香港國際數學競賽初賽 2019（香港賽區）

HONG KONG INTERNATIONAL MATHEMATICAL OLYMPIAD
HEAT ROUND 2019 (HONG KONG REGION)

小學五年級 Primary 5

時限：60 分鐘

Time allowed: 60 minutes

試題
Question Paper

考生須知：

Instructions to Contestants:

1. 本卷包括 試題 乙份，試題紙不可取走。
   Each contestant should have ONE Question-Answer Book which CANNOT be taken away.

2. 本卷共 5 個範疇，每範疇有 4 題，共 20 題，每題 3 分，總分 60 分，答錯不扣分。
   There are 5 exam areas and 4 questions in each exam area. There are a total of 20 questions in this Question-Answer Book. Each carries 3 marks. Total score is 60 marks. No points are deducted for incorrect answers.

3. 請將答案寫在 答題紙 上。
   All answers should be written on ANSWER SHEET.

4. 比賽期間，不得使用計算工具。
   NO calculators can be used during the contest.

5. 本卷中所有圖形不一定依比例繪成。
   All figures in the paper are not necessarily drawn to scale.

6. 比賽完畢時，本試題會被收回。
   This Question-Answer Book will be collected at the end of the contest.

請以最簡形式填寫答案，若計算結果是分數，請確保為真分數或帶分數，或將計算結果寫成小數。錯誤單位將不給予任何分數。

Write down the answer in the simplest form. If the calculation result is a fraction, please write down the answer as a proper or mixed fraction, decimal figure is also accepted. Marks will NOT be given for incorrect unit.

請將答案寫在 答題紙 上。
All answers should be written on the ANSWER SHEET.

填空題 (第 1 至 20 題) (每題 3 分，答錯及空題不扣分)

Open-Ended Questions (1st ~20th) (3 points for correct answer, no penalty point for wrong answer)

Logical Thinking
邏輯思維

1. Given *A* and *B* are two non-zero digits and the 2-digit numbers formed by these two digits have the following properties:

    1. $\overline{AB}$ is a product of 5 and a prime number;

    2. $\overline{BA}$ is a product of 4 prime numbers;

    Find the 3-digit number $\overline{ABA}$.

    已知 *A* 和 *B* 為兩個非零數位，且利用這兩個數位組成的兩位數有以下性質：

    1. $\overline{AB}$ 為 5 和另一個質數之積；

    2. $\overline{BA}$ 是 4 個質數之積；

    求三位數 $\overline{ABA}$。

2. There are some chickens and rabbits, where the number of chickens is 18 more than the number of rabbits. If there are 210 legs in total, how many rabbits are there?

    雞兔同籠，雞比兔多 18 隻，共有腿 210 條。問兔有多少隻?

3. A book store had a box of books. One half but 3 more books were sold on the first day. One third of the remaining part and 9 more books were sold on the second day. Finally 27 books are left. How many book(s) did the book store have originally?

    某書店有一箱書本，第一天賣掉了總數的一半多 3 本，第二天則賣掉剩下的三分之一多 9 本，最後剩下 27 本。問原本一箱書有多少本書?

4. Alice needs 40 days to finish a project. Peter needs 10 days to finish the same project. If Alice and Peter do the project together, how many day(s) do they need to finish it?

    愛麗絲需要 40 天完成一項工程，彼德需要 10 天完成同一項工程，若兩人合作，需要多少天完成工程?

Arithmetic
算術

5. Find the value of 1010101×1010101.

   求 1010101×1010101 的值。

6. Find the value of $\dfrac{1}{3 \times 5} + \dfrac{1}{5 \times 7} + \dfrac{1}{7 \times 9} + ... + \dfrac{1}{17 \times 19} + \dfrac{1}{19 \times 21}$.

   求 $\dfrac{1}{3 \times 5} + \dfrac{1}{5 \times 7} + \dfrac{1}{7 \times 9} + ... + \dfrac{1}{17 \times 19} + \dfrac{1}{19 \times 21}$ 的值。

7. Find the value of $1 \times 3 + 2 \times 4 + 3 \times 5 + 4 \times 6 + 5 \times 7 + 6 \times 8 + 7 \times 9 + 8 \times 10 + 9 \times 11$.

   求 $1 \times 3 + 2 \times 4 + 3 \times 5 + 4 \times 6 + 5 \times 7 + 6 \times 8 + 7 \times 9 + 8 \times 10 + 9 \times 11$ 的值。

8. Find the value of $73^2 - 9 \times 81$.

   求 $73^2 - 9 \times 81$ 的值。

Number Theory
數論

9. If 9-digit number $\overline{2019583AB}$ is divisible by 36 and $A > B$, find the value of $A - B$.

   若 9 位數 $\overline{2019583AB}$ 可被 36 整除及 $A > B$,, 求 $A - B$ 的值。

10. Find the number of factors for 300.

    問 300 有多少個因數?

11. Define the operation symbol $a \oplus b = 15 \times a - (a + b)$, find the value of $4 \oplus (3 \oplus 8)$.

    定義運算 $a \oplus b = 15 \times a - (a + b)$, 求 $4 \oplus (3 \oplus 8)$ 的值。

12. Teacher gives some candies to students. If everyone gets 8 candies, 16 candies will be left. If everyone gets 5 candies, 31 candies will be left. How many candies do teacher have?

    老師將若干粒糖果分給學生, 若每人派 8 粒糖果, 會剩下 16 粒; 若每人派 5 粒糖果, 會剩下 31 粒。問老師共有多少粒糖?

<u>Geometry</u>
<u>幾何</u>

13. How many rectangle(s) is / are there in the figure below?
   請問下圖有多少個長方形?
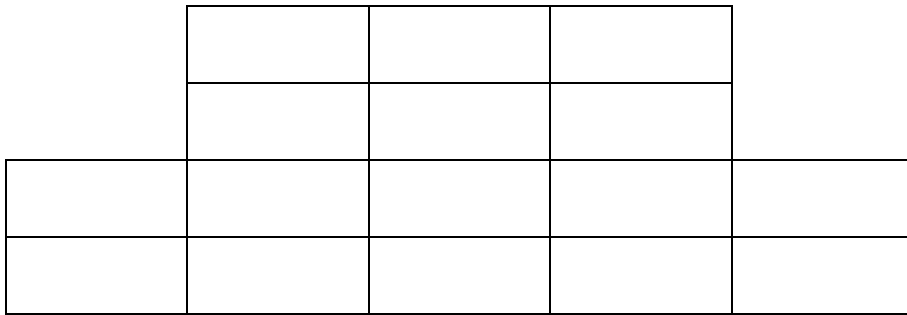
Question 13
第 13 題

14. After cutting 1 cm and 5 cm from 2 neighboring sides of a rectangle card respectively, we get a square. The area of the square is 53cm^2 less than the rectangle. Find the perimeter of the rectangle.

    將一張長方形的卡片從兩鄰邊各剪去 1 厘米和 5 厘米，得到一個正方形，其面積比長方形少 53 平方厘米，求長方形的周界。

15. 19 small cubes with side length 1cm are combined. According to the pattern shown below, find the surface area in cm^2.

    19 個邊長為 1 厘米的小立方體按以下規律組合成立體，求表面面積（以平方厘米表示答案）。
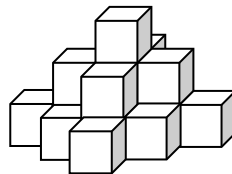
Question 15
第 15 題

16. How many side(s) does a regular polygon have which has 170° interior angle?s

    問內角為 170° 的正多邊形有多少條邊?

請以最簡形式填寫答案，若計算結果是分數，請確保為真分數或帶分數，或將計算結果寫成小數。錯誤單位將不給予任何分數。

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Combinatorics
組合數學

17. Alice draws all isosceles triangles whose perimeter is 40cm and length of sides are integers. How many different types of triangle(s) does she draw?
愛麗絲畫了所有周界為 40 厘米，且邊長為整數的等腰三角形。問她共畫了多少種不同的三角形？

18. 10 students join a competition. Only top 5 students can advance to next round. How many different way(s) of advancing is / are there?
10 個學生參加比賽，頭 5 名可以晉級，問有多少個晉級的可能性？

19. In a primary school, at least how many of 111 students that are in the same grade?
在同一所小學裡，111 人之中最少有多少個是同一個年級？

20. Numbers are drawn from 61 integers 10 to 70. At least how many number(s) is / are drawn at random to ensure that there are two numbers whose sum is 30?
在 10 至 70 這 61 個整數中最少任意選出多少個數，才必定有兩個數之和是 30？

~ 全卷完 ~
~ End of Paper ~