MathConception 2022

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. If the information printed on your answer sheet is not correct, please inform the invigilator immediately.
4. 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.
5. Unless otherwise specified, all answers must be in exact value and in its simplest form. Writing the units for the answers is NOT necessary.
6. Rough-work sheets provided will be collected at the end of the contest but they will not be marked.
7. Diagrams in this question booklet are not necessarily drawn to scale.

限時：1 小時
不允許使用計算機。

比賽須知：

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. 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。
4. 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。
5. 除非題目特別表明，所有答案均不需填寫單位，但必須以準確數值及最簡方式表示。
6. 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。
7. 此問題簿的附圖不一定依比例繪成。

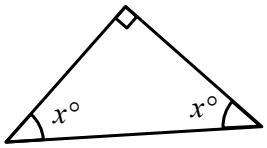
1) Calculate 16.38 ÷ 2.5. Round off the answer to 2 significant figures. [3%]

計算 16.38 ÷ 2.5，答案準確至二位有效數字。

---

2) Find x. [3.1%]

求 x。



---

3) Expand $2(4x + 7)(4x - 7)$. [3.2%]

展開 $2(4x + 7)(4x - 7)$。

4) Solve $\begin{cases} 7x+3y=6 \\ 2y-x=4 \end{cases}$. [3.3%]

解$\begin{cases} 7x+3y=6 \\ 2y-x=4 \end{cases}$。

---

5) Simplify $\dfrac{10x}{x-4}-\dfrac{24+x^2}{x-4}$. [3.4%]

化簡 $\dfrac{10x}{x-4}-\dfrac{24+x^2}{x-4}$ 。

6) Factorize $-2q^2x + p^2x - 2q^2x$. [3.5%]

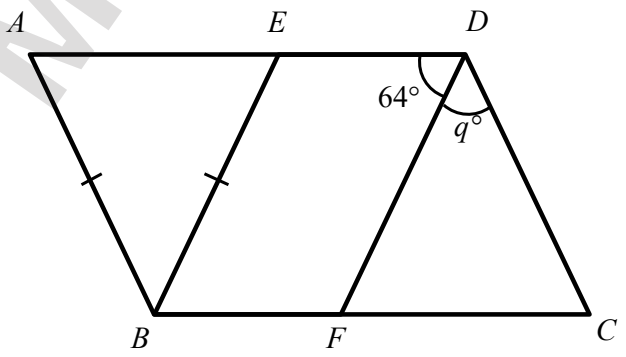
因式分解 $-2q^2x + p^2x - 2q^2x$。

---

7) In the figure, *ABCD* and *EBFD* are parallelograms. $AB = EB$ and $\angle EDF = 64°$. [3.6%]

Find q.

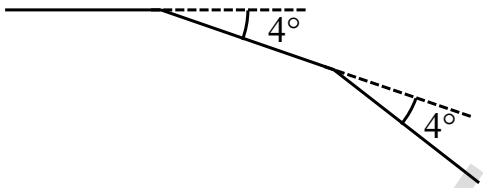
圖中 *ABCD* 和 *EBFD* 是平行四邊形。$AB = EB$ 和 $\angle EDF = 64°$。求 q。



8) The diagram shows two of the exterior angles of a regular polygon with n sides. [3.7%]

Find n.

圖中是一個正 n 邊形的兩個外角。求 n。



---

9) It is given that the ratio of two numbers is 4 : 9. If 5 is added to both numbers, their ratio will become 1 : 2. If 5 is subtracted from the original two numbers, find their new ratio. [4.8%]

已知兩個數的比是 4 : 9。如果兩數都加上 5，則兩數的比將變為 1 : 2。如果原來兩數都減去 5，求兩數新的比。

10) If $x = 4 - \cfrac{4}{4 - \cfrac{4}{4 - \cfrac{4}{4 - \ldots}}}$, find x. [4.9%]

若 $x = 4 - \cfrac{4}{4 - \cfrac{4}{4 - \cfrac{4}{4 - \ldots}}}$，求 x。

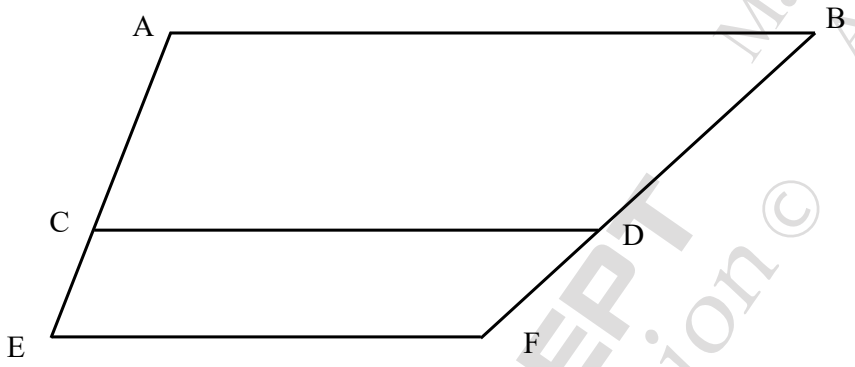
---

11) It is known that the ratio of the sum, the difference and the product of a and b is 17 : 15 : 8. If $a > b$, find the value of a. [5.1%]

已知 a 和 b 兩數之和、差與乘積的比是 17 : 15 : 8。若 $a > b$，求 a 的值。

12) In the figure, AB // CD // EF. ACE and BDF are straight lines. If $AB = 85$, $CD = 67$ and $AC : CE = 3 : 2$, find EF. [5.2%]

圖中，AB // CD // EF。ACE 和 BDF 是直線。如果 $AB = 85$、$CD = 67$ 及 $AC : CE = 3 : 2$，求 EF。



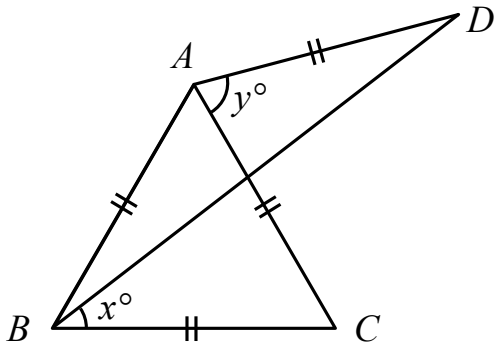
---

13) The diagram shows an equilateral triangle ABC and an isosceles triangle ABD. [6.3%]

$AB = BC = AC = AD$, $\angle DBC = x°$ and $\angle DAC = y°$. Find $\dfrac{x}{x-y} + \dfrac{3x}{y-x}$.

圖中ΔABC 是一個等邊三角形，ΔABD 是一個等腰三角形。

$AB = BC = AC = AD$，$\angle DBC = x°$ 及 $\angle DAC = y°$。求 $\dfrac{x}{x-y} + \dfrac{3x}{y-x}$ 。



14) Factorize $x^3 - 3x - 2$. [6.4%]

因式分解 $x^3 - 3x - 2$。

---

15) Find the number of pairs of positive integral solutions to the equation [6.5%]

$7x + 6y = 2022$.

求方程 $7x + 6y = 2022$ 的正整數解組數目。

16) Find the minimum value of $(x^2-144)-22(x-12)+12$. [6.6%]

求 $(x^2-144)-22(x-12)+12$ 的最小值。

---

17) What is the remainder when the 8088-digit number 202220222022…2022 is divided by 11? [6.7%]

當 8088 位數 202220222022…2022 除以 11 時，餘數是多少？

18) If $(x-22)(x+22)(x-44)(x+11) \leq 0$, find the total number of integer solutions of x. [6.8%]

若 $(x-22)(x+22)(x-44)(x+11) \leq 0$，求 x 的整數解的數目。

---

19) Given the lengths of three sides of a triangle are $(a + b)$, $(b + c)$ and $(a + c)$, such that $a + b + c = 21$ and $abc = 336$. Find the area of the triangle. [6.9%]

三角形的邊長分別是$(a + b)$、$(b + c)$和$(a + c)$，且 $a + b + c = 21$ 及 $abc = 336$。求三角形的面積。

20) $\frac{1}{2\times3\times4}-\frac{1}{1\times4\times7}-\frac{1}{4\times7\times10}-\frac{1}{7\times10\times13}-\ldots-\frac{1}{2014\times2017\times2020}-\frac{1}{2017\times2020\times2023}=?$ [7%]

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	6.6		11	8	
2	45		12	55	
3	$32x^2 - 98$		13	2	
4	$x = 0, y = 2$		14	$(x+1)^2(x-2)$	
5	$6 - x$		15	48	
6	$x(p - 2q)(p + 2q)$		16	11	
7	52		17	4	
8	90 / 九十		18	35	
9	$3:8$ / $8:3$		19	84	
10	2		20	$\frac{1}{24518760}$	