

GRADE 5

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.

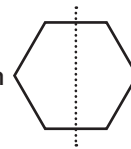
Student Name:

Score: /40

1) $3 \times 2 + 1 - 10 = ?$
 A) -24 B) -12 C) -3 D) 15 _____

2) Find the next number in the following sequence: 48, 24, 12, 6, ____ .
 A) 1 B) 2 C) 3 D) 6 _____

3) If a shape can be folded in half such that both halves are identical, then the folding line is a line of symmetry. For example, one line of symmetry is shown in the hexagon to the right. How many lines of symmetry are in a **square**?
 A) 3 B) 4 C) 5 D) 12 _____



4) In the magic square to the right, each row, column, and diagonal have a sum of 15. Which number does * represent?
 A) 3 B) 5 C) 7 D) 9 _____

8		6
*	5	
4		2

5) The number 110 is NOT divisible by which of the following?
 A) 2 B) 3 C) 5 D) 11 _____

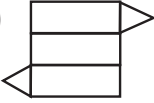
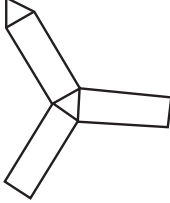
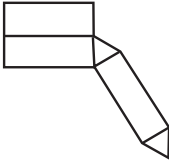
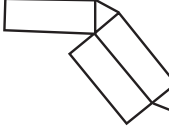
6) The units digit of a number is the rightmost digit of the number. For example, the units digit of 573 is 3. What is the units digit of the product of 56×96 ?
 A) 1 B) 4 C) 6 D) 9 _____

7) $27 \times 5 \div 3 \div 9 = ?$
 A) 1 B) 5 C) 9 D) 15 _____





8) Consecutive numbers are numbers that follow each other in order, with a difference of one between any two adjacent numbers. For example, 9, 10, and 11 are consecutive numbers. Five consecutive numbers add up to 20. Which of the following is one of the consecutive numbers?
 A) 1 B) 4 C) 9 D) 10 _____

Space for rough work



- 9) Connor's dog barks every 15 seconds and his bird chirps every 10 seconds. If they both bark and chirp together at noon, in how many seconds will they bark and chirp together again?
 A) 15 seconds B) 20 seconds C) 30 seconds D) 45 seconds _____
- 10) Find an equivalent expression for $2^3 \times 5^3 \times 6$.
 A) $2^3 \times 3 \times 5$ B) $2^3 \times 3 \times 5^3$ C) $2^4 \times 3 \times 5^3$ D) $2^3 \times 5^3 \times 15$ _____
- 11) Which of the following nets will NOT fold into a triangular prism?
 A)  B)  C)  D)  _____
- 12) There are 25 students in Ms. Huang's class, 15 of whom are girls. What is the ratio of girls to boys in her class?
 A) 3:2 B) 2:1 C) 3:1 D) 5:2 _____
- 13) How many different ways can you arrange the letters in the word ZERO, including the way that spells "ZERO"?
 A) 4 B) 6 C) 10 D) 24 _____
- 14) Which one of these numbers does not belong: 24, 36, 54, 72? What is the best logical question you could ask to help you answer this question?
 A) What are the numbers? C) What is the sum of these numbers?
 B) How many numbers are there? D) What are the properties of these numbers? _____

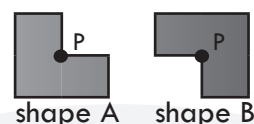
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- 15) Which of the following illustrates $\frac{1}{2}$ of $\frac{1}{3}$?
- A)  B)  C)  D)  _____

- 16) All 30 students in Ms. Lim's class participated in "Italian Night" at their school. Of these, 18 students served pizza and 15 students served pasta. Six students served both pizza and pasta. How many students served neither pizza nor pasta?
- A) 2 B) 3 C) 5 D) 6 _____

- 17) I am going camping for one week. I need to buy enough granola bars such that I can eat three granola bars each day for the entire camping trip. If granola bars are only sold in packages of 12, what is the fewest number of packages I need to buy?
- A) 1 B) 2 C) 3 D) 4 _____

- 18) How many 90° clockwise rotations about point P are needed to turn shape A into shape B?
- A) 1 B) 2 C) 3 D) 5 _____



- 19) Fractions can always be written in decimal form. For example: $\frac{2}{11} = 0.\overline{18}$, where the bar above 18 indicates that 18 repeats indefinitely. Find the 54th digit of the decimal expansion of $\frac{2}{11}$.
- A) 0 B) 1 C) 2 D) 8 _____

- 20) In the addition question to the right, A, B, C, and D represent four different digits from 1 to 9. Find the value for C.
- A) 1 B) 2 C) 3 D) 4 _____

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

Space for rough work



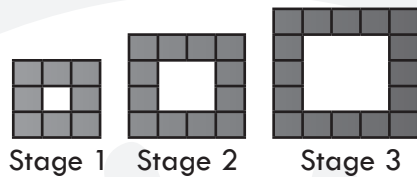
- 21) Four triangles are made of matchsticks labelled A to L. Which two matchsticks can you move to create five same-sized triangles? Note: having loose ends or overlapping matches is not allowed.



- A) A, H B) A, I C) D, E D) E, J _____
- 22) Adventurous Adam is paddling downstream on Rushing River. He paddles his boat at a constant speed of 3 km/h and the river flows downstream at a constant speed of 5 km/h. How far will he travel downstream in 2 hours and 30 minutes?
 A) 7.5 km B) 12.5 km C) 20 km D) 24 km _____
- 23) Calculate the sum of all the prime factors of 105.
 A) 7 B) 15 C) 17 D) 38 _____
- 24) Mike writes all the whole numbers less than 11 on the board. He then replaces two randomly chosen numbers with their sum. He continues replacing two numbers with their sum until there is only one number left on the board. What is the value of that number?
 A) 30 B) 45 C) 50 D) 55 _____
- 25) A triangle has the interior angles J, K, and L. Angle J is three times the size of angle K and angle K is twice the size of angle L. How big is angle L?
 A) 20° B) 40° C) 60° D) 120° _____

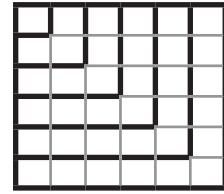
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- 26) A chord is a line segment that connects two points on a circle. If you divide a circle with three chords, what is the maximum number of non-overlapping regions you can make?
 A) 3 B) 4 C) 7 D) 11 _____
- 27) If half the perimeter of a rectangle is 50 cm and one side is four times as long as another side, what is the area of the rectangle?
 A) 100 cm² B) 400 cm² C) 2 000 cm² D) 2 400 cm² _____
- 28) If $a * b$ is defined as $(a - b) \times b - a$, find the value of $7 * 1$.
 A) -1 B) 1 C) 5 D) 41 _____
- 29) Rupert got his first summer job at a water park. He works 10 hours each week and makes \$17 per hour. During his first week he spent \$34 on freezies and fries. What percent of his first week's salary did he spend?
 A) 5% B) 10% C) 17% D) 20% _____
- 30) Each of the seven rhinos at Surprising Safari weighs at least 2300 kg. In total, all seven rhinos weigh 17300 kg. At most, how many kilograms could one of these rhinos possibly weigh?
 A) 2400 kg B) 2800 kg C) 3500 kg D) 3800 kg _____
- 31) In the pattern to the right, there are eight square blocks shaded in Stage 1 and 12 blocks shaded in Stage 2. How many square blocks are shaded in Stage 102?
 A) 404 B) 408 C) 412 D) 416 _____



Space for rough work

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



A) $1 + 3 + 5 + \dots + n = \left(\frac{n+n}{2}\right)^2$

C) $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$

B) $1 + 3 + 5 + \dots + n = \left(\frac{n+1}{2}\right)^2$

D) $1 + 3 + 5 + \dots + n = \left(\frac{n}{2}\right)^2$

33) During the winter holiday, Samara read from the top of page 40 to the bottom of page 135 of her new book about insects. How many times is the digit four printed on the page numbers of the pages she read?

A) 18

B) 19

C) 20

D) 21

34) Alpaca Farmer Fred has a long straight fence which consists of eight equally-spaced fence posts. He decides to also raise llamas and plans to build a new straight fence, twice as long as his original fence. How many equally-spaced fence posts does Farmer Fred need for his new fence?

A) 14

B) 15

C) 16

D) 17

35) The 2018 class averages are shown for some Spirit of Math campuses in the table to the right. What is the average of all students represented in the table?

Campus	# of students	Class average
East	10	82%
South	20	76%

A) 78%

B) 79%

C) 80%

D) 81%

36) 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 $5 \times 5 = 25$. How many perfect squares are between 16 and 10 000?

A) 94

B) 95

C) 96

D) 97

Space for rough work



