Spirit of Math®

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IN COLLABORATION WITH

smile

Developed by

Stanford University

GRADE 6

Spirit of Math International Contest 2022

In collaboration with SMILE developed by Stanford University

INSTRUCTIONS

1. You have **60 minutes** to write the contest.
2. The contest is multiple-choice with four choices for each question.
3. Write the CAPITAL letter of the answer you choose on the line to the right of each question and fill in the corresponding circle on the SoM Answer Sheet.
4. Each question answered correctly is worth one mark, and the sum of the correct answers is the score.
5. Marks are not taken off for wrong answers.
6. No calculators or other counting tools are allowed.

Student Name: _____ **Score:** /40

1) $5 \times 9 - 10 + 2 = ?$

A) 33 B) 37 C) 39 D) 47 ____

2) The unit's digit of a number is the rightmost digit of the number. For example, the units digit of 416 is 6. What is the unit's digit of the product of 128×364?

A) 2 B) 4 C) 6 D) 8 ____

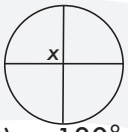
3) What is the next term in this sequence? 3, 6, 12, 24, ___

A) 36 B) 48 C) 60 D) 72 ____

4) Barry is five years younger than Allen. If Allen is going to be 17 years old in one year, how old is Barry now?

A) 11 B) 12 C) 22 D) 23 ____

5) A pizza is sliced into four equal quarters, as shown in the diagram. What is the measure of angle *x* in the diagram?

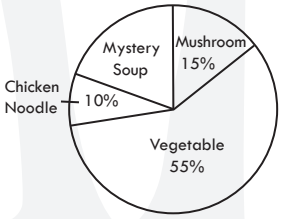


A) 25° B) 45° C) 90° D) 180° ____

6) For every gram of pepper in the stew, there are 11 grams of salt. If there are 55 grams of salt in the stew, how many grams of pepper are there in the stew?

A) 5 grams B) 7 grams C) 9 grams D) 11 grams ____

7) Using the chart on the right, what percentage of people ordered the mystery soup?



A) 10% B) 20% C) 25% D) 30% ____

8) In the magic square to the right, each column, row, and diagonal add up to 34. What number does x represent?

	9		16
14	7		
15		10	3
1	12	x	

A) 6 B) 8 C) 13 D) 17 ____

Space for rough work

9) A factor set consists of all numbers that can divide evenly into a given number with no remainder. For example, the factor set of 10 is {1, 2, 5, 10}. How many numbers are in the factor set of 24?

A) 2 B) 4 C) 6 D) 8 ____

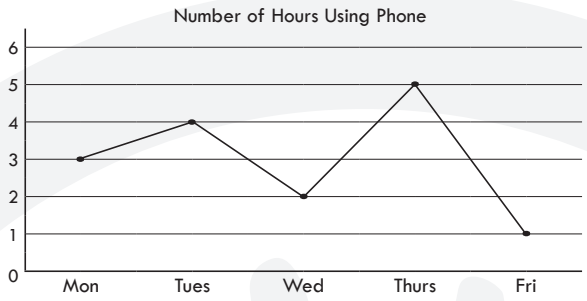
10) A regular polygon is a polygon with all sides equal and all angles equal. Dhruv paints a regular pentagon with integer side lengths. Which of the following could be the perimeter of his pentagon?

A) 1032 B) 1033 C) 1034 D) 1035 ____

11) Anna is buying cupcakes for her sister's birthday party. Cupcakes are sold in packages of four and Anna needs to buy enough cupcakes so that herself, her sister, and 19 guests can each have one. What is the fewest number of packages Anna needs to buy?

A) 4 B) 5 C) 6 D) 7 ____

12) At the end of the school week, Denton's phone notifies him of how many hours he spent using his phone from Monday to Friday. Denton's phone shows him the chart to the right on Friday night. How many hours per day on average did Denton spend using his phone that school week?



A) 2.5 B) 3 C) 3.5 D) 4 ____

13) Mother has 12 apples and father has 16 oranges. If mother gives you 25% of her apples and father gives you 25% of his oranges, how many fruits do you have in total?

A) 7 B) 8 C) 9 D) 12 ____

14) If a # b is defined as $a + b \times a^2$, then what is the value of 2 # 3?

A) 14 B) 20 C) 45 D) 100 ____

Space for rough work

15) Three consecutive numbers sum to 333. What is the smallest of these three numbers?

A) 109 B) 110 C) 111 D) 112 ____

16) Last year there were four more woodwind instruments in the school band than there are this year. If there was a total of 34 woodwind instruments in the band in both years combined, how many woodwind instruments are in the band this year?

A) 13 B) 15 C) 19 D) 30 ____

17) Two parents live in a house with their children. What is the ratio of brothers to parents if each brother has three brothers?

A) 3:2 B) 2:1 C) 3:1 D) 9:2 ____

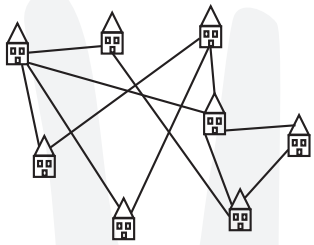
18) My favourite two-digit number is a perfect square. I add my favourite two-digit number to its square root and its square. What sum could I possibly get?

A) 121 B) 275 C) 342 D) 655 ____

19) Marcel cuts a circle with radius 2 cm out of a circle with radius 4 cm as shown in the image to the right. What is the area of the shaded region?

A) 4π cm^2 B) 8π cm^2 C) 12π cm^2 D) 16π cm^2 ____

20) The eight houses of eight friends are each connected to each other with a single telephone wire. One night, several of the wires broke in a storm. The remaining wires are shown in the image to the right. How many wires broke in the storm?



A) 17 B) 18 C) 25 D) 34 ____

21) Kiyoko has 10 candies numbered from 1 to 10. She eats some of the candies and adds the numbers of the remaining candies to find their sum is 25. At most how many candies remained?

A) 4 B) 5 C) 6 D) 7 ____

Space for rough work

22) In Mathworld, the currency is rhombuds (®). Only six types of coins exist and they have the following values: 1®, 2®, 4®, 8®, 16®, and 32®. Zane has four coins in his pocket. Which of the following could be the total value of the rhombuds in Zane's pocket?

A) 3® B) 45® C) 47® D) 63® ____

23) Risako has nine flowers that are red or yellow with 39 petals altogether. Her red flowers have four petals each and her yellow flowers have five petals each. How many red flowers does Risako have?

A) 3 B) 4 C) 5 D) 6 ____

24) Max has seven books to put on one shelf. He has four red-covered books, two green-covered books, and one white-covered book. Rearranging the same coloured books does not change the appearance of the books on the shelf. How many different ways can the books appear on the shelf?

A) 105 B) 210 C) 630 D) 1680 ____

25) A four-storey building was having a light show on New Year's Eve by having each floor flick on and off their lights. The first floor flicks their lights every 12 seconds. The second floor flicks every 60 seconds. The third floor flicks every 45 seconds and the top floor flicks every 56 seconds. If all floors flick their lights at 11 p.m., in how many seconds will they next flick their lights all together again?

A) 173 B) 840 C) 2520 D) 7560 ____

26) A cubic water tank is half full of water. Jon drains the tank by drawing water from it at the rate of 300 cm^3 per second. If it took 5 minutes to drain the tank, what is the total volume of the tank in cm^3?

A) 1 500 cm^3 B) 15 000 cm^3 C) 90 000 cm^3 D) 180 000 cm^3 ____

27) Penelope rolls four regular hexahedral dice and adds the dots facing up on each die. How many different possible sums could she obtain?

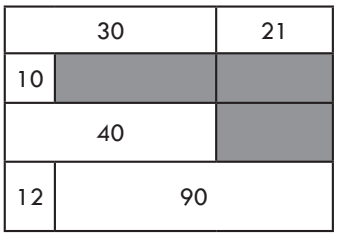
A) 20 B) 21 C) 36 D) 42 ____

Space for rough work

28) A subway train takes a total of 10 seconds for the doors to go from open to closed at each stop. After the doors close, it takes 40 seconds to travel to the next station. If the subway train starts opening the doors at exactly 10 a.m. at the first train station, during what time are the doors opened on the 15th stop?

A) 10:11:40 a.m. to 10:11:50 a.m. B) 10:12:00 a.m. to 10:12:10 a.m. C) 10:13:30 a.m. to 10:13:40 a.m. D) 10:14:50 a.m. to 10:15:00 a.m. ____

29) A large rectangle has been divided into several smaller rectangles. The numbers in each region represent the area of that region in cm^2. All side lengths of each rectangle are whole numbers. What is the area of the shaded region in cm^2?



A) 50 cm^2 B) 51 cm^2 C) 100 cm^2 D) 103 cm^2 ____

30) A 3D printer is set to print all digits of the numbers consecutively starting from 1. What number was the printer printing when the digit "1" was printed for the 141st time?

A) 199 B) 201 C) 210 D) 211 ____

31) The *Super Sums* program transforms numbers by following this procedure:

1. The two leftmost digits are replaced with their sum to create a new number.
2. The new number is input back into the *Super Sums* program.

The *Super Sums* program repeats this process until the number is only one digit. For example, 82517, 10517, 1517, 617, 77, 14, 5 is a sequence of numbers generated by the *Super Sums* program that ends in 5. If I input the number 333...3, which consists of one hundred 3's, what number will the *Super Sums* program end with?

A) 0 B) 3 C) 6 D) 9 ____

Space for rough work

32) A blacksmith has 15 chains. Each chain consists of 6 links. He wants to combine them into one long chain by cutting and welding the least number of links. How many different links must be cut and welded together?

A) 6 B) 12 C) 14 D) 15 ____

33) If Augustus watches a movie, he will not have time to water his flowers. If Augustus does not water his flowers, his flowers will not grow. Based on this information, which statement is true?

A) If Augustus watches a movie, his flowers will grow.

B) If Augustus does not watch a movie, his flowers will grow.

C) If Augustus does not watch a movie, he will water his flowers.

D) If Augustus' flowers grew, he did not watch a movie. ____

34) A chord is a line segment that connects two points on a circle. What is the maximum number of non-overlapping regions a circle can be divided into with 15 chords?

A) 30 B) 48 C) 121 D) 127 ____

35) Ivy paddled 32 km up Woby River and then paddled back down the river to get home. The river flowed at a rate of 8 km/h, and Ivy paddled at a rate of 24 km/h. What was her average speed for the entire trip in km/h?

____

A) $18\frac{1}{3}$ km/h B) $21\frac{1}{3}$ km/h C) 32 km/h D) 64 km/h

36) Thirty-nine travellers are on a vacation. On their trip, everyone travelled by at least one of three modes of transportation: train, plane, or car. In total, 19 travelled by train, 20 travelled by plane, and 23 travelled by car. Nine needed to take both a train and a car, 11 drove a car and flew on a plane, and eight took a plane and a train. How many travellers took all three modes of transportation?

A) 2 B) 3 C) 4 D) 5 ____

Space for rough work

37) The number 1441 is a palindrome because it reads the same forwards and backwards. How many 4-digit palindromes are divisible by 3?

A) 20 B) 30 C) 60 D) 90 ____

38) Every letter in the addition problem to the right represents a different digit. What is the sum of the digits in "STAR"?

$$\begin{array}{cccc} & J & J & J \\ & O & O & O \\ + & Y & Y & Y \\ \hline S & T & A & R \end{array}$$

A) 12 B) 13 C) 15 D) 16 ____

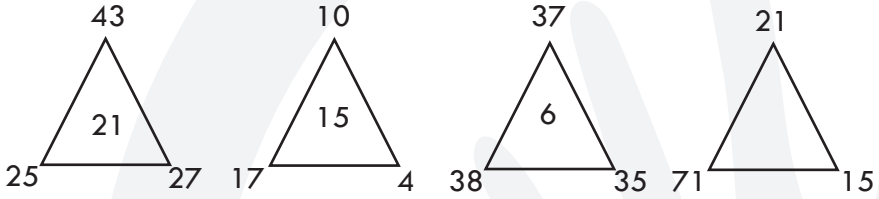
39) A large number is written on the outside of a space ship. The 30 aliens inside the ship each made a statement about the number written on the ship one by one:

- Alien #1 claims the number is divisible by 2.
- Alien #2 claims the number is divisible by 3.
- Alien #3 claims the number is divisible by 4, and so on.
- Finally, Alien #30 claims the number is divisible by 31.

Exactly two aliens, who spoke consecutively, were incorrect in their claims. What is the sum of the digits of the Alien # for one of the two aliens who were incorrect?

A) 6 B) 8 C) 10 D) 11 ____

40) Based on the first three triangles, what number should go in the fourth triangle?



A) 9 B) 32 C) 46 D) 53 ____

Space for rough work