

2024/25 第十五屆香港中學數學創意解難比賽

22/2/2025（星期六） 10:25-11:30

比賽時間：65 分鐘

參賽者須知：

1. **比賽時間：65 分鐘。**建議在甲部用 50 分鐘作答，在乙部用 15 分鐘作答。
2. 本問題卷共 8 頁、答題紙 5 頁，甲部有 10 題數學題，乙部有 1 題創意解難題。
3. 每位參賽學生獲派一份問題卷及一份答題紙。
4. 比賽期間隊員可以討論題目，並於答題紙寫上議定的答案。
**** 只有寫於隊長的答題紙上的答案方可得到評分。**
5. 參賽隊伍需自備文具及計算機。為公平起見，比賽中只可使用非圖像計算機。本比賽中嚴禁使用電子字典、電腦、電話或其他有上網或通訊功能的工具。
6. 本試卷每頁的空白位置可作為草稿之用。每位參賽學生會獲派三張草稿紙，如有需要，可要求額外草稿紙。
7. 在筆試完結後，必須交回隊長的答題紙。

2024/25 The 15th Hong Kong Mathematics Creative Problem Solving Competition for Secondary Schools

22/2/2025 (Saturday) 10:25-11:30

Time allowed : 65 minutes

Instructions for participants :

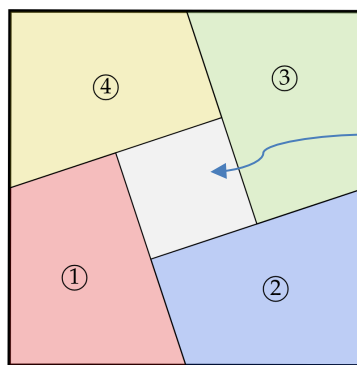
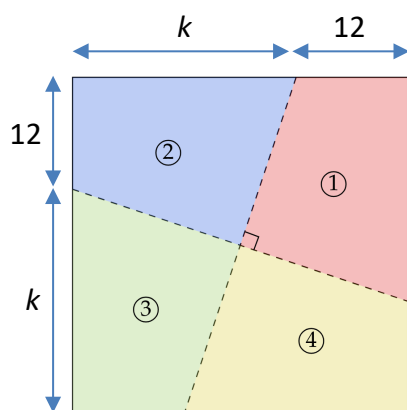
1. **Time allowed: 65 minutes.** It is advised to spend 50 minutes in Section A and 15 minutes in Section B.
2. The question paper consists of 8 pages, the answer sheet consists of 5 pages. There are 10 questions in Section A and 1 creative problem in Section B.
3. Each participant will get a set of question paper and a set of answer sheets.
4. Team members are allowed to discuss during the competition. The agreed answers should be written on the answer sheets.
**** Only the answers in the captain's answer sheet will be marked.**
5. Participating teams should bring their own stationery and calculators. For the purpose of fairness, please use only non-graphic calculators. Electronic dictionaries, computers, mobile phones and other online or communication devices are prohibited.
6. The blank space on each page of this question paper can be used for rough work. Each participant will get three rough work sheets. Extra rough work sheets will be provided upon request.
7. The captain's answer sheets will be collected after the competition.

甲部 (建議此部用 50 分鐘作答)

Section A (Suggested to use 50 minutes in this Section)

1. 一個邊長為 $(k+12)$ 單位的正方形被切成四個相同的部分，然後以以下方式重新排列，使得新形成的圖形是一個更大的「正方形」，中間有空隙。

A square with side $(k+12)$ units is cut into four identical pieces, and then rearranged in the following way such that the newly formed figure is a larger “square” with empty space in the centre.



Perimeter of the larger
“square”
較大「正方形」的周長

- (a) 如果空隙的面積為9平方單位，求 k 的值。

If the area of the empty space is 9 square units, find the value of k .

- (b) 如果更大正方形的周長是原正方形的1.25倍，求 k 的值。

If the perimeter of the larger square is 1.25 times of the original square, find the value of k .

2. 2025 最多可以寫成多少個連續正整數之和？

What is the maximum number of consecutive positive integers that can sum up to 2025?

3. 已知 p 為一正四位數使得 $7007p$ 為一完全平方數。求所有 p 的可能值之和。

It is given that p is a positive 4-digit number such that $7007p$ is a perfect square. Find the sum of all possible values of p .

4. a, b 及 c 為三個數使得 $a+b+c=11$ 及 $ab+bc+ca+24=0$ 。若 $d>0$ 且 $d^2=a^2+b^2+c^2$ ，求 d 。

a, b and c are three numbers such that $a+b+c=11$ and $ab+bc+ca+24=0$. If $d>0$ and $d^2=a^2+b^2+c^2$, find d .

5. 現在的時間為下午一時。當過了 $2024^2 + 2025^2$ 小時後，時間是什麼？

The time now is 1:00 pm. What is the time after $2024^2 + 2025^2$ hours?

6. 求一個正整數，使得該整數的平方與它自身的和等於 380。

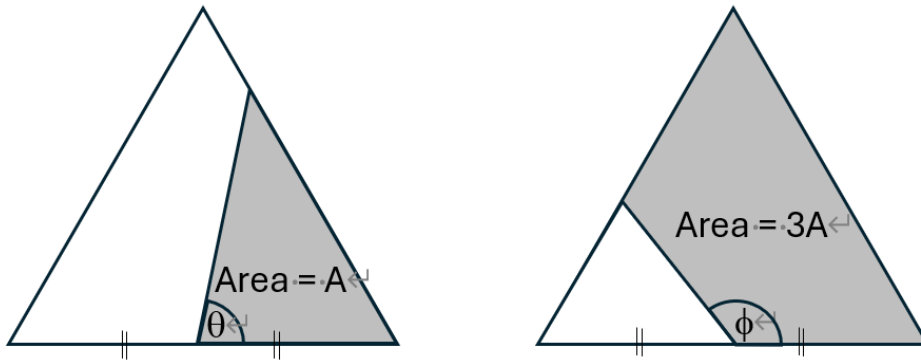
Find a positive integer such that the sum of the square of this integer and itself is equal to 380.

7. 你有一個朋友想通過在生日蛋糕上點燃蠟燭來慶祝他的 18 歲生日。但你只有五根蠟燭。你如何表示 18 歲生日？

You have a friend who wants to celebrate his 18th birthday by lighting candles on a birthday cake. But you have only five candles. How can you represent the number 18th birthday?

8. 給定一個邊長為10 cm 的等邊三角形。兩條直線連接底邊的中心到三角形的邊界，形成角度 θ 和 ϕ ，如圖所示。如果陰影區域的面積分別為 A 和 $3A$ ，求這兩個角的值。

You have given an equilateral triangle of side length 10 cm. Two straight lines connect the center of the bottom sides to the borders of the triangle with angle θ and ϕ as shown. Find the values of the angles if the area of the shaded regions are A and $3A$ respectively.



9. 使用四個「4」建立一個算式，使得該算式的值等於1。請寫下三個算式。

Create an expression by using four “4”s such that the express has a value equal to 1. Write down three such expressions.

Example：例子：

$$4 - 4 + \frac{4}{4} = 1$$

10. 提供了如图所示的计算器。包括“EXE”按钮，给出三种方法，通过最多按下 5 个按钮达到大于或等于 10^{90} 的结果。

A calculator as shown is provided. Including the ‘EXE’ button, give 3 ways to reach a result greater than or equal to 10^{90} by pressing at most 5 buttons.

方法一 Method 1 :

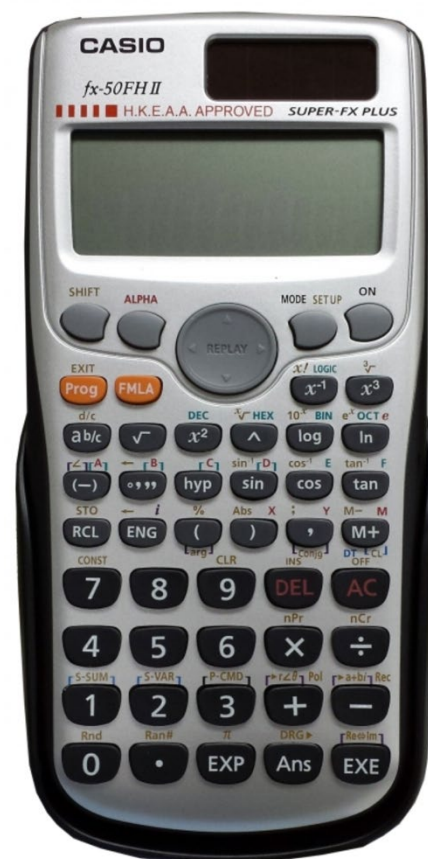
_____ EXE _____

方法二 Method 2 :

_____ EXE _____

方法三 Method 3 :

_____ EXE _____



乙部 (建議此部用 15 分鐘作答)

Section B (Suggested to use 15 minutes in this Section)

1. Fold and Cut 摺疊和切割

- (a) Given a piece of rectangular paper with length 10 cm and width 8 cm. It is folded and finally cut according to the following steps.

給定一張長 10 cm、寬 8 cm 的長方形紙。按照以下步驟進行摺疊和切割。

Step 1: 步驟 1 :

Fold along MN , where M and N are mid-points of AD and BC .

沿 MN 摺疊，其中 M 和 N 是 AD 和 BC 的中點。

Step 2: 步驟 2 :

Mark P on MN such that $MP : PN = 5 : 3$. Fold along AP .

在 MN 上標記 P ，使得 $MP : PN = 5 : 3$ 。沿 AP 摺疊。

Step 3: 步驟 3 :

Mark Q on AP such that $AQ : QP = 3 : 2$ and mark R on BN such that $QR \parallel AB$. Fold along QR .

在 AP 上標記 Q ，使得 $AQ : QP = 3 : 2$ ，並在 BN 上標記 R ，使得 $QR \parallel AB$ 。沿 QR 摺疊。

Step 4: 步驟 4 :

Mark S on QR . Fold along BS such that R lies on AB .

在 QR 上標記 S 。沿 BS 摺疊，使得 R 位於 AB 上。

Step 5: 步驟 5 :

Mark T and U on AQ and BS respectively such that $AT : TQ = BU : US = 2 : 1$. Make a straight cut along TU .

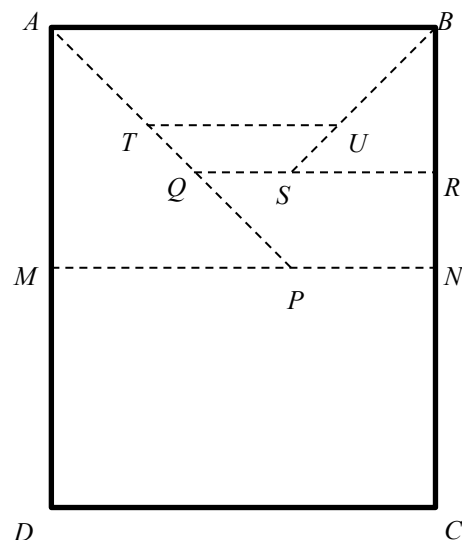
在 AQ 和 BS 上分別標記 T 和 U ，使得 $AT : TQ = BU : US = 2 : 1$ 。沿 TU 進行切割。

After making the straight cut, unfold the part that is cut out. Draw and indicate the dimensions of the part that is cut out below in the answer sheets.

進行切割後，展開切割出來的部分。在答題紙上繪畫並標明切割部分的尺寸。

(4 分)

(4 marks)

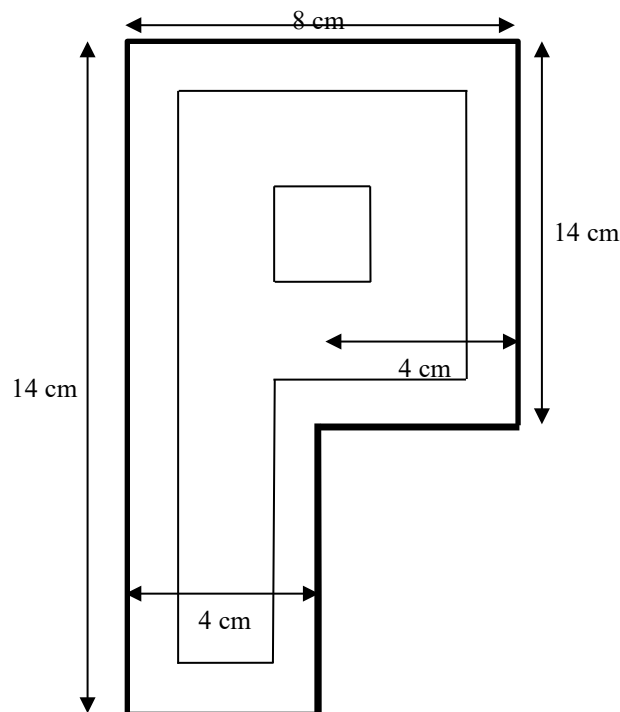


(b) A letter 'P' is printed on a piece of paper with dimension as shown. All lines are either vertical or horizontal. The letter 'P' has a uniform thickness of 2 cm and a uniform margin of 1 cm.

在一張紙上印有字母「P」，其尺寸如下圖所示。所有線條都是垂直或水平的。字母「P」的厚度均為 2 cm，邊距均為 1 cm。

We want to cut out the letter 'P' by folding the paper several times and making straight cuts only. If we want to make as few straight cuts as possible, describe your steps below. You can express it with words accompanied by illustrations.

我們希望通過多次折疊紙張並僅進行直切來切出字母「P」。如果我們希望盡可能減少直切的次數，請在下面描述你的步驟。你可以用文字表達，並附上插圖。



(6 分)
(6 marks)

全卷完
End of Paper

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2024/25 The 15th Hong Kong Mathematics Creative Problem Solving Competition for
Secondary Schools

答題紙 Answer sheets

學校編號 School Code : S_____

學校名稱 School Name :

得分 Score :

/42

甲部 Section A

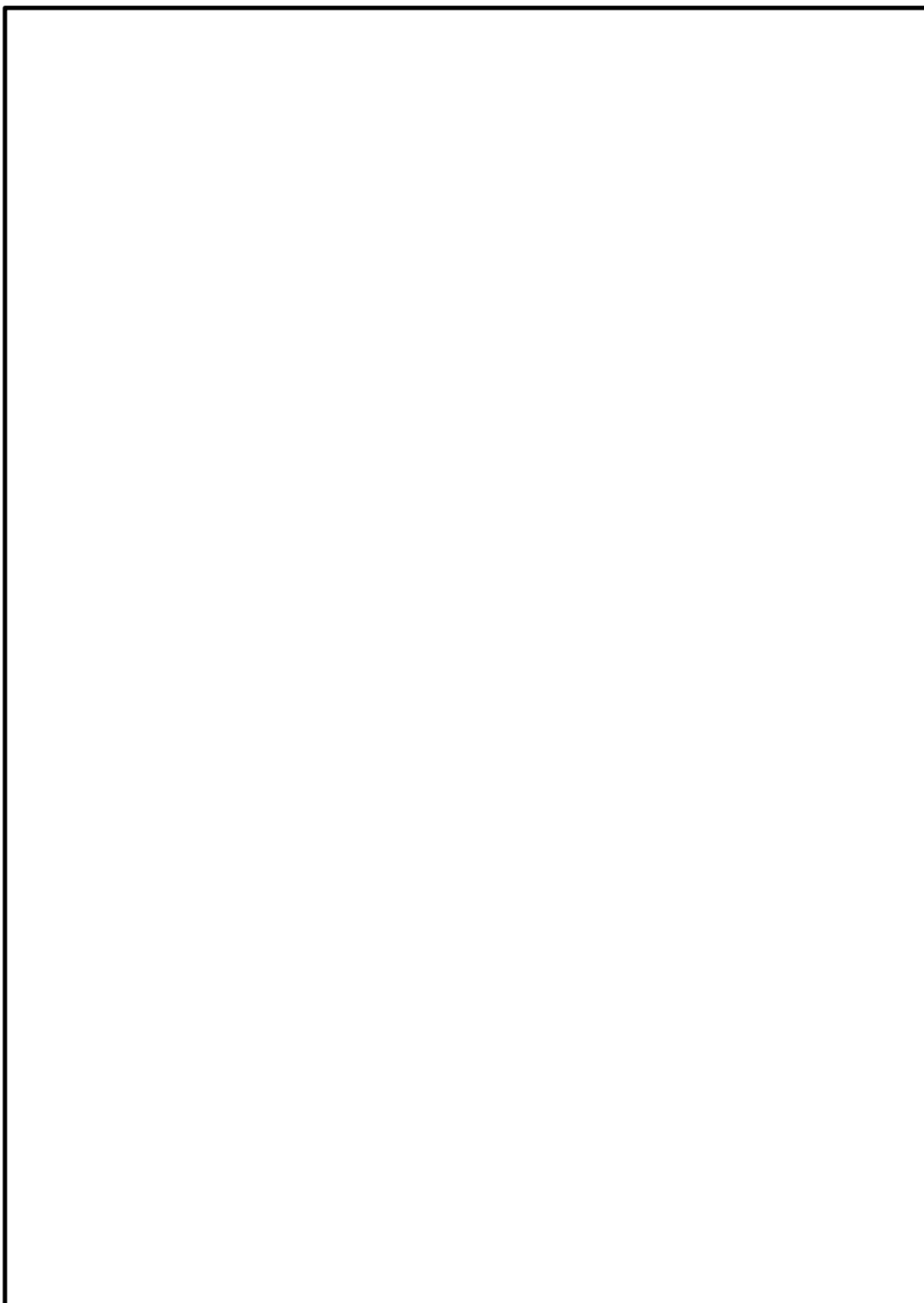
答案 Answers		評分 Marks
1.	(a) 求 k 的值。 Find the value of k . 答案：Answer: _____	/4
	(b) 求 k 的值。 Find the value of k . 答案：Answer: _____	

2.	2025 最多可以寫成多少個連續正整數之和？ What is the maximum number of consecutive positive integers that can sum up to 2025? 答案：Answer:	/3
3.	求所有 p 的可能值之和。 Find the sum of all possible values of p. 答案：Answer:	/3
4.	若 $d > 0$ 且 $d^2 = a^2 + b^2 + c^2$，求 d。 If $d > 0$ and $d^2 = a^2 + b^2 + c^2$, find d. 答案：Answer:	/3
5.	當過了 $2024^2 + 2025^2$ 小時後，時間是什麼？ What is the time after $2024^2 + 2025^2$ hours? 答案：Answer:	/3
6.	求一個正整數，使得該整數的平方與它自身的和等於 380。 Find a positive integer such that the sum of the square of this integer and itself is equal to 380. 答案：Answer:	/3
7.	你如何表示 18 歲生日？ How can you represent the number 18th birthday? 答案：Answer:	/3

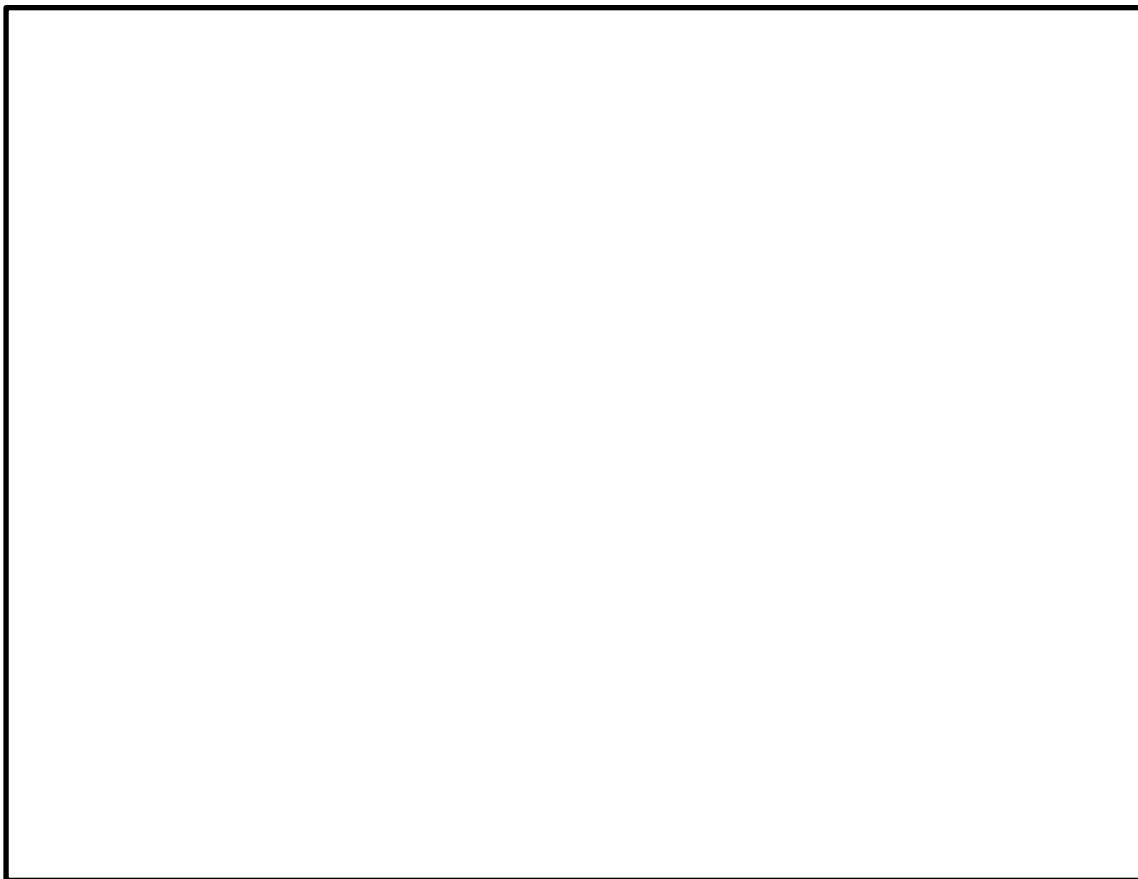
8.	求這兩個角的值。 Find the values of the angles. 答案：Answer: $\theta = \underline{\hspace{2cm}}$ $\phi = \underline{\hspace{2cm}}$	/4
9.	請寫下三個算式。 Write down three such expressions. 答案：Answer: _____ _____ _____	/3
10.	給出三種方法，通過最多按下 5 個按鈕達到大於或等於 10^{90} 的結果。 Give 3 ways to reach a result greater than or equal to 10^{90} by pressing at most 5 buttons. 方法一 Method 1 : _____ <u>EXE</u> 方法二 Method 2 : _____ <u>EXE</u> 方法三 Method 3 : _____ <u>EXE</u>	/3

乙部 Section B

1. (a)

A large, empty rectangular box with a black border, occupying the central portion of the page. It is intended for a drawing or a detailed response to the question.

(b) 插圖 Illustration



文字表達 Expressed with words

全卷完
End of Paper