Spirit of Math®

Releasing the Genius®

IN COLLABORATION WITH

smile

Developed by

Stanford University

GRADE 6

Spirit of Math International Contest 2020

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) $3 \times 4 - 15 + 6 = ?$

A) –3 B) 2 C) 3 D) 8 ____

2) Angela's 100 L rain barrel is only 10% full of rainwater. How much rainwater is in Angela's rain barrel?

A) 1 L B) 10 L C) 25 L D) 100 L ____

3) If the area of the shaded region in this square is 15 u^2, what is the area of the entire square?

A) 18 u^2 B) 20 u^2 C) 24 u^2 D) 30 u^2 ____

4) Which of the following represents $0.\overline{142857}$ as a fraction?

A) $\frac{1}{7}$ B) $\frac{1}{5}$ C) $\frac{1}{9}$ D) $\frac{1}{12}$ ____

5) The ratio of green to yellow marbles is 11:7. If there are 28 yellow marbles, how many green marbles are there?

A) 17 B) 22 C) 28 D) 44 ____

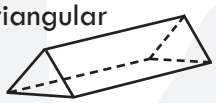
6) Yasmine's book has 89 pages and is numbered consecutively starting at one. How many page numbers have exactly one 9?

A) 7 B) 9 C) 10 D) 11 ____

7) The units digit of a number is the rightmost digit of that number. For example, the units digit of 573 is 3. What is the units digit of the product of 543×959?

A) 1 B) 5 C) 7 D) 8 ____

8) A prism is a solid object with two congruent parallel faces and parallelograms as sides. The shape of the ends gives the prism its name. For example, a triangular prism has two triangular faces and three parallelogram faces for a total of five faces, as shown to the right. How many faces make up an octagonal prism?



A) 4 B) 9 C) 10 D) 11 ____

Space for rough work

9) Which of the following expressions is equal to $5^2 \times 5 \times 5 \times 2^3 \times 2 \times 3$?

A) $2^2 \times 3 \times 5^4$ B) $2^3 \times 3 \times 5^2$ C) $2^4 \times 3 \times 5^5$ D) $2^4 \times 3 \times 5^4$ ____

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

A) 6 B) 8 C) 10 D) 24 ____

11) Ruby's age is between 11 and 19 and she is three times as old as her brother. Four years from now, both Ruby and her brother's ages will end with the same digit. How old is Ruby now?

A) 12 B) 14 C) 15 D) 18 ____

12) Both side lengths, A and B, of a certain rectangle are changed but the area stays the same. If side A was doubled, then side B is:

A) four times as long B) half as long C) one quarter as long D) not changed ____

13) On a 20-question test, each correct answer is worth 5 points, each unanswered question is worth 2 points, and each incorrect answer is worth 0 points. What is your score if you answered only 15 questions and got 9 questions correct?

A) 45 B) 55 C) 75 D) 95 ____

14) A box with dimensions 4 cm × 4 cm × 4 cm is filled with small rectangular prisms with dimensions 2 cm × 1 cm × 1 cm. At most, how many small prisms are contained in the box?

A) 4 B) 16 C) 32 D) 64 ____

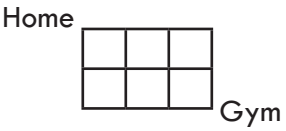
15) Each row, column, and diagonal in this magic square have a sum of 15. What is the value of a?

$a + 4$	$a - 3$	$2a - 2$
$-1 + a$	5	$a + 3$
a	$2a + 1$	$-a + 6$

A) 4 B) 5 C) 6 D) 8 ____

Space for rough work

16) Akim wants to go to the gym. How many different ways can he take from his home to the gym if he can only travel south and east on a 2×3 grid?



A) 5 B) 6 C) 10 D) 12 ____

17) In the addition question to the right, A, B, and C are three different digits. Find the value for D.

$$\begin{array}{r} A\ A \\ +\ B\ C \\ \hline A\ D\ B \end{array}$$

A) 0 B) 2 C) 3 D) 9 ____

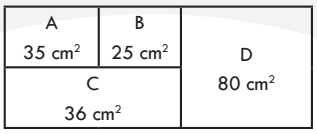
18) Express the following as a mixed fraction: $1+\dfrac{2}{3+\frac{4}{5}}$

A) $1\dfrac{2}{19}$ B) $1\dfrac{10}{19}$ C) $2\dfrac{3}{7}$ D) $8\dfrac{3}{5}$ ____

19) If a * b is defined as $(a + b)^2 \div b - a$, find the value of 6 * 3.

A) 6 B) 21 C) 24 D) 30 ____

20) In the diagram to the right, rectangles A, B, C, and D have side lengths that are natural numbers and have areas as shown. If B is a square, what is the perimeter of the large rectangle formed by regions A, B, C, and D?



A) 30 cm B) 60 cm C) 88 cm D) 176 cm ____

21) Five friends are each moving to a different country today: Canada, France, Iceland, Pakistan, or Thailand. Eleanor is moving from Iceland. Beate is moving to where Francesca is leaving. One friend moves from Canada to France, but it is not Beate or Delilah. Cassandra is moving to Thailand. If no friends start or end in the same country, who is moving to Iceland?

A) Beate B) Cassandra C) Delilah D) Francesca ____

Space for rough work

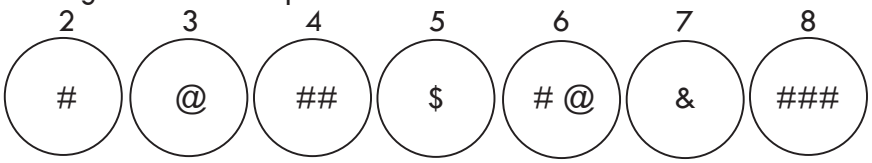
22) A perfect square is a number that can be expressed as the product of the same two integers. For example, 25 is a perfect square because $5 \times 5 = 25$. What is the largest perfect square that will divide into 792 with no remainder?

A) 9 B) 16 C) 36 D) 64 ____

23) Nicole made a pizza. Her brother ate one third of the pizza and Nicole ate one third of the left over pizza. What fraction of the original pizza did Nicole eat?

A) $\frac{1}{3}$ B) $\frac{1}{9}$ C) $\frac{2}{9}$ D) $\frac{4}{9}$ ____

24) What does the image below **not** represent?



A) Factors B) Prime factoring C) Sum of primes D) Multiples ____

25) Rudi has a wooden cube. She wants to cut it into eight identical pieces. What is the least amount of cuts she needs to make?

A) 2 B) 3 C) 4 D) 8 ____

26) Which of the following illustrates $\frac{2}{3} \div \frac{1}{6}$?

A)  B)  C)  D)  ____

27) What is the remainder when $1 + 2 + 3 + \ldots + 100$ is divided by 3?

A) 0 B) 1 C) 2 D) 3 ____

Space for rough work

28) It takes Parsa 30 minutes to walk 2 km and Avan 10 minutes to walk 1 km. They live 2 km apart from each other and leave their houses at the same time. Calculate the total speed in m/min at which they approach each other. Round to the nearest hundredth, if necessary.

A) 5 m/min B) 30 m/min C) 33.33 m/min D) 166.67 m/min ____

29) Susie and Sasha play a guess-my-number game. Susie chooses one of the numbers from 1 to 8 and Sasha has only 3 yes or no questions to find Susie's number. Sasha discovers Susie's number is 1 by asking the following three questions:
1. Is your number greater than 4? No.
2. Is your number greater than 2? No.
3. Is your number greater than 1? No.
If Sasha is using this strategy, what is the largest range of numbers Susie can choose her number from for Sasha to certainly find Susie's number with five questions?

A) 1 to 16 B) 1 to 32 C) 1 to 64 D) 1 to 128 ____

30) Meghan's birthday is February 20th. She loves to party and is always thinking a step ahead. If her birthday fell on Thursday in 2020, what day will her birthday be in the following year?

A) Tuesday B) Wednesday C) Friday D) Saturday ____

31) Insert three operations (+, –, ×, or ÷) in the space provided to make an expression equal to –9. Which signs, in the order provided below, are in the second and third spaces from the left? 3 _ 4 _ (– 1) _ 8

A) +, – B) –, + C) ×, – D) –, × ____

32) What is the next term in this sequence? 1, 9, 52, 94, 18, ____ .

A) 1 B) 71 C) 100 D) 121 ____

Space for rough work

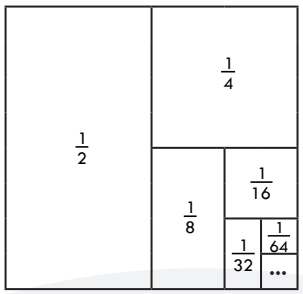
33) The volume of a triangular pyramid is 0.34 m^3. What is the volume in cm^3?

A) 34 cm^3 B) 340 cm^3 C) 34 000 cm^3 D) 340 000 cm^3 ____

34) $-25\frac{3}{36}+\frac{11}{9}-\left(-107\frac{3}{18}\right)=?$

A) $83\frac{11}{36}$ B) $83\frac{17}{36}$ C) $84\frac{1}{2}$ D) $133\frac{13}{30}$ ____

35) Using the image to the right, what is the sum of $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\ldots+\frac{1}{n}$ as n approaches infinity?



A) $\frac{63}{64}$ C) 2

B) 1 D) Infinity ____

36) Nine marbles numbered from 6 to 14 are on a table. Asuka, Belma, and Carlos each take three marbles. Asuka's marbles have a product of 720, Belma's marbles have a sum of 31, and Carlos' marbles have a product of 1 001. What is the sum of Asuka's marbles?

A) 27 B) 28 C) 29 D) 30 ____

Space for rough work

37) How many odd factors does 15 000 have?

A) 8 B) 10 C) 12 D) 15 ____

38) Three ballerinas, Sally, Molly, and Dolly, are performing in the Black Swan ballet. One of the ballerinas wears a red dress, one wears a black dress, and one wears a white dress. If only one of the following three statements is correct: Sally wears a red dress; Molly is not wearing a red dress; Dolly is not wearing a black dress, determine the colour of the dress for each ballerina.

A) Sally wears red
Molly wears white
Dolly wears black

B) Sally wears white
Molly wears black
Dolly wears red

C) Sally wears black
Molly wears red
Dolly wears white

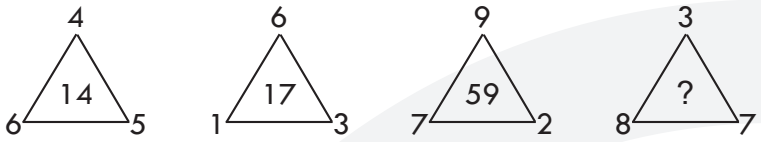
D) Sally wears red
Molly wears black
Dolly wears white

____

39) How many ways can four brothers and two sisters line up to take a family photo such that the sisters are standing beside each other?

A) 120 B) 240 C) 480 D) 720 ____

40) Which number is missing from the centre of the fourth triangle?



A) 47 B) 51 C) 53 D) 63 ____

Space for rough work