Spirit of Math
Releasing the Genius ®

GRADE 5

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

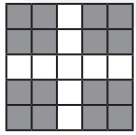1) $30 \div 6 - 10 + 8 = ?$

    A)   −13   B)   3   C)   7.5   D)   8   _____

2) Carson ate one quarter of a pizza that weighs 400 g. How much pizza did Carson eat?

    A)   10 g   B)   40 g   C)   100 g   D)   300 g   _____

3) The unit's digit of a number is the rightmost digit of the number. For example, the unit's digit of 647 is 7. What is the unit's digit of the product of 87×46?

    A)   2   B)   3   C)   5   D)   6   _____

4) If I multiply my favourite whole number by itself, the result could be:

    A)   28   B)   32   C)   36   D)   40   _____

5) Marcel volunteered at the community centre after school from 3:10 p.m. until 4:05 p.m. How long did Marcel volunteer at the community center?

    A)   35 minutes   B)   45 minutes   C)   50 minutes   D)   55 minutes   _____

6) A large square is divided into 25 small squares as shown on the diagram to the right. Each of the small squares has an area of 2 cm². What is the area of the shaded region?

    A)   8 cm²   B)   16 cm²   C)   18 cm²   D)   32 cm²   _____
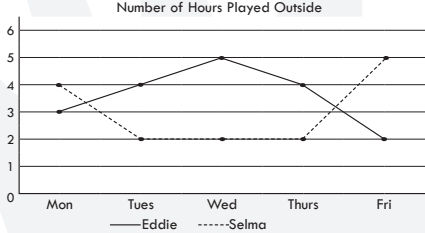
7) A 3D printer printed all of the digits of the numbers from 1 to 20. How many times did the printer print the digit 2?

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

8) Lucy is five years older than Stella. Next year, Stella will be nine years old. How old is Lucy this year?

    A)   12   B)   13   C)   14   D)   15   _____

9) In the magic square, each column, row, and diagonal must add up to the same number. What number does the x represent?

    A)   5   B)   6   C)   8   D)   12   _____

Space for rough work

10) How many ways can you rearrange the letters in the word GAME including the arrangement that spells GAME?

A) 4 B) 16 C) 24 D) 30 _____

11) There are ten different coloured balls in a bag. Six are red, one is yellow, and three are blue. What is the probability of picking a blue ball from the bag without looking?

A) $\dfrac{1}{10}$ B) $\dfrac{3}{10}$ C) $\dfrac{1}{2}$ D) $\dfrac{9}{10}$ _____

12) The number 16 is a perfect square because it can be expressed as a product of the same two integers: 4×4. How many perfect squares are between 5 and 50?

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

13) Cynthia studied her medical textbook for her final exam. She studied from the top of page 25 to the bottom of page 32. How many pages did she study?

A) 6 B) 7 C) 8 D) 9 _____

14) Rafael took two-fifths tablespoons of sugar and mixed it with a pinch of salt. Realizing that his mixture did not taste as sweet as he wanted, he added one-fifth tablespoon of sugar to the mixture. How many tablespoons of sugar did Rafael use in total?

A) $\dfrac{2}{5}$ B) $\dfrac{3}{5}$ C) $\dfrac{4}{5}$ D) $\dfrac{3}{10}$ _____

15) A factor is a number that divides into another number evenly. How many factors does 18 have?

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

16) Eddie and Selma love to play outside during free time. The graph shows the total number of hours each of them played outside one week. How many hours did Eddie play outside from Monday to Friday?

Number of Hours Played Outside

A) 11 hours B) 15 hours C) 17 hours D) 18 hours _____

Space for rough work

17) Francis has a stall filled with 12 durians, six papayas, eight star fruits, and 24 rambutans. What is the ratio of the sum of durians and papayas to the sum of star fruits and rambutans in Francis' stall?

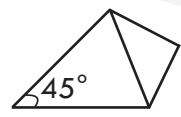A) 9:16   B) 9:8   C) 3:4   D) 2:3   _____

18) Malu added 9 whole numbers together and noticed their sum was even. At most, how many of the numbers she added could have been odd?

A) 1   B) 2   C) 6   D) 8   _____

19) What is the next term in this sequence? 14, 17, 23, 32, 44, ___

A) 56   B) 59   C) 61   D) 63   _____

20) At the carnival, there is a round carousel with 28 horses along the edge numbered consecutively from 1 to 28. The horses are evenly spaced. Sanjay rides horse number 3 and Naomi rides the horse on the opposite side of the carousel. What horse number is Naomi riding?

A) Horse 17   B) Horse 18   C) Horse 19   D) Horse 20   _____

21) A triangle and a quadrilateral share one interior angle of 45°. What is the difference between the sum of the remaining interior angles of the triangle and the quadrilateral?

A) 45°   B) 90°   C) 120°   D) 180°   _____

22) 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 4 chords?

A) 8   B) 10   C) 11   D) 16   _____

23) Water flows from Dundalk to Paris via 12 different streams represented as line segments in the diagram to the right. Water will only flow toward Paris; it will not flow toward Dundalk. What is the greatest number of streams that can be removed such that water still flows from Dundalk to Paris?

A) 7   B) 8   C) 9   D) 10   _____

Space for rough work

24) Tabitha noticed that her nine classmates finished their drill in an average time of five minutes. As a new student, Tabitha finished her drill in 10 minutes. What is the average time that Tabitha and her classmates finished their drill?

A) 5.5 minutes B) 7 minutes C) 7.5 minutes D) 9 minutes _____

25) The letters S, O, and M represent different digits. What is the sum of the digits of SOM in the addition problem to the right?

$$\begin{array}{cccc} & & O & O \\ + & & O & O \\ \hline & S & O & M \end{array}$$

A) 9 B) 15 C) 18 D) 24 _____

26) If a # b is defined as $a^b - b \times a$, then what is the value of 6 # 3?

A) 0 B) 198 C) 711 D) 1278 _____

27) A large stone oven has been baking pizzas for six hours. The oven can bake eight pizzas every half hour. If a customer bought 24 of the baked pizzas, what percent of the baked pizzas did the customer buy?

A) 12.5% B) 25% C) 33% D) 50% _____

28) Millie edits her videos by cutting them into shorter video clips. So, if Millie makes one cut to a video, it splits the video into two shorter video clips. If it takes her one minute to cut a video into six shorter video clips, how long would it take her to cut a video into 10 shorter video clips?

A) 100 seconds B) 108 seconds C) 200 seconds D) 220 seconds _____

29) Memphis forgot the combination to his 4-digit bike lock. He knows the product of the digits is 1890. What is the sum of the digits?

A) 18 B) 20 C) 24 D) 27 _____

30) The number 123321 is a palindrome because it reads the same forwards and backwards. How many 4-digit palindromes are there?

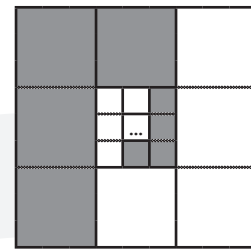A) 90 B) 99 C) 100 D) 400 _____

Space for rough work

31) The Notre Dame Cathedral has seven bells. The first bell rings every second. The second bell rings every two seconds. The third bell rings every three seconds, and so on. If the bells all ring together at 12:00 p.m., when is the next time they will all ring together again?

A) 12:03 p.m.   B) 12:07 p.m.   C) 12:14 p.m.   D) 1:24 p.m.   _____

32) Which of the five statements in the list below is true?

1. Exactly one statement in this list is false
2. Exactly two statements in this list are false
3. Exactly three statements in this list are false
4. Exactly four statements in this list are false
5. Exactly five statements in this list are false

A) Statement 1   B) Statement 2   C) Statement 3   D) Statement 4   _____

33) It takes Michael three minutes to fill his fish tank with water. He has a second fish tank that is three times larger in length and width than the first. How long will it take Michael to fill his second fish tank with water?

A) 9 minutes   B) 12 minutes   C) 18 minutes   D) 27 minutes   _____

34) A personal protective equipment company has 2970 hand sanitizers and 4410 masks to pack. The company wants to pack these in as many boxes as possible such that the contents of each box is identical and nothing is left over. Each box will contain the same number of hand sanitizers and masks as any other box. What is the greatest number of boxes they can fill?

A) 90   B) 210   C) 330   D) 490   _____

Space for rough work

35) A new bubble tea store opened! Many customers added an assortment of toppings to their tea: pearl, aloe, or grass jelly. Each customer bought only one cup of tea. Seven customers chose all three toppings. Sixteen chose pearl and grass jelly, fifteen chose pearl and aloe, and fourteen chose aloe and grass jelly. If 62 customers have pearl in their tea, 45 customers have aloe, and 42 customers have grass jelly, how many customers bought tea with toppings?

A) 101   B) 111   C) 156   D) 201   _____

36) A cylindrical container can hold exactly three tennis balls where the balls are stacked on top of each other and are touching the sides of the container. If the radius of one ball is 4 cm, what is the volume inside the container not occupied by the tennis balls?

A) 128π cm^3 B) 192π cm^3 C) 256π cm^3 D) 384π cm^3 _____

37) Which of the following statements does the diagram to the right prove?

A) $\dfrac{4}{9} + \dfrac{4}{18} + \dfrac{4}{27} + ... = \dfrac{1}{2}$

B) $\dfrac{1}{9} + \dfrac{1}{18} + \dfrac{1}{27} + ... = 1$

C) $\dfrac{4}{9} + \dfrac{4}{18} + \dfrac{4}{27} + ... = 2$

D) $\dfrac{1}{3} + \dfrac{1}{9} + \dfrac{1}{27} + ... = \dfrac{1}{2}$ _____

Space for rough work

38) Yui is a Jack Russell-Pomeranian puppy who loves to watch cars go by. If she sees a noisy motorcycle, she will bark. If she barks, her neighbours will wake up from their nap. Based on this information, which statement is true?

A) If Yui barks, her neighbours will not wake up.

B) If Yui's neighbours woke up, then Yui saw a noisy motorcycle.

C) If Yui's neighbours did not wake up, Yui did not see a motorcycle.

D) If Yui does not bark, her neighbours will not wake up.

_____

39) The Math Machine accepts or rejects numbers based on the following rules:

- If the number is even or a multiple of three, the Math Machine accepts the number.
- If the number is neither even nor a multiple of three, the Math Machine rejects the number.
- If the number is both even and a multiple of three, the Math Machine rejects the number.

What is the sum of all numbers from 1 to 300 accepted by the Math Machine?

A) 22 500   B) 30 150   C) 37 800   D) 44 850   _____

40) The three circles in the diagram below are related through a pattern. What is the missing number x in the diagram?

6	1
8	3

5	9
4	9

6	7
5	x

A) 2   B) 5   C) 7   D) 8   _____

_____

Space for rough work