# MathConception 2019

# S2

## Question Booklet

## 問題簿

Name:
姓名：

Reg. No.:
登記編號：

Time: 1 hour
Calculators are NOT permitted.

Instructions:

1. DO NOT OPEN THIS QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.
2. Write your name and registration number on the cover of this question booklet.
3. Please use a pencil and write your answers neatly ONLY on the answer sheet provided. DO NOT write or draw in the circle next to each answer box. No mark will be given if you failed to follow this instruction.
4. If the information printed on your answer sheet is not correct, please inform the invigilator immediately.
5. Rough-work sheets provided will be collected at the end of the contest but they will not be marked.
6. Diagrams in this question booklet are not necessarily drawn to scale.

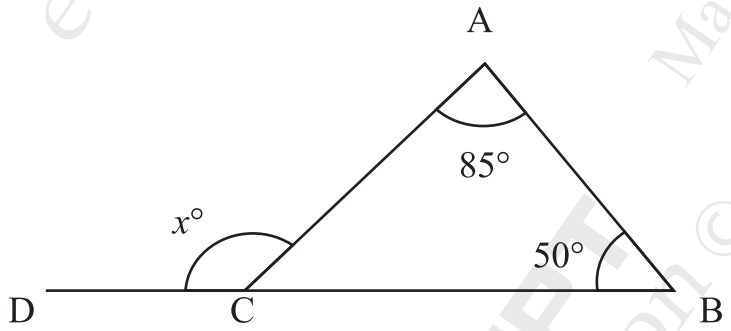
限時：1小時
不允許使用計算機。

考生須知：

1. 未宣布開始前，切勿翻閱此問題簿。
2. 請在此問題簿封面的適當位置寫上你的姓名及登記編號。
3. 所有答案必須寫在答題紙內，並須用鉛筆作答。請勿填寫或畫花題號後方的圓圈，否則該題答案將會作廢。
4. 請核對答題紙上列出的資料是否與你相符。如有問題，請舉手。
5. 比賽完結時監考員會收回桌上的草稿紙，但草稿紙上所書寫的任何文字或圖表將不獲評閱。
6. 此問題簿的附圖不一定依比例繪成。

1) In the figure, DCB is a straight line. Find $x$. [3.0%]

圖中，DCB 是一條直線。求 $x$。

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2) Find $m$ when $4^m \times 4^2 = 4^{12}$. [3.1%]

如果 $4^m \times 4^2 = 4^{12}$，求 $m$。

3) Factorize $9x^2 + 24x + 16$. [3.2%]

因式分解 $9x^2 + 24x + 16$。

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4) Evaluate $498 \times 502$. [3.3%]

計算 $498 \times 502$。

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5) Make $a$ the subject of the formula $y = \frac{5x}{a+1}$. [3.4%]

使 $a$ 成為公式 $y = \frac{5x}{a+1}$ 的主項。

6) Solve $\begin{cases} x + 5y = 7 \\ 2x + 7y = 11 \end{cases}$. [3.5%]

解 $\begin{cases} x + 5y = 7 \\ 2x + 7y = 11 \end{cases}$。

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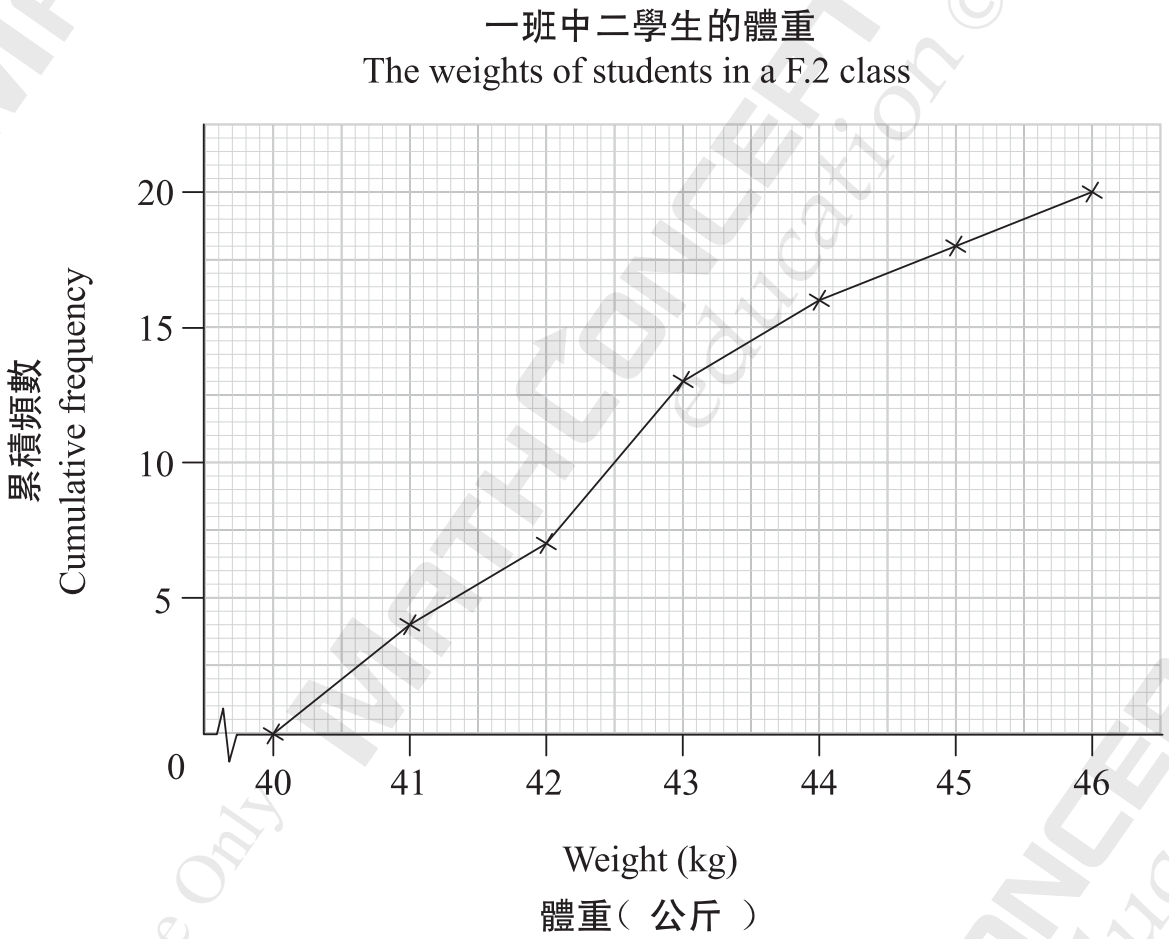
7) If $a : b = 3 : 4$ and $b : c = 6 : 5$, find the ratio $a : b : c$. [3.6%]

如果 $a : b = 3 : 4$ 及 $b : c = 6 : 5$，求 $a : b : c$。

8) The cumulative frequency polygon shows the distribution of the weights (in kg) of a class of F.2 students. Find the median weight in kg. [3.7%]

圖中的累積頻數多邊形顯示了一班中二學生的體重。問學生體重的中位數是多少公斤？



9) Correct to 2 significant figures, the area of a square is 230 $cm^2$. Calculate the lower limit for the perimeter of the square in cm. [4.8%]

一個正方形的面積取至 2 個有效數值後為 230 $cm^2$。問該正方形的周界下限是多少厘米？

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10) Convert $500_{10}$ into a hexadecimal number. [4.9%]

以十六進制表示 $500_{10}$。

11) Ada and Billy are 210 m apart. If they walk towards each other, they will meet in 20 seconds. If they walk in the same direction, Ada will catch up with Billy in 140 seconds. Find the speed of Ada in m/s. (Assume the speeds of Ada and Billy are constants.) [5.1%]

小美和小明相距 210 米。如果他們相向而行，他們將會在 20 秒後相遇。如果他們向同一個方向行走，小美會在 140 秒後追上小明。問小美行走的速率是多少米每秒？( 假設小美和小明全程行走的速率不變。)

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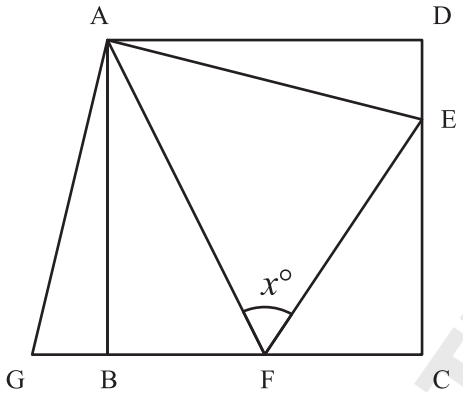
12) In the figure, ABCD is a square. GBFC and CED are straight lines. It is given that BG = DE, ∠DAE = 10° and ∠BAF = 35°. Find $x$. [5.2%]

圖中，ABCD 是一個正方形。GBFC 和 CED 是直線。已知 BG = DE、∠DAE = 10° 及 ∠BAF = 35°。求 $x$。



13) If $a$, $b$ are positive numbers and $20a^2 - b^2 = ab$, find the value of $\frac{a}{b}$. [6.3%]

若 $a$、$b$ 為正數，且 $20a^2 - b^2 = ab$，求 $\frac{a}{b}$ 的值。

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14) Find the number of pairs of positive integral solutions to the equation $20x + 19y = 2019$. [6.4%]

求方程 $20x + 19y = 2019$ 的正整數解組數目。

15) Find the smallest positive integer $n$ such that $n + 76$ is a square number while $18n$ is a cubic number. [6.5%]

求最小的正整数 $n$，使得 $n + 76$ 是平方数，而 $18n$ 是立方数。

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16) Find the value of $4^2 + 9^2 + 14^2 + \ldots + 99^2$. [6.6%]

求 $4^2 + 9^2 + 14^2 + \ldots + 99^2$ 的值。

17) What is the remainder when the 2000-digit number 200020002000…2000 is divided by 7? [6.7%]

當 2000 位數 200020002000…2000 除以 7 時，餘數是多少？

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18) Let $n$ be a positive integer such that $n^{3200} = 80^n$. Find $n$. [6.8%]

設 $n$ 是正整數，使得 $n^{3200} = 80^n$。求 $n$。

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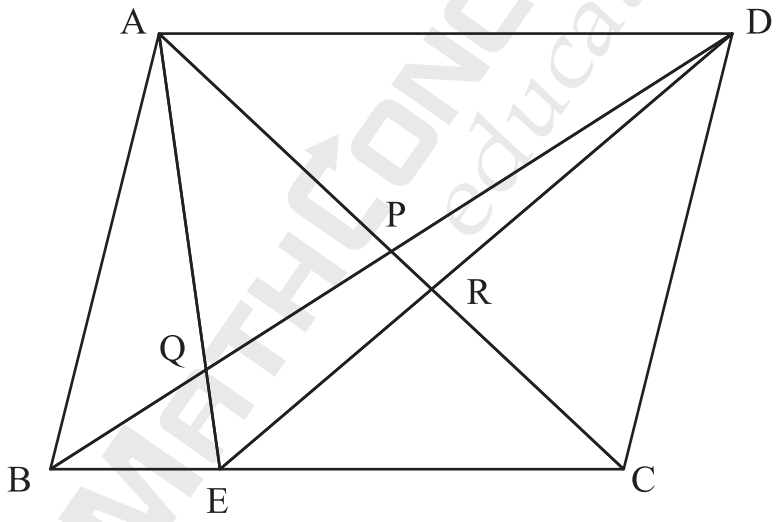
19) How many ways are there to pick 3 cells from a $6 \times 5$ grid, such that any two of the chosen cells do not belong to the same row nor the same column? [6.9%]

有多少種方法可以在一個 $6 \times 5$ 的方格上選取 3 格，使得該 3 格沒有任何兩格位於同一行或同一列？

20) In the figure, ABCD is a parallelogram of area 280. E is a point on BC such that BE : EC = 1 : 3. AC and BD meet at P, AE and BD meet at Q while AC and ED meet at R. Find the difference between the areas of ΔAQP and ΔDPR. [7.0%]

圖中，ABCD 是一個面積為 280 的平行四邊形。E 是 BC 上的一點，使得 BE : EC = 1 : 3。AC 與 BD 相交於 P，AE 與 BD 相交於 Q，AC 與 ED 相交於 R。求 ΔAQP 與 ΔDPR 的面積之差。




End of paper

全卷完

MATH 數學·思維大激鬥
CONCEPTITION

| | | | |
|---|---|---|---|
| REG NO | | | S2 |
| NAME | | | |
| GROUP | | | |
| SEAT | | | |

## ANSWER SHEET

| | ANSWER | | | ANSWER | |
|---|---|---|---|---|---|
| 1 | 135 | ○ | 11 | 6 | ○ |
| 2 | 10 | ○ | 12 | 55° | ○ |
| 3 | $(3x + 4)^2$ | ○ | 13 | $\frac{1}{4}$ | ○ |
| 4 | 249996 | ○ | 14 | 6 | ○ |
| 5 | $a = \frac{5x - y}{y}$ | ○ | 15 | 324 | ○ |
| 6 | $x = 2$<br>$y = 1$ | ○ | 16 | 69670 | ○ |
| 7 | 9 : 12 : 10 | ○ | 17 | 4 | ○ |
| 8 | 42.5 | ○ | 18 | 6400 | ○ |
| 9 | 60 | ○ | 19 | 1200 | ○ |
| 10 | $1F4_{16}$ | ○ | 20 | 32 | ○ |