

**2014/15 The 6th Hong Kong Mathematics Creative
Problem Solving Competition for Secondary Schools
(Heat – Written Test)**

CPS-ID:			
Session:		Seat No.:	

Time allowed : 50 minutes

Instructions :

1. The time allowed is 50 minutes.
2. The question paper consists of 10 pages. There are 18 questions in this paper. **The diagrams in this paper are not necessarily drawn to scale.**
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. When the product is finished, raise your hand to invite the invigilator to grade the product. The product will be collected after marking.
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.

2014/15 第六屆香港中學數學創意解難比賽

(初賽-筆試)

參賽學校編號:			
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 10 頁，全卷共有 18 題。本問題卷的附圖不一定依比例繪成。
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，學生於確認完成作品後請舉手示意監考員作評分。監考員於評分後會將作品收去。
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)

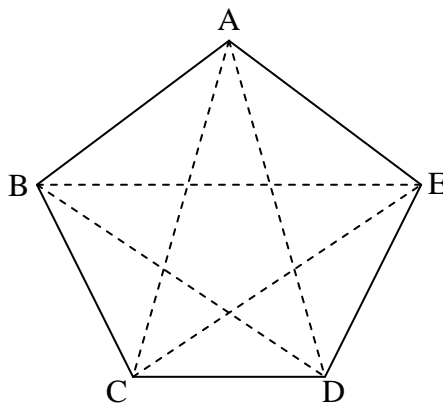
ABCDE 為一個正五邊形，用虛線畫出所有對角線，得出一個五星形。求該五星形的內角 $\angle CAD$ 的度數。

(2 分)

Question (1)

ABCDE is a regular pentagon. When all diagonals of the pentagon are drawn, a five-pointed star (pentagram) is formed. Find the interior angle $\angle CAD$ of the star.

(2 marks)



題(2)

一個等腰三角形的底邊長度是高的 5 倍，把該三角形沿底邊上的高剪開，分成兩個三角形，然後將該兩個三角形拼成一個長方形。若該長方形的面積為 640，求該長方形的周界。

(2 分)

Question (2)

An isosceles triangle has the base 5 times the length of the altitude to the base. When this triangle is cut along this altitude into two pieces, the two pieces can be put together to form a rectangle. If this rectangle formed is of area 640, find its perimeter.

(2 marks)

題(3)

已知 a 及 b 為正整數，且 $a < 2015$ 及 $b > 2015$ ，求 $2015(b - a)$ 的最小值。

(2 分)

Question (3)

It is given that a and b are both positive integers where $a < 2015$ and $b > 2015$. Find the least value of $2015(b - a)$.

(2 marks)

題(4)

A、B、C、D 四人進行乒乓球單打比賽，互相對戰一局或兩局。結果 A 一場勝兩場敗；B 三場全勝；C 四場全敗。那麼，D 多少場勝多少場敗？

(2 分)

Question (4)

In a table tennis single competition, A, B, C and D each played one or two games with another. In these games, A won in one game and lost in two. B won in all three games he played. C lost all four games he played. How many games did D win and how many games did he lose?

(2 marks)

題(5)

已知 30 個正整數之和為 2015，其中 A 為該 30 個數的最大公因數(H.C.F.)，求 A 的最大值。

(3 分)

Question (5)

The sum of 30 positive integers is 2015. A is the highest common factor (H.C.F.) of these 30 numbers. Find the greatest value of A .

(3 marks)

題(6)

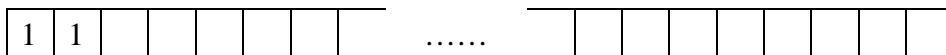
將 2015 個數排成一行，其中任意相鄰的三個數中，中間的數等於它前後兩數的和，若第一個數及第二個數都是 1，求該 2015 個數的總和。

(3 分)

Question (6)

2015 numbers are arranged in a row. For any three consecutive terms in this row, the middle one is the sum of the other two numbers at its two sides. If the first and second terms in the row are both 1, find the sum of these 2015 numbers.

(3 marks)



題(7)

在 2015×2015 的方格紙上，將方格所在的行數及列數加起來的和，填在這個方格中，例如 $x = 2 + 3 = 5$ 及 $y = 2014 + 2013 = 4027$ 。求在該 2015×2015 的數字中奇數的數目。
(3 分)

Question (7)

In a 2015×2015 grid, each box is to be filled with the sum of its corresponding row and column. For example, in the figure, $x = 2 + 3 = 5$ and $y = 2014 + 2013 = 4027$. Among the numbers in these 2015×2015 boxes, how many are odd numbers?

(3 marks)

			2	2	2			
			0	0	0			
			1	1	1			
	1	2	3	4		3	4	5
1								
2			x					
3								
4								
2013								
2014						y		
2015								

題(8)

已知 a 、 b 、 c 及 d 為整數，其中 $0 < a < b < c < d$ 。若 $b - a = 201$ ， $d - c = 5$ 及 a 、 b 、 c 、 d 的平均值為 307。求 d 的最大值。

(3 分)

Question (8)

It is given that a , b , c and d are integers such that $0 < a < b < c < d$. $b - a = 201$ and $d - c = 5$. The mean of a , b , c and d is 307. Find the greatest value of d .

(3 marks)

題(9)

已知互不相等的 50 個正整數之和是 2015，若其中有 x 個奇數，求 x 的最小值。

(3 分)

Question (9)

It is given that 50 positive integers, not equal to one another, has a sum of 2015. If x of these integers are odd. Find the least value of x .

(3 marks)

題(10)

$4^{1005} \times 5^{2015}$ 是一個多少位數？

(3 分)

Question (10)

How many digits does the value of $4^{1005} \times 5^{2015}$ have?

(3 marks)

題(11)

今天將 2015 本書分給某補習中心全體學生。若平均分配，剛好分完；若今天有一人缺席，則每個學生可多分 2 本書，且有剩餘。若今天有二人缺席，若每人多分 5 本書，則書的數目不足；求該中心全體學生的人數。

(3 分)

Question (11)

2015 books are distributed to the students of a tuition centre. All students are present and the books can just be distributed evenly. If one student is absent, each student can get 2 more books with books remaining. If two students are absent, there will not be enough books to give each student 5 more. Find the number of students in this centre.

(3 marks)

題(12)

小明在球場上散步，從 O 點出發向前走 10 米，然後順時針方向轉 120° ，再向前走 10 米，然後又順時針方向轉 120° ，再向前走 10 米，不斷重覆進行。當小明共行了 2115 米時，求他與出發點 O 的距離。

(3 分)

Question (12)

Simon took a walk in the playground. He started from O, walked 10 m forward and then turned 120° clockwise. Then he walked another 10 m and turned 120° clockwise again. He kept repeating these moves. When he had walked a total of 2115 m, how far was he from the starting point O?

(3 marks)

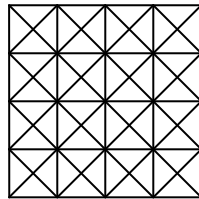
題(13)

圖中的正方形圖案是由 4×4 個正方形圖案  組成，當中可畫出多少個正方形？
(3 分)

Question (13)

The figure is formed by 4×4 square patterns . How many squares are there in the figure?

(3 marks)



題(14)

某班有 42 人，其中 26 人愛打籃球，17 人愛打排球，19 人愛踢足球，9 人既愛打籃球又愛踢足球，4 人既愛打排球又愛踢足球。若沒有一個人三種球都愛好，也沒有一個人三種球都不愛好。求既愛打籃球又愛打排球的有多少人？

(3 分)

Question (14)

There are 42 students in a class. 26 of them like basketball. 17 of them like volleyball. 19 of them like soccer. 9 of the students like both basketball and soccer. 4 of the students like both volleyball and soccer. None of the students likes all three sports. No student likes none of the three sports. Find the number of students who like both basketball and volleyball?

(3 marks)

題(15)

在直角坐標系中，已知點 O 為原點，點 A 為 $(1, 1)$ ，點 B 為 $(b, 0)$ ，若 $\triangle OAB$ 為一等腰三角形，求 b 的值。

(4 分)

Question (15)

In a rectangular coordinate plane with origin O , A is the point $(1, 1)$ and B is the point $(b, 0)$. Find the value(s) of b such that $\triangle OAB$ is an isosceles triangle.

(4 marks)

題(16)

若 x 及 $\sqrt{2015+x^2}$ 均為正整數，求 x 的值。

(4 分)

Question (16)

Given that x and $\sqrt{2015+x^2}$ are both positive integers. Find the value(s) of x .

(4 marks)

題(17)

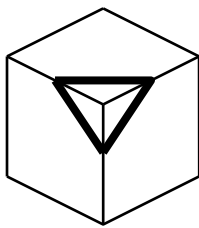
圖(A)為一個正方體，其中三個面上都畫有黑線。試在圖(B)及圖(C)上的某些面上畫上黑線，使得圖(B)及圖(C)分別是圖(A)正方體的展開圖。

(6分)

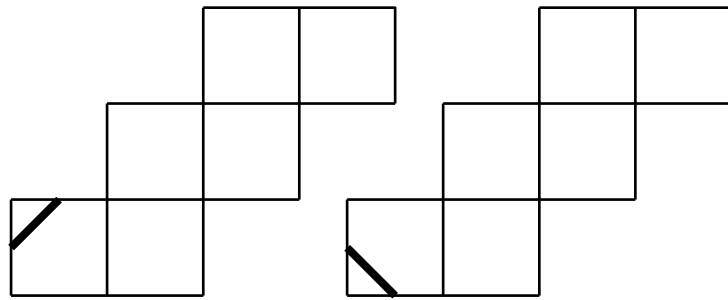
Question (17)

Figure (A) shows a cube with a black line segment drawn on each of three of its faces. Draw line segments on figure (B) and figure (C) so that they both form the nets of the cube in figure (A).

(6 marks)



圖(A)



圖(B)

圖(C)

題(18) 動手題

每隊桌上有一個一端開口的小封套及一小段膠紙封條。請將小封套摺成一個正四面體(如圖)，並以膠紙封條將它固定。

(過程中可將封套折曲，而摺合時紙片不可重疊，且不可將封套剪開或撕開。)

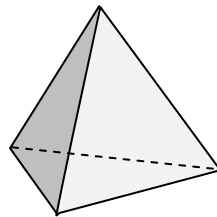
(3 分)

Question (18) Hands-on Question

On your desk is an envelope and a small piece of adhesive tape. The envelope is opened at one end. Fold the envelope to form a regular tetrahedron (as in the figure) and secure it with the adhesive tape.

(The envelope can be folded. However, there should not be any overlapping areas. Also, the envelope cannot be torn or cut.)

(3 marks)



問題卷完

End of paper