



奧冠教育中心

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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)

中學一年級 Secondary 1

時限：90 分鐘

Time allowed: 90 minutes

模擬試題

Mock 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 5 題，共 25 題，每題 4 分，總分 100 分，答錯不扣分。
There are 5 exam areas and 5 questions in each exam area. There are a total of 25 questions in this Question-Answer Book. Each carries 4 marks. Total score is 100 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.

本試題不可取走。

THIS Question-Answer Book CANNOT BE TAKEN AWAY.

未得監考官同意，切勿翻閱試題，否則參賽者將有可能被取消資格。

DO NOT turn over this Question-Answer Book without approval of the examiner.

Otherwise, contestant may be DISQUALIFIED.

填空題 (第 1 至 25 題) (每題 4 分，答錯及空題不扣分)

Open-Ended Questions (1st ~25th) (4 points for correct answer, no penalty point for wrong answer)

Logical Thinking

邏輯思維

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

1. \overline{CA} is a prime number;

2. \overline{AC} is a prime number;

3. $A - C > 4$

Find the 2-digit number \overline{AC} .

已知 A 和 C 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{CA} 是質數；

2. \overline{AC} 是質數；

3. $A - C > 4$

求兩位數 \overline{AC} 。

2. Andy goes west for 5km, then goes north for 12km. How far is he now from the original position?

安迪向西走了 5 公里，向北走了 12 公里，問他和原來位置相距多遠？

3. How many time(s) does hour hand and minute hand of a clock overlap?

每天時鐘的時針和分針會重疊多少次？

4. There are 30 problems in a mathematics competition. The scores of each problem are allocated in the following ways: 1 mark will be given for a correct answer, 0 marks will be given for a blank answer or a wrong answer. Find the minimum number of candidate(s) to ensure that 2 candidates will have the same scores in the competition.

某數學比賽共有 30 條題目。以下述方式為每個題目評分：答對得 1 分、答錯或不作答得零分。求最小參賽者的數目才可保證比賽中有兩人同分。

5. There are 7 pairs of white chopsticks, 3 pairs of yellow chopsticks and 2 pairs of brown chopsticks mixed together. Close your eyes. If you want to get each 2 pairs of chopsticks with different colours, at least how many piece(s) of chopstick(s) is / are needed to be taken?

現有白色、黃色、棕色的筷子分別有 7 對、3 對和 2 對，把它們混在一起。你要在閉上眼睛的情況下，從這些筷子中各取出兩對不同顏色的筷子，最少要取多少根？

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.

Algebra

代數

6. Find the value of x if $(4x+5)+(3x-19)=0$.

若 $(4x+5)+(3x-19)=0$ ，求 x 的值。

7. Given $\frac{1}{8} + \frac{1}{24} + \frac{1}{48} + \dots + \frac{1}{n(n+2)} = \frac{252}{1009}$, find the value of $n^2 - 4034n + 4068289$.

已知 $\frac{1}{8} + \frac{1}{24} + \frac{1}{48} + \dots + \frac{1}{n(n+2)} = \frac{252}{1009}$ ，求 $n^2 - 4034n + 4068289$ 的值。

8. How many positive integral solution(s) is / are there for y if $13y + 47 < 2349$?

若 $13y + 47 < 2349$ ，則 y 有多少個正整數解？

9. Given a and b are positive real numbers and satisfy equations $a^2 + b^2 = 45$ and $ab = 18$, find the value of $a + b$.

已知 a 、 b 皆為正實數且滿足等式 $a^2 + b^2 = 45$ 和 $ab = 18$ ，求 $a + b$ 的值。

10. Factorise $4x^2 + 20x + 21$.

因式分解 $4x^2 + 20x + 21$ 。

Number Theory

數論

11. Find the number of positive factor(s) of the 1002001.

求 1002001 的正因數數目。

12. Find the value of $1^3 + 2^3 + 3^3 + \dots + 100^3$.

求 $1^3 + 2^3 + 3^3 + \dots + 100^3$ 的值。

13. A is an integer such that A^{15} is a 17-digit number with 7 as unit digit. Find A .

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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All answers should be written on the ANSWER SHEET.

A 為正整數，而 A^{15} 是一個 17 位數，且個位是 7，求 A 的值。

14. Given $x > 0$ and $x^2 + \frac{1}{x^2} = 14$, find the value of $x + \frac{1}{x}$.

已知 $x > 0$ 及 $x^2 + \frac{1}{x^2} = 14$ ，求 $x + \frac{1}{x}$ 的值。

15. Find the remainder of 10^{2018} when divided by 11.

求 10^{2018} 除以 11 的餘數。

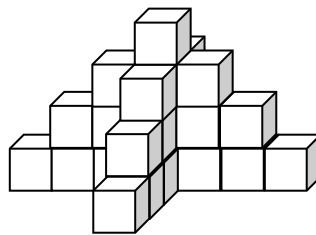
請將答案寫在 答題紙 上。

All answers should be written on the ANSWER SHEET.

Geometry

幾何

16. A solid cuboid is formed by merging 2431 cubes with side length 1cm. Find the minimum value of the total surface area of the cuboid.
現有邊長1厘米的正方體2431個。將它們堆成一個實心的長方體。求該長方體總表面面積的最小值。
17. The length of a right-angled side of a right-angled triangle is 36cm and the length of hypotenuse is 60cm. Find the area of the triangle in cm^2 .
一直角三角形的其中一條直角邊長 36 厘米，且斜邊長 60 厘米。求三角形的面積 (以平方厘米表示答案)。
18. Small cubes with side length 1cm are combined according to the pattern shown below. If there are 11 layers, find the surface area.
邊長為 1 的小立方體按以下規律組成立體，如果它有 11 層，求該立體的表面面積。



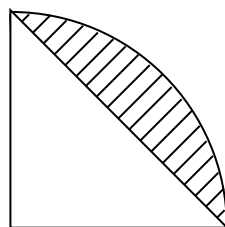
Question 18

第 18 題

19. The side length of an equilateral triangle is 6, find the area of the triangle.
一個等邊三角形的邊長為 6，求這等邊三角形的面積。

20. Find the area of the shaded region in the figure. (Take $\pi = \frac{22}{7}$)

下圖中陰影部份面積是多少？〔取 $\pi = \frac{22}{7}$ 〕



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Question 20

第 20 題

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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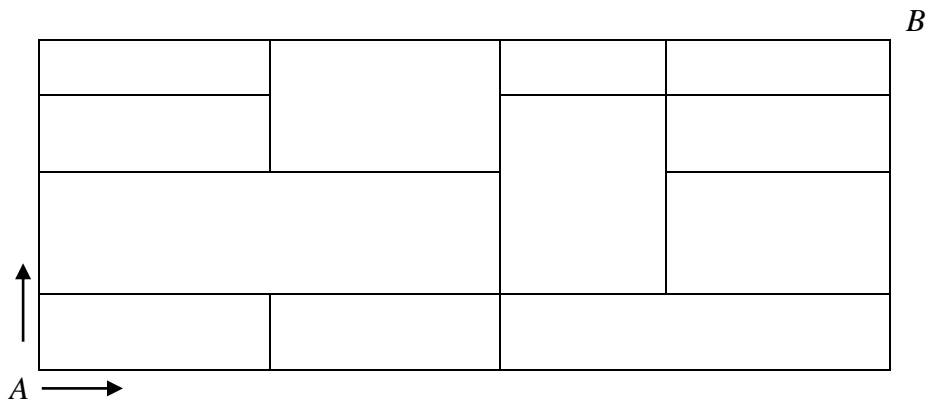
請將答案寫在 答題紙 上。

All answers should be written on the ANSWER SHEET.

Combinatorics

組合數學

21. For a 6-digit number, if the leftmost digit is now put at the rightmost, the new number formed is 5 times the original. Find the original number.
有一個六位數，若把最左邊的數位放在最右邊，則組成的數字會是原來的 5 倍。求原來的數字。
22. In between 3 o'clock and 4 o'clock, when does the hour hand and minute hand form a right angle?
在 3 時至 4 時之間，時針和分針在何時會形成直角？
23. In how many possible ways can 8 identical balls be distributed to 3 distinct boxes?
把 8 個完全相同的球放入三個不同的盒中，問共有多少個不同的分配方法？
24. Choose three digits, without repetition, from 1, 2, 3, 5, 8, 9 to form three-digit numbers. How many number(s) can be divisible by 6?
從 1、2、3、5、8、9 中選三個不可重複的數位組成三位數。請問當中有多少個數能被 6 整除？
25. If Amy goes from point A to point B , each step can only move up or move right. How many way(s) is / are there?
如果艾美從 A 點走到 B 點，每步只能向上或向右走，共有多少種走法？



Question 25

第 25 題

~ 全卷完 ~

~ End of Paper ~