Spirit of Math®

Releasing the Genius®

IN COLLABORATION WITH

smile

Developed by

Stanford University

GRADE 6

Spirit of Math International Contest 2023

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) $-4 \times 7 + 25 + 7 = ?$

A) 4 B) 10 C) 35 D) 60 ____

2) I have a set of numbers {11, 13, 17, 19, 23, 25, 29}. Which number from the set does not belong with the rest of the numbers?

A) 17 B) 19 C) 25 D) 29 ____

3) What is the sum of the number of sides of a hexagon and octagon?

A) 10 B) 14 C) 16 D) 17 ____

4) If the perimeter of a square is 48 cm, what is the area of the square?

A) 24 cm^2 B) 48 cm^2 C) 96 cm^2 D) 144 cm^2 ____

5) Math Town Mall has a capacity of 1000 people. To limit the number of people in the mall for social distancing, the mall can only admit 10% of the capacity. How many people will be allowed in the mall?

A) 10 B) 100 C) 110 D) 1000 ____

6) The ratio of purple pencils to yellow pencils is 3:13. If there are 9 purple pencils, how many yellow pencils are there?

A) 19 B) 22 C) 36 D) 39 ____

7) The units digit of a number is the rightmost digit of that number. For example, the units digit of 354 is 4. What is the units digit of the product of 2348×3987?

A) 5 B) 6 C) 7 D) 8 ____

8) Mei is 5 years younger than her sister Yui. Bao is 6 years older than Mei. If Yui is 12 years old, how old is Bao?

A) 1 B) 7 C) 13 D) 23 ____

Space for rough work

9) If you travel 65 km in 50 minutes, what is your speed in km/h?

A) 13 km/h B) 70 km/h C) 78 km/h D) 91 km/h ____

10) The area of a square is 36 cm^2. If you draw a rectangle with the same width as the square and with a length twice as long, what is the perimeter of this rectangle?

A) 24 cm B) 36 cm C) 54 cm D) 72 cm ____

11) A magician's hat contains 11 red roses, 7 yellow roses and 14 blue roses. What is the least number of roses you must choose, without looking, to be certain that you have chosen 2 blue roses?

A) 16 B) 18 C) 20 D) 30 ____

12) How many different ways can you arrange the letters in the word GENIUS, including the way that spells "GENIUS"?

A) 24 B) 100 C) 120 D) 720 ____

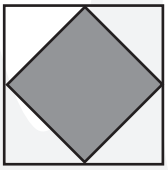
13) A lemon orchard has 60 lemon trees with, on average, 80 lemons per tree. Each lemon can produce 50 mL of lemon juice. If there are 1000 mL in 1 L, then how many **litres** of lemon juice can the orchard produce?

A) 96 L B) 240 L C) 2400 L D) 240 000 L ____

14) Agnes wants to buy a $50.00 bouquet of flowers for her sister's birthday. Once the cashier applies 10% tax, what is the final price of the flowers?

A) $5 B) $55 C) $60 D) $500 ____

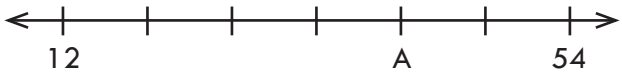
15) Jay drew a square inside a larger square by connecting the mid-points on each side of the larger square as shown on the right. If the shaded region has an area of 221 cm^2, what is the area of the larger square?



A) 110.5 cm^2 B) 221 cm^2 C) 442 cm^2 D) 663 cm^2 ____

Space for rough work

16) If the points on this number line are evenly spaced, then what number does A represent on the number line?



A) 36 B) 40 C) 42 D) 47 ____

17) Express the following as a mixed fraction: $2+\dfrac{3}{1+\dfrac{2}{3}}$

A) $2\frac{1}{5}$ B) 3 C) $3\frac{4}{5}$ D) 7 ____

18) Aashi must choose a top, pants, and a pair of shoes to wear to her concert! If she has 3 tops, 4 pants and 5 pairs of shoes to choose from, how many different outfits does she have?

A) 12 B) 17 C) 60 D) 120 ____

19) You have two different cubic dice. One of the dice has letters from A to F written on each face and the other has numbers from 1 to 6 written on each face. If you roll both dice together, what is the probability of getting a letter C and a number greater than 4?

A) $\frac{1}{36}$ B) $\frac{1}{18}$ C) $\frac{1}{6}$ D) $\frac{1}{3}$ ____

20) If a * b is defined as $a^2 - ba + b \times 2$, what is the value of 6 * 3?

A) 6 B) 24 C) 30 D) 114 ____

21) A park shaped like a circle has streetlights every 8 metres around the park. If there are 31 streetlights in total, what is the circumference of the park in metres?

A) 16 m B) 240 m C) 248 m D) 256 m ____

Space for rough work

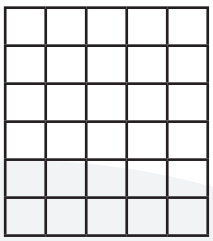
22) A room of length 8 m, width 6 m, and height 3 m is painted on the inside. The walls are painted green and the ceiling is painted yellow. The floor is not painted and there is no door in the room. What fraction of the total painted area is yellow?

A) $\frac{1}{5}$ B) $\frac{1}{3}$ C) $\frac{4}{11}$ D) $\frac{4}{7}$ ____

23) Forty-seven students went to a science centre for a field trip. Twenty students went to a chemistry lab and 25 students went to a biology lab. Five students went to both the chemistry and biology labs. How many students went to neither the chemistry lab nor the biology lab?

A) 3 B) 5 C) 6 D) 7 ____

24) How many squares of different sizes can you find in the shape on the right?



A) 30 B) 50 C) 70 D) 91 ____

25) If 50% of A is 25% of B, then B is what percent of A?

A) 25% B) 75% C) 100% D) 200% ____

26) A sequence of numbers is added as below. What is the sum of all the numbers?

$$7 + 13 + 19 + 25 + \ldots + 607 = ?$$

A) 30086 B) 30700 C) 31007 D) 31314 ____

Space for rough work

27) Birte is picking 3 different numbers from 5, 0, 9, 2, and 3 to make a three-digit number. How many three-digit numbers can she make if the three-digit number must have a quotient of 27 and a remainder when divided by 19?

A) 3 B) 4 C) 5 D) 9 ____

28) Jamie is selling homemade chocolates for Valentine's Day. He sold $\frac{1}{5}$ of the chocolates on Monday and 220 chocolates on Tuesday. At the end of Tuesday, he counted $\frac{1}{4}$ of his chocolates left to sell for the rest of the week and plans to sell one half of the remaining chocolates on Wednesday. How many chocolates does he need to sell on Wednesday?

A) 30 B) 50 C) 70 D) 91 ____

29) If 8 teachers can mark 8 tests in 8 minutes, how long will it take 100 teachers to mark 200 tests?

A) 16 minutes B) 100 minutes C) 160 minutes D) 200 minutes ____

30) How many digits are in the number $2^{444} \times 5^{446}$?

A) 444 B) 445 C) 446 D) 890 ____

31) On January 17th, 2022, there was a huge snowstorm in Ontario. Claire wanted to help her dad shovel the driveway together. She asked, "Dad, it takes me 3 hours to shovel our driveway and you take 1 hour to shovel the same driveway. How many minutes would it take for you and I to shovel our driveway together?" What would be the answer to Claire's question?

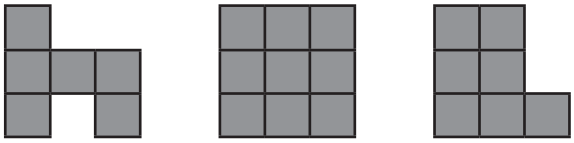
A) 30 minutes B) 45 minutes C) 60 minutes D) 90 minutes ____

32) Pam is starting a new cupcake business to sell cupcakes! She bought a stand mixer and other baking tools for $435. Since this cost does not change with the amount of cupcakes she makes, it is called a fixed cost. In addition, Pam spends $2 for ingredients to make each cupcake. If Pam wants to sell each cupcake for $5, at least how many cupcakes does she need to sell to break even?

A) 87 B) 145 C) 213 D) 217 ____

Space for rough work

33) When looking at a figure from the top, front, and right side, the views seen are shown below. If all blocks are the same sized blocks, what is the least number of blocks needed to make this figure?



Top Front Right Side

A) 11 B) 12 C) 16 D) 18 ____

34) A bicycle travels at a constant speed of 10 km/h. A bus starts 180 km behind the bicycle and catches up to the bicycle in 5 hours. What is the average speed of the bus in km/h?

A) 36 km/h B) 38 km/h C) 46 km/h D) 360 km/h ____

35) The volume of a rectangular prism is 72 000 cm^3. What is the volume in m^3?

A) 0.072 m^3 B) 0.72 m^3 C) 72 m^3 D) 720 m^3 ____

36) In the magic square on the right, you need to place numbers 11 through 19 to have the same sum in each row, column, and diagonal. What is the sum of A + B?

	11	A
12	B	

A) 27 B) 28 C) 33 D) 37 ____

37) Three siblings, Kai, Max and Roy, are making a birthday card for their mother. One of the siblings uses a pink marker, one uses a blue marker, and one uses a green marker. If only one of the following statements is true: Max is not using a pink marker; Kai uses a pink marker; Roy is not using a blue marker, determine the colour of the marker that each sibling is using.

A)	Kai uses pink Max uses green Roy uses blue	B) Kai uses pink Max uses blue Roy uses green	C) Kai uses green Max uses blue Roy uses pink	D) Kai uses blue Max uses pink Roy uses green

____

Space for rough work

38) A circle can be separated into regions by drawing smaller circles inside. For example, if you draw one circle inside the big circle, you can have two regions (see Figure 1). If you draw two circles inside, you can separate the big circle into at most 5 different regions (see Figure 2). If you draw 9 smaller circles inside the big circle, what is the greatest number of different regions you can have?

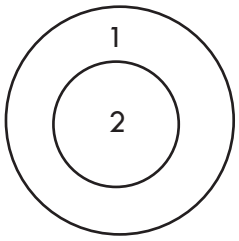


Figure 1

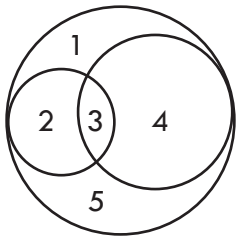


Figure 2

A) 12 B) 26 C) 82 D) 90 ____

39) What is the sum of the remainders when you divide each number 2^{102}, 3^{103}, 4^{104}, and 7^{107} by 10?

A) 10 B) 16 C) 20 D) 24 ____

40) The numbers in the squares below follow a certain pattern. What is the missing number?

5	3
8	42

6	2
4	22

5	7
4	28

8	7
6	?

A) 21 B) 41 C) 50 D) 105 ____

Space for rough work