

2024 SCSU MATH CONTEST
7th and 8th GRADE

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

1. Welcome to the SCSU Math Contest, held today on April 11, 2024! In honor of the occasion, find the number of positive integers that leave a remainder of 11 when divided into 2024.

(a) 4 (b) 5 (c) 6 (d) 7 (e) 8

2. Finish the square so that the numbers in each row, column, and diagonal add up to the same number. What is the *median* of the missing numbers?

12		10
	9	
		6

(a) 8 (b) 8.5 (c) 9 (d) 9.5 (e) 10

3. Donations to Maple Middle School are projected to increase each year by the same dollar amount. In 2024, donations should be \$2,204. In 2033, donations should be \$2,420. In which year should donations be \$2,636?

(a) 2039 (b) 2042 (c) 2044 (d) 2045 (e) 2046

4. Three girls (Gwen, Glenda, and Gina) and two boys are sitting in the front row of class. They are in alphabetical order by last name, going left to right: Abdi, Benson, Carlson, Dahl, and Elyas. They are boy, girl, boy, girl, girl from left to right. Brandon's last name is Carlson. Neither Gwen nor Glenda is wearing a bracelet (the middle girl is), and Gwen is not sitting next to the boy named Brian.

Who is sitting second from the left?

(a) Gina (b) Gwen (c) Glenda (d) Brian (e) Brandon

5. Find the value of $\frac{9^{2026} - 9^{2024}}{9^{2025} - 9^{2024}}$.

(a) 2 (b) $\frac{9}{2}$ (c) 8 (d) 9 (e) 10

6. How many two-digit whole numbers are exactly 4 times the sum of their digits?

(a) 1 (b) 2 (c) 3 (d) 4 (e) 8

7. A four-foot party-length sandwich is cut into three pieces. The middle piece is 2 inches longer than the shortest piece. The shortest piece is 4 inches shorter than the longest piece. How long is the longest piece?



(a) 14 inches (b) 16 inches (c) 18 inches (d) 20 inches (e) 24 inches

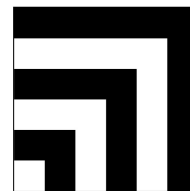
8. Two fair six-sided dice, one red and one green, are rolled. What is the probability that the red die shows a number that is prime and also strictly less than the number showing on the green die?

(a) $\frac{2}{9}$ (b) $\frac{1}{4}$ (c) $\frac{5}{12}$ (d) $\frac{11}{18}$ (e) $\frac{13}{36}$

9. While driving his truck, Elon notices the odometer reading, 24942 miles, is a *palindromic* number, meaning it is not changed when reversed. In just two hours, he sees the next possible palindromic number. Find Elon's average speed (in miles per hour) during the last two hours.

(a) 45 (b) 50 (c) 55 (d) 60 (e) 70

10. What fraction of the square region at the right is shaded?
The stripes are equal in width.



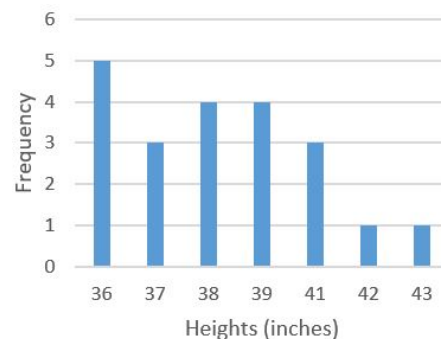
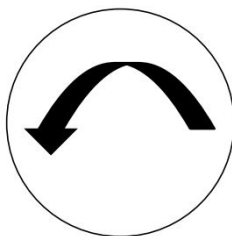
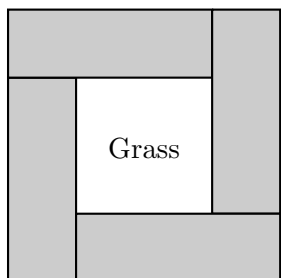
- (a) $\frac{1}{2}$ (b) $\frac{5}{9}$ (c) $\frac{7}{12}$ (d) $\frac{2}{3}$ (e) $\frac{7}{9}$

11. How many positive integers have squares between 50 and 800?

- (a) 20 (b) 21 (c) 27 (d) 31 (e) 32

12. A brick walkway 3 feet \times 24 feet is created using bricks that are 3 inches \times 9 inches. The central space inside each ring of bricks used in forming the walkway will contain grass. Four bricks are arranged into one ring as shown (below, left, not to scale). In the walkway, what is the ratio of the grass area to the area of the bricks?

- (a) 1 : 1 (b) 1 : 2 (c) 1 : 3 (d) 2 : 3 (e) 4 : 5



13. For the figure appearing above (center), which choice shows a 90° clockwise rotation followed by a reflection across a vertical axis?

- (a) (b) (c) (d) (e)

14. Sergey is practicing for the high jump competition. The bar chart (above, right) shows the heights Sergey made in multiple attempts. What was the median height (in inches) of all attempts made by Sergey?

- (a) 37 (b) 38 (c) 39 (d) 41 (e) None of these

15. To the nearest thousandth, what is the probability of getting two heads and one tail (in any order) if a fair coin is flipped three times?

- (a) 0.125 (b) 0.250 (c) 0.333 (d) 0.375 (e) 0.667

16. I have only nickels, dimes, and quarters to pay for a book that costs \$10.85. What is the smallest number of these coins I can use to pay for it?

- (a) 43 (b) 44 (c) 45 (d) 46 (e) 47

17. The scale on an architectural floor plan is 1 in:12 ft. The length of a hallway in the floor plan is 1.75 inches. What is the actual length of the hallway?

- (a) 5 yards (b) 6 yards (c) 7 yards (d) 8 yards (e) 9 yards

18. I can ride my bicycle 5 miles in $\frac{1}{3}$ of an hour. At this rate, how many minutes will it take me to ride 26 miles?

- (a) 102 (b) 104 (c) 108 (d) 120 (e) 124

19. Pencils come in packs of 3 and 4. I bought a total of 15 packs of these pencils and got a total of 51 pencils. I bought at least one of each pack. How many packs of 3 pencils did I buy?

- (a) 6 (b) 7 (c) 8 (d) 9 (e) None of these

20. Jake bought a toaster at a kitchen supply store that gave a discount of 25% off the original price, P . The total amount Jake paid was t dollars, including a 6% sales tax on the discounted price. Which of the following represents the original price of the toaster in terms of t ?

(a) $P = 0.81t$ (b) $P = \frac{t}{0.81}$ (c) $P = 0.795t$ (d) $P = \frac{0.81t}{0.795}$ (e) $P = \frac{t}{0.795}$

21. Assume the following statements are true.

- If it rains, we will cry.
- If it doesn't rain, we will play soccer.
- If we play soccer, I will get muddy.
- Mom will get angry if I get muddy.
- I did not get muddy.

Which of these is a valid conclusion?

- (a) We cried. (b) It did not rain. (c) We did not cry. (d) Mom is not angry. (e) We played soccer.

22. Mary's list consists of four consecutive odd whole numbers and four consecutive even whole numbers. The mean of all eight numbers is 18.5. The mean of the four even numbers is 21.

Find the smallest of the eight numbers in Mary's list.

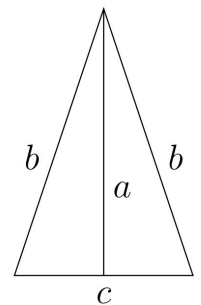
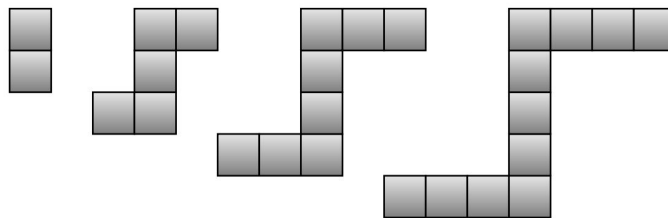
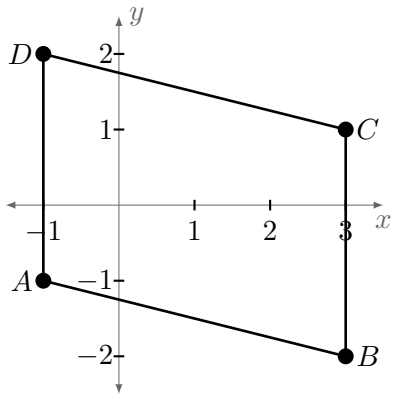
- (a) 11 (b) 13 (c) 17 (d) 21 (e) None of these

23. Find the area, in square units, of the quadrilateral $ABCD$ (below, left) where $A = (-1, -1)$, $B = (3, -2)$, $C = (3, 1)$, and $D = (-1, 2)$.

- (a) 12 (b) $3\sqrt{17}$ (c) $3 + \sqrt{17}$ (d) $6 + 2\sqrt{17}$ (e) 25

24. In the pattern of square tiles (below, center), there are 2 tiles in the first figure and 5 tiles in the second. Assuming that the pattern continues, how many tiles are in the 150th term?

- (a) 443 (b) 446 (c) 449 (d) 450 (e) 451



25. The altitude a , equal sides b , and non-equal side c of an isosceles triangle (above, right) have lengths that are, in the order listed, consecutive even numbers of inches. What is the area of the triangle?

- (a) 6 in^2 (b) 16 in^2 (c) 24 in^2 (d) 48 in^2 (e) 70 in^2

26. Yenran has 10 white cubes and 17 red cubes, each 1 inch on each side. She arranges them to form a larger cube that is 3 inches on each side. What is the largest possible fraction of red surface area on the larger cube?

- (a) $\frac{17}{54}$ (b) $\frac{17}{27}$ (c) $\frac{2}{3}$ (d) $\frac{7}{9}$ (e) $\frac{8}{9}$

27. Two sides of a triangle have lengths of 8.1 and 1.4 units. The length of the third side is an even integer. What is this integer?
- (a) 2 (b) 4 (c) 6 (d) 8 (e) 10
28. If $a \heartsuit b = 2b - a$, then $[2 \heartsuit (b \heartsuit a)] - [(2 \heartsuit a) \heartsuit b] =$
- (a) $6a - 4b - 4$ (b) $3a + 3b$ (c) $3a + 3b - 4$ (d) $a + b - 4$ (e) 0
29. If the degree measures of a triangle are in a ratio of 3 : 4 : 5, what is the difference between the measures of the largest and the smallest angles?
- (a) 15° (b) 30° (c) 45° (d) 60° (e) 90°
30. The product of four consecutive integers must be divisible by each of the following except
- (a) 2 (b) 3 (c) 8 (d) 10 (e) 24
31. There are 12 marbles in a bag, all the same size. There are five red marbles and the rest are blue. Jazzmine randomly removes two marbles from the bag, both at the same time. What is the probability that she chooses one red and one blue marble from the bag?
- (a) $\frac{35}{144}$ (b) $\frac{35}{132}$ (c) $\frac{11}{35}$ (d) $\frac{5}{11}$ (e) $\frac{35}{66}$
32. If the population of a city started at 100,000, then went up by 10%, then down by 15%, then up by 5%, what was the net change in the population?
- (a) decrease by 2000 (b) increase by 2000 (c) no change (d) increase by 1825 (e) decrease by 1825
33. Triangle ABC has vertices $A(0, -5)$, $B(7, -6)$, and $C(-3, -2)$. $\triangle A'B'C'$, the image of $\triangle ABC$, is the result of two transformations: a reflection in the y -axis followed by a 90° counterclockwise rotation about the origin. Find the sum of the x - and y -coordinates of the vertices of $\triangle A'B'C'$.
- (a) -23 (b) -3 (c) 3 (d) 7 (e) 9
34. In order, the numbers A, B, C, D , and E are the first five terms in a sequence. Starting with C , each term is the sum of the previous two terms. If $A = 4$ and $E = 29$, find the value of D .
- (a) 17 (b) 18 (c) 19 (d) 21 (e) None of these
35. When a number is added to the numerator of the fraction $\frac{4}{25}$ and 6 times that same number is added to the denominator of the fraction, the result is $\frac{3}{26}$. What is the number?
- (a) $-\frac{29}{8}$ (b) -1 (c) $\frac{2}{3}$ (d) $\frac{23}{8}$ (e) 7
36. Two lines have the same y -intercept and reciprocal slopes. If the first line has slope m and x -intercept a , what is the x -intercept of the other line?
- (a) $\frac{m^2}{a}$ (b) $\frac{m}{a}$ (c) $\frac{1}{a}$ (d) am (e) am^2
37. What is the remainder when 4^{2024} is divided by 10?
- (a) 1 (b) 2 (c) 4 (d) 6 (e) 8
38. A staircase has a total of 7 steps. Asha can climb the stairs taking 1 step at a time, or 2 steps at a time, or a combination of 1 and 2 steps at a time. For example, Asha can climb a staircase of 4 steps in 5 ways. In how many ways can Asha climb the staircase of 7 steps?
- (a) 8 (b) 13 (c) 21 (d) 34 (e) None of these