



TMSCA MIDDLE SCHOOL MATHEMATICS

TEST #11 ©

FEBRUARY 12, 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.

[illegible]

1. $311 + (-178) = \underline{\hspace{2cm}}$

- A. 489 B. -489 C. 133 D. 143 E. 267

2. $-94 - 59 = \underline{\hspace{2cm}}$

- A. 32 B. -153 C. -45 D. -32 E. 35

3. $-3.2 \times (-17.4) = \underline{\hspace{2cm}}$ (nearest tenth)

- A. 55.7 B. 55.6 C. 55.4 D. -55.7 E. -55.6

4. $26\frac{1}{3} \div \frac{5}{9} = \underline{\hspace{2cm}}$

- A. $47\frac{4}{5}$ B. $23\frac{2}{3}$ C. $29\frac{2}{3}$ D. $47\frac{1}{5}$ E. $47\frac{2}{5}$

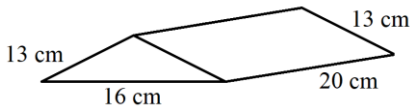
5. Michelle goes swimming every 8th day and Jeff goes swimming every 15th day. If Michelle and Jeff went swimming today, how many days until they again go swimming together on the same day?

- A. 240 B. 120 C. 60 D. 96 E. 105

6. If 5 *bb*'s = 8 *mm*'s and 12 *mm*'s = 17 *zz*'s, how many *zz*'s equal 15 *bb*'s?

- A. 51 B. 24 C. 34 D. 42 E. 46

7. What is the lateral surface area of the triangular prism?



- A. 728 cm^2 B. $4,160 \text{ cm}^2$ C. $16\sqrt{5} + 840 \text{ cm}^2$ D. 840 cm^2 E. 760 cm^2

8. Bubba earns a 7% commission for each bicycle he sells. On Wednesday, Bubba sells a bicycle for \$240. How much commission does Bubba earn on the sale?

- A. \$14.80 B. \$15.20 C. \$16.80 D. \$18.20 E. \$17.40

9. $68^2 - 12^2 = \underline{\hspace{2cm}}$

- A. 4,260 B. 4,840 C. 4,480 D. 4,420 E. 4,640

10. If you double 550 centimeters, it is equal to meters.

- A. 55 B. 5.5 C. 1,100 D. 110 E. 11

11. Which of the following values satisfy the inequality $\frac{3}{4}x - 4 > -13$?

- A. -20 B. -100 C. -12 D. -13 E. -2

12. Clint can dribble his basketball 30 times in 15 seconds. At this rate, how many times can he dribble his basketball in 3 minutes?

- A. 480 B. 240 C. 270 D. 300 E. 360

13. If the number $7n8$ is divisible by the number 13, what is the value of n ?

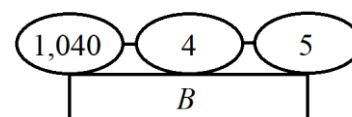
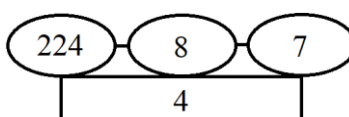
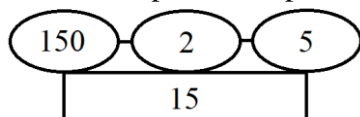
- A. 0 B. 1 C. 2 D. 3 E. 4

14. If P is equal to the number of prime numbers less than 30, what is the value of P^2 ?

- A. 100 B. 121 C. 144 D. 81 E. 112

15. What is the sum of the number of edges and faces of a hexagonal prism?
 A. 20 B. 30 C. 38 D. 26 E. 24
16. What is the area of a square with a perimeter of 108 inches?
 A. 729 in^2 B. 432 in^2 C. 864 in^2 D. $2,916 \text{ in}^2$ E. $1,458 \text{ in}^2$
17. CCCXLIV + XXIX + CLXVII = _____ (Arabic number)
 A. 550 B. 640 C. 580 D. 610 E. 540
18. 35 quarters + 74 dimes = _____ nickels + 955 pennies
 A. 144 B. 132 C. 152 D. 148 E. 138
19. John-Paul has seven less than six times as many baseball cards as Miguel. Alhindi has three more than twice the number of baseball cards as John-Paul. If Miguel has 76 cards, how many does Alhindi have?
 A. 849 B. 895 C. 1,347 D. 915 E. 901
20. If $360 = 2^a \cdot 3^b \cdot 5^c$, then what is the value of b^{a+c} ?
 A. 27 B. 81 C. 16 D. 32 E. 3,125
21. If no number can repeat, how many different positive two-digit integers can be formed using the numbers 3, 5, 6, 9 and 1?
 A. 10 B. 12 C. 24 D. 28 E. 20

22. Use the examples in the picture below to find the value of B .



- A. 52 B. 14 C. 65 D. 104 E. 74
23. Given the set of numbers {11, 23, 24, 55, 59}, what is the value of the upper-quartile?
 A. 55 B. 57 C. 59 D. 48 E. 114
24. The sum of three consecutive odd integers is 207. What is the value of twice the greatest of these integers?
 A. 142 B. 138 C. 134 D. 146 E. 154

25. The table represents the function g . Which equation represents the function g ?

x	-3	0	4	17
$g(x)$	8	-1	15	288

- A. $g(x) = x + 11$ B. $g(x) = 2x + 14$ C. $g(x) = -x + 5$ D. $g(x) = x^2 - 1$ E. $g(x) = x^2 + 1$
26. Let U be a universal set and A and B be subsets of U defined as shown. How many elements are in $(A \cup B)'$?
 $U = \{a, b, c, d, e, f, g\}$ $A = \{a, e\}$ $B = \{b, c, d, f\}$
 A. 2 B. 1 C. 4 D. 5 E. 7

27. Which of the following is a geometric sequence?
 A. 2, 4, 6, 8, ... B. 7, 21, 63, 189, ... C. $5, 4\frac{1}{2}, 4, 3\frac{1}{2}, \dots$ D. 5, 15, 25, 35, ... E. 5, 4, 3, 2, ...

28. What is the sum of all the two-digit multiples of the number 21?

- A. 210 B. 234 C. 188 D. 290 E. 226

29. Neeha colored a circle on her sheet of paper that had a diameter of 12 cm. Aliyah colored a circle on her paper that had a radius of 4 cm. If $\pi = 3$, how much greater is the area of Neeha's circle than Aliyah's circle?

- A. 48 cm^2 B. 12 cm^2 C. 384 cm^2 D. 60 cm^2 E. 108 cm^2

30. $23_4 \times 12_4 =$ _____ (base 10)

- A. 58 B. 64 C. 60 D. 66 E. 62

31. 640 acres = _____ square miles

- A. 12 B. 6 C. 2 D. 320 E. 1

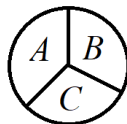
32. Line a passes through the points $(-13, 5)$ and $(-7, 10)$. Line c is perpendicular to line a . What is the slope of line c ?

- A. $-\frac{6}{5}$ B. $\frac{6}{5}$ C. $\frac{5}{6}$ D. $-\frac{5}{6}$ E. -4

33. $\frac{14.8 \times 10^4}{4 \times 10^2} =$ _____ (scientific notation)

- A. 3.7×10^2 B. 3.2×10^2 C. 1.08×10^2 D. 1.08×10^6 E. 3.7×10^{-2}

34. A spinner has three equal sectors, as shown. If the spinner is spun three times, what is the probability of getting at least two A's?



- A. $\frac{1}{3}$ B. $\frac{1}{9}$ C. $\frac{7}{27}$ D. $\frac{2}{9}$ E. $\frac{1}{27}$

35. If $f(x) = x^2 + 2x - 5$ and $g(x) = -7x + 3$, what is the value of $f(g(-2))$?

- A. 73 B. -18 C. 51 D. 78 E. 318

36. On a map, $\frac{1}{4} \text{ cm} = 9 \text{ miles}$. If the distance between two state monuments is 6.75 cm, what is the actual distance between the two monuments in miles?

- A. 256 miles B. 243 miles C. 234 miles D. 252 miles E. 225 miles

37. The angle ratios in a quadrilateral is 11:17:21:23. What is the measure of the largest angle?

- A. 125° B. 95° C. 85° D. 115° E. 105°

38. What are the coordinates of the x -intercept of the graph of the line with the equation $y = -\frac{4}{5}x - 8$?

- A. $(-10, 0)$ B. $(8, 0)$ C. $(-8, 0)$ D. $(-12, 0)$ E. $(16, 0)$

39. In a $30 - 60 - 90$ right triangle, the difference between the length of the longest side and the length of the shortest side is 52 units. What is the length of the shortest side of the triangle?

- A. 104 units B. 26 units C. 52 units D. 130 units E. 13 units

40. $\sqrt{12}(4\sqrt{27} - \sqrt{75})$ simplifies to which of the following?

- A. $11\sqrt{3}$ B. $28\sqrt{3}$ C. $28\sqrt{6}$ D. 42 E. -102

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

- A. 64 B. 66 C. 62 D. 16 E. 14

42. Amelia bought sodas and pizzas for her and her friends. Sodas cost \$4.00 each while pizzas cost \$12.00 each. If Amelia spent \$92.00 and only ended up with 9 items, how many pizzas did she buy?

- A. 6 pizzas B. 2 pizzas C. 7 pizzas D. 4 pizzas E. 3 pizzas

43. A triangle has a height of $4(2x + 1)$ units and an area of $24x^2 - 28x - 20$ units². What is the base of the triangle?

- A. $3x - 5$ units B. $3x + 5$ units C. $12x - 5$ units D. $12x + 5$ units E. $8x + 5$ units

44. Which expression produces the largest value?

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

45. If 8, x , y , 59, z are the first five terms of an arithmetic sequence, what is the sum of $x + z$?

- A. 76 B. 101 C. 135 D. 67 E. 84

46. Find the value of x , if $2 \log_{10} x = 1$.

- A. 1 B. $\frac{1}{10}$ C. 100 D. $\frac{\sqrt{10}}{10}$ E. $\sqrt{10}$

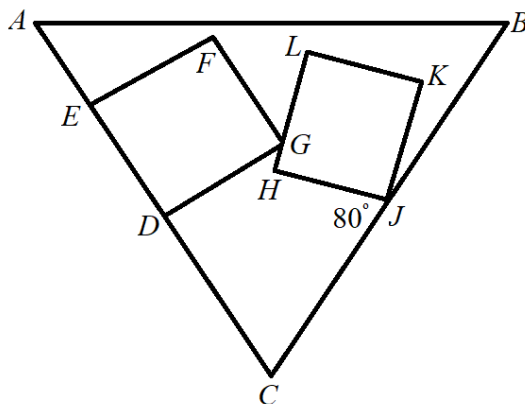
47. If the sum of the roots of $x^2 + x = 30$ is added to the product of its roots, the result is which of the following?

- A. 43 B. -17 C. -37 D. -31 E. 47

48. $3(5 - 3i)^2 =$ _____

- A. $225 - 9i$ B. $48 - 90i$ C. $225 - 90i$ D. $225 + 9i$ E. $48 + 9i$

49. Rectangle $DEFG$ and rectangle $HJKL$ are drawn inside equilateral $\triangle ABC$, as shown. One side of rectangle $DEFG$ lies on one side of $\triangle ABC$. If $m\angle HJC = 80^\circ$, what is the measure of $\angle DGH$?



- A. 20° B. 25° C. 30° D. 35° E. 40°

50. The height, in centimeters, of a bouncing ball after x bounces is represented by the function $h(x) = 48 \left(\frac{1}{2}\right)^x$. How many centimeters high did the ball bounce on the second bounce?

- A. 36 cm B. 24 cm C. 20 cm D. 12 cm E. 18 cm

2021 – 2022 TMSCA Middle School Mathematics Test #11 Answer Key

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

2021 – 2022 TMSCA Middle School Mathematics Test #11 Selected Answers

10. $2(550) = 1,100$ centimeters = 11 meters.

20. If $360 = 2^3 \cdot 3^2 \cdot 5^1 = 2^a \cdot 3^b \cdot 5^c$, then $a = 3$, $b = 2$, and $c = 1$. Therefore, $b^{a+c} = 2^{3+1} = 2^4 = 16$.

21. We are given the numbers 3, 5, 6, 9 and 1, which is a total of 5 numbers. For a two-digit number, there are 5 choices for the first digit and 4 choices for the second digit. Therefore, there are a total of $5(4) = 20$ different two-digit numbers that can be created using the numbers 3, 5, 6, 9, and 1.

28. The two-digit multiples of the number 21 are 21, 42, 63, and 84. The sum is then $21 + 42 + 63 + 84 = 210$.

31. 640 acres = 1 square mile.

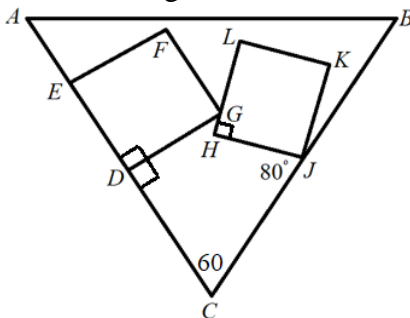
35. If $f(x) = x^2 + 2x - 5$ and $g(x) = -7x + 3$, then to find the value of $f(g(-2))$, first find the value of $g(-2)$. $g(-2) = -7(-2) + 3 = 14 + 3 = 17$. Now, $f(17) = 17^2 + 2(17) - 5 = 289 + 34 - 5 = 318$.

37. There are 360° inside a quadrilateral. Let x equal the common ratio, so if the angle ratios in a quadrilateral are 11:17:21:23, we can make the equation $11x + 17x + 21x + 23x = 360$. Combining like terms gives us $72x = 360$. Dividing by 72 to both sides of the equation gives us $x = 5$. Therefore, the measure of the largest angle of the quadrilateral is $23(5) = 115^\circ$.

41. To find $x^2 + \frac{1}{x^2}$, when given $x + \frac{1}{x} = 8$, square both sides of the equation. $\left(x + \frac{1}{x}\right)^2 = 8^2$, which becomes $\left(x + \frac{1}{x}\right)^2 = x^2 + 2 + \frac{1}{x^2} = 64$. Subtracting 2 from both sides of the equation gives us $x^2 + \frac{1}{x^2} = 62$.

47. A quadratic equation in standard form is $Ax^2 + Bx + C = 0$. The sum of the roots can be found using $-\frac{B}{A}$ and the product of the roots can be found using $\frac{C}{A}$. We are given the equation $x^2 + x = 30$, so we must subtract 30 from both sides of the equation to get $x^2 + x - 30 = 0$. The sum of the roots is then $-\frac{1}{1} = -1$ and the product of the roots is $\frac{-30}{1} = -30$. Therefore, the sum of the roots added to the product of the roots is $-1 + (-30) = -31$.

49. With the given information, we can label the picture as shown:



We have pentagon $CDGHIJ$, which has a total of 540° . We can subtract 60° , 90° and 80° from 540 to get $540 - 90 - 80 - 60 = 310$. A reflex angle is an angle which measures more than 180° , but less than 360° . In our picture, reference $\angle GHJ$ has a measure of $360 - 90 = 270^\circ$. Subtracting 270 from 310 gives us $310 - 270 = 40$. Therefore, $m\angle DGH = 40^\circ$.

50. Since x represents the number of bounces, which is 2, then $h(2) = 48\left(\frac{1}{2}\right)^2 = 48\left(\frac{1}{4}\right) = 12$ cm.