2019 Hong Kong Mathematics Kangaroo Contest
— Cadet —
## 2019香港數學袋鼠競賽
【中學低年級】

Instruction 說明

1. DO NOT FLIP OPEN THIS FRONT COVER UNTIL YOUR PROCTOR TELLS YOU.
   在未收到監考老師指示前，請不要翻開此封面。

2. This is a 30 question multiple choice test. For each question, only one answer choice is correct.
   這是一套包括30道選擇題的測試，每道題目只有一個正確答案。

3. Each question is given a point value. You will receive full points for correct answer, and zero point for blank or incorrect answer. The full score of this test is 120 points.
   每道題目都有給定的分值，答對得滿分，答錯或空白得0分。本次測試的滿分為120分。

4. Mark your answer to each problem on the answer form with a #2 pencil. Check the blackened circles for accuracy and erase errors and stray marks completely. Only answers properly marked on the answer form will be scored.
   請將每道題目的答案用＃2鉛筆標註在答題卡上。請注意檢查塗寫的黑色圓圈的準確性，用橡皮完全擦掉錯誤的答案和多餘的標記。只有恰當標註在答題卡上的答案才會被評分。

5. Only scratch paper, graph paper, rulers, protractors, and erasers are allowed as aids. Calculators are NOT allowed. No problems on the test *require* the use of a calculator.
   只能使用草稿紙、方格紙、尺、量角器和橡皮作為輔助工具。計算器是不允許使用的。測試中沒有任何問題必須需要使用計算器。

6. Figures are not necessarily drawn to scale.
   圖形不一定按比例繪製。

7. Before beginning the test, make sure to record your name, school name and Competition ID on the answer form, especially to bubble in the 8-digit Competition ID completely!
   在開始測試之前，請確保已將你的名字，校名和准考證號填寫在答題卡上，特別是8位准考證號的每位數字已經塗好相應的黑色圓圈。

8. You will have 75 minutes to complete the test once your proctor tells you to begin.
   監考老師宣布開始後，你將有75分鐘的時間完成測試。

<div style="text-align:center">

Part 1: 10 problems, 3 points each | 第一部分：10道題目，每題3分

</div>

1. Which cloud contains four even numbers?

哪一朵雲上有四個偶數？

(A) 6 9 3 5

(B) 13 33 3 23

(C) 27 3 30 9

(D) 6 1 9 3

(E) 34 10 2 58
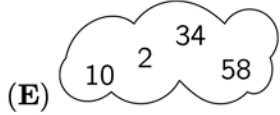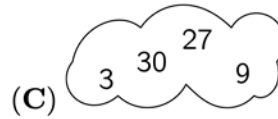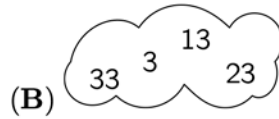
2. How many hours are there in ten quarters of an hour?

十個四分之一小時是多少小時？

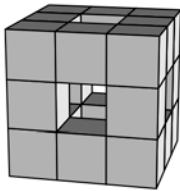(A) 40 四十   (B) 5 and a half 五個半   (C) 4 四

(D) 3 三   (E) 2 and a half 兩個半

3. A $3 \times 3 \times 3$ cube is built from $1 \times 1 \times 1$ cubes. Then some cubes are removed from front to back, from left to right and from top to bottom, as shown. How many $1 \times 1 \times 1$ cubes are left?

用$1 \times 1 \times 1$的立方體構建了一個$3 \times 3 \times 3$的立方體。然後如圖所示，從前到後，從左到右，從上到下移除了一些立方體。問還剩下多少個$1 \times 1 \times 1$立方體？
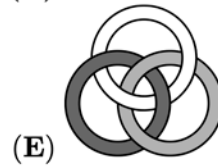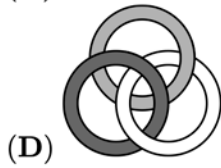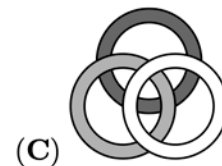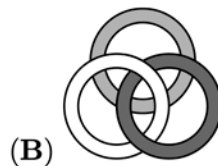
(A) 15   (B) 18   (C) 20   (D) 21   (E) 22

4. Three rings are linked as shown in the diagram. Which of the following diagrams also shows the three rings linked in the same way?

如圖所示，三個環連接在一起。以下哪個圖也顯示了以相同方式連接的三個環？

(A)   (B)   (C)

(D)   (E)
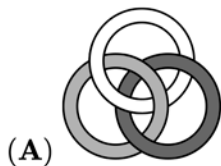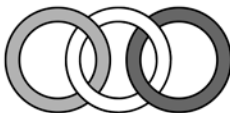
5. Which of the diagrams below cannot be drawn without lifting your pencil off the page and without drawing along the same line twice?
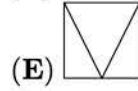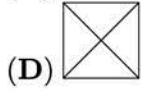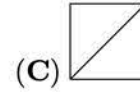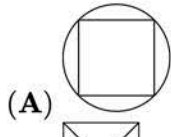
如果要求筆不離紙，並且一條線不能畫兩次，那麼下面哪個圖無法畫出？

(**A**)

(**B**)

(**C**)

(**D**)

(**E**)

6. Five friends met. Each of them gave a cupcake to each of the others. They then ate all the cupcakes they had been given. As a result, the total number of cupcakes they had decreased by a half. How many cupcakes did the five friends have at the start?

五個朋友見了面。他們每個人都給了其他每個人一個紙杯蛋糕。然後他們吃了收到的所有紙杯蛋糕。結果，他們手中紙杯蛋糕的總數減少了一半。問五個朋友一開始有多少個紙杯蛋糕？

(**A**) 20　　　　(**B**) 24　　　　(**C**) 30　　　　(**D**) 40　　　　(**E**) 60

7. In a race, Lotar finished before Manfred, Victor finished after Jan, Manfred finished before Jan and Eddy finished before Victor. Who finished last of these five runners?

在一場跑步比賽中，Lotar在Manfred之前到達終點，Victor在Jan之後到達終點，Manfred在Jan之前到達終點，並且Eddy在Victor之前到達終點。問這五名選手中的最後一名是誰？

(**A**) Victor　　　(**B**) Manfred　　　(**C**) Lotar　　　(**D**) Jan　　　(**E**) Eddy

8. The pages of the book Juliet is reading are all numbered. The numbers used on the pages contain the digit 0 exactly five times and the digit 8 exactly six times. What is the number of the final page?

Juliet正在閱讀的書每頁都有編號。在頁面的編號中，數字0恰好出現了五次，數字8恰好出現了六次。問最後一頁的編號多少？
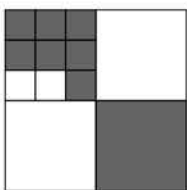
(**A**) 48　　　　(**B**) 58　　　　(**C**) 60　　　　(**D**) 68　　　　(**E**) 88

9. A large square is divided into smaller squares. What fraction of the large square is colored grey?

一個大的正方形被分成了一些較小的正方形。灰色的部分佔大正方形的幾分之幾？

(**A**) $\dfrac{2}{3}$　　　(**B**) $\dfrac{2}{5}$　　　(**C**) $\dfrac{4}{7}$　　　(**D**) $\dfrac{4}{9}$　　　(**E**) $\dfrac{5}{12}$

10. Andrew divided some apples into six equal piles. Boris divided the same number of apples into five equal piles. Boris noticed that each of his piles contains two more apples than each of Andrew's piles. How many apples does Andrew have?

Andrew將一些蘋果分成相同的六堆。 Boris將同樣數量的蘋果分成相同的五堆。 Boris注意到他的每一堆都比Andrew的每一堆還要多兩個蘋果。問Andrew有多少個蘋果？

(**A**) 60   (**B**) 65   (**C**) 70   (**D**) 75   (**E**) 80

**Part 2: 10 problems, 4 points each | 第二部分：10道題目，每題4分**

11. Four-digit integer are written on each of three pieces of paper. The pieces of paper are arranged so that three of the digits are covered, as shown. The sum of the three four-digit integers is 10126. Which are the covered digits?

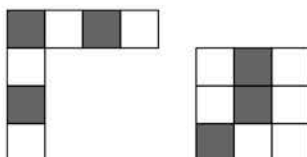在三張紙上分別寫有四位整數。如圖所示，這些紙放在一起時有三個數字被覆蓋了。三個四位整數的總和是10126。問被蓋住的數字分別是幾？
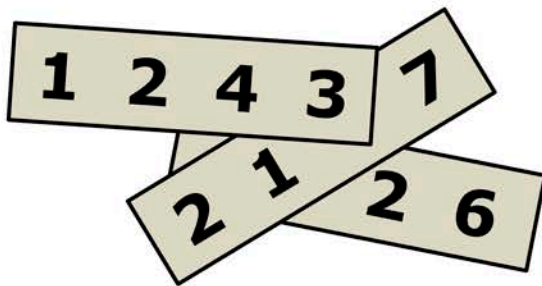
(**A**) 5, 6, 7   (**B**) 4, 5, 7   (**C**) 4, 6, 7   (**D**) 4, 5, 6   (**E**) 3, 5, 6

12. In the diagram, $PQ = PR = QS$ and angle $\widehat{QPR} = 20°$. What is the size of angle $\widehat{RQS}$?
如圖所示，$PQ = PR = QS$，並且角 $\widehat{QPR} = 20°$。 問角 $\widehat{RQS}$是多大？
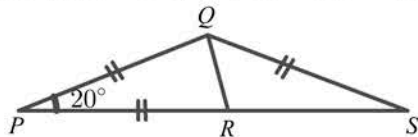
(**A**) 50°   (**B**) 60°   (**C**) 65°   (**D**) 70°   (**E**) 75°

13. Which of the following 4×4 tiles cannot be formed by combining the two given pieces?
哪個4×4瓷磚不能夠通過下面給定的兩片拼成？

(**A**)   (**B**)   (**C**)   (**D**)   (**E**)

14. Alan, Bella, Claire, Dora, and Erik met at a party and shook hands exactly once with everyone they already knew. Alan shook hands once, Bella shook hands twice, Claire shook hands three times and Dora shook hands four times. How many times did Erik shake hands?

Alan，Bella，Claire，Dora和Erik在一個聚會上相遇，並與他們中已經認識的每個人握手一次。Alan握了一次手，Bella握了兩次手，Claire握了三次手，Dora握了四次手。 問Erik握了幾次手？

**(A)** 1   **(B)** 2   **(C)** 3   **(D)** 4   **(E)** 0

15. Jane is playing basketball. After a series of 20 shots, Jane had scored 55% of the time. Five shots later, her scoring rate had increased to 56%. On how many of the last five shots did she score?

Jane在打籃球。在20次投籃後，Jane的得分率為55%。又投了5次後，她的得分率提高到了56%。問她的最後五次投籃中有多少次得分？

(A) 1   **(B)** 2   **(C)** 3   **(D)** 4   **(E)** 5

16. Cathie folded a square sheet of paper exactly in half twice and then cut it in the middle twice, as shown in the diagram. How many of the pieces that she obtains are squares?
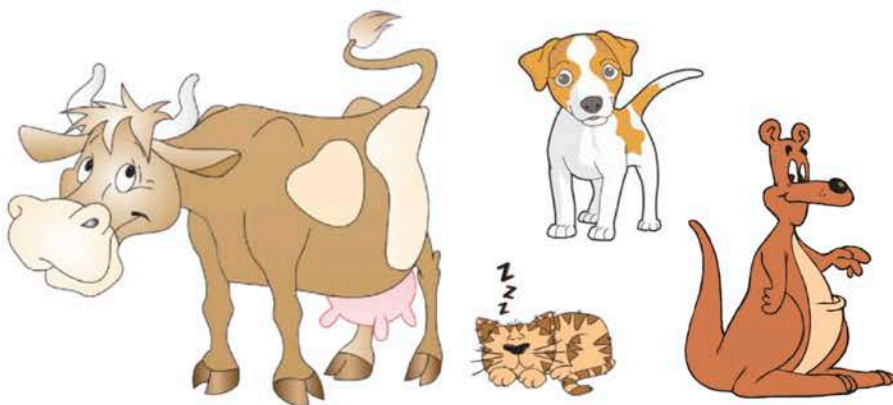
如圖所示，Cathie將一張正方形的紙對折兩次，然後在中間剪開兩次。 她會得到多少片正方形？
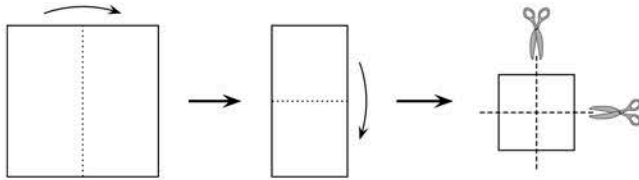
(A) 3   **(B)** 4   **(C)** 5   **(D)** 6   **(E)** 8

17. Michael keeps dogs, cows, cats and kangaroos as pets. He tells Helen that he has 24 pets in total and that $\frac{1}{8}$ of them are dogs, $\frac{3}{4}$ are NOT cows and $\frac{2}{3}$ are NOT cats. How many kangaroos does Michael keep?

Michael將狗、牛、貓和袋鼠作為寵物飼養。他告訴Helen，他總共有24隻寵物，其中$\frac{1}{8}$是狗，$\frac{3}{4}$不是牛，$\frac{2}{3}$不是貓。問Michael有多少只袋鼠？

(A) 4   **(B)** 5   **(C)** 6   **(D)** 7   **(E)** 8

18. Some identical rectangles are drawn on the floor. A triangle of base 10 cm and height 6 cm is drawn over them, as shown, and the region inside the rectangles and outside the triangles is shaded. What is the area of the shaded region in cm^2?

地板上繪製了一些相同的長方形。如圖所示，另有一個底邊是10cm而高是6cm的三角形，在長方形內，但是在三角形外的區域用陰影標出。問陰影區域的面積是多少cm^2？
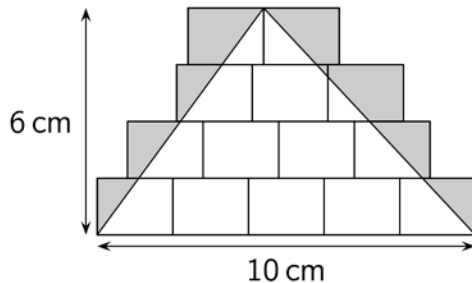
(**A**) 10   (**B**) 12   (**C**) 14   (**D**) 15   (**E**) 21

19. Julio has two cylindrical candles with different heights and diameters. The first candle lasts 6 hours, while the second candle lasts 8 hours. He lit both candles at the same time and three hours later both candles were the same height. What was the ratio of their original heights?

Julio有兩根高度和直徑不同的圓柱形蠟燭。第一根蠟燭可燃燒6小時，而第二根蠟燭可燃燒8小時。他同時點燃兩根蠟燭，三小時後兩根蠟燭的高度相同。問蠟燭原來的高度比例是多少？

(**A**) 4 : 3   (**B**) 8 : 5   (**C**) 5 : 4   (**D**) 3 : 5   (**E**) 7 : 3

20. Aylin wants to create a path of matches using as few matches as possible. She places each match on the piece of paper like the one shown, along one of the dotted lines. Her path returns to the left-hand end of her original match. The numbers shown in some of the cells are equal to the number of matches around that cell. How many matches are in this path?

Aylin想要使用盡可能少的火柴來構造一個火柴路徑。她將每根火柴放在如圖所示的紙的虛線上，其中一根火柴在圖中已顯示。她的路徑的終點就是這根火柴的左端點。某些單元格中顯示的數字等於該單元格周圍的火柴的數目，問這條路徑上有多少根火柴？
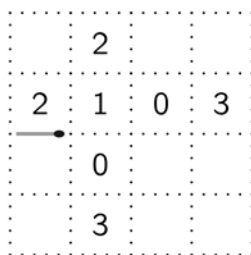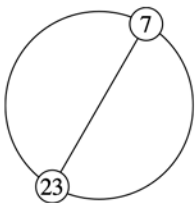

(**A**) 12   (**B**) 14   (**C**) 16   (**D**) 18   (**E**) 20

21. The integers from 1 to n, inclusive, are equally spaced in order round a circle. The diameter through the position of the integer 7 also goes through the position of 23, as shown. What is the value of n?

從1到n的整數（包括首尾兩數）按順序在圓周上等間隔排列。如圖所示，通過整數7所在位置的直徑也經過23所在位置。問n是多少？

(**A**) 30   (**B**) 32   (**C**) 34   (**D**) 36   (**E**) 38

22. Liam spent all his money buying 50 soda bottles at the store for 1 Euro each. He sells each bottle at the same higher price. After selling 40 bottles, he has 10 Euros more than he started with. He then sells all the remaining bottles. How many Euros does Liam now have?

Liam花了他所有的錢在商店買了50瓶蘇打水，每瓶1歐元。他以固定但是更高的價格銷售。 在賣掉40瓶蘇打水之後，他已經比開始時多了10歐元。然後他賣掉所有剩下的蘇打水。 問Liam現在有多少歐元？

(**A**) 70   (**B**) 75   (**C**) 80   (**D**) 90   (**E**) 100

23. Natasha has many sticks of length 1. The sticks are coloured either blue, red, yellow or green. She wants to make a 3×3 grid, as shown, so that each 1×1 square in the grid has four sides of different colours. What is the smallest number of green sticks that she could use?

Natasha有很多長度為1的棍子。這些木棒的顏色為藍色、紅色、黃色或綠色。 如圖所示，她想要製作一個3×3的網格，使得每個1×1正方形的四條邊顏色不同。她最少要用多少根綠色的棍子？
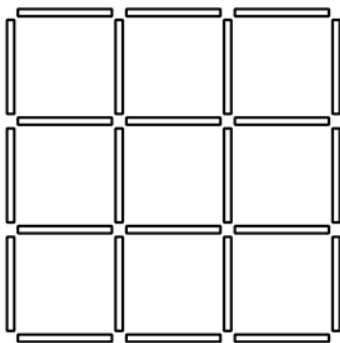
(**A**) 3   (**B**) 4   (**C**) 5   (**D**) 6   (**E**) 7

24. An ant would like to walk along a marked line on the surface of a cube until it returns to its starting point. From which one of the following nets could a cube be made so that such a journey is possible?

一隻螞蟻想要沿著立方體表面上的標記線行走，並最終回到它的出發點。 以下哪個展開圖做成的立方體，可以使螞蟻進行這樣的行程？

(A)

(B)

(C)

(D)

(E)
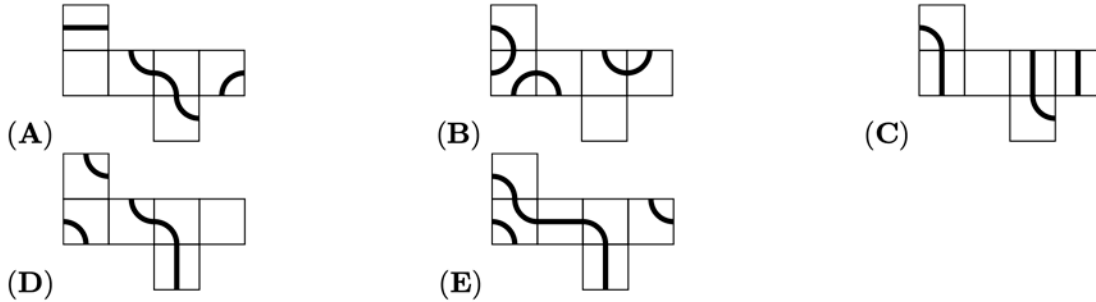
25. Elisabeta had a large bag of 60 chocolates. She started by eating one 10th of them on Monday, then one 9th of the remainder on Tuesday, then one 8th of the rest on Wednesday, then one 7th on Thursday and so on until she eats half of the remaining chocolates from the previous day. How many chocolates does she have left?

Elisabeta有一大袋60塊巧克力。她在星期一吃了十分之一，然後在星期二吃了袋裡剩下的九分之一，然後星期三吃了袋裡剩下的八分之一，星期四吃了袋裡剩下的七分之一，依此類推，直到她吃掉前一天袋裡剩下巧克力的一半為止。她還剩下多少塊巧克力？

(A) 1 (B) 2 (C) 3 (D) 4 (E) 6

26. Prab painted each of the eight circles in the diagram either red, yellow or blue such that no two circles that are joined directly are painted the same colour. Which two circles are necessarily painted the same colour?

Prab將圖中八個圓圈中的每一個都塗上紅色、黃色或藍色的一種，使得沒有兩個有直線相連的圓圈被塗成相同的顏色。問下面哪兩個圓圈必然被塗上相同的顏色？
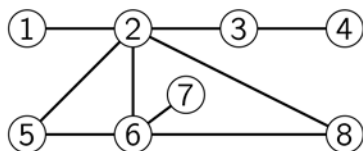
(A) 5 and 8 (B) 1 and 6 (C) 2 and 7 (D) 4 and 5 (E) 3 and 6

27. When Ria and Flora compared their savings, they found that the ratio of their savings was 5 : 3. Then Ria bought a tablet for 160 Euro and the ratio of their savings changed to 3 : 5. How many Euro did Ria have before buying the tablet?

當Ria和Flora比較他們的存款時，他們發現他們存款的比例為5：3。然後Ria買了160歐元的平板電腦，他們的存款比例變為3：5。問在購買平板電腦之前，Ria有多少歐元？

(A) 192 (B) 200 (C) 250 (D) 400 (E) 420

28. Some three-player teams enter a chess tournament. Each player in a team plays exactly once against every player from all the other teams. For organisational reasons, no more than 250 games can be played in total. At most, how many teams can enter the tournament?

若干三人隊參加象棋錦標賽。每個隊的每名參賽隊員與所有其他隊的每個人比賽一次。 出於組織原因，比賽的總場次不能超過250。問最多可以有多少隊可以參加錦標賽？

(**A**) 11   (**B**) 10   (**C**) 9   (**D**) 8   (**E**) 7

29. The diagram shows the square $ABCD$ with P, Q and R the midpoints of the sides DA, BC and CD respectively. What fraction of the square $ABCD$ is shaded?

如圖所示，在正方形$ABCD$中，P，Q和R分別是邊DA，BC和CD的中點。 問陰影部分佔正方形$ABCD$的幾分之幾？
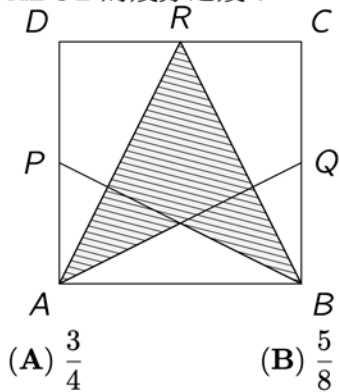
(**A**) $\dfrac{3}{4}$ (**B**) $\dfrac{5}{8}$ (**C**) $\dfrac{1}{2}$ (**D**) $\dfrac{7}{16}$ (**E**) $\dfrac{3}{8}$

30. A train is made up of 18 carriages. There are 700 passengers travelling on the train. In any block of five adjacent carriages, there are 199 passengers in total. How many passengers are in the middle two carriages of the train?

一列火車由18節車廂組成。火車上共有700名乘客。在任何五個相連的車廂裡都總共有199名乘客。問火車中間的兩節車廂里共有多少名乘客？

(**A**) 70   (**B**) 77   (**C**) 78   (**D**) 96   (**E**) 103