2017 SCSU MATH CONTEST
7th and 8th Grade Test – 50th Annual Edition

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

1. This is the 50th annual SCSU Math Contest! To celebrate, Jake flew in the Blizzard Balloon for $50 plus $5.00 per half hour, and Jamie rode the Husky Helicopter for $75 plus $2.50 per half hour. They each paid the same amount for their rides. For how many hours did Jake fly in the balloon?
   A. 4.5   B. 5   C. 5.5   D. 7.5   E. 10

2. The midrange is a measure of center of a data set. It is defined to be the mean of the maximum and minimum. If the midrange of a data set is 37 and the maximum is 54, what is the minimum?
   A. 10   B. 14.5   C. 17   D. 20   E. 45.5

3. In basketball, a player can make a 1-point, 2-point or 3-point shot. The table shows the number of each type of shot a team took in one game and the percentage of each type of shot made. How many points did this team score in the game?

 | | 1-point shots | 2-point shots | 3-point shots |
   |---|---|---|---|
   | Shots attempted | 25 | 35 | 16 |
   | Percent made | 76% | 40% | 25% |

   A. 37   B. 42   C. 48   D. 57   E. 59

4. George, Henry, and Ralph share a bowl of cherries. First George ate one-third of them. Then Henry ate one-third of the remaining cherries. Ralph ate the last 16 cherries. How many cherries did George eat?
   A. 12   B. 16   C. 24   D. 36   E. 48

5. I have some rare gold coins. Each one of these coins is worth either 12 bronze coins or 7 silver coins. I traded 40 of my gold coins and got 119 silver coins. How many bronze coins did I also receive?
   A. 2   B. 23   C. 53   D. 161   E. 276

6. The first SCSU Math Contest was held 50 years ago (in 1968). In honor of this, find the sum of the **odd** integers from 1968 through 2017 (including 2017).
   A. 47,818   B. 49,800   C. 49,825   D. 51,792   E. 51,817

7. A solid wood cube measured 12 inches on each side. It was cut into eight smaller congruent cubes. These smaller cubes were then put end-to-end to form the longest possible rectangular prism. What is the gain, if any, in square inches of surface area of the new prism as compared to the original cube?
   A. No gain in area   B. 76.5   C. 108   D. 360   E. 1728

8. 20 fence posts are used to build a fence around a square plot. With one post at each corner, the distance between the center of adjacent fence posts is 6 meters. What is the area of the plot in square meters?
   A. 576   B. 625   C. 900   D. 1024   E. 1296

9. In an arithmetic sequence, there is a common difference between successive terms. The following terms form an arithmetic sequence: $42, x, 12, y$. Find $x - y$.
   A. 18   B. 21   C. 24   D. 27   E. 30

10. Let X, Y and Z represent three different numbers selected from the set $\{-800, -50, -24, 1000, 1200\}$.

What is the maximum possible value of $\dfrac{XY}{Z}$?

A. 1,500   B. 24,000   C. $33{,}333\frac{1}{3}$ D. 40,000   E. 50,000

11. $4^9 \times 4^9 = ?$

A. 16^{18} B. 16^{81} C. 2^{36} D. 4^{81} E. 8^9

12. Integers x, y, and z satisfy the three equations $xy = -14$, $yz = 70$ and $xz = -20$.

If $y > z$, what is the value of $(x + y + z)^3$?

A. -3375 B. -15 C. 15   D. 3375   E. 46,656

13. One brownie and one sweet potato pie together cost $10.00. Two brownies and three sweet potato pies together cost $26.20. What is the cost of one brownie?

A. $3.80   B. $4.76   C. $5.15   D. $5.24   E. $6.20

14. A company agreed to pay Megan and Bob $400 to complete a task. Megan did one-sixth of the task, then Bob did three-fourths of the remaining work. Megan then finished the task. How much of the $400 should Megan receive?

A. $100   B. $133.33   C. $150   D. $166.67   E. $175

15. At Perry's Parers, each parer pares a pair of pears every 6 minutes. How many pears do a pair of triplets pare in a pair of hours?

A. 60   B. 120   C. 160   D. 240   E. 480

Use the three diagrams below to answer questions 16, 17, and 18.

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1
3    5
7    9   11
13   15  17  19
21   23  25  27  29
31   33  35  37  39  41
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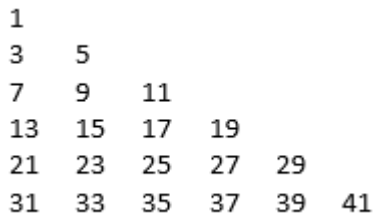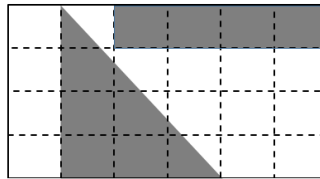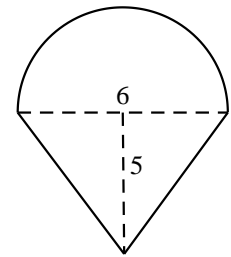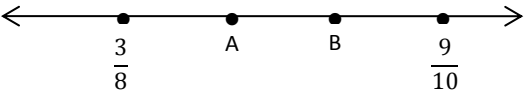
Question 16   Question 17   Question 18

16. The first six rows of a triangular array of odd numbers is shown, above left.
What will be the middle number in row 17?

A. 287   B. 289   C. 291   D. 293   E. 295

17. The nose of a dart will randomly hit the rectangle shown, above center.
What is the probability that it will hit a shaded region?

A. $\dfrac{5}{12}$ B. $\dfrac{3}{8}$ C. $\dfrac{1}{5}$ D. $\dfrac{5}{6}$ E. $\dfrac{7}{12}$

18. A semicircle with diameter 6 is placed on an isosceles triangle, as shown above right.
What is the perimeter, to the nearest tenth unit, of this figure?

A. 4.7   B. 11.1   C. 17.4   D. 18.8   E. 21.1

19. Sammy Snail participates in a 26-mile marathon. Sammy crawls at the rate of 10 furlongs per fortnight. How long, in days, does it take Sammy to finish the marathon? Round to the nearest whole number of days. (1 furlong = 220 yards; 1 fortnight = 2 weeks)

    A. 10   B. 220   C. 291   D. 2863   E. 5725

20. An empty rectangular pool is 15 feet wide by 30 feet long. The shallow end has a depth of 3 feet and the depth increases at a uniform slope to a depth of 6 feet at the deep end. If one cubic foot is equivalent to 7.48 gallons, and city water costs $4 for every 1000 gallons, about how much will it cost to completely fill the pool?

    A. $13.46   B. $15.15   C. $40.39   D. $60.59   E. $80.78

21. The four points are evenly spaced on the number line. Find the fraction located at point A.

    A. $\dfrac{2}{3}$ B. $\dfrac{3}{4}$ C. $\dfrac{43}{72}$ D. $\dfrac{29}{40}$ E. $\dfrac{11}{20}$

22. Consider the page numbers on eight consecutive pages of a book. The sum of these eight page numbers could **NOT** be:

    A. 612   B. 780   C. 864   D. 932   E. 1148

23. In a sequence of numbers, $1,3,2,\ldots$, each term, starting with the third term, is equal to the term preceding it minus the term preceding that one. What is the sum of the first 50 terms of the sequence?

    A. 2   B. 3   C. 4   D. 5   E. 6

24. The lengths of the sides of a scalene triangle are all integers. Two of these integers are primes that differ by 50. Compute the smallest possible value for the length of the third side.

    A. 51   B. 53   C. 55   D. 56   E. 57

25. In my kitchen, I had a stack of plates: $\dfrac{2}{3}$ were cracked, $\dfrac{1}{2}$ were chipped, and $\dfrac{1}{4}$ were both chipped and cracked. Two of the plates were neither chipped nor cracked. How many plates were in the stack?

    A. 12   B. 24   C. 36   D. 48   E. 54

26. Millie was born 1 million seconds after the start of 2017. If New Year's Day 2017 was Sunday, on what day of the week was Millie born?

    A. Wednesday   B. Thursday   C. Friday   D. Saturday   E. Sunday

27. If the ratio of $2x+y$ to $x-y$ is 50:1, what is the ratio of x to y?

    A. 1:50   B. 1:2   C. 49:50   D. 17:16   E. 2:1

28. If $A+B=Z$ and $Z+P=T$ and $T+A=F$ and $B+P+F=120$ and $A=24$, what is the value of F?

    A. 0   B. 36   C. 48   D. 72   E. 84

29. By exchanging the positions of two digits in the number 965,142, the resulting number is 19,980 smaller than the original number. What is the sum of the two digits exchanged?

    A. 7   B. 8   C. 9   D. 10   E. 13

30. Four suspects of a crime made the following statements to the police.
    Anil: Cora stole the $50.
    Bev: I did not steal the $50.
    Cora: Dan stole the $50.
    Dan: Cora lied when she said that I stole the $50.
    Given that one of them "did it" and that exactly one of them told the truth, who stole the $50?
    A. Anil   B. Bev   C. Cora   D. Dan   E. Impossible to
                                                                                        determine

31. For what positive real number n are $\dfrac{(n+1)^2}{5n}$ and $\dfrac{n^2+2n}{5n+1}$ reciprocals?

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

32. The graphs of the lines defined by the equations below intersect at a single point. Find the value of k.
    $$2x+y=-1 \qquad\qquad -4x+6y=42 \qquad\qquad -7x-5y=k$$

    A. −46   B. −4   C. 4   D. 6   E. 46

Use the three figures below to answer questions 33, 34, and 35.

Question 33

Question 34

Question 35

33. How many triangles of any size are in the picture, above left?
    A. 12   B. 13   C. 15   D. 17   E. 18

34. The six numbers on the faces of our cube, above center, are consecutive even numbers. The sums of the two
    numbers on each pair of opposite faces are equal. A portion of our cube can be seen in the diagram. What is
    the number on the face opposite 22?
    A. 18   B. 20   C. 24   D. 30   E. 32

35. Eight identical sheets of paper were placed on the table one at a time, overlapping as shown in the diagram,
    above right. Which sheet(s) of paper could have been the fifth one placed on the table?
    A. Only A   B. Only D   C. Only E   D. Only D or E   E. Only E or H

36. To celebrate the 50th annual SCSU Math Contest, Rimsa wants to walk 50% farther today than yesterday in only
    50% of the time she walked yesterday. What percent increase in speed will she need today as compared to
    yesterday to meet her goal?
    A. 20%   B. 50%   C. 200%   D. 300%   E. 500%