2025 SCSU MATH CONTEST
7^{th} and 8^{th} GRADE

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

1. Welcome to the 2025 SCSU Math Contest! 2025 is a special year in that it has six factors that are also perfect squares. Two of these perfect square factors are 225 and 2025. What is the sum of the other four?

   (a) 35 (b) 71 (c) 115 (d) 116 (e) 2366

2. In a survey of 100 junior high school students, the following is obtained about the courses they are taking: 62 are enrolled in Spanish, 43 are enrolled in band, and 14 are enrolled in neither Spanish nor band. How many of the 100 students are enrolled in both Spanish and band?

   (a) 13 (b) 15 (c) 17 (d) 19 (e) None of these

3. A stack of 16 pennies is 1 inch high. Gloria has a stack of pennies and a stack of dimes each 6 inches high and together they have a value of \$12.36. How many dimes are in a stack 1 inch high?

   (a) 15 (b) 16 (c) 17 (d) 18 (e) 19

4. Alejandra wrote the following sequence on the board: $3, 6, 11, 18, \ldots$. What is difference between the 30th and the 29th numbers in the sequence?

   (a) 57 (b) 59 (c) 61 (d) 63 (e) None of these

5. When expressed as a repeating decimal, the fraction $\frac{1}{13}$ is written as $0.076923076923\ldots$, where the 6 digits 076923 continue to repeat. The digit in the third position right of the decimal is 6. In which one of the following positions to the right of the decimal point will there also be a 6?

   (a) 119^{th} (b) 121^{st} (c) 123^{rd} (d) 125^{th} (e) 126^{th}

6. The heights of four athletes on a team are 135 cm, 160 cm, 170 cm, and 175 cm. Lukas joins the team. On the new team of five athletes, the mode height of the players is equal to the median height which is equal to the mean height. How tall is Lukas?

   (a) 135 cm (b) 160 cm (c) 165 cm (d) 170 cm (e) None of these

7. A 15-foot wide, 30-foot long in-ground pool is filled with water. The shallow end is 3 feet deep and slopes linearly to the deepest end, which is 10 feet deep. What is the volume of the pool?

   (a) 1350 ft^3 (b) 1575 ft^3 (c) 2925 ft^3 (d) 4500 ft^3 (e) None of these

8. In Minnesota in 2024, about $\frac{1}{3}$ of the state's electricity was produced by renewable sources (e.g. solar, wind). In addition, roughly $\frac{1}{4}$ and $\frac{1}{5}$ of the state's electricity was produced by natural gas and by nuclear sources respectively. The rest of the state's electricity was produced from coal. Find the approximate fraction of Minnesota's electricity that came from coal in 2024.

   (a) $\frac{1}{40}$ (b) $\frac{3}{40}$ (c) $\frac{11}{60}$ (d) $\frac{13}{60}$ (e) $\frac{59}{60}$

9. Paul drives from Saint Paul to Fargo, a distance of 250 miles. For the first 100 miles, he averaged 65 miles per hour (mph). For the last 150 miles, he averaged 55 mph. If V represents Paul's average speed (in mph) for the entire trip, which of the following is true?

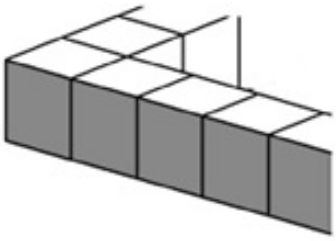
   (a) $58 < V < 59$ (b) $59 < V < 60$ (c) $V = 60$ (d) $60 < V < 61$ (e) $61 < V < 62$

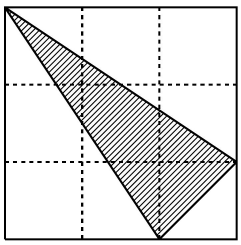
10. Myah fills her fish tank from empty at a constant rate of 3 gallons of water per 10 minutes. After one hour, the tank is $\frac{3}{8}$ full. How many gallons of water can the tank hold?

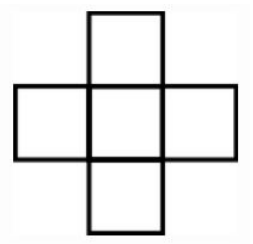
(a) 36 (b) 48 (c) 72 (d) 96 (e) None of these

11. Jari made a wall around a square region using identical cubes. A section of the wall is shown (below, left). How many cubes are in the wall if it takes 2025 cubes to completely fill the square region?

(a) 176 (b) 180 (c) 184 (d) 196 (e) 200







12. A shaded triangle appears in the 3×3 grid shown (above, center). Which of the following is closest to the percentage of the square region shaded?

(a) 25% (b) 27% (c) 30% (d) 33% (e) 35%

13. Five *different* integers from 1 to 6 are selected and one integer is placed into each of the five squares shown in the grid (above, right). The integers are placed so that the sum of the three integers in the vertical column is 7, and the sum of the three integers in the horizontal row is 11. Which integer does *not* appear in any square?

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

14. Gladys writes down the 15 smallest positive integers that have at least one 7 as one of their digits. Nina writes down the 15 smallest positive integers that have at least one 5 as one of their digits. How many more primes are in Gladys' list compared to Nina's list?

(a) 0 (b) 1 (c) 2 (d) 3 (e) 4

15. Whatchamagigs are made up of 3 wheels, 5 shafts, and 6 nuts. If Corey has 200 wheels, 300 shafts, and 350 nuts, what is the maximum number of complete whatchamagigs that Corey can assemble?

(a) 58 (b) 59 (c) 60 (d) 66 (e) None of these

16. How many pairs of positive integers a and b satisfy the equation $\frac{a}{7} + \frac{4}{b} = 1$?

(a) 0 (b) 1 (c) 3 (d) 4 (e) 5

17. In a *Gareth sequence*, each number after the second is the *non-negative* difference between the previous two numbers. For example: $15, 12, 3, 9, 6, 3, 3, 0, 3, \ldots$ is a Gareth sequence. If a Gareth sequence begins $5, 3$, what is the sum of the first 2025 numbers in the sequence?

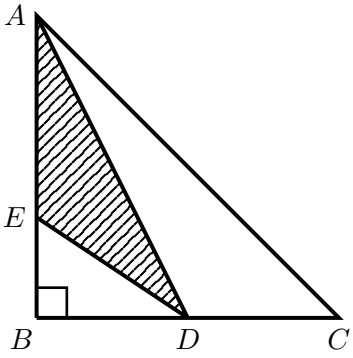
(a) 1358 (b) 1359 (c) 1360 (d) 1361 (e) None of these

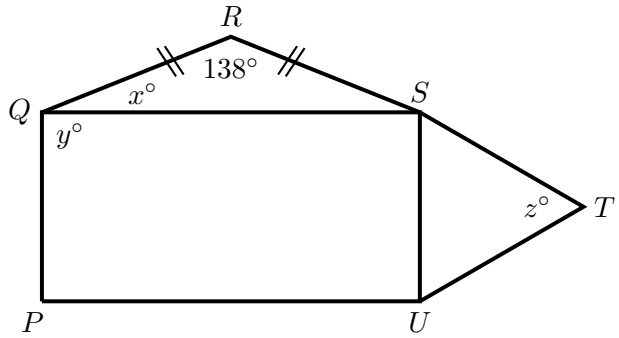
18. Terry has a jar that contains \$1.00 worth of dimes and \$1.00 worth of quarters and no other coins. If he randomly removes two coins from the jar, what is the probability that both coins are dimes?

(a) $\frac{1}{90}$ (b) $\frac{1}{5}$ (c) $\frac{1}{4}$ (d) $\frac{45}{91}$ (e) $\frac{25}{49}$

19. In the diagram (below, left), $\triangle ABC$ is a right-angled isosceles triangle. D is the midpoint of segment BC and BE is one-third the length of AB. If $AB = BC = 24$ cm, what is the area of $\triangle AED$?

(a) 48 cm^2 (b) 72 cm^2 (c) 81 cm^2 (d) 96 cm^2 (e) 192 cm^2





$$\begin{array}{rcccc} & & & Q & R \\ & & P & P & P \\ + & & P & P & P \\ \hline & 2 & 0 & 2 & 5 \end{array}$$

20. In the diagram (above, center), $\triangle RQS$ is isosceles with $QR = RS$. $PQSU$ is a rectangle and $\triangle UST$ is an equilateral triangle. If $m(\angle QRS) = 138°$, $m(\angle RQS) = x°$, $m(\angle PQS) = y°$, and $m(\angle STU) = z°$, find the average of $x°, y°$, and $z°$.

(a) 53° (b) 57° (c) 60° (d) 64° (e) None of these

21. In the sum shown (above, right), each letter represents a digit from 1 to 9. Find the value of $P + Q + R$.

(a) 14 (b) 15 (c) 16 (d) 17 (e) 18

22. The positive integer N has exactly 8 positive divisors including 1 and N. Two of these divisors are 10 and 15. What is the sum of all 8 positive divisors of N?

(a) 36 (b) 42 (c) 66 (d) 70 (e) 72

23. Cyril owns more cats than Abdul and more dogs than Brad. Abdul owns more dogs than Cyril and fewer cats than Brad. Which of the statements *must* be true?

(a) Abdul owns the most dogs. (b) Kathy owns the fewest dogs. (c) Cyril owns the most cats. (d) Brad owns the fewest cats. (e) Brad owns the most cats.

24. Janet had an 85-ounce solution of 19% iodine. She poured out 25 ounces of the solution and then added 10 ouces of pure water. What is the concentration of the new solution? Round the answer to 1 decimal place.

(a) 15.8% (b) 16.3% (c) 16.8% (d) 17.3% (e) None of these

25. If $n = 2025$, which of the following expressions has an even value?

(a) $7n$ (b) $n + 8$ (c) $n - 16$ (d) $3n + 2$ (e) $2n - 2$

26. The original price of a shirt is reduced by 50% to obtain a second price. This second price is then reduced by 40% to obtain a third price. What is the discount of the third price off the original price?

(a) 10% (b) 45% (c) 70% (d) 80% (e) 90%

27. A large number is written with a one followed by many zeroes (1000...000). When 1 is subtracted from this number, the sum of the digits in the result is 2025. How many zeroes are in the original number?

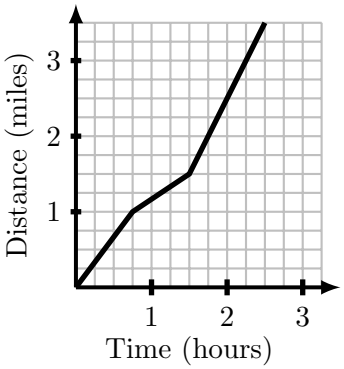
(a) 224 (b) 225 (c) 226 (d) 338 (e) 2025

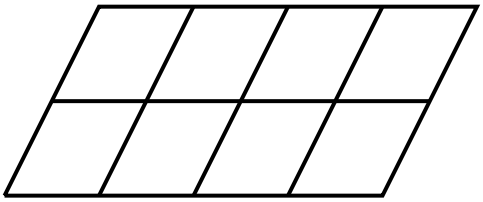
28. The operation # is defined so that $a\#b = ab + a + b$. If $2\#(p\#3) = 71$, what is the value of p?

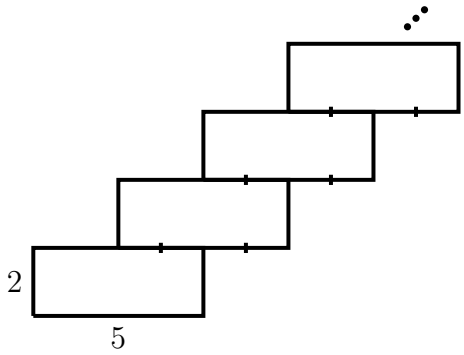
(a) 3 (b) 4 (c) 5 (d) 6 (e) None of these

29. The line graph (below, left) shows the distance that Andrea walked over time. How long did it take Andrea to walk the first 2 miles?

(a) 45 minutes (b) 75 minutes (c) 90 minutes (d) 105 minutes (e) 150 minutes







30. The figure (above, center) consists of 8 identical parallelograms arranged side by side in 2 rows and 4 columns. Including these 8 small parallelograms, how many parallelograms appear in this figure?

(a) 26 (b) 27 (c) 28 (d) 29 (e) 30

31. Rectangles with sides of length 5 cm and 2 cm are positioned in a pattern in which the bottom left corner of each rectangle (after the first one) is placed at the midpoint of the top edge of the rectangle below it as shown (above, right). When a total of 2025 rectangles are arranged in this pattern, what is the perimeter of the figure?

(a) 18,207 cm (b) 18,225 cm (c) 18,230 cm (d) 18,235 cm (e) 28,350 cm

32. A pile of coins made up of only nickels and dimes is worth \$20.25. The number of nickels is one more than double the number of dimes. How many coins are in the pile?

(a) 101 (b) 202 (c) 203 (d) 303 (e) 304

33. One of Edith's children ate the last piece of pie. When asked, the children responded as follows:

Annalisa: *I did not eat the last piece of pie.*
Breanna: *Cole ate the last piece of pie.*
Cole: *Dristi ate the last piece of pie.*
Dristi: *Cole lied when he said I ate the last piece of pie.*

Exactly one of Edith's children told the truth. Who ate the last piece of pie?

(a) Annalisa (b) Breanna (c) Cole (d) Dristi (e) Impossible to tell

34. Ahmed starts the year off by doing push-ups every day for two weeks. Each day after the first day, he did 5 more push-ups than the day before. In total, he did 595 push-ups. How many push-ups did Ahmed do on the last day of the two weeks?

(a) 65 (b) 75 (c) 85 (d) 95 (e) None of these

35. In a quadrilateral, the measure of one of the angles is 105°. The measures of the other three angles are in the ratio 2 : 5 : 10. What is the measure of the largest angle in the quadrilateral?

(a) 75° (b) 120° (c) 150° (d) 170° (e) 255°

36. ABCDE is an even number that is less than 25,000. Given that all digits are unique, none of them are 3 or 6, and that 4 times ABCDE is EDCBA, find B+D.

(a) 8 (b) 9 (c) 10 (d) 11 (e) None of these