Spirit of Math®

Releasing the Genius®

GRADE 6

Spirit of Math International Contest 2024

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.
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) $-7 \times (3 + 4) - 14 = ?$

A) –63 B) –35 C) 49 D) 63 ____

2) Which of the following numbers is not a prime number?

A) 17 B) 23 C) 47 D) 51 ____

3) What is the sum of the number of vertices of a pentagon and a hexagon?

A) 9 B) 10 C) 11 D) 12 ____

4) What is the next term in this sequence? 4, 20, 100, 500, ___

A) 2500 B) 5000 C) 10000 D) 25000 ____

5) If Eli can drink one cup of milk in 10 seconds, how many cups of milk can she drink in two minutes?

A) 6 B) 10 C) 12 D) 15 ____

6) Your 5 L juice container is only 20% full. How much juice is in your container?

A) 0.2 L B) 0.5 L C) 1 L D) 2 L ____

7) Andrew sliced his birthday cake into six equal parts, as shown in the diagram. What is the measure of angle x in the diagram?

A) 45° B) 60° C) 65° D) 70° ____

8) The total number of students in a Grade 6 class is 20. Three students in the class are 10 years old, two students are 12, and the rest of the students are 11. What is the probability that a randomly chosen student is **not** 11 years old?

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

Space for rough work

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

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

10) A fruit basket on your dining table contains ten red apples, six yellow apples, and nine green apples all of the same size. Without looking, what is the least number of apples you must choose to be certain that you have chosen three green apples?

A) 5 B) 9 C) 15 D) 19 ____

11) The difference between two natural numbers is 19 and their product is 120. What is the sum of these two numbers?

A) 26 B) 29 C) 34 D) 43 ____

12) There are 8 light posts along Gregory's street. The space between two neighbouring posts is 11 metres. Gregory walked from the first light post to the last one and then back to the first post. How many metres has he walked? Which question below requires the correct logical thinking to solve the problem?

A) Does Gregory walk at a constant rate?
B) How many light posts are on Gregory's street?
C) How many spaces are there from the first to the last post?
D) What is the distance between two neighbouring light posts? ____

13) In the magic square to the right, each column, row, and diagonal adds up to 50. What number does m represent?

		18	5
m	6		16
7		13	10
14	9		

A) 11 B) 13 C) 15 D) 17 ____

14) A cubic toy box with a side length of 4 cm is filled with small rectangular blocks with dimensions of 1 cm × 2 cm × 4 cm. At most, how many small blocks can fit in the toy box?

A) 4 B) 8 C) 10 D) 12 ____

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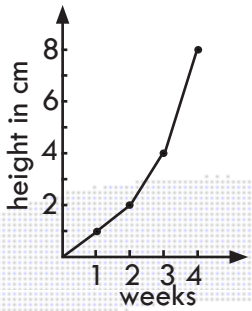
15) Lana has a beautiful garden full of roses. Last year, she had three times more roses than this year. If there are a total of 56 roses in the garden in both years combined, how many roses are in Lana's garden this year?

A) 7 B) 14 C) 21 D) 42 ____

16) Five families live on Elm street. If in each family a girl has two sisters and the ratio between the total number of boys to the total number of girls on Elm street is 1:5, what is the total number of boys on Elm street?

A) 3 B) 4 C) 5 D) 10 ____

17) For her science class, Emmanuella monitored and recorded the growth of a plant at the end of each week. According to her graph, determine the height of the plant after eight weeks.



A) 32 cm B) 64 cm C) 128 cm D) 256 cm ____

18) At the local restaurant, the menu has six choices for appetizers, five choices for main courses, and three choices of desserts. Kenzo must choose an appetizer, a main course, and a dessert for his dinner. How many different combinations does Kenzo have for his dinner?

A) 15 B) 45 C) 80 D) 90 ____

19) Express the following as a mixed fraction: $2+\dfrac{1-\frac{1}{4}}{1+0.75}$

A) $2\frac{1}{7}$ B) $2\frac{3}{7}$ C) $2\frac{5}{8}$ D) $3\frac{5}{16}$ ____

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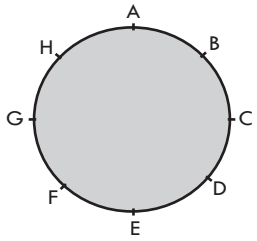
20) On the given circle with a radius of 16 cm, all points are evenly spaced. What is the shorter distance along the curve between points A and D?



A) 4 cm B) 4π cm C) 12 cm D) 12π cm ____

21) Olivia makes a 20% profit on all lemonades she sells at a lemonade stand. If she sells 35 lemonades per week for $3 each, what is her profit after three weeks?

A) $21 B) $31.5 C) $42 D) $63 ____

22) Jack's favourite two digit number is a perfect square. He adds his favourite two digit number to its square root and then doubles it. What result could he possibly get?
Note: A perfect square is a number that can be expressed as the product of the same two integers.

A) 48 B) 70 C) 112 D) 192 ____

23) An ice cream store sells ice cream in packages of 200 g, 300 g, and 500 g. If you buy four packages of ice cream for your birthday party, which of the following could not be the total amount of ice cream you bought?

A) 1 kg B) 1.6 kg C) 1.9 kg D) 2 kg ____

24) While practicing during the new basketball season, Kareem has been trying to improve his shooting scores. After scoring 81% during the first four games, he aimed to raise his average. What shooting average should he get in the next three games to achieve an overall of 84%?

A) 88% B) 90% C) 91% D) 96% ____

25) When a school bus picked up students to drive them home, its odometer showed the palindrome 2992 km. After the bus had traveled for 30 minutes at a constant rate, the odometer showed the next palindromic number. How fast was the school bus traveling in kilometers per hour?
(Hint: A palindrome is a word or number that reads the same forwards and backwards.)

A) 22 km/h B) 25 km/h C) 30 km/h D) 34 km/h ____

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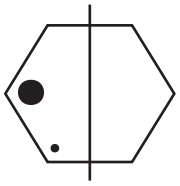
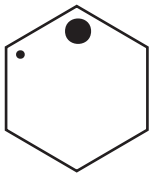
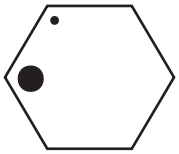
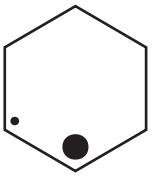
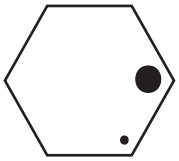
26) Numbers in a sequence are added together. What is the sum of the series?
$4 + 8 + 12 + 16 + ... + 208 = ?$

A) 832 B) 2756 C) 4900 D) 5512 ____

27) The hexagon in the diagram is reflected in a line of symmetry and then rotated 990° counterclockwise about its centre. What is the resulting shape after the applied transformations?



A)  B)  C)  D)  ____

28) Every morning upon arrival to school, you and your eight friends all "high-five" each other. This morning, two of your friends were not able to attend school. How many fewer "high-fives" were there among the remaining group of friends compared to those of the full group?

A) 1 B) 14 C) 15 D) 30 ____

29) What is the sum of the last digits of the numbers 4^{122}, 5^{122}, and 6^{122}?

A) 6 B) 10 C) 15 D) 17 ____

30) Samara was born in a year between 2019 and 2024. This year, Samara's grandmother is 14 times as old as Samara. In nine years, Samara's grandmother will be five times older than Samara. In what year was Samara born?

A) 2020 B) 2021 C) 2022 D) 2023 ____

31) Red, green, blue, white, and yellow cubes are lined up on a shelf. In how many ways can the five cubes be arranged in the row if the red and blue cubes are always placed beside each other?

A) 12 B) 24 C) 36 D) 48 ____

Space for rough work

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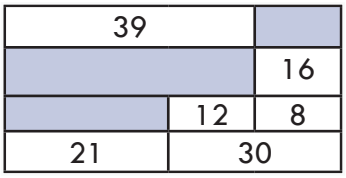
32) If the operation "◊" between numbers x and y is defined as $x \lozenge y = -[(x - y)^3 + y] \div (-x)$, find the value of $4 \lozenge 8$.

A) −18 B) −14 C) 8 D) 14 ____

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



A) 52 cm^2 B) 64 cm^2 C) 74 cm^2 D) 78 cm^2 ____

34) I am thinking of three whole numbers m, n, and p which are less than 100 and each have exactly two factors. The numbers that come directly after m, n, and p are powers of two. What is LCM(m, n, p)?

A) 315 B) 651 C) 1024 D) 1281 ____

35) At the Sun and Sea Festival, all contestants were assigned to build the same sand castle using identical equipment. It takes Emily six hours to build the assigned castle. It takes Emily and her younger brother Marco four hours to build the same castle when working together. How long would it take Marco to build the same sand castle when working alone?

A) 8 hours B) 10 hours C) 12 hours D) 14 hours ____

36) Insert three different operations (+, −, ×, or ÷) in the boxes provided to make an expression equal to 5. Which operation you did not use?

1 □ 6 □ (− 2) □ 3

A) + B) − C) × D) ÷ ____

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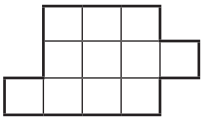
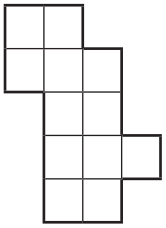
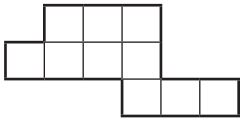
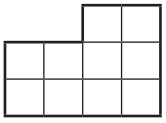
37) Which of the following figures cannot be cut along the grid lines to divide a figure in exactly two identical shapes?

A)  B)  C)  D) 

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38) Encryption is the conversion of a message to a secret code, called ciphertext. One well-known ciphertext is created by following these steps:
a) Pick a random word that will be a keyword.
b) Pick a key letter, which can be any letter in the alphabet.
c) Start at the key letter and alphabetically replace each letter with the keyword letter.
d) Replace the rest of the alphabet with the letters not in the keyword in alphabetical order.
For example, if the keyword is "PENCIL" and the key letter is "C", then the encryption is as follows:

C	D	E	F	G	H	I	J	K	...
P	E	N	C	I	L	A	B	D	...

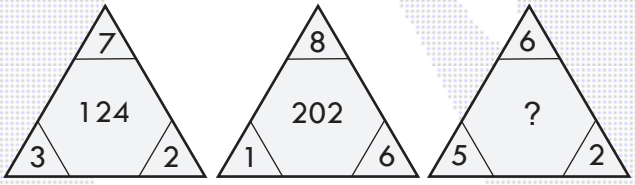
Following the encryption rule from above, encrypt the word "SURPRISE" using "MATH" as the keyword and "E" as the key letter.

A) "NPLJLBNM" B) "NPLKLBNM" C) "NLPJLBNM" D) "NPLJLBMN" ____

39) Three students, Natalie, Maya, and Jaia are each a member of one of the three school clubs: math club, art club, or drama club. Each of them is also studying one of three languages: French, Japanese, or Latin. The following is known: The member of the math club studies Japanese. The girl who studies French is not in the art club. Natalie studies Latin. Jaia is not a member of the drama club. Determine which of the following is a true statement. (For example, the set (Maya, art, Latin) means that Maya is a member of the art club and she studies Latin.)

A) (Jaia, drama, French) B) (Maya, drama, French) ____
C) (Maya, math, Japanese) D) (Natalie, drama, Latin)

40) Which number should replace the question mark?



A) 125 B) 130 C) 135 D) 140 ____

Space for rough work

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