### 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)

## 小學六年級 Primary 6

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.

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填空題（第 1 至 20 題）（每題 3 分，答錯及空題不扣分）

Open-Ended Questions (1$^{st}$ ~20$^{th}$) (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 multiple of 17;

    2.  $\overline{BA}$ is a composite number and a multiple of *B*;

    Find the 2-digit number $\overline{AB}$.

    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. $\overline{AB}$ 是個 17 的倍數；

    2. $\overline{BA}$ 為合成數及 *B* 的倍數；

    求兩位數 $\overline{AB}$。

2.  There are chickens and rabbits in a cage and the number of chickens is four times of the number of rabbits. They have 288 legs in total. How many rabbit(s) is / are there?

    雞兔同籠，雞的數量是兔的 4 倍，共有腿 288 條，問兔有多少隻？

3.  The age of Alice is five times that of Peter now. 10 years later, the age of Alice is three times that of Peter. How old is Alice now?

    今年愛麗絲的年齡是彼德的 5 倍，10 年後，愛麗絲的年齡是彼德的 3 倍。問愛麗絲今年幾歲？

4.  Alice is saving money. She save \$1 on the first day, \$2 on the second day, \$3 on the third day, etc. Her target is saving \$3600. How long does she need to save?

    愛麗絲在儲錢，第一天儲 1 元，第二天儲 2 元，第三天儲 3 元，如此類推。愛麗絲的目標是要儲 3600 元，問她要儲多少天？

### Arithmetic
### 算術

5.  Find the value of $1234554321 \div 11$.

    求 $1234554321 \div 11$ 的值。

6.  Find the value of $\dfrac{1}{1\times3}+\dfrac{1}{2\times4}+...+\dfrac{1}{7\times9}+\dfrac{1}{8\times10}$.

    求 $\dfrac{1}{1\times3}+\dfrac{1}{2\times4}+...+\dfrac{1}{7\times9}+\dfrac{1}{8\times10}$ 的值。

7.  Find the value of $1\times3+2\times4+3\times5+...+20\times22$.

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.

求 $1\times3+2\times4+3\times5+...+20\times22$ 的值。

8. Find the value of $1-2+3+4+5-6+...+117-118+119+120$.

   求 $1-2+3+4+5-6+...+117-118+119+120$ 的值。

<u>Number Theory</u>
<u>數論</u>

9. If 9-digit number $\overline{2019A513B}$ is divisible by 44 and $A \neq B$, find the value of $A$.

   若 9 位數 $\overline{2019A513B}$ 可被 44 整除及 $A \neq B$，求 $A$ 的值。

10. How many simplified fraction(s) with denominator 72 is / are there?

    分母為 72 的最簡真分數有多少個?

11. How many 3-digit number(s) is / are there that can be divisible by 5 or 7 but not divisible by 17?

    能被 5 或 7 整除而不能被 17 整除的三位數有多少個?

12. A 3-digit number has a remainder 1 when divided by 5, has a remainder 2 when divided by 7 and has a remainder 5 when divided by 11. What is such largest 3 digit number?
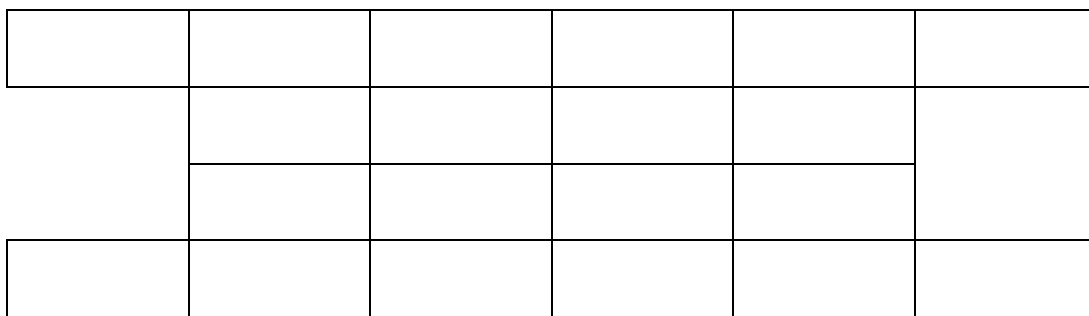
    一個三位數除以 5 餘 1，除以 7 餘 2，除以 11 餘 5，問這個三位數最大是多少?

<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. A rectangle is cut into 4 equal squares. If the area of the small square is 225cm², how many cm at least does the perimeter increase in cm after cutting the rectangle?

    一個矩形被切割成 4 個相同的正方形。若小矩形的面積為 225 平方厘米，切割之後周界最少增加了多少厘米?

15. Small cubes with side length 1 are combined according to the pattern shown below. If there are 9 layers,

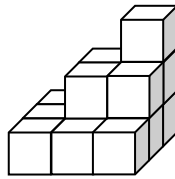請以最簡形式填寫答案，若計算結果是分數，請確保為真分數或帶分數，或將計算結果寫成小數。錯誤單位將不給予任何分數。

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find the surface area.

邊長為 1 的小立方體按以下規律組合成立體，如果它有 9 層，求該立體的表面面積。



Question 15

第 15 題

16. A square is formed by 675 rectangles that are 1cm×3cm. Find the decrease in perimeter in cm.

利用 675 個 1 厘米×3 厘米的長方形砌成一個正方形，求周界之差。(單位以厘米)

## Combinatorics
## 組合數學

17. A flight of stairs has 10 steps. Alice can go up for 1 step or 2 steps each time. The $7^{th}$ step cannot be stepped on as it is destroyed. How many way(s) is / are there for Alice to go up the stairs?

一道有 10 級的樓梯，愛麗絲每一步可以上 1 級或 2 級。其中第 7 級因為損壞而不能踏上，問愛麗絲走上這道樓梯共有多少種方法?

18. Alice needs 30 days to finish a task. Alice and Peter needs 5 days to finish a task if they work together. How many day(s) does Peter need to finish the task by himself?

愛麗絲需要 30 天完成一份工作，愛麗絲和彼德合作需要 5 天完成同一份工作。若彼德獨自完成工作需要多少天?

19. When do the hour hand and the minute hand overlap between 7pm and 8pm?

在下午 7 時至 8 時之間，時針和分針何時重疊?

20. 4 identical blue boxes and 3 identical red boxes are put from left to right. How many different permutation(s) is / are there?

由左至右放置 4 個相同的藍色箱子和 3 個相同的紅色箱子，有多少個不同排列方法?

~ 全卷完 ~
~ End of Paper ~

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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