

2022/23 第十七屆香港小學數學創意解難比賽

18/2/2023 (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 20 頁，甲部有 12 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. 比賽其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一張草稿紙，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。

2022/23 The 17th Hong Kong Mathematics Creative Problem Solving Competition for Primary Schools

18/2/2022 (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 20 pages. There are 12 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 one rough work sheet. 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. 某一個國家的貨幣只有 8 元和 9 元兩種。在不設找續而又不多付款的情況下：

There are only two types of coins, \$8-coin and \$9-coin, in a country. If only exact amount is accepted in a transaction:

a) 有多少種未能付款的價格？

How many prices cannot be accepted in the transaction?

b) 未能付款的價格當中最高是多少元？

What is the highest price which cannot be accepted in the transaction?

2. 一張正方形手工紙，把它對摺 2 次後，得到的圖形還是正方形，如(圖 1)。

用同樣的方法，如把某形狀的手工紙對摺 4 次後，可摺成如(圖 2)的三角形。

已知有五種形狀的手工紙 (不計算圖 1 的正方形手工紙) 對摺 4 次後可得出(圖 2)的三角形，請畫出這五種形狀。

In Diagram 1, a smaller square is obtained by folding a larger square paper into half twice.

A smaller triangle is obtained by folding the smaller square into half four times as shown in Diagram 2.

It is given that there are five different shapes of papers (other than the square paper in Diagram 1) which can obtain the triangle in Diagram 2 by folding into half four times. Please draw the five different shapes on the grid paper provided.

圖 1 Diagram 1

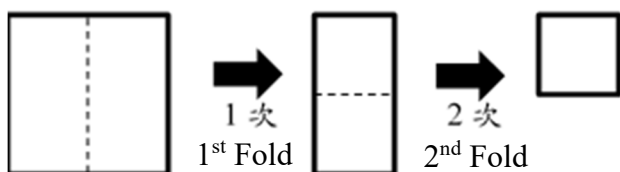
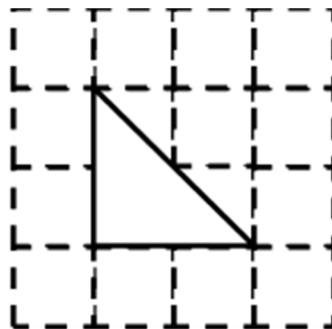


圖 2 Diagram 2



3. 根據規律列出數式如下：

The equations below are listed according to certain patterns:

第一行

$$1+2=3$$

First row

第二行

$$4+5+6=7+8$$

Second row

第三行

$$9+10+11+12=13+14+15$$

Third row

.....

以上的算式計算結果分別是第一行=3，第二行=15，第三行=42，求出第十行的計算結果是多少？

The results of the above arithmetic expressions are First row = 3, Second row = 15, Third row = 42, find the result of the tenth row.

4. 兩個分別為 3×3 和 4×4 的正方形(圖 1)，利用以下兩個步驟將正方形分割成 4 個部分，並組成一個 5×5 的正方形。

The 3×3 and 4×4 squares in Diagram 1 are cut into 4 parts and re-combined into a 5×5 square by the following two steps.

步驟一：與正方形的邊平行，沿虛線切割(圖 2)；

Step 1: Cut along the dotted lines which are parallel to the sides of the square (Diagram 2);

步驟二：如下(圖 3)，把分割的部分重新組合成一個 5×5 的正方形。

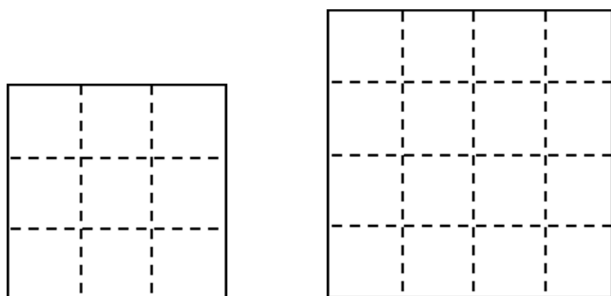
Step 2: Re-combine the parts into a 5×5 square (Diagram 3).

除圖 2 及圖 3 的方法外，試畫出 5 組不同的方法。

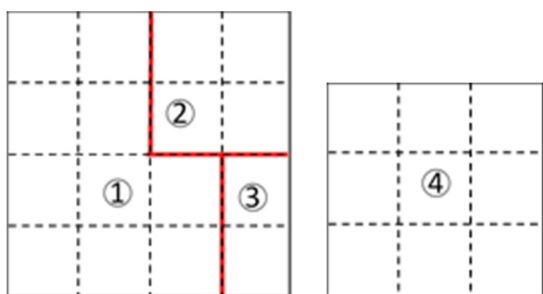
Draw 5 different methods other than the method illustrated in Diagram 2 and Diagram 3.

(注：鏡象(反過來)和旋轉(轉方向)將視為同一種方法)

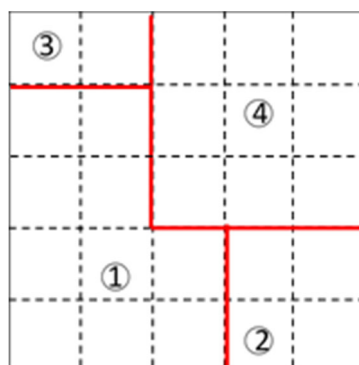
(Remark: Method obtained from reflection and rotation will be considered as same method)



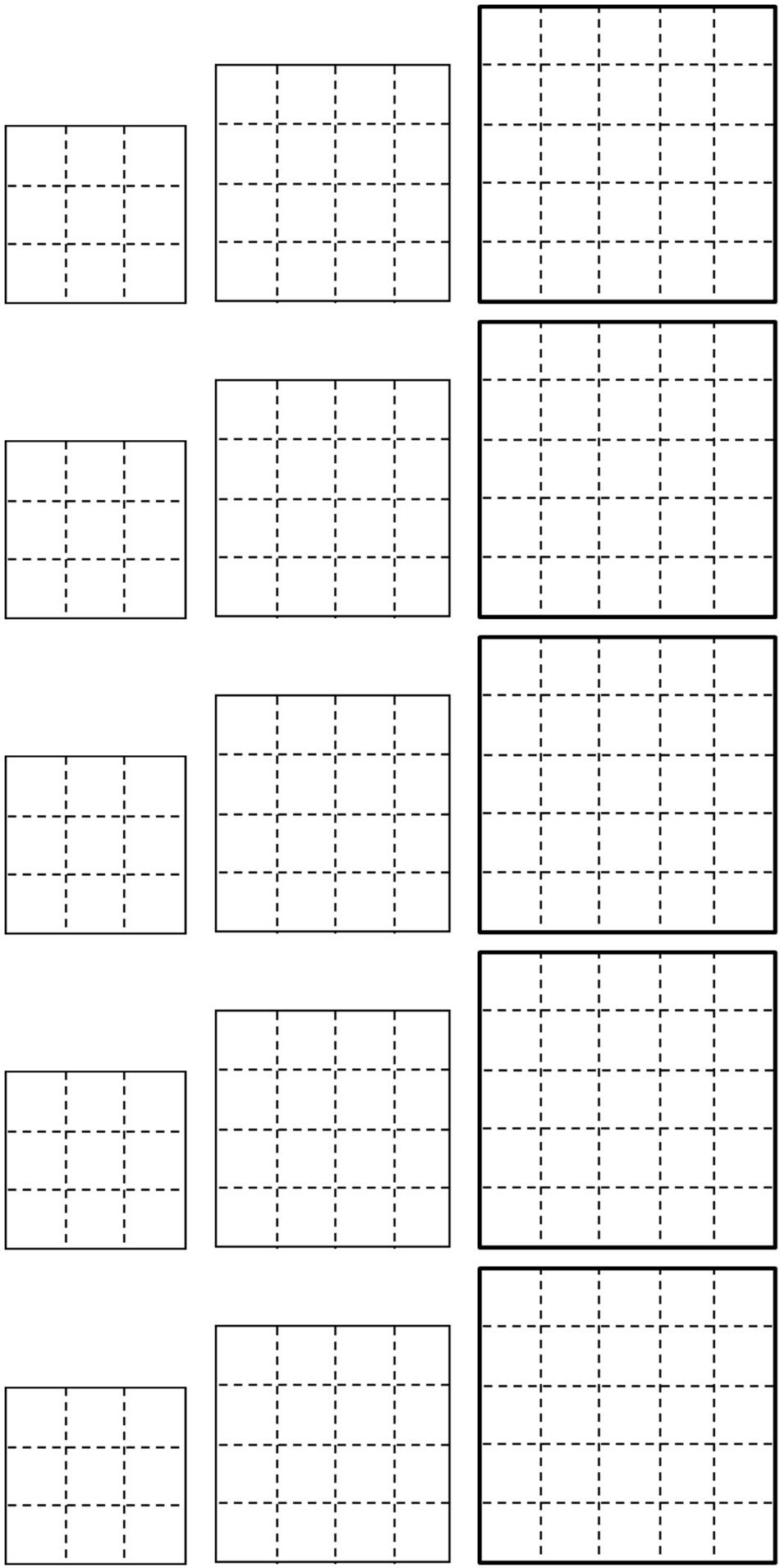
(圖 1 Diagram 1)



(圖 2 Diagram 2)

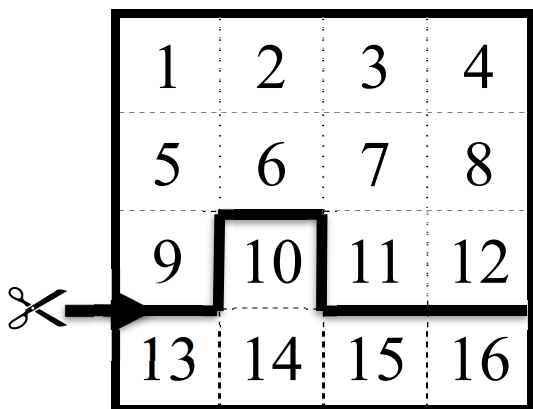


(圖 3 Diagram 3)



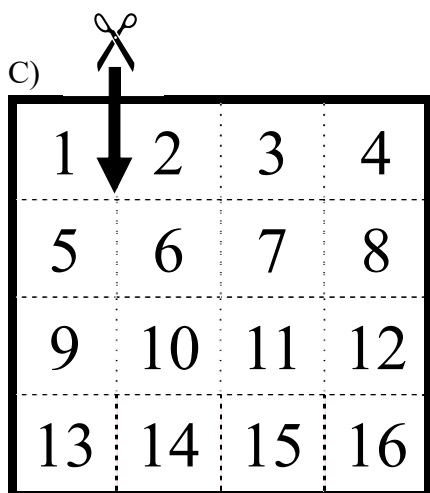
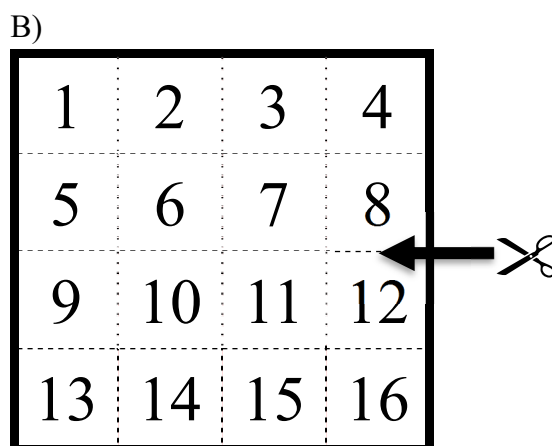
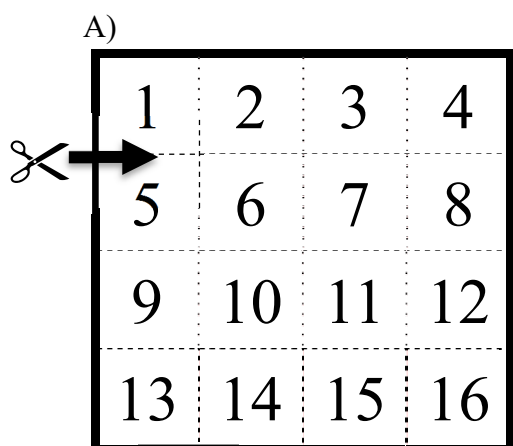
5. 下圖所示的紙上，寫有由 1 至 16 的數字。由圖側邊的箭咀開始，沿粗線把紙剪成兩片。兩片紙上的數字合計是相同的。

The numbers 1 to 16 are marked on the paper in the diagram below. If the paper is cut into two parts along the bolded lines started from the arrow sign with the ✂ mark, the sums of the numbers in each part are the same.



試利用下圖所示的剪咀開始，把紙剪成兩片，令剪開的兩片紙上的數字合計均是相同的。

Try to mark the cutting lines in each of the diagram below according to the start position marked by the arrow and the ✂ mark, such that the sums of the numbers in each of the two parts are the same.



6. 一個住在城市右上方(P)的人在左下方(Q)工作。圖中黑色正方形為不可通過的建築物。假設每兩個相鄰的路口相隔 100 米，

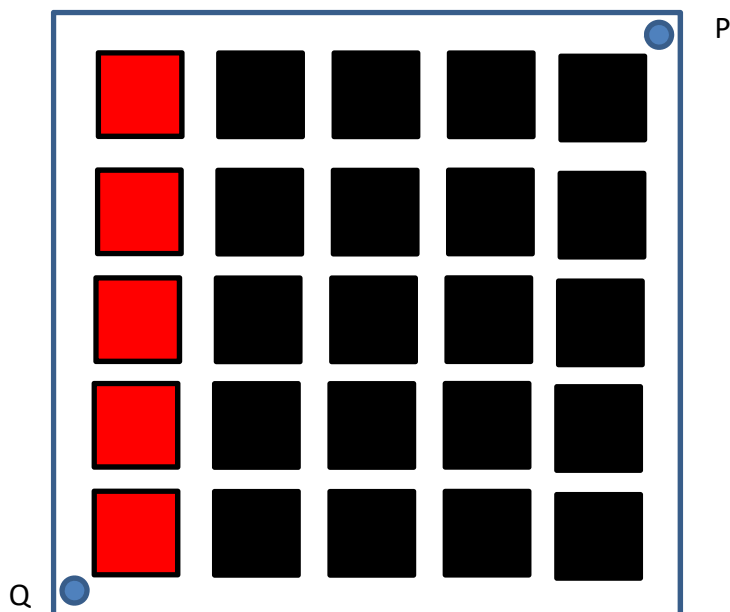
A man lives in the top right corner of a city (P) while works in the bottom left corner of the city (Q). The black squares in the diagram are buildings which are not allowed to pass through. Assume that the distance between every two consecutive junctions is 100m,

(a) 他從家走到辦公室的最短距離是多少？

what is the shortest distance he travels to work?

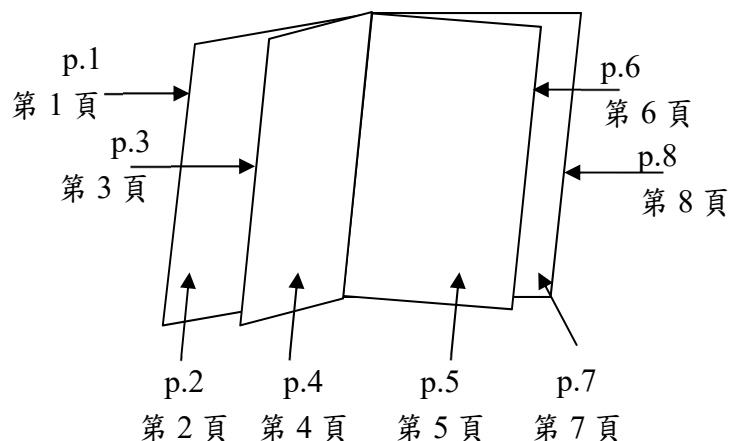
(b) 他可以走的最短路線有多少條？

how many different paths of shortest distance are there?



7. 報紙每張紙印刷4頁內容。如下圖，若報紙共有8頁，則第1、2、7、8頁在同一張紙上，第3、4、5、6頁在同一張紙上。如果從報紙中抽出一張，發現第9頁和20頁在同一張紙上印刷，這份報紙最少有多少頁？最多有多少頁？

Each paper of a newspaper has 4 pages of content printed. Refer to the diagram below, if the newspaper has 8 pages, then pages 1, 2, 7, 8 are printed on the same paper, pages 3, 4, 5, 6 are printed on the same paper. One paper is randomly drawn from the newspaper. It is found that page 9 and page 20 are printed on the same paper. At least how many pages are there in the newspaper? At most how many pages are there in the newspaper?



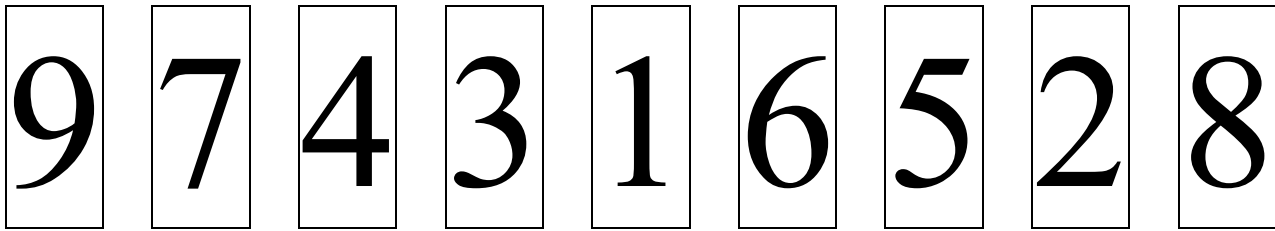
8. 右面是一個鐘面圖，試利用直線把鐘面劃分為三塊，使每塊內有四個數，且每塊中四個數的和都是相等的。

The diagram below shows the face of a clock. Draw straight lines to divide the clock face into three parts such that each part contains four numbers and the sums of the numbers in each part are the same.



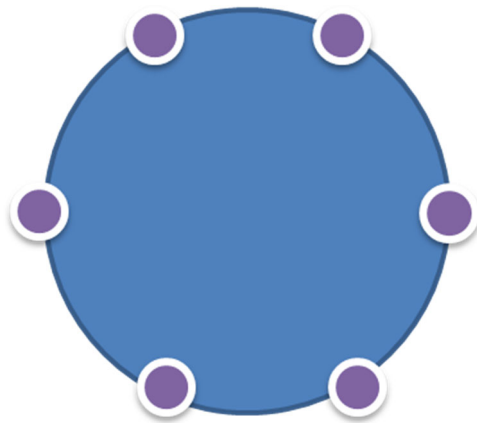
9. 下圖顯示 1 至 9 的數卡混亂排列。Amy 和 Betty 兩人交替取一張數卡然後放在桌面上，先讓桌上的點數合計為 15 的一方勝利。以上遊戲是先手必勝，即先取數卡的一方穩勝。如果你是先手，你最好首先取哪張數卡？請描述你的必勝策略。

The diagram below shows the number cards with numbers 1 to 9 marked. Amy and Betty take one card and put on the table alternatively. The one who makes the sum of the cards on the table equal to 15 is the winner. It is given that the first player with a suitable strategy must win the game. If you were the first player, which card should be taken first? Describe your winning strategy.



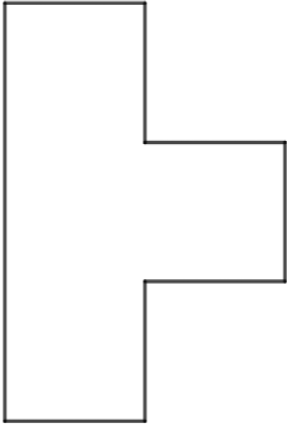
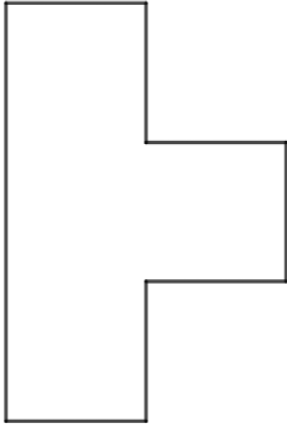
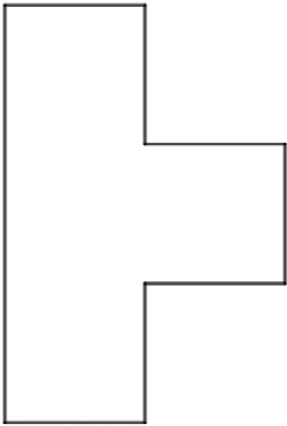
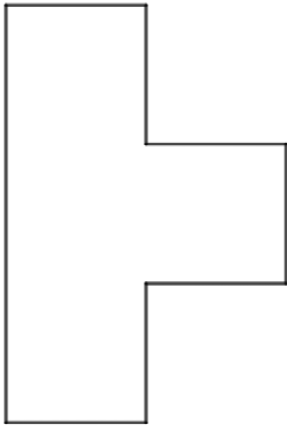
10. 下圖顯示 6 個人坐在一張圓桌旁，如果每人同時與另一人握手，而各人的手臂不能交疊，共可能出現多少種握手的組合？

The diagram below shows 6 people sitting around a round table. Suppose each person shakes hands with one other person at the same time, where the arms are not overlapped, how many possible combinations of hand-shaking are there?



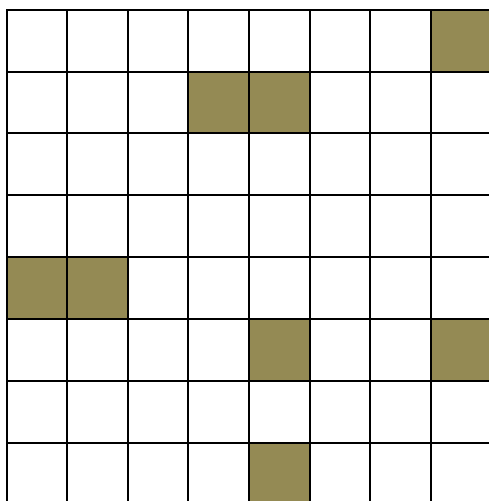
11. 在以下圖案中，用兩條直線分別分割成 3 個、4 個、5 個及 6 個平面圖形。兩條直線都必須穿過以下圖案。

In each of the diagram, divide the plane figure into 3, 4, 5 and 6 parts respectively by two straight lines, where the two straight lines must pass through the plane figure.

分割成 3 個平面圖形： Divide into 3 parts:	分割成 4 個平面圖形： Divide into 4 parts:
	
分割成 5 個平面圖形： Divide into 5 parts:	分割成 6 個平面圖形： Divide into 6 parts:
	

12. 在下圖最少數量的方格填色，使以下整個圖案成為有兩條對稱軸的軸對稱平面圖形，並以虛線畫出該對稱軸。

Fill in the minimum number of boxes in the diagram below, such that the whole diagram has two axes of reflectional symmetry. Draw the axes of reflectional symmetry with dotted lines.



乙部 (建議此部用 15 分鐘作答)

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

1. 長方形一的長和闊分別為 p 和 q ，長方形二的長和闊分別為 r 和 s ，其中 p 、 q 、 r 及 s 皆為整數。試寫出可符合以下每一項條件的 p 、 q 、 r 、 s 的其中一個組合。

The length and width of rectangle one are p and q , the length and width of rectangle two r and s , where p , q , r and s are integers. Try to suggest a possible combination of p , q , r , s that fits each the following condition.

- (a) 長方形一的面積較大而長方形二的周界較長。

Rectangle one has bigger area while rectangle two have longer perimeter.

- (b) 長方形二的面積及周界均為長方形一的三倍。

Rectangle two's area and perimeter are both three times that of rectangle one.

- (c) 長方形一的面積為長方形二的雙倍但長方形一的周界為長方形二的一半。

Rectangle one's area is double that of rectangle two and its perimeter is just half of that of rectangle two.

全卷完

End of Paper

2022/23 第十七屆香港小學數學創意解難比賽

2022/23 The 17th Hong Kong Mathematics Creative Problem Solving Competition for
Primary Schools

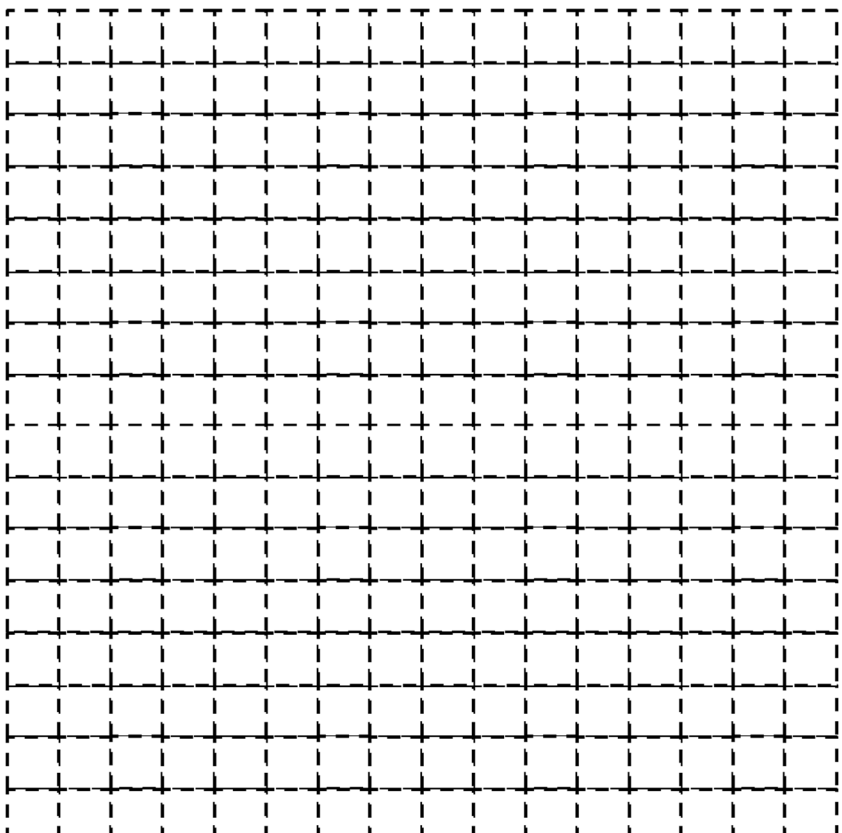
答題紙 Answer sheets

學校名稱 School Name :

得分 Score :

/35

甲部 Section A

答案 Answers		評分 Marks
1.	<p>a) 有多少種未能付款的價格？ How many prices cannot be accepted in the transaction? (a) 答/Ans: _____</p> <p>b) 未能付款的價格當中最高是多少元？ What is the highest price which cannot be accepted in the transaction? (b) 答/Ans: _____</p>	/2
2.	<p>請畫出這五種形狀。 Please draw the five different shapes on the grid paper provided.</p> 	/5

3.

求出第十行的計算結果是多少？
Find the result of the tenth row.

答/Ans: _____

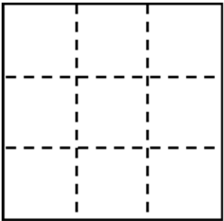
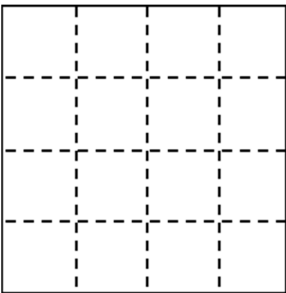
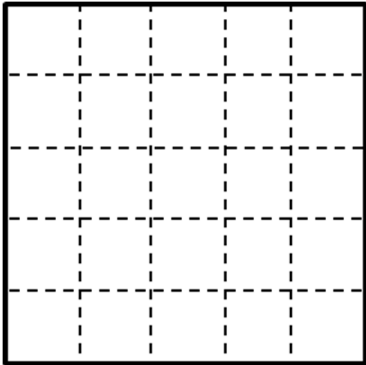
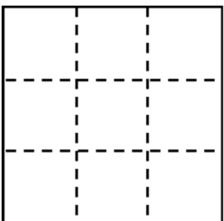
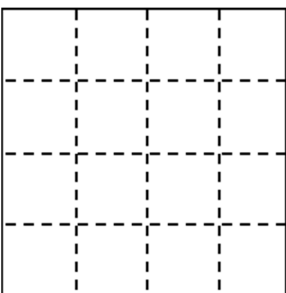
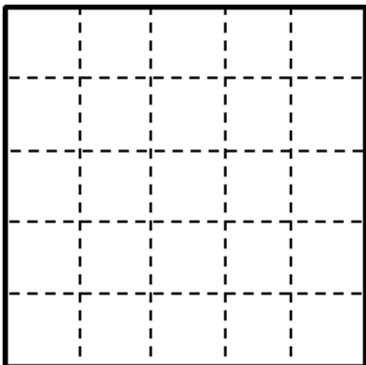
/2

4. 除圖 2 及圖 3 的方法外，試畫出 5 組不同的方法。

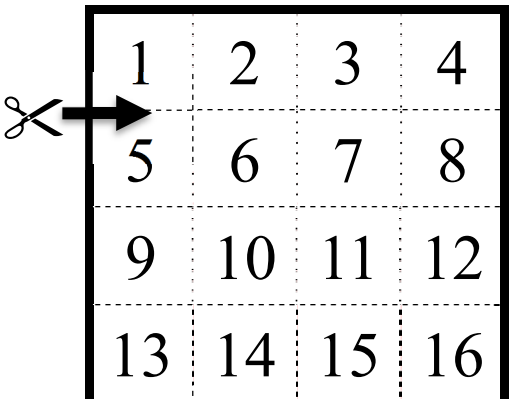
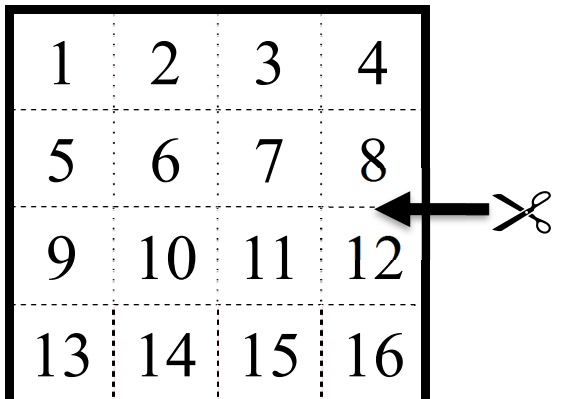
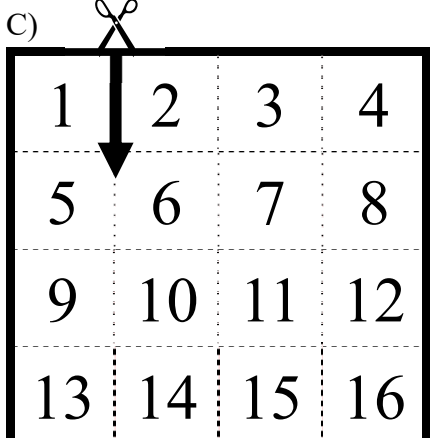
Draw 5 different methods other than the method illustrated in Diagram 2 and Diagram 3.

	3×3 正方形的切割方法	4×4 正方形的切割方法	5×5 正方形的組合方法
1			
2			
3			


/5

4			
5			

5. 試利用下圖所示的剪咀開始，把紙剪成兩片，令剪開的兩片紙上的數字合計均是相同的。
 Try to mark the cutting lines in each of the diagram below according to the start position marked by the arrow and the ✂ mark, such that the sums of the numbers in each of the two parts are the same.

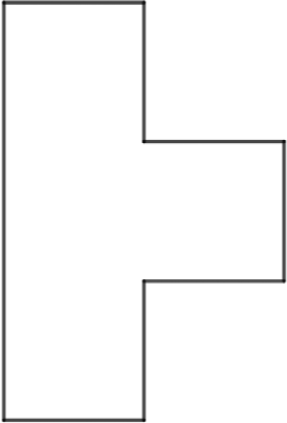
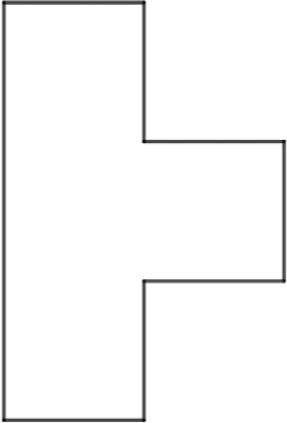
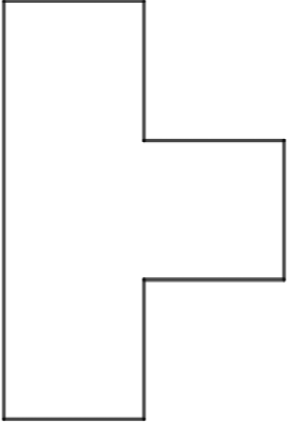
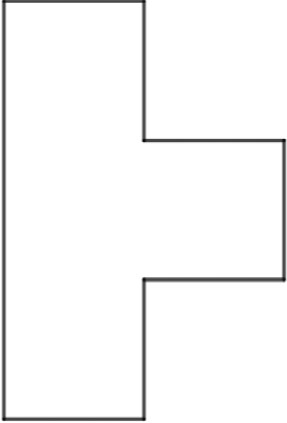
<p>A)</p> 	<p>B)</p> 
<p>C)</p> 	

/3

6.	<p>(a) 他從家走到辦公室的最短距離是多少？ what is the shortest distance he travels to work? (a) 答/Ans: _____</p> <p>(b) 他可以走的最短路線有多少條？ how many different paths of shortest distance are there? (b) 答/Ans: _____</p>	/2
7.	<p>(a) 最少有多少頁？ At least how many pages are there in the newspaper? (a) 答/Ans: _____</p> <p>(b) 最多有多少頁？ At most how many pages are there in the newspaper? (b) 答/Ans: _____</p>	/2
8.	<p>試利用直線把鐘面劃分為三塊，使每塊內有四個數，且每塊中四個數的和都是相等的。 Draw straight lines to divide the clock face into three parts such that each part contains four numbers and the sums of the numbers in each part are the same.</p> <div style="text-align: center;">  </div>	/2
9.	<p>如果你是先手，你最好首先取哪張數卡？請描述你的必勝策略。 If you were the first player, which card should be taken first? Describe your winning strategy.</p> <p>答/Ans: _____ _____ _____ _____ _____ _____</p>	/4
10.	<p>共可能出現多少種握手的組合？ How many possible combinations of hand-shaking are there? 答/Ans: _____</p>	/2

11. 用兩條直線分別分割成 3 個、4 個、5 個及 6 個平面圖形。

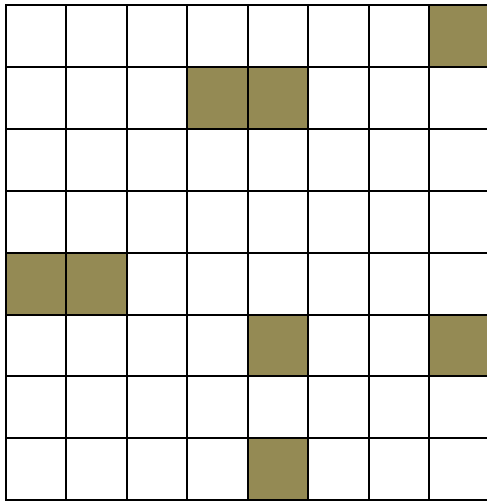
Divide the plane figure into 3, 4, 5 and 6 parts respectively by two straight lines

分割成 3 個平面圖形: Divide into 3 parts:	分割成 4 個平面圖形: Divide into 4 parts:
	
分割成 5 個平面圖形: Divide into 5 parts:	分割成 6 個平面圖形: Divide into 6 parts:
	

/4

12. 在下圖最少數量的方格填色，使以下整個圖案成為有兩條對稱軸的軸對稱平面圖形，並以虛線畫出該對稱軸。

Fill in the minimum number of boxes in the diagram below, such that the whole diagram has two axes of reflectional symmetry. Draw the axes of reflectional symmetry with dotted lines.



/2

乙部 Section B

1. 長方形一的長和闊分別為 p 和 q ，長方形二的長和闊分別為 r 和 s ，其中 p 、 q 、 r 及 s 皆為整數。試寫出可符合以下每一項條件的 p 、 q 、 r 、 s 的其中一個組合。

The length and width of rectangle one are p and q , the length and width of rectangle two r and s , where p , q , r and s are integers. Try to suggest a possible combination of p , q , r , s that fits each the following condition.

- (a) 長方形一的面積較大而長方形二的周界較長。

Rectangle one has bigger area while rectangle two have longer perimeter.

答案 Answer			
p	q	r	s

- (b) 長方形二的面積及周界均為長方形一的三倍。

Rectangle two's area and perimeter are both three times that of rectangle one.

答案 Answer			
p	q	r	s

- (c) 長方形一的面積為長方形二的雙倍但長方形一的周界為長方形二的一半。

Rectangle one's area is double that of rectangle two and its perimeter is just half of that of rectangle two.

答案 Answer			
p	q	r	s