2019 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. Laura jogs seven blocks the first day of her training program. She increases her distance by two blocks each day. On the last day, she jogged 25 blocks. How many days was Laura in training?
   A. 5 B. 8 C. 9 D. 10 E. 15

2. 197,000,19X is a prime number. What is the value of X?
   A. 1 B. 3 C. 5 D. 7 E. 9

3. Find the integer *n* for which $4^n + 4^n + 4^n + 4^n = 4^{16}$.
   A. 4 B. 7 C. 8 D. 15 E. 20

4. If X is 50% larger than Z and Y is 25% larger than Z, then X is _____% larger than Y.
   A. 2 B. 5 C. 20 D. 25 E. 120

5. Cody wrote down all of the six-digit numbers that could be formed using each of the digits 1, 2, 3, 4, 5, and 6 exactly once. How many of these six-digit numbers are divisible by 5?
   A. 21 B. 32 C. 36 D. 64 E. 120

6. Point A $(4,2)$ is reflected about the *y*-axis to point B. Point B is then reflected about the line $y = x$ to Point C. What are the coordinates of Point C?
   A. $(-4,2)$ B. $(-2,4)$ C. $(2,-4)$ D. $(2,4)$ E. $(4,-2)$

7. A store owner decided to sell his last two Halloween costumes for $15 each. He made a 20% profit on one of them and took a 20% loss on the other one. What was his total profit or loss on the two costumes?
   A. $1.25 loss B. $1.20 loss C. $0 profit or loss D. $1.20 profit E. $1.25 profit

8. A rectangular prism has dimensions $2 \text{ ft} \times 3 \text{ ft} \times 4 \text{ ft}$. What is the greatest number of cubes, each measuring 4 inches on a side, which can fit completely inside this prism?
   A. 6 B. 24 C. 324 D. 648 E. 1296

9. A sequence of five consecutive positive numbers has a sum of 85.
   What is the product of the first and last numbers in this sequence?
   A. 221 B. 252 C. 285 D. 320 E. 418

10. The sum of the measures of the vertex angles of a regular polygon is 1800 degrees.
    How many sides does the polygon have?
    A. 10 B. 12 C. 15 D. 18 E. 30

11. $x^2 + y^2 = 61$ and $x - y = -1$. If $x + y > 0$, find the value of $x + y$.
    A. -1 B. 5 C. 6 D. 11 E. 73

12. Point P is a positive number on a real number line. The distance between 0 and P is four times the distance between P and 60. What is the sum of the two possible values for P?
    A. 32 B. 40 C. 64 D. 72 E. 128

13. Find the value of this expression: $\dfrac{5^{4000}+5^{4002}}{5^{4000}+5^{4000}}$

A. $\dfrac{26}{25}$ B. 3 C. 13 D. 25 E. 100

14. The line $4y+2x+6=0$ is perpendicular to the line $6y+ax+4=0$. Find the value of a.

A. -12 B. -10 C. -8 D. -6 E. -4

15. Gabby has \$2.15 in her piggy bank, made up entirely of dimes and quarters. There are more quarters than dimes in her piggy bank. How many coins are there altogether in Gabby's bank?

A. 11 B. 12 C. 14 D. 15 E. 17

16. The students in Professor Einstein's class collected a total of \$529 for charity. Professor Einstein noticed that each student collected the same amount of money and that this amount was equal to the number of students in the class. In addition, each student collected the same five bills. All of the money was ordinary US bills, none of which were two-dollar bills. How many ten-dollar bills were collected in Professor Einstein's class?

A. 10 B. 12 C. 15 D. 23 E. 46

17. A rectangular block of wood has dimensions 2 in $\times$ 3 in $\times$ 5 in. An ant located at a lower corner of the rectangular block of wood wants to crawl along the surface to the opposite upper corner of the block. What is the length of the shortest such path, in inches?

A. $\sqrt{50}$ B. $\sqrt{58}$ C. 8 D. $\sqrt{68}$ E. 10

18. Jaimie walked 10 miles to her grandma's house. She started at 10:35 am and arrived at 1:55 pm. What rate did Jaimie walk, in miles per hour?

A. 2 B. 2.5 C. 3 D. 3.5 E. 4

19. A brand new tank is a cube with side length 6 yards. Jake starts to fill the tank at 6:57 am, with the water flowing at a rate of 6 cubic feet per minute. At what time will the tank be full?

A. 7:33 am B. 4:00 pm C. 10:59 pm D. 11:09 pm E. 12:09 pm

20. Suppose on day one you save 1 penny, and on each successive day you save one penny more than the previous day. How much money would you have saved through this process after 365 days?

A. \$3.65 B. \$500.00 C. \$667.95 D. \$730.00 E. \$1335.90

21. Let A, B, and C be three different numbers from the set $\{-10,-6,-2,4,8\}$.

What is the least possible value of $\dfrac{A-B}{C}$?

A. -12 B. -9 C. $-\dfrac{9}{2}$ D. $-\dfrac{7}{5}$ E. $\dfrac{3}{5}$

22. John was asked by his teacher to subtract 3 from a certain number and then divide the result by 9. Instead, he subtracted 9 and then divided the result by 3, giving an answer of 43. What would his answer have been if he had worked the problem correctly?

A. 11 B. 13 C. 15 D. 17 E. 138

23. A survey of 2000 children showed that 1400 watched *The Lion King*, 850 watched *Finding Nemo*, and 390 watched both movies. What percentage of children did not watch either movie?

A. 7% B. 11.25% C. 14% D. 22.5% E. 24.8%

24. How many different ways can you arrange the letters of the word TRIANGLE if the first three letters must be TRI (in that exact order)?

A. 1 B. 8 C. 120 D. 720 E. 40,320

25. At the end of a Red Sox game, the 10 players and 4 coaches each shook hands with one another. Each person shook hands exactly one time with every other person. How many handshakes in total were there?

A. 80 B. 81 C. 90 D. 91 E. 101

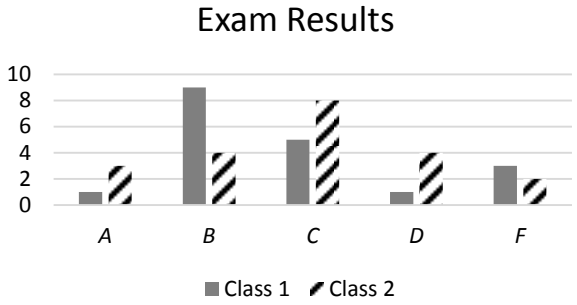
26. Flip a fair coin n times.
What is the smallest possible value of n such that the probability of at least two heads exceeds 0.8?

A. 4 B. 5 C. 6 D. 7 E. 8

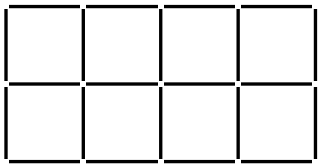
27. Let $LCM(a,b)$ and $GCD(a,b)$ be the least common multiple and greatest common divisor of a and b, respectively. What is the sum of all positive integers *n* such that $LCM(n,14)=GCD(n,84)$?

A. 84 B. 126 C. 140 D. 168 E. 294

Use the diagrams below to answer questions 28 and 29.



QUESTION 28



QUESTION 29

28. The bar graph shows the distribution of exam scores in two classes.
What percentage of the exams were an A, B, or C?

A. 70% B. 75% C. 75.2% D. 77.5% E. 80%

29. 22 bars of equal length were used to build the 2 x 4 array of 8 small squares shown in the diagram.
How many of this same type of bars would be needed to construct a 2 x 40 array of 80 small squares?

A. 180 B. 184 C. 200 D. 202 E. 220

30. A pitcher originally contains a juice drink with 20 percent cranberry juice.
After 4 ounces of cranberry juice is added, the new drink is one-fourth cranberry juice.
How many total ounces of juice drink are in the pitcher after the addition of the cranberry juice?

A. $\frac{20}{11}$ B. 56 C. 60 D. 64 E. 68

31. Before Molly started her 3 hour drive, her car's odometer reading was 29,792, a palindromic number.
(A palindromic number reads the same forward and backward.)
At the end of her trip, the odometer reading was another palindromic number.
If Molly never exceeded 70 mph, what was the greatest distance she could have driven, in miles?

A. 150 B. 190 C. 200 D. 210 E. 211

32. Two numbers have a product of 1024 and a quotient of 4. What is the sum of these two numbers?

A. 32 B. 64 C. 80 D. 90 E. 512

33. A brother says to his sister, "If you gave me seven of your mints, I would have twice as many as you." His sister replied, "If I had seven of your mints, we would have the same number of mints."
How many mints do the brother and sister have altogether?

A. 77 B. 84 C. 97 D. 112 E. 120

34. The product of three consecutive positive integers is 8 times their sum.
What is the sum of the squares of these three integers?

A. 15 B. 50 C. 77 D. 120 E. 14400

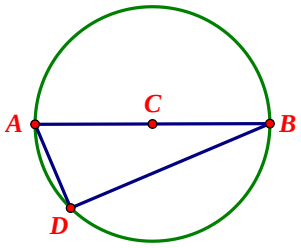
35. Andrea rolls three six-sided fair dice, all at the same time.
What is the probability that she gets three of the same number?

A. $\frac{5}{7776}$ B. $\frac{1}{1296}$ C. $\frac{1}{36}$ D. $\frac{1}{6}$ E. $\frac{5}{6}$

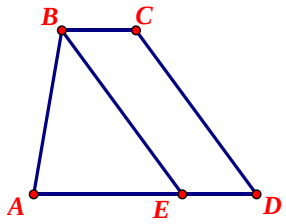
36. There are several four-digit numbers that have the property that, when the leftmost digit is removed, the resulting three-digit number is one-ninth of the original number.
What is the sum of the digits of the smallest four-digit number that has this property?

A. 6 B. 7 C. 8 D. 9 E. 10

Use the diagrams below to answer questions 37 and 38. Graphs are not necessarily drawn to scale.



QUESTION 37



QUESTION 38

37. In the circle shown, $BD = 24$ in and $AD = 10$ in. What is the area of the circle, in square inches?

A. 169π B. 196π C. 289π D. 360π E. 676π

38. In the figure shown, $\overline{BE}$ divides trapezoid $ABCD$ into a triangle and parallelogram of equal area.
If AD equals 10, find the length of $\overline{BC}$.

A. 2 B. $\frac{8}{3}$ C. $\frac{10}{3}$ D. 4 E. 5