

2023 SCSU MATH CONTEST
7th and 8th Grade Test

DIRECTIONS: Select the BEST response from those given. Scientific and graphing calculators are allowed. Symbolic graphing calculators are not allowed.

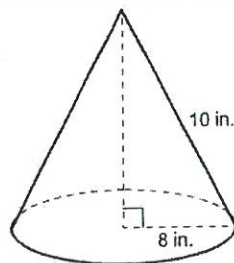
1. The area of a square is 2.89×10^{16} cm². What is the length of one side of this square, in cm?
A. 1.7×10^2 B. 1.7×10^4 C. 1.7×10^8 D. 1.7×10^{12} E. 1.7×10^{15}
2. I have 39 coins in my pocket, consisting only of nickels, dimes, and quarters. The number of dimes is three times the number of nickels, and the number of quarters is three times the number of dimes. What is the value of the 39 coins in my pocket?
A. \$2.60 B. \$5.10 C. \$5.20 D. \$7.80 E. \$8.20
3. My favorite number has two digits and an odd number of positive divisors. The sum of the digits is 13. What is the positive difference of the two digits?
A. 1 B. 2 C. 3 D. 4 E. 5
4. Donald filled a 120-gallon dunk tank for the fall carnival. Daisy filled the duck-pull pond. Daisy used a hose with one-fifth the fill rate of Donald's and finished in half the time that Donald needed. How many gallons does the duck-pull pond contain?
A. 12 B. 24 C. 48 D. 60 E. 100
5. What is the difference between the mean and median of the fractions $\frac{3}{4}$, $\frac{1}{2}$, $\frac{3}{20}$ and $\frac{2}{5}$?
A. 0 B. $\frac{1}{16}$ C. $\frac{1}{8}$ D. $\frac{1}{4}$ E. $\frac{3}{8}$
6. Jose spent $\frac{4}{17}$ of his money for the movies, then spent $\frac{7}{13}$ of the remainder for books. He used $\frac{2}{3}$ of what he had left for CDs, after which he had \$4 remaining for lunch. How much did Jose spend on movies and books?
A. \$8 B. \$14 C. \$22 D. \$24 E. \$34
7. If the lengths of two sides of a right triangle are 6 and 8, what is the least possible length of the third side?
A. 5 B. $2\sqrt{7}$ C. 7 D. $7\sqrt{2}$ E. 10
8. A figure skater is facing north when she begins to spin clockwise. She spins 2790 degrees. What direction is she facing when she finishes her spin?
A. West B. East C. Northwest D. South E. Southwest
9. The four interior angles of a convex quadrilateral are x , $1.5x$, $x+18$, and $2x+1$. What is the measure of the largest interior angle of the quadrilateral?
A. 93° B. 99° C. 123° D. 125° E. 131°
10. In the sequence of seven numbers shown below, the difference between consecutive terms doubles.
A B 12 18 30 C D
Compute $D \div A$.
A. 7.6 B. 7.2 C. 9 D. 10.4 E. 13.6

11. Super Brand X battery will last for 14,999 hours.
If it is used for 2 hours each afternoon starting on Wednesday, on what day of the week will it stop working?
A. Wednesday B. Thursday C. Friday D. Saturday E. Sunday
12. How many three-digit numbers have the property that none of the three digits are prime numbers?
A. 24 B. 60 C. 64 D. 125 E. 180
13. Of the animals entered in a dog show, the number of Airedales is at least one-fifth of the number of beagles and at most one-sixth the number of collies. The number of dogs that are Airedales or beagles is at least 23. Find the minimum number of collies entered in the show.
A. 18 B. 24 C. 30 D. 36 E. 42
14. A one inch thick stack of paper contains 200 sheets of paper. A large, thin piece of this paper is folded in half (two thicknesses), then folded in half again (four thicknesses), and so on. If Marge *could* fold this paper in half 25 times, how thick would be the folded paper?
A. Less than 1 foot B. Between 1 foot and 1 yard C. Between 1 yard and 1 mile D. Between 1 mile and 10 miles E. More than 10 miles
15. Using three different numbers from this set, $\{-10, -6, -2, 4, 8\}$, what is the least possible value of $\frac{A-B}{C}$?
A. -9 B. -8 C. $-4\frac{1}{2}$ D. $-1\frac{2}{5}$ E. $\frac{3}{5}$
16. Define a new mathematical operator \square by: $x\square y = x^2 - y$. What is $(3\square 4)\square 5$?
A. -5 B. -2 C. 17 D. 20 E. 174

Use the three figures below to answer questions 17-19. All diagrams are not to scale.



Question 17



Question 18



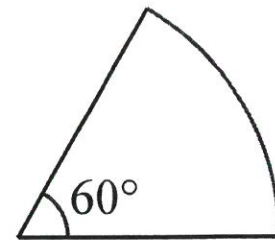
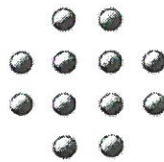
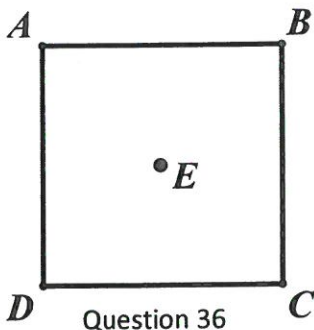
Question 19

17. There are nine points on the circumference of a circle, shown above left. How many chords can be drawn by joining the points in all possible ways?
A. 18 B. 21 C. 27 D. 28 E. 36
18. The right cone, shown above center, has radius 8 inches and slant height 10 inches. Find the total surface area of this cone.
A. 124π B. 130π C. 142π D. 144π E. 154π
19. Assume that the triangular array will continue in the manner shown, above right. What number will be directly below 94?
A. 104 B. 106 C. 108 D. 110 E. 112

20. What is the ones digit in the number $2019^{2017} + 2019^{2018} + 2019^{2019}$?
 A. 0 B. 1 C. 5 D. 7 E. 9
21. In order to prepare for a new patio, you need to dig a hole that is in the shape of a one-fourth of a circle with a radius of 24 feet. It is to be 6 inches deep. You are going to remove the dirt by repeatedly filling a pail with a capacity of $\frac{\pi}{8}$ cubic feet. How many times do you need to fill the pail?
 A. 48 B. 96 C. 192 D. 576 E. 1152
22. Suppose $743,2A5,11B$ is divisible by 12 where **A** and **B** are digits between 1 and 9 inclusive. What is the largest possible sum of **A** and **B**?
 A. 8 B. 11 C. 12 D. 13 E. 17
23. Four friends win a total \$1400 dollars, and they decide to split this money amongst themselves in the following way. Person #2 will receive 30 dollars less than twice the money Person #1 will receive. Person #3 will receive half as much money as Person #2. Person #4 will receive three times the money Person #3 receives plus 20 dollars. How much combined money will Person #2 and Person #3 receive?
 A. 575 B. 585 C. 590 D. 605 E. 610
24. A one year old tree was planted in a park. The tree has been growing at a constant rate and after 4 years from the planting, it has grown to 10 feet tall. After 7 years from planting, it has grown to 14.5 feet tall. Which is an equation that can model the height of the tree, h , after y , years.
 A. $h=1.5y+4$ B. $h=4.5y+4$ C. $h=1.5y+10$ D. $h=4.5y+10$ E. $h=1.5y-14.5$
25. Let M and N be positive integers with the least common multiple being 84 and the greatest common factor being 4. What is the minimum value of $M+N$?
 A. 32 B. 40 C. 56 D. 84 E. 88
26. Joe runs around the track at a pace of 80 seconds per lap. Jim runs it in the opposite direction. They meet every 30 seconds. How many seconds does it take Jim to run each lap around the track?
 A. 30 B. 36 C. 48 D. 60 E. 80
27. If the length of a diagonal of a square is $X-Y$, what is the area of the square?
 A. $\frac{(X-Y)^2}{2}$ B. $(X+Y)^2$ C. $(X-Y)^2$ D. $\frac{(X+Y)^2}{2}$ E. $X^2 - Y^2$
28. If I subtract the reciprocal of $(1-x)$ from 1, the result is the reciprocal of $(1-x)$. What is the value of x ?
 A. -2 B. -1 C. 0 D. $\frac{1}{2}$ E. 2
29. At the grocery store, 3 avocados and 2 pineapples cost \$8.80, while 5 avocados and 3 pineapples cost \$14.00. How much do 1 avocado and 1 pineapple cost?
 A. \$2 B. \$2.75 C. \$3.60 D. \$4 E. \$4.10
30. In the addition problem $AH + HA = DAD$, each different letter in the two-digit and three-digit numbers represents a different digit. Find the number represented by A .
 A. 1 B. 2 C. 3 D. 4 E. 5

31. Sam has a fish tank that can hold 3 fish. At the store, Sam discovers she can choose from 6 types of fish. In how many ways can Sam choose 3 of these different types of fish to put in her tank?
 A. 3 B. 10 C. 18 D. 20 E. 120
32. The number of seconds in six weeks is $n!$. Find n .
 A. 10 B. 12 C. 13 D. 17 E. 20
33. $3,333,333,334^2$ is equal to a twenty-digit number. What is the sum of these twenty digits?
 A. 45 B. 51 C. 55 D. 58 E. 61
34. An urn contains four red, five blue, and one green marble. Two marbles are drawn from the urn, both at the same time. What is the probability that both marbles are the same color?
 A. $\frac{1}{3}$ B. $\frac{16}{45}$ C. $\frac{19}{42}$ D. $\frac{3}{5}$ E. $\frac{2}{3}$
35. Sue wrote a new mathematics textbook. It takes 852 digits to number the pages of Sue's book. (For example, it takes 8 digits to number pages 99-101.) How many times does the digit 7 appear in the numbering of the pages of Sue's new book?
 A. 58 B. 60 C. 62 D. 64 E. 66

Use the three figures below to answer questions 36-38.



36. As shown above left, suppose square $ABCD$ is rotated 90 degrees clockwise about its center E , and then reflected over a diagonal line determined by the lower left and upper right vertices. The square is then reflected over a horizontal line through the center E . What point now corresponds to the position originally occupied by B ?
 A. A B. B C. C D. D E. E
37. If the corners of a square must lie on a grid dot, how many squares can you create in this figure, shown above center, by connecting any 4 dots?
 A. 4 B. 5 C. 9 D. 11 E. 16
38. The area of the circle sector shown, above left, is 24π . Find the perimeter of the sector.
 A. $24+4\pi$ B. $32+6\pi$ C. $12+8\pi$ D. $8+12\pi$ E. $12+12\pi$