2020/21 第十五屆香港小學數學創意解難比賽

15/5/2021（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 13 頁，甲部有 15 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。

2020/21 The 15th Hong Kong Mathematics Creative Problem Solving Competition for Primary Schools

15/5/2021(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 13 pages. There are 15 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.

符號 ※ 的操作由以下的例子說明。

The symbol ※ is defined by the following examples.

$$1※2005 = 2006$$
$$2※2006 = 4014$$
$$3※2007 = 6024$$

求 $17※2021$ 的值。

Find the value of $17※2021$.

2.

一艘小船以圓形的航道航行。當它航行了 100米 的距離時，它的方向改變了 30°。求圓形航道的半徑。（答案準確至最接近的米。）

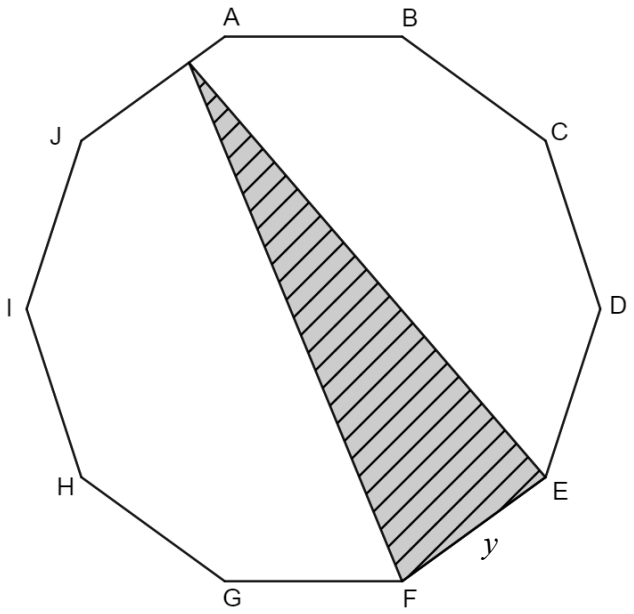
A boat is travelling in a circular path. After it has travelled a distance of 100 m , it has turned 30° in direction. Find the radius of the circular path. (Correct the answer to the nearest meter.)

3.

志明以 3 公里每小時的速度在河上逆流划艇。上午10時，他的袋子掉進水中並隨水飄流。艇前進多 2 公里後，志明發現他丟失了袋子。那一刻，志明把艇掉頭，然後順流划艇，直至他到達袋子的位置。如果志明在靜水中的划艇速度是 7 公里每小時，他在什麼時候才能到達袋子的位置？

Peter was rowing upstream in a river at a speed of 3 km/h . At 10:00 a.m., his bag felt into water and drifted downstream with the current. After rowed 2 km more, he realized that he had lost his bag. At that moment, he turned his boat around and rowed downstream until he reached his bag. If the rowing speed of Peter in still water is 7 km/h, when would he reach his bag?

4.



圖一 / Figure 1

圖一顯示一個邊長為 y 的正十邊形。

求斜線部分面積佔正十邊形面積的幾分之幾。

Figure 1 shows a regular decagon with side length y .

Write down the fraction of the regular decagon which is shaded.

5.

書架上擺放着五本不同科目的書，書本的順序符合以下五個條件:

(I) 歷史書、中文書和科學書是連續擺放的，而歷史書在其餘兩書之間;

(II) 英文書不是排第一;

(III) 科學書不是排最後;

(IV) 數學書與科學書之間相隔了兩本書;

(V) 英文書不在數學書的旁邊。

寫出五本書擺放的次序。

Five books of different subjects are placed on the bookshelf. The order of the books satisfies the following five conditions:

(I) The History book, the Chinese book, and the Science book are placed next to each other and the History book is the middle one;

(II) The English book is not the first;

(III) The Science book is not the last;

(IV) Two books are placed between the Mathematics book and the Science book;

(V) The English book is not next to the Mathematics book.

Write down the order of the five books.

6.

把一個圓形蛋糕切成 22 份，每份的大小不一定相等，而每刀都只在蛋糕朝上的面垂直切。問最少要切多少次?

A circular cake is being cut into 22 pieces such that the size of each piece is not necessarily equal and each cut must be perpendicular to the upper surface. What is the minimum number of cuts?

7.

甲、乙、丙是三位好朋友，甲欠乙60元，乙欠丙40元，丙欠甲100元，問丙要分別還款多少給甲和乙才能結清欠款?

A, *B*, and *C* are friends. *A* owes *B* $60, *B* owes *C* $40 and *C* owes *A* $100. How much should *C* repay *A* and *B* respectively in order to settle the debts?

8.

在一次家庭聚會上，李太向她的五個孩子每人派發一包糖果，包裝上說明內有 4 至 6 粒糖果。孩子們數算了所得糖果的總數。李先生回到家時，詢問孩子們共有多少粒糖果。所有得到 5 粒糖果的孩子都說了謊話，而其他人都是如實回答。五個孩子的答覆分別是 21、22、23、24 和 25。

求孩子所得糖果的總數。

In a family gathering, Mrs. Lee distributed 5 packs of candies to 5 children. The label on the packing states that the number of candies inside is 4 to 6. The children counted the total number of candies among them. Mr. Lee came home and asked the children how many candies they had among them. All the children with 5 candies lay while others told the truth. The responses of 5 children were 21, 22, 23, 24 and 25 respectively.

Find the total number of the candies among the children.

9.

假設星球 X 與地球一天的時間長度相同，但表達時間的方式各有不同。星球 X 一天平均分為 8 個♥，每個♥分為 64 個♦。以下為地球時間(24 小時報時制)和星球 X 時間的對照表，求「∗」準確至 1 個♦。

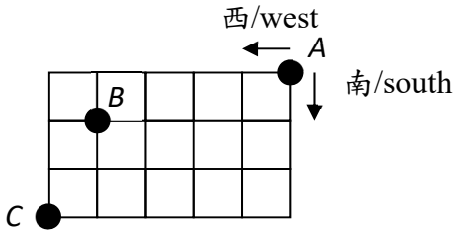
Suppose Planet X has the same time length as the Earth each day, but the methods of description of time are different. Each day on Planet X is evenly divided into 8 ♥. Each ♥ is evenly divided into 64 ♦. The table below shows the comparison between Earth time system (24-hour time) and Planet X time system. Find "∗" correct to the nearest unit ♦.

地球時間/ Earth time	星球 X 時間/ Planet X time
12:00	**4♥ 0♦**
15:14	**5♥ 5♦**
20:10	**∗**

10.

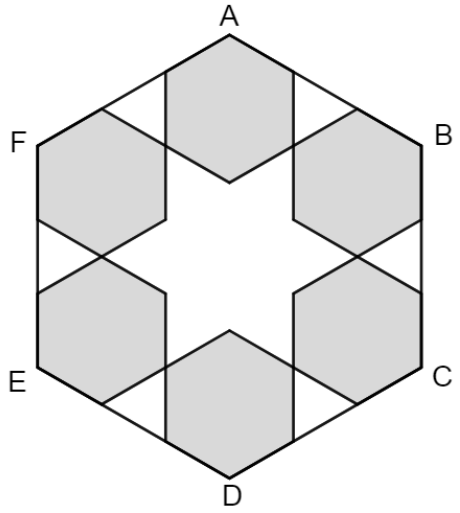
圖二顯示一城市網絡圖。小明現位於 *A* 點。假定小明只可向南面或西面前進。求小明由 *A* 點步行至 *C* 點但**不經過** *B* 點的路線數目。

Figure 2 shows a network of a city. John is now at *A*. Suppose he can move towards south or west only. Find the number of different ways for him to walk from *A* to *C* **without passing** *B*.



圖二 / Figure 2

11.



圖三/ Figure 3

圖三的陰影部分為六個完全相同的小正六邊形，陰影部分的總面積是 24 cm^2。求六邊形 ABCDEF 的面積。

The shaded parts in Figure 3 are 6 identical small regular hexagons and the total area of the shaded parts is 24 cm^2. Find the area of hexagon ABCDEF.

12.

使用四則運算符號、括號及所有 1 至 10 的整數，每個數字必須及只能出現一次，寫出答案為 2021 的算式，當中數字無須順序。

Using the four main arithmetic operations, parentheses and all integers from 1 to 10, each integer can be used once and only once, write down an expression with result 2021. The numbers need not be in order.

求得 39 的算式例子:

Example of expression with result 39:

$$(6 + 5) \times 4 - 10 + 9 \div 3 \times 2 \times (8 - 7) - 1 = 39$$

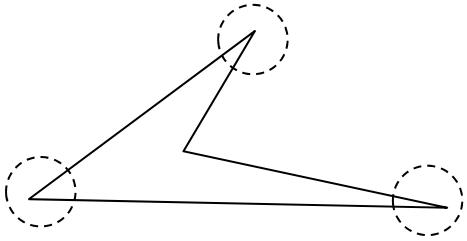
13.

在答題紙提供的方格中，清晰畫出一個有最多內角為銳角的七邊形，並圈起所有銳角的內角。

In the graph paper provided in the answer sheet, draw a heptagon with the maximum number of acute interior angles clearly and circle all the interior angles that are acute.

例如下圖顯示一個四邊形，並圈起三隻銳角的內角。

For example, the following figure shows a quadrilateral with 3 acute interior angles circled.

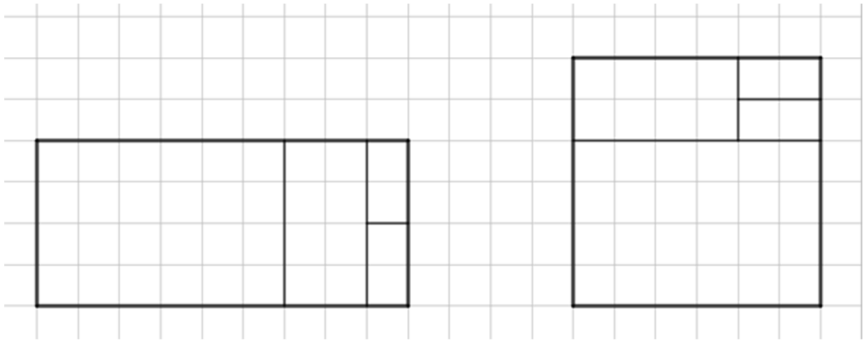


14.

我們可以把長方形加上直線，把它分割成數份，並重新組合成一個正方形。

圖四為一個分割的例子。

We can draw straight lines on the rectangle to cut it into several pieces, and rearrange the pieces to form a square. Figure 4 is an example.



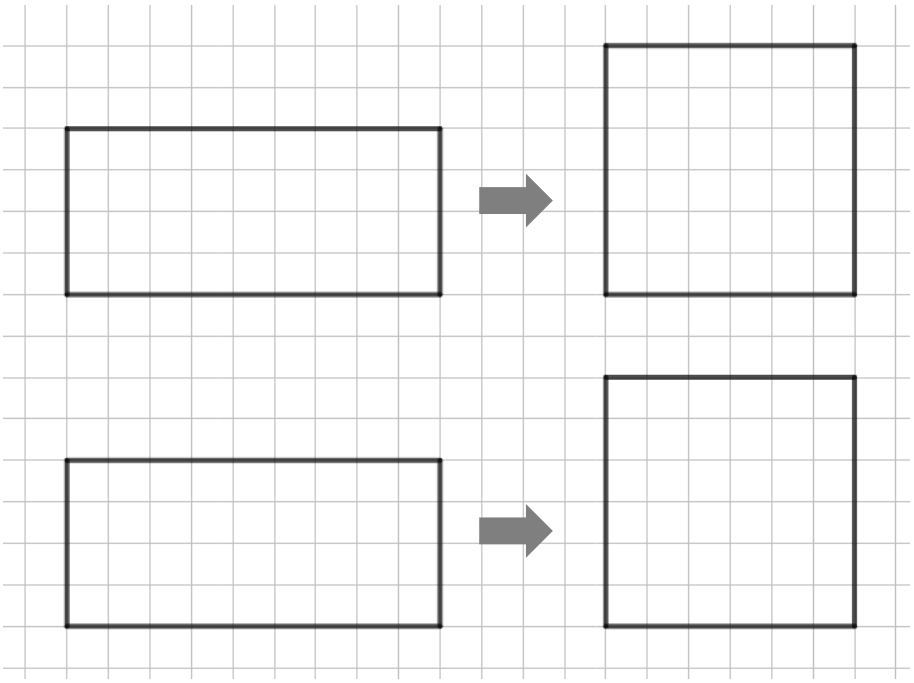
圖四/ Figure 4

若兩種切割方法得出來的圖形組互為全等，則此兩種方法視之為相同的切割方法。

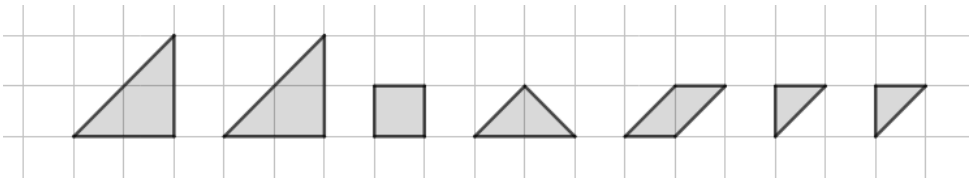
If the set of pieces obtained by two cutting methods are identical, we say these two cutting methods are the same.

試設計兩種與例子不同的分割方法，把下圖的長方形加畫直線，分割成少於 5 塊，重新組合成一個正方形，並在正方形上畫直線顯示如何組合。

Design two cutting methods different from the example. Draw straight lines on each of the rectangles below to cut it into less than 5 pieces. Rearrange the pieces to form a square and draw straight lines on the squares to show the combinations.



15.



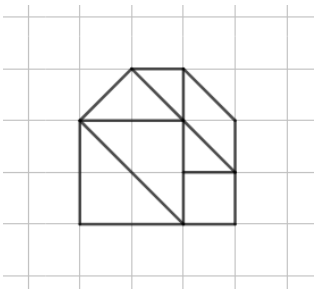
圖五/ Figure 5

利用圖五顯示的七巧板拼出:
Use tangram as shown in Figure 5 to make:

(a) 能夠密鋪的五邊形;
a pentagon that can tessellate;

(b) 能夠密鋪的六邊形。
a hexagon that can tessellate.

把圖形在方格圖中畫出來。下圖顯示了**不能夠密鋪**的六邊形例子。
Draw the figures on the grids. The figure below shows an example of a hexagon that **cannot tessellate**.



乙部（建議此部用 15 分鐘作答）

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

以下是 A 國有關男性和女性的每年平均死亡年齡統計。

The following is the annual average age of death statistics of men and women in Country A.

年份	當年平均死亡年齡	
	男性 Men	女性 Women
2001	61.2	70.6
2002	61.3	70.5
2003	61.3	70.4
2004	61.8	70.8
2005	61.6	70.6
2006	62.2	71.5
2007	62.2	71.4
2008	62.2	71.5
2009	62.6	71.9
2010	62.9	72
2011	63.1	72.7
2012	63.5	72.4
2013	63.9	72.7
2014	64	72.9
2015	64.2	73.3
2016	64.1	73.3
2017	64.7	73.6
2018	65.1	73.7
2019	65	74.1
2020	65.5	74.1

(a) 假設你全校的同學都於 A 國出生並生活，試以 A 國的數據估算和你同齡的女同學和男同學的平均預期壽命。

Assuming that all your schoolmates were born and live in Country A, estimate the expected average life of female schoolmates and male schoolmates of the same age as yours based on the statistics of Country A.

(b) A 國的數據顯示女士的平均預期壽命一向比男士長。參考以上數據，你認為將來會否可能出現男士的平均壽命較女士長？為什麼？

The statistics of Country A shows that expected average life of women has always been longer than that of men. With reference to the above data, do you think it is possible that men's expected average life will be longer than women's in the future? Why?

全卷完

End of Paper

2020/21 第十五屆香港小學數學創意解難比賽

2020/21 The 15th Hong Kong Mathematics Creative Problem Solving Competition for Primary Schools

答題紙 Answer sheets

學校名稱 School Name：	得分 Score： /30

甲部 Section A

答案 Answers		評分 Marks
1. 求 17※2021 的值。 Find the value of 17※2021 .	答/Ans: _____	/2
2. 求圓形航道的半徑。(答案準確至最接近的米) Find the radius of the circular path. (Correct the answer to the nearest meter)	答/Ans: _____ 米(m)	/2
3. 志明什麼時候才能到達袋子的位置？ When would Peter reach his bag?	答/Ans: _____ *a.m. / p.m. (*刪去不適用者/ Delete as appropriate)	/2
4. 求斜線部分面積佔正十邊形面積的幾分之幾。 Write down the fraction of the regular decagon which is shaded.	答/Ans: _____	/2

5.

書本 Book	中文 Chinese	英文 English	歷史 History	數學 Mathematics	科學 Science
次序 Order					

/2

6. 最少要切多少次?
What is the minimum number of cuts?

答/Ans: _____ 次/cuts

/2

7. 丙分別要還款多少給甲和乙?
How much should C repay A and B respectively?

答/Ans: 甲/A: $_____

乙/B: $_____

/2

8. 求糖果的總數。
Find the total number of candies.

答/Ans: _____

/2

9. 求「＊」。
Find "＊".

答/Ans: _____♥_____♦

/2

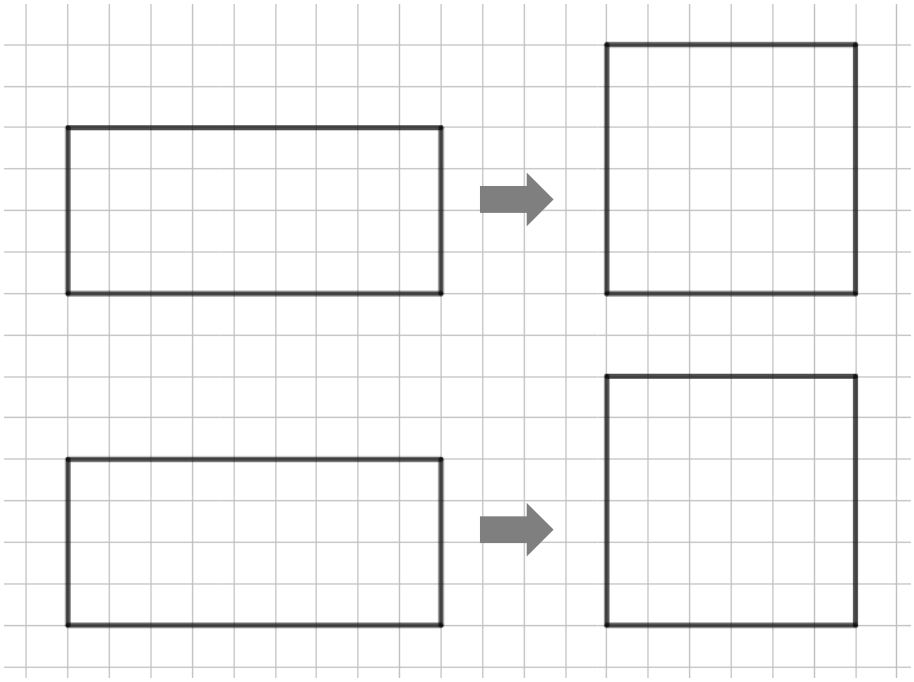
10. 求小明由 A 點步行至 C 點但不經過 B 點的路線數目。
Find the number of different ways for him to walk from A to C without passing B.

答/Ans: _____

/2

11. 求六邊形 ABCDEF 的面積。 Find the area of hexagon ABCDEF. 答/Ans: _____ cm^2	/2
12. $\square = 2021$	/2
13. 	/2

14.



/2

15.

(a) 能夠密鋪的五邊形

A pentagon that can tessellate

(b) 能夠密鋪的六邊形

A hexagon that can tessellate

/2

乙部 Section B

(a) 我的年齡是 _____ 歲。
I am _____ years old.

試以 A 國的數據估算和你同齡的女同學和男同學的平均預期壽命。
Estimate the expected average life of female schoolmates and male schoolmates of the same age as yours based on the statistics of Country A.

(b) 你認為將來會否可能出現 A 國的男士的平均壽命較女士長？為什麼？
Do you think it is possible that men's expected average life will be longer than women's in Country A in the future? Why?

全卷完

End of Paper