# 2015/16 The 11th HK Mathematics Creative Problem Solving Competition for Primary School (Heat – Written)

| CPS-ID: | Centre Code: | Session: | Seat No.: |
|---|---|---|---|
| | | | |

## Time allowed：50 minutes

Instructions：

1. The time allowed is 50 minutes.

2. The question paper consists of 13 pages. There are 15 questions in this paper.

3. A set of question paper will be given to each student in a team.
   Only ONE answer sheet (green) will be given to each team.
   All the questions should be discussed among team members. The agreed answers should be written onto the answer sheet. Only the answers on the answer sheet will be marked.

4. The last question of this paper is a hands-on question. The team should inform the invigilator for marking when they are ready to perform the task.

5. Participating teams should bring their own stationery and calculators. For the purpose of fairness, please use only scientific calculators on the "List of Approved Calculators" by the Hong Kong Examinations and Assessment Authority. Electronic dictionaries, computers, mobile phones and other communication devices are prohibited.

6. The blank space on each page of this question paper can be used for rough work. One rough work sheet will be distributed to each participant. Extra rough work paper will also be provided upon request.

7. The answer sheet, all question papers and rough work papers will be collected after the competition. Participants are not allowed to take away any of these papers or the team might risk disqualification.

# 2015/16 第十一屆香港小學數學創意解難比賽
# (初賽-筆試)

| 學校編號: | 試場編號 : | 比賽場次: | 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 13 頁，全卷共有 15 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答題紙上。
** 只有寫於答題紙上的答案方可得到評分。

4. 卷中的最後一題為動手題，學生作好準備後請示意監考員作評分。

5. 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。

6. 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。

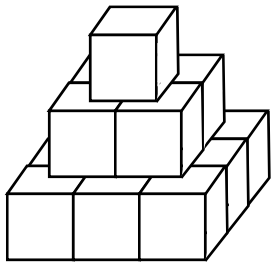
7. 在筆試完結後，各同學必須交回所有問題卷、答題紙及草稿紙。參賽學生不得取走任何於比賽中所派發之紙張文具，違規者全隊可被取消資格。

**題(1)**

圖(1)所見是一個由 14 個邊長 1 cm 的白色正方體黏合組成的模型。若將該模型完全浸於紅色漆油中著色，那麼該模型染上紅色漆油的面積是多少？

(2 分)

答: 染上紅色漆油的面積是 _____ $cm^2$。



圖(1)

Figure (1)

**Question (1)**

Figure (1) shows a model formed by gluing together 14 white cubes of side 1 cm. If the model is completely dipped into a red paint for coloring, what is the area that is painted red?

(2 marks)

Answer: The area that is painted red is _____ $cm^2$.

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**題(2)**

將 $\frac{288}{2016}$ 化成小數後，小數點後第 2016 個位的數字是甚麼？

(2 分)

答: 小數點後第 2016 個位的數字是 _____ 。

**Question (2)**

When $\frac{288}{2016}$ is converted to decimal, what is the numeral at the $2016^{th}$ place after the decimal point?

(2 marks)

Answer: The numeral at the $2016^{th}$ place after the decimal point is _____.

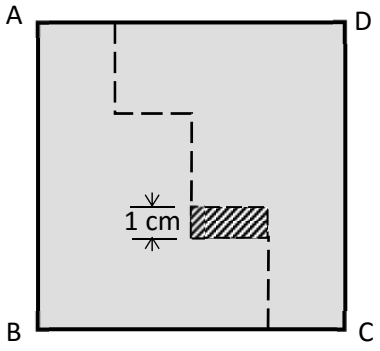
**題(3)**

圖(3a)中 *ABCD* 是一個邊長 10 cm 的正方形。若沿圖中虛線部分的幾個線段將 ABCD 分割，可分成一個高 1 cm 的長方形和兩個「梯級形」的多邊形。兩個「梯級形」又可重新拼合成一個長方形(如圖(3b))。

這長方形跟原來的正方形 *ABCD* 相比，周界改變了多少?

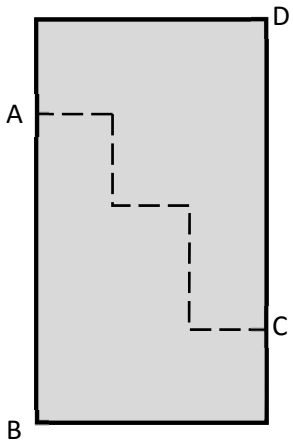
(2 分)

答: 長方形的周界比正方形 *ABCD* 的周界 _____ ( 長 / 短 ) 了 _____ cm。




圖(3a)

Figure (3a)




圖(3b)

Figure (3b)

**Question (3)**

In figure (3a), *ABCD* is a square of side 10 cm. If the square is cut along the dotted line in the figure, two "staircase" shapes and a rectangle of height 1 cm will be formed. The two "staircase" shapes can be put together to form a rectangle as shown in figure (3b).

What is the change when comparing the perimeter of this rectangle with that of the square *ABCD*?

(2 marks)

Answer:

The perimeter of the rectangle is _____ (longer / shorter) than that of the square *ABCD* by

_____ cm.

**題(4)**

定義 [$N$]為整數 $N$ 的數字和。例如: [89] = 8 + 9 =17, [1001] = 1 + 0 + 0 + 1 = 2。

若 $A = 20^{16} - 2016$，那麼 [$A$]是多少？

(2 分)

答: [$A$] = _____。

**Question (4)**

Define [$N$] as the numeral sum of $N$. For example: [89] = 8 + 9, [1001] = 1 + 0 + 0 + 1 = 2

Given that $A = 20^{16} - 2016$, what is the value of [$A$]?

(2 marks)

Answer: [$A$] = _____.

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**題(5)**

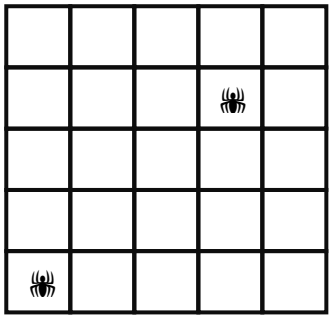
圖(5)所示為一個格線圖，由 5 × 5 個正方格單位組成，其中兩個方格有 🕷 標誌。
現需從圖中沿格線剪出一個正方形，若要這剪出的正方形中不見 🕷 標誌，共有多少種剪法?

(2 分)

答: 剪出如上述正方形，共有 _____ 種剪法。

圖(5)

Figure (5)



**Question (5)**

Figure (5) shows a grid diagram that is made up of 5 × 5 square units.
Two of the units contain the symbol 🕷.
A square is to be cut out from this diagram along the grids so that the symbol 🕷 is not included in the square. In how many ways can this square be cut?

(2 marks)

Answer: There are _____ ways to cut out such a square.

**題(6)**

$\frac{A}{B}$ 是一個最簡分數，分母 $B$ 是一個兩位整數。$\frac{A}{B}$ 的數值介乎 0.023 和 0.024 之間。求 $(A + B)$ 的最大值和最小值。

(3 分)

答: $(A + B)$ 的最大值是 _____。$(A + B)$ 的最小值是 _____。

**Question (6)**

$\frac{A}{B}$ is a simplest fraction. The denominator $B$ is a 2-digit number. The value of $\frac{A}{B}$ is between 0.023 and 0.024. What are the greatest possible value and the smallest possible value of $(A + B)$.

(3 marks)

Answer:

The greatest possible value of $(A+B)$ is _____. The smallest possible value of $(A+B)$ is _____.

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**題(7)**

陳先生的機構有數以千計(四位數字)的禮物包要送給學校。

原先有 27 間學校申請，他剛好將所有禮物包分成 27 等分。

但有兩間學校退出了，重新平分後剩餘了兩個禮物包。

到最後又再有兩間學校退出了，陳先生發現又可以剛好平分給這 23 間學校。

陳先生要送出的禮物包共有多少個?

(2 分)

答: 陳先生要送出 _____個禮物包。

**Question (7)**

Mr. Chan's company had thousands (4-digit number) of gift packs to be sent to schools.

Originally, 27 schools applied. Mr. Chan could exactly divide the gifts into 27 equal portions.

Then, two schools withdrew and Mr. Chan had to distribute the gift packs again. Two packs remained when all gift packs were to be divided evenly.

Finally, two more schools withdrew. Mr. Chan found that he could just divide all the gift packs into 23 equal portions.

How many gift packs were there to be given out by Mr. Chan?

(2 marks)

Answer: Mr. Chan was to give out _____ gift packs.

**題(8)**

圖(8)是一個日曆裝置的設計，設計中用了兩件立方體積木表示日子。

每件積木有六面，每面都寫上一個 *0*、*1*、*2*、*3*、*4*、*5*、*6*、*7*、*8*、*9* 的其中一個數字，要該兩面上的數字能組合成 *01*、 *02*、*03*、*04*、*05*、*06*、…、*29*、*30*、*31* 等數字來表示日子。這可能做到嗎?

若不可能，請解釋。

若可能的話，那麼每顆骰子上的六面是哪些數字呢？請列舉其中一個可能方法。

(2 分)

答: (請以✓ 選其中一項並完成作答)

☐ 不可能，因為_____。

☐ 可能做到。以下是其中一個方法:

| | | | | | | |
|---|---|---|---|---|---|---|
| 第一件積木上的數字 | | | | | | |
| 第二件積木上的數字 | | | | | | |


圖(8)

Figure (8)

**Question (8)**

Figure (8) shows the design of a calendar. In the design, two cubical bricks are used to show the day of month. There are six faces on each brick. On each face, one numeral *0, 1, 2, 3, 4, 5, 6, 7, 8* or *9* is printed. The numerals on the two faces are to be put together to show the days *01, 02, 03, 04, 05, 06, …, 29, 30* and *31*. Is this possible?

If it is not possible, please explain.

If possible, what are the numerals to be printed on the two cubes? Give one possible way.

(2 marks)

Answer: (Use a ✓ to choose one option and complete the answer.)

☐ Not possible. Because _____.

☐ Possible. One of the ways is as follows:

| | | | | | | |
|---|---|---|---|---|---|---|
| Numerals on the first brick | | | | | | |
| Numerals on the second brick | | | | | | |

**題(9)**

陳老師把一些糖果放進一個大玻璃瓶中，她請同學們估量瓶中糖果的數目，估得最接近者可以得獎。以下是同學的答案: 328、 350、 308、 228、 298、 311、 400、332 及 402。

老師對同學的答案有以下評語:

(1) 有兩位同學得獎，因為他們的答案與正確數目同樣接近。

(2) 就是最差的答案也跟正確數目相差不超過 100。

問瓶中有多少粒糖果?

(2 分)

答: 瓶中有 _____ 粒糖果。

**Question (9)**

Ms. Chan put some candies in a large glass jar. Students are asked to guess the number of candies in the jar. The closest guess will get a prize.

The following are the answers given by the students:

328, 350, 308, 228, 298, 311, 400, 332 and 402.

The responses from the teacher are:

(1) There are two prize winners. Their guesses are equally close to the correct number.

(2) The worst guess does not differ more than 100 from the correct number.

How many candies are there in the jar?

(2 marks)

Answer: There are _____ candies in the jar.

**題(10)**

有一項包裝工作，小强和小青通常會一起做，需時 30 分鐘完成。

某天，他們又要負責該項工作。他們一起做了 8 分鐘後，小青被調派另一任務，留下小强單獨工作了 28 分鐘，其後小青回來，她替代了小强單獨工作 12 分鐘後，那項包裝工作便完成了。

假設兩人單獨工作或一同工作，都不影響各自的效率，問小强獨自完成這項包裝工作需多少時間?

(2 分)

答: 小强獨自完成整項包裝工作需時 _____ 分鐘。

**Question (10)**

Jack and Jenny usually work together for a packaging job. They can finish the job in 30 minutes.

One day, they worked on the same job. They worked together for 8 minutes and Jenny had to leave for another duty. Jack was left to work alone for 28 minutes. After that, Jenny replaced Jack to work alone for another 12 minutes to complete the job.

We can assume that whether working alone or together does not affect Jack and Jenny's speed. If Jack is to work for the whole job alone, how much time will it take?

(2 marks)

Answer: It will take Jack _____ minutes to finish the job alone.

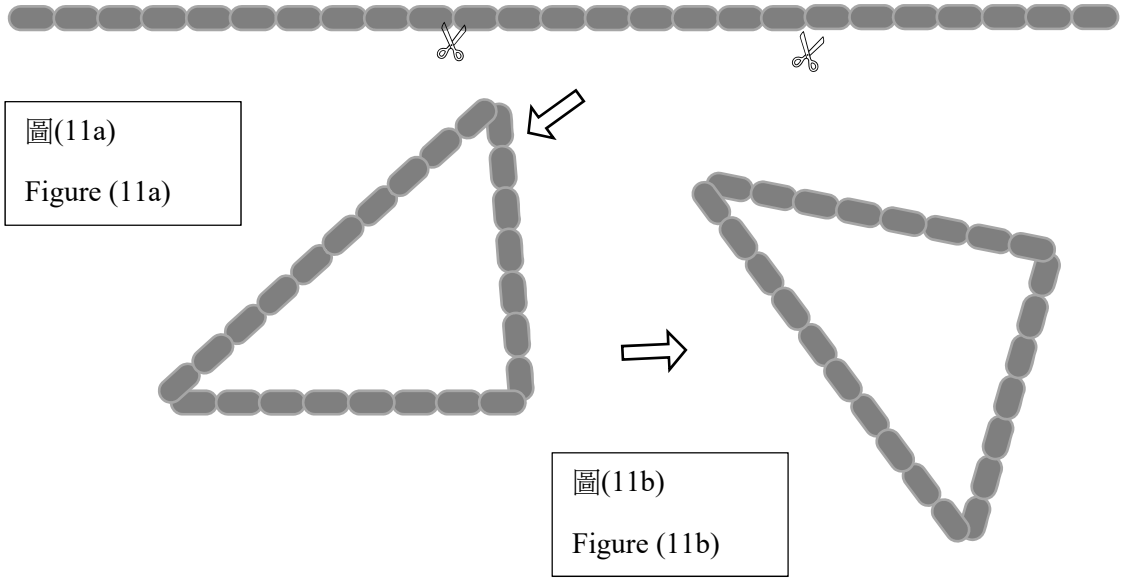
**題(11)**

圖(11a)中有一支長 25 cm 的硬膠棒，膠棒上每隔 1 cm 有一個小缺口方便折斷。若將這膠棒在某兩個缺口上折成三段 ，並將三段接合成三角形，可做出多少個不同形狀的三角形?

(註: 接合完成的三角形可翻轉或以任何角度轉動。如圖(11b)。)

(2 分)

答: 共可做出 _____ 個不同形狀的三角形。



圖(11a)
Figure (11a)

圖(11b)
Figure (11b)

**Question (11)**

Figure (11a) shows a plastic rod of length 25 cm. Small cuts are made at 1 cm intervals for easy splitting of the rod. This plastic rod is to be split into three parts at two of the cuts. The three parts are then joined ends to ends to form a triangle.

How many different triangular shapes can be formed?

(Remark: The triangle formed can be flipped or turned in any angle, as shown in figure (11b).)

(2 marks)

Answer: _____ different triangular shapes can be formed.

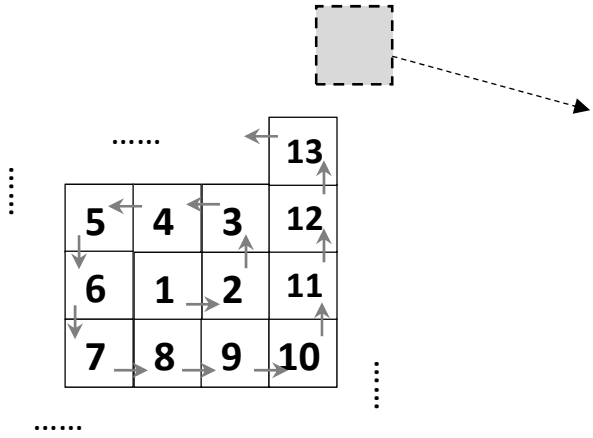
**題(12)**

在 365 張大小相同的紙卡上，分別印上整數 1 至 365，若將紙卡依數字由小至大循逆時針方向螺旋由內而外排列，從 1 開始排列至 365 為止。(如圖(12a))

而圖(12b)是完成上述排列後，抽出 365 周圍的部分。

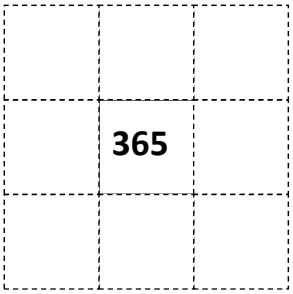
a. 在圖(12b)的 8 個空白方格中，其中有些位置不會有數字卡，在這些空格上填上「×」。
b. 在其他位置填上與 365 這數字相鄰的數字。

(3 分)




圖(12a)
Figure (12a)

答:
Answer:




圖(12b)
Figure (12b)

**Question (12)**

The integers 1 to 365 are printed 365 cards of the same size, one on each card. The cards are then arranged in an anti-clockwise outward spiral, in ascending order of the numbers. The arrangement starts from 1 and ends with 365. (As shown in figure (12a))

Figure (12b), shows the part of the arrangement around the number card 365 when the arrangement is complete.

a. Among 8 blank spaces in figure (12b), some spaces will not have any number card. Fill these spaces with '×'.
b. Fill the other spaces with the appropriate numbers that are put around the card 365.

(3 marks)

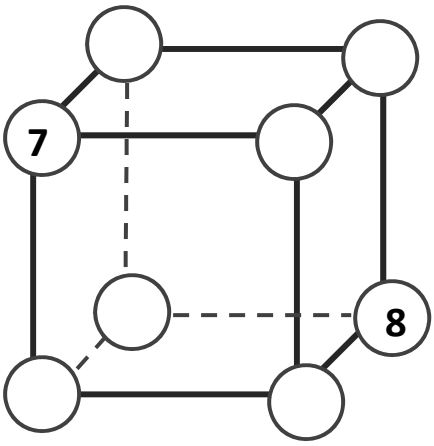
**題(13)**

一個立方體有 8 個頂點和 6 個正方形的面。圖(13) 中的立方體的每個頂點均附上一個圓圈，其中兩個圓圈已填入數字「7」和「8」。

請將 1、2、3、4、5、6 分別填入其餘的六個圓圈，使得每個面的四個頂點上的數字之和相等。

(2 分)

答:
Answer:




圖(13)

Figure (13)

**Question (13)**

A cube has eight vertices and six square faces. In the figure (13), a circle is drawn at each of the vertices of a cube. Two of the circles are filled with the numbers ‘7’ and ‘8’.

Fill the other six circles with the numbers 1, 2, 3, 4, 5 and 6 such that the same sum will be resulted when the numbers at the four vertices of each of the six faces are added.

(2 marks)

**題(14)**

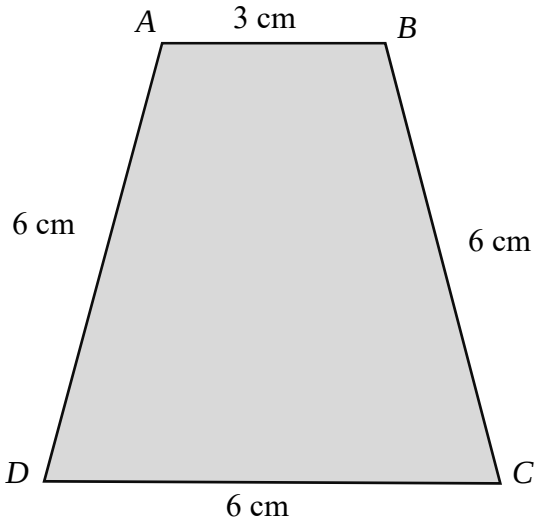
圖(14)為梯形 *ABCD*。通過頂點 *C* 畫一直線，將梯形分為兩個面積相等的部分。

[註: 請以量度工具作輔助，在答題紙的圖形上準確地畫出直線。]

(2 分)

答:

Answer:




圖(14)

Figure (14)

**Question (14)**

Figure (14) shows a trapezium ABCD. Draw a straight line through the vertex C to cut the trapezium in two parts of equal area.

[Remark: The line should be drawn accurately on the figure in the answer sheet. Do it with the help of measuring tools. ]

(2 marks)

**題(15)** 動手題

小明把玩一張正方形包裝紙，他把包裝紙摺疊數次，再依一段直線剪去部分，餘下部分張開後便可形成如圖(15)的圖案。

你們隊伍的桌上已分發了一張綠色手工紙，請以小明的方法剪出圖案。(另有四張相同大小的色紙可作練習之用。)

1➢ 將顏色紙適當的摺疊；

2➢ 在摺疊的紙上畫上一直線剪痕；

3➢ 舉手示意監考員到桌前，在他的觀察下以剪刀沿剪痕剪去部分，留下如圖(15)圖案交出作評分。

(2 分)

**Question (15)** Hands-on Question

Michael played with a piece of square wrapping paper. He folded the paper a few times and then cut away some part along ONE straight line. The remaining piece was unfolded to show the pattern in figure (15).

A piece of green square paper is given to your team. Cut the paper as Michael did to form the pattern. (Four other pieces of paper of the same size are given for your practice.)

1➢ Fold the paper in an appropriate way.

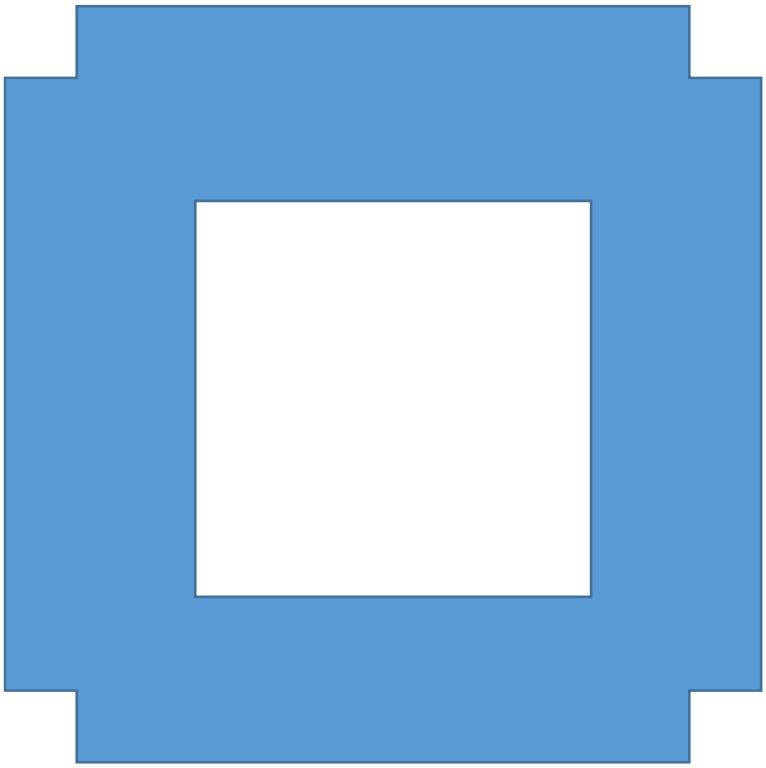
2➢ Sketch the straight line segment for the cut on the folded piece.

3➢ Put up your hand to invite the invigilator to your desk. Perform the cut in front of the invigilator. Submit the remaining piece, which should look like figure (15), for marking.

(2 marks)

圖(15)

Figure (15)



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