

2012/13 第九屆香港小學數學創意解難比賽

(初賽-筆試)

場次:	
學校編號 / 座位編號:	

比賽時間：50 分鐘

參加者須知：

1. 比賽時間共 50 分鐘。
2. 本問題卷共 15 頁，全卷共有 14 題。
3. 每位參賽同學獲派一份問題卷，每一隊參賽隊伍只會獲派一張（綠色）答題紙。題目須由各成員經過討論，然後將議定的答案寫於（綠色）答題紙上。

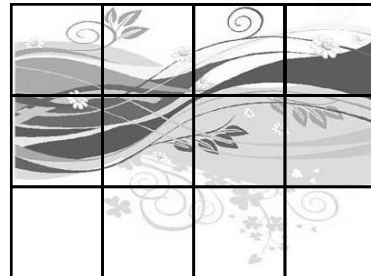
** 只有寫於答題紙上的答案方可得到評分。

4. 參賽學生需自備文具及計算機。為公平考慮，比賽中只可使用香港考試及評核局「准用計算機型號名單」中的科學計算機(Scientific Calculator)。本比賽中嚴禁使用電話、電子字典、電腦或其他有上網或通訊功能的工具。
5. 本試卷每頁空白位置可作為算草之用。每位參賽學生亦會獲派一張算草紙，如有需要，可要求額外算草用紙。
6. 在筆試完結後，各同學必須交回所有問題卷、答題紙及草稿紙。參賽學生不得取走任何於比賽中所派發之紙張文具，違規者全隊可被取消資格。

問題 (1)

圖中所見圖畫由格線分成小方格。

現要將圖畫沿格線分割成兩塊，其中一塊由三個小方格組成。



共有多少種方法將圖畫分割？

(2 分)

答： 共有 _____ 種不同方法將圖畫分割。

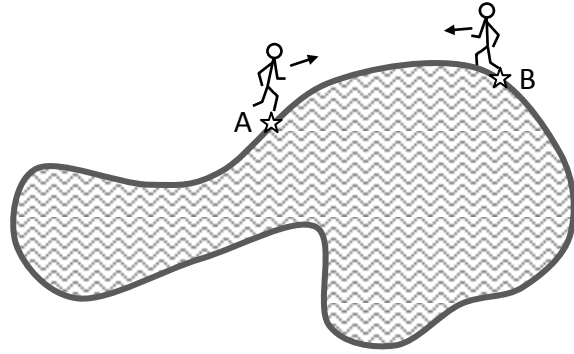
The figure shows a picture divided by grid lines into small squares.

The picture is to be cut along the grid lines into two pieces. One of the two pieces consists of three small squares.

In how many ways can the picture be cut?

問題 (2)

志文及敏兒都喜歡在一條環湖的緩跑徑上緩跑。如圖中所示， A 、 B 為緩跑徑上兩個相距 2.4 km 的景點。某早上 7:30 a.m.，志文從 A 點出發而敏兒從 B 點出發，他們向彼此方向跑去並於 7:38 a.m. 相遇。其後，他們又繼續沿各自方向跑去，並於 7:55 a.m. 再次相遇。



- a. 該早上，志文和敏兒保持各自的均速及方向跑步，直至他們第三次相遇便停下來休息聊天。
他們在甚麼時候第三次相遇？

- b. 該緩跑徑全長為多少？

(2 分)

答： a. 兩人於 ____:____ 第三次相遇。

b. 緩跑徑全長 ____ km。

John and Mary both like to jog along a path that surrounds a lake (as shown in the figure). A and B are two checkpoints along the path which are 2.4 km apart. One morning, at 7:30 a.m., John started at A and Mary started at B . They jogged towards each other and met at 7:38 a.m. After that, they both continued to jog in their own directions and met again at 7:55 a.m.

- a. That morning, both John and Mary jogged with their own constant speeds in their own directions. When they met for the third time, they took a break to chat. At what time did they meet for the third time that morning?
- b. What is the length of the whole jogging path?

問題 (3)

求 $\frac{1}{2} + \frac{1}{3} + \frac{2}{3} + \frac{1}{4} + \frac{2}{4} + \frac{3}{4} + \frac{1}{5} + \frac{2}{5} + \frac{3}{5} + \frac{4}{5} + \frac{1}{6} + \frac{2}{6} + \frac{3}{6} + \frac{4}{6} + \frac{5}{6} + \cdots + \frac{18}{20} + \frac{19}{20}$ 。

(2 分)

答：

$$\frac{1}{2} + \frac{1}{3} + \frac{2}{3} + \frac{1}{4} + \frac{2}{4} + \frac{3}{4} + \frac{1}{5} + \frac{2}{5} + \frac{3}{5} + \frac{4}{5} + \frac{1}{6} + \frac{2}{6} + \frac{3}{6} + \frac{4}{6} + \frac{5}{6} + \cdots + \frac{18}{20} + \frac{19}{20} =$$

Find $\frac{1}{2} + \frac{1}{3} + \frac{2}{3} + \frac{1}{4} + \frac{2}{4} + \frac{3}{4} + \frac{1}{5} + \frac{2}{5} + \frac{3}{5} + \frac{4}{5} + \frac{1}{6} + \frac{2}{6} + \frac{3}{6} + \frac{4}{6} + \frac{5}{6} + \cdots + \frac{18}{20} + \frac{19}{20}$.

問題 (4)

圖(1)展示了兩個 $\triangle ABC$ ，其中一個是將原本的三角形翻轉後再旋轉一個直角。其中 $\angle B$ 為直角， $AB = 4\text{ cm}$ ， $BC = 6\text{ cm}$ 。

現將兩個 $\triangle ABC$ 如圖(2)般重疊使兩個直角 B 完全相疊。

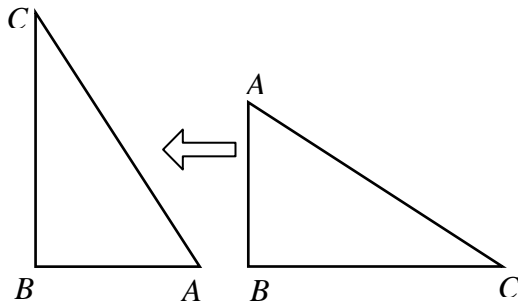


圖 (1)

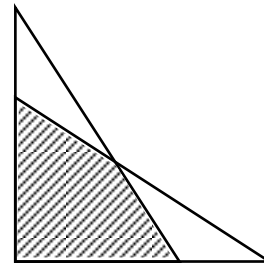


圖 (2)

求兩個三角形重疊部分(即圖 2 的陰影部分)的面積。

(2 分)

答： 重疊部分的面積是 _____ cm^2 。

Figure (1) shows two forms of the $\triangle ABC$. One is formed by flipping the other over and turning a right angle. $\angle B$ is a right angle. $AB = 4\text{ cm}$ and $BC = 6\text{ cm}$.

In figure (2), one of the triangles is put on top of the other such that their right angles completely overlap.

Find the area of the overlapping part of the two triangles, i.e. the shaded part in figure 2.

問題 (5)

小甘從來不善於分數的運算。有一天老師在黑板上寫了一個分數，要求他將這分數化成一個小數，至少要算至 5 個小數位。小甘直至下課還只是算至 0.30...便交給老師。老師說：「最前的兩個小數位都算對了，回家繼續努力完成吧。」並把小甘的算草紙收下了。

小甘回家後只記得該分數的分母是 2013，卻忘記了分子的數值。

只憑以上的描述，老師寫出那個數的分子有多少個可能的數值？

(2 分)

答： 那分子有_____ 個可能的數值。

Kenny was no good at working with fractions. One day, the teacher wrote a fraction on the blackboard. He asked Kenny to convert the fraction to a decimal to at least 5 decimal places. When the bell rang, Kenny had only worked out 0.30... and showed his answer to the teacher. The teacher said, "The first two decimal places are both correctly calculated. Finish with the work at home." She kept Kenny's rough work paper.

When Kenny got home, he only remembered that the denominator of the fraction was 2013. He forgot the numerator.

With the above descriptions, how many possible values of are there for the numerator of the fraction that the teacher wrote?

問題 (6)

以下算式中，「A」、「B」、「C」、「D」每個均代表由 0 至 9 的一個不同的數字。

$$\begin{array}{rcccc} & & & B & D \\ & & & B & D & C \\ + & B & D & B & C \\ \hline & A & B & C & D \end{array}$$

試找出「A」、「B」、「C」、「D」所代表的數字。

(3 分)

答：A 代表 ____, B 代表 ____, C 代表 ____, D 代表 ____。

In the following, 'A', 'B', 'C' and 'D' each represents a *different* number from 0 to 9.

Find the numbers respectively represented by 'A', 'B', 'C' and 'D'.

問題 (7)

小敏剛巧有大量的火柴，便以火柴拼出數字。她以圖 1 的方法拼成數字 0–9。

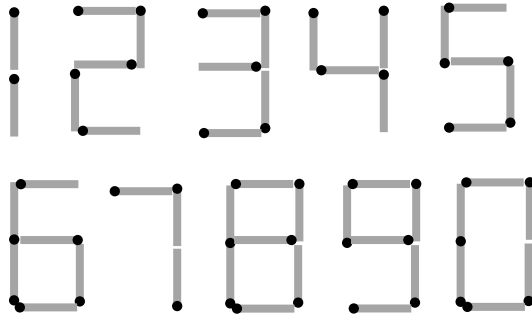


圖 1

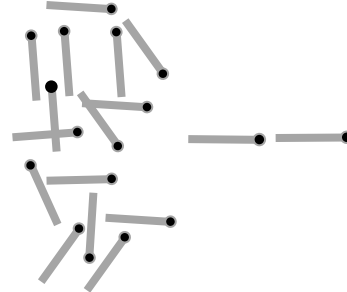


圖 2

- 小珊向小敏取得 17 根火柴。若她以同樣的拼字方法要拼出一個四位數字，這四位數字最大的數值是多少？
- 小文也取了 17 根火柴以同樣方法拼數字。他以兩根火柴拼出分線（如圖 2），再以餘下的所有火柴拼出兩位數的分子和分母。小文要拼出一個分數使得這分數與 1 的相差最小。他要拼出的這分數是甚麼？

(3 分)

- 答：
- 小珊可拼出的最大的四位數字是 _____。
 - 小文要拼出那個分數是 _____。

Mandy has a lot of match sticks which she uses to make numeral figures. She makes the numerals '0' to '9' as shown in figure (1).

- Sandy takes 17 match sticks to make numeral figures in the same way. What is the largest possible 4-digit number that Sandy can make with these match sticks?
- David also takes 17 match sticks. He uses 2 match sticks to make a fraction line as shown in figure (2). He then uses all the *remaining* match sticks to make the 2-digit numerator and denominator. He wants to make a fraction such that the difference between 1 and this fraction is the smallest. What is the fraction that David should make?

問題 (8)

將數字 1, 2, 3, 4, ... 如下圖依次從上而下、從左而右列出，每一列比上列多兩個數字。數字所在位置可以「列」和「行」作表示。

例如：數字 18 位於第 5 列、第 2 行。

```
1
2  3  4
5  6  7  8  9
10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25
26 27 .....
.....
```

若繼續以此規律將數字排列，2013 這數字位於第幾列和第幾行？

(3 分)

答： 2013 位於第 _____ 列、第 _____ 行。

In the figure, the numbers 1, 2, 3, 4, ... are arranged in order down the rows, from left to right. Each row has two more numbers than the row above. The position of any number can be described in terms of 'row' and 'column'.

For example, the number 18 is in the 5th row and the 2nd column.

If the arrangement continues in the same pattern, in which row and which column is the number 2013?

問題 (9)

有總數為 2013 塊的糖果，這些糖果會全數以 15 粒裝或 9 粒裝的盒子包裝。用以包裝的糖果盒都必需裝滿。

- a. 若要以盒數最少的方法將所有糖果包裝，需用上多少個盒子？
- b. 若不限制所用兩種盒子的數量，只須將所有 2013 塊糖果都包裝，共有多少個方法？

(3 分)

答：a. 最少要用_____個盒子。

b. 共有_____個方法包裝所有糖果。

There are 2013 pieces of candy. They are all to be packed into boxes of 15 pieces or 9 pieces. When a candy box is filled, it will be filled to its full capacity.

- a. If the candies are to be packed so as to use the smallest number of boxes, how many boxes are to be used?
- b. If there is no restriction on the numbers of both types of boxes, in how many ways can these 2013 pieces of candies be packed?

問題 (10)

浩文有許多邊長 1 cm 的立方體積木(圖 1)，他喜歡以 4 塊立方體積木拼成一個立體圖形，並稱這圖形為「酷立體」，他規定拼合時兩個相連的立方體必在一個面完全重合(圖 2)。

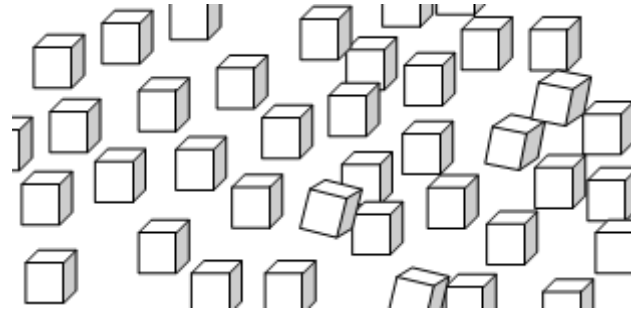


圖 1

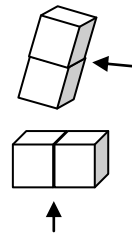


圖 2

- 這些「酷立體」可以有多少個不同的形狀？
- 這些不同形狀的「酷立體」中，總表面面積最大和最小分別是多少？

(3 分)

答：a. 共有_____種不同的形狀。

b. 總表面面積最大是 _____ cm^2 、最小是_____ cm^2 。

Howard has a lot of small wooden cubes of side 1 cm (Figure 1). He likes to attach 4 small cubes together to form a larger block that he calls the “Howard Block”. When two cubes are attached, one face of each of the attaching cubes are to be overlapped completely (figure 2).

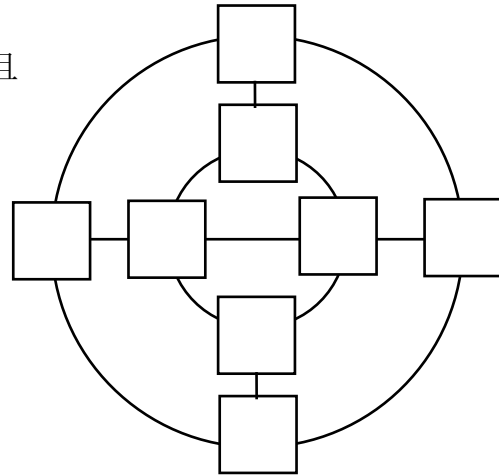
- How many different shapes are there for the “Howard Block”?
- For all possible shapes of the “Howard Block”, what are the greatest and the smallest total surface areas?

問題 (11)

圖中的圖像由 8 個方格組成，其中部分方格由線段相連。

將整數 0 至 7 寫進圖中的 8 個方格中，且

- (1) 每個數只用一次；
- (2) 若將任何兩個相連的方格內的數字相加，其和必為質數。



註：

「質數」是一個大於 1 的整數，其因數只有兩個：1 和這數字本身。

例如：17 是質數。

15 的因數有 4 個：1、3、5 和 15，因此 15 不是一個質數。

(3 分)

The figure shows a diagram consisting of eight squares. Some of the squares are connected by lines.

Fill the eight squares in the figure with the integers 0 to 7 such that

- (1) each number should be used only once,
- (2) when the numbers in any two connected squares are added, the sum is a *prime number*.

Note:

A 'prime' number is an integer greater than 1 with only TWO factors: 1 and itself.

For example: 17 is a prime number.

15 is NOT a prime number because it has *four* factors 1, 3, 5 and 15.

問題 (12)

在一個棋藝比賽中，有 A 、 B 、 C 、 D 、 E 共 5 人進入決賽。決賽形式如下：

- (1) 5 位決賽棋手中每一人均與其他決賽入圍者各對決一局；
- (2) 在每場決賽局中，勝者得 3 分，負者得 1 分，和局則各得 2 分；
- (3) 決賽的最後排名以棋手各場決賽局得分總和而定。

計算各場決賽得分後， A 、 B 和 C 分別以總分得決賽的第一、第二和第三名。

已知 A 、 D 和 E 分別得總分 12 分、7 分和 4 分。而 B 與 C 對賽時， B 勝出。

- a. B 在決賽的總得分是多少？
- b. 這比賽中有沒有和局？若有，列出是在那些棋手的對賽時出現和局。

(4 分)

答：a. B 的總得分為_____。

b. 決賽有_____次和局。(若沒有和局，請填上 0)

和局出現於 _____ 對 _____、_____ 對 _____、_____ 對 _____、
_____ 對 _____、_____ 對 _____、_____ 對 _____ 的賽局中。

(無須填上的線請留空。)

In a chess contest, there are 5 contestants A , B , C , D and E entering the final round.

The final round is arranged as follows:

- (1) Each of the five contestants is to play one game with each of the other contestants.
- (2) In each game in the final, the winner gets 3 marks, the loser gets 1 mark. In the case of a tie, each contestant gets 2 marks.
- (3) The result of the final round is determined by the total marks that the contestants get in all the games in the final round.

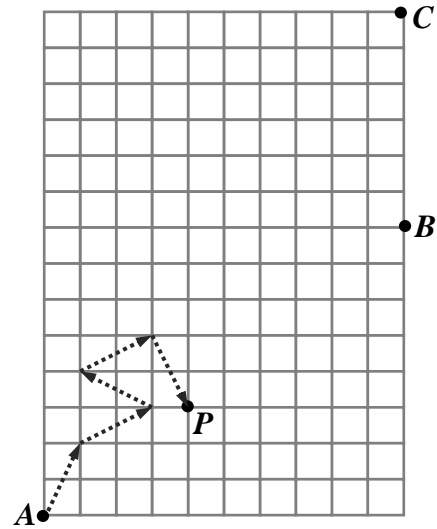
After calculating the total marks of all the games, A , B and C get respectively the first, the second and the third prizes in the final round. It is known that A , D and E get respectively 12 marks, 7 marks and 4 marks. In the game of B vs. C , B wins.

- a. What is the total mark that B gets in the final round?
- b. Is there any game that ends in a tie? If yes, list out the contestants in the game(s) that end(s) in ties.

問題 (13)

圖中有一個方格圖，包含 10×14 個小方格。
 A 和 C 分別是這方格圖的左下角和右上角的格點。
 B 是 C 向下 6 單位的點。

方格中的任何一個格點可以循一個「日」字步構成的路徑到達另一個格點。一個「日」字步就是走一個 2×1 方格或 1×2 方格的對角線，如圖中所示為一個 5 步的路徑從 A 點到達 P 點。



- 在這方格圖中，以「日」字步從 A 點經 B 點到達 C 點，至少要走多少步？
- 以(a)部所求得的最少步數由 A 點經 B 點到達 C 點，共有多少個不同的走法？

(4 分)

答：a. 至少要走 _____ 個「日」字步。

b. 共有 _____ 個不同的走法。

The figure shows a grid diagram. It consists of 10×14 small squares.

A and C are respectively the lattice points at the bottom-left and the top-right corners of the diagram. B is the point 6 units below point C .

In this grid diagram, a path of '□□-steps' can be designed to go from one lattice point to another. A '□□-step' is a step along a diagonal of a 2×1 grid or a 1×2 grid. The figure shows a path of 5 steps going from A to P .

- In order to go from point A , through point B , to point C in '□□-steps', at least how many steps will it take?
- How many different ways are there going from point A , through point B , to point C in the least number of steps found in part (a) ?

問題 (14)

- a. 寫出 2013 的所有因數。
- b. i. M 是一個兩位數。 M 和 2013 有 4 個公因數。
寫出 M 的所有可能數值。
(註：1 是任何兩個整數的公因數。)
- ii. N 是一個三位數，它本身有 6 個因數(包括 1 和 N)。
 N 和 2013 有 4 個公因數。 N 和 M 只有兩個公因數。
 N 的數值是甚麼？

(5 分)

答：a. 2013 的因數是 1, _____ 和 2013。

b. i. M 可以是 _____。 ii. $N =$ _____。

- a. Write down all factors of 2013.
- b. i. M is a 2-digit number. M and 2013 have four common factors.
Write down all the possible values of M .
(Note: 1 is a common factor of any two integers.)
- ii. N is a 3-digit number that has 6 factors (including 1 and N).
 N and 2013 have 4 common factors. N and M have only 2 common factors.
What is the value of N ?

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End of Paper