2cm}}$ (decimal)

- A. 0.7 B. 0.78 C. 0.778 D. $0.\overline{778}$ E. $0.\overline{7}$

29. Which of the following is an example of an arithmetic sequence?

- I. 5, 10, 15, 20 II. 1, $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ III. 0.1, 1, 10, 101, IV. 76, 75, 74, 73

- A. I only B. I and IV only C. II and III only D. II and IV only E. III and IV only

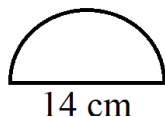
30. Nana has a bag full of 5 green marbles, 17 red marbles and 3 blue marbles. If Nana accidentally drops one of her marbles on the floor, what is the probability it is a blue marble?

- A. 12% B. 3% C. 20% D. 68% E. 6%

31. What is the slope of a line passing through the origin and the point (18, 12)?

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

32. What is the area of the semi-circle below? Let $\pi = 3$.



- A. 42 cm² B. 21 cm² C. 147 cm² D. 73.5 cm² E. 42.5 cm²

33. Point A has coordinates $(-4, 9)$ and is translated by the rule $(x - 5, y - 11)$. What are the new coordinates of point A ?

- A. $(-1, 2)$ B. $(1, -2)$ C. $(-9, 2)$ D. $(-9, -20)$ E. $(-9, -2)$

34. Simplify: $(14n^2 + 5n - 7) + (13 - 5n - 7n^2)$

- A. $7n^2 + 10n + 6$ B. $7n^2 + 6$ C. $21n^2 + 10n + 20$ D. $27n^2 - 14n^2$ E. $7n^2 - 10n + 6$

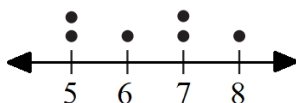
35. Which formula can be used to find the area of a triangle?

- A. $A = bh$ B. $A = \frac{bh}{3}$ C. $A = \frac{(b_1 + b_2)h}{2}$ D. $A = \frac{bh}{2}$ E. $A = \frac{d_1 \cdot d_2}{2}$

36. 35 meters = _____ centimeters

- A. 3,500 B. 3.5 C. 0.35 D. 35,000 E. 350,000

37. What is the median of the dot plot below?



- A. $6\frac{1}{2}$ B. $6\frac{1}{3}$ C. 3 D. 7 E. 6

38. Which of the following points does not lie on the line $y = -\frac{1}{2}x + 7$?

- A. $(-4, 9)$ B. $(-10, 12)$ C. $(0, -7)$ D. $(4, 5)$ E. $(14, 0)$

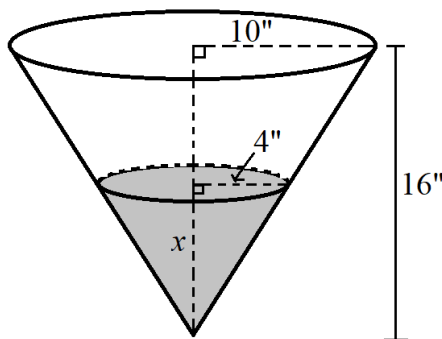
39. $a^4 \cdot a^{11} \cdot a^{-3} \cdot a^0$ is equivalent to which of the following?

- A. a^{12} B. 1 C. 0 D. a^0 E. a^{18}

40. Which of the following is not a Pythagorean triple?

- A. 3, 4, 5 B. 5, 12, 13 C. 8, 15, 17 D. 9, 24, 25 E. 20, 21, 29

41. What is the simple interest of depositing \$800 into a checking account for 3 years at 4%?
 A. \$899.89 B. \$899.90 C. \$96.00 D. \$960.00 E. \$9,600
42. What are all real values of x which satisfy $\sqrt{1 \cdot 16 \cdot 16 \cdot 1} = x^2$?
 A. $\{4\}$ B. $\{16, 16\}$ C. $\{\pm 16\}$ D. $\{\pm 4\}$ E. $\{\pm 8\}$
43. At a school game night, student tickets cost \$3.00 and adult tickets cost \$7.00. 200 people attended the last game night and \$1,080 was collected for ticket sales. Which system of equations can be used to find how many students and adults attended the game night?
 A. $\begin{cases} S + A = 200 \\ 7S + 3A = 1080 \end{cases}$ B. $\begin{cases} S + A = 200 \\ 3S + 7A = 1,080 \end{cases}$ C. $\begin{cases} S = A + 200 \\ A = 200 - S \end{cases}$ D. $\begin{cases} S + A = 1080 \\ 3S + 7A = 200 \end{cases}$ E. $\begin{cases} 3S + A = 200 \\ S + 7A = 1080 \end{cases}$
44. What are the coordinates of the vertex of the quadratic function $y = 3(x - 4)^2 + 7$?
 A. $(-12, 7)$ B. $(4, 7)$ C. $(-4, 7)$ D. $(3, 7)$ E. $(-4, -7)$
45. What is the value of the mean absolute deviation of the set of numbers 24, 8, 13, and 27?
 A. 18 B. 6.5 C. 7.5 D. 30 E. 11.5
46. $7^2 = 49$ can be rewritten as which of the following?
 A. $\log_7 2 = 49$ B. $\log_2 49 = 7$ C. $\log_{49} 7 = 2$ D. $\log_{49} 2 = 7$ E. $\log_7 49 = 2$
47. What is the positive root of the equation $3x^2 - 10x - 25 = 0$?
 A. -3 B. 3 C. 5 D. 0.6 E. $\frac{5}{3}$
48. Which of the following points is not a solution to the system of linear inequalities $\begin{cases} y < 3x - 4 \\ y \geq -x - 1 \end{cases}$?
 A. $(4, -3)$ B. $(10, -10)$ C. $(3, 1)$ D. $(6, 0)$ E. $(0, -2)$
49. A cone is partially filled with water. The radius of the cone is 10 inches. The height of the cone is 16 inches. The radius of the surface of the water is 4 inches. How deep is the water in the cone?



- A. 7.2 inches B. 6.2 inches C. 6.8 inches D. 7 inches E. 6.4 inches
50. What is the value of i^2 , if $i = \sqrt{-1}$?
 A. -1 B. 1 C. 0 D. $\frac{1}{2}$ E. i

2021 – 2022 TMSCA Middle School Mathematics Kick-Off Test Answer Key

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

2021 – 2022 TMSCA Middle School Mathematics Kick-Off Test Selected Answers

6. $56 = 8 \cdot 7 = 2 \cdot 4 \cdot 7 = 2 \cdot 2 \cdot 2 \cdot 7 = 2^3 \cdot 7$. Therefore, 56 has two distinct prime factors, which are 2 and 7.

19. In the first example, 44 and 16 are shown with 38 as a result. In the second example, 12 and 36 are shown with a result of 42. Using these examples, we see to find the result, you take $\frac{1}{2}$ of the 1st number added to the second number. $\frac{1}{2}(44) + 16 = 22 + 16 = 38$, and $\frac{1}{2}(12) + 36 = 6 + 36 = 42$. Using the numbers 26 and 25, $\frac{1}{2}(26) + 25 = 13 + 25 = 38$.

22. If $a \blacksquare b = 3a + 5b$, then $4 \blacksquare 9 = 3(4) + 5(9) = 12 + 45 = 57$.

24. The unit rate of buying 9 theater tickets for \$58.50 is equal to $\frac{58.50}{9} = \$6.50$ per ticket.

26. If $f(x) = 4x - 9$, then $f(13) = 4(13) - 9 = 52 - 9 = 43$.

27. The symbol \cap means the intersection of the sets, or, what the sets have in common. If $A = \{1, 2, 3, 4, 5\}$ and $B = \{3, 4, 5, 6, 7\}$, then $A \cap B = \{3, 4, 5\}$, which has three elements.

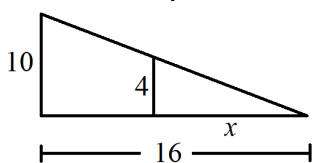
31. When given two points (x_1, y_1) and (x_2, y_2) , the formula to find the slope of the line passing through the points is $\frac{y_2 - y_1}{x_2 - x_1}$. We are given the origin, that has coordinates $(0, 0)$ and the point $(18, 12)$. The slope of the line passing through the two points is therefore $\frac{12 - 0}{18 - 0} = \frac{12}{18} = \frac{2}{3}$.

32. The formula to find the area of a circle is $A = \pi r^2$. Since we have a semi-circle, we need to find the area of the circle and then divide it in half. Our semi-circle has a diameter of 14 cm, so its radius is 7 cm. With $\pi = 3$, the area of the circle is $A = 3(7)^2 = 3(49) = 147$, and the area of the semi-circle is then $147 \div 2 = 73.5 \text{ cm}^2$.

34. $(14n^2 + 5n - 7) + (13 - 5n - 7n^2) = 14n^2 + 5n - 7 + 13 - 5n - 7n^2 = 7n^2 + 0n + 6 = 7n^2 + 6$.

44. The vertex form of a quadratic equation is in the form $y = a(x - h)^2 + k$, where the vertex is (h, k) . Therefore, the coordinates of the vertex of the quadratic equation $y = 3(x - 4)^2 + 7$ are $(4, 7)$.

49. From the picture of the cone given in the problem, we get the following picture.



x is the value we are trying to find, which is the depth of the water. To find x , we can use similar triangles and set up the proportion $\frac{10}{16} = \frac{4}{x}$. Cross multiply to get $64 = 10x$. Dividing by 10 to both sides of the equation gives us $x = 6.4$. The water is 6.4" deep.

50. If $i = \sqrt{-1}$, then $i^2 = (\sqrt{-1})^2 = -1$.