



奧冠教育中心

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世界國際數學競賽總決賽 2018

# WORLD INTERNATIONAL MATHEMATICAL OLYMPIAD FINAL 2018

小學四年級 Primary 4

時限：120 分鐘

Time allowed: 120 minutes

試題

## Question Paper

考生須知：

### Instructions to Contestants:

1. 本卷包括 試題 乙份，試題紙不可取走。  
Each contestant should have ONE Question-Answer Book which CANNOT be taken away.
2. 本卷共 5 個範疇，每範疇有 6 題，共 30 題，每題 5 分，總分 150 分，答錯不扣分。  
There are 5 exam areas and 6 questions in each exam area. There are a total of 30 questions in this Question-Answer Book. Each carries 5 marks. Total score is 150 marks. No points are deducted for incorrect answers.
3. 請將答案寫在 答題紙 上。  
All answers should be written on ANSWER SHEET.
4. 比賽期間，不得使用計算工具。  
NO calculators can be used during the contest.
5. 本卷中所有圖形不一定依比例繪成。  
All figures in the paper are not necessarily drawn to scale.
6. 比賽完畢時，本試題會被收回。  
This Question-Answer Book will be collected at the end of the contest.

Write down the answer in the simplest form. If the calculation result is a fraction, please write down the answer as a proper or mixed fraction, decimal figure is also accepted. Marks will NOT be given for incorrect unit.

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**THIS Question-Answer Book CANNOT BE TAKEN AWAY.**

未得監考官同意，切勿翻閱試題，否則參賽者將有可能被取消資格。

**DO NOT** turn over this Question-Answer Book without approval of the examiner.

Otherwise, contestant may be **DISQUALIFIED**.

請以最簡形式填寫答案，若計算結果是分數，請確保為真分數或帶分數，或將計算結果寫成小數。錯誤單位將不給予任何分數。

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填空题 (第 1 至 30 題) (每題 5 分, 答錯及空題不扣分)

Open-Ended Questions (1<sup>st</sup> ~30<sup>th</sup>) (5 points for correct answer, no penalty point for wrong answer)

Logical Thinking

邏輯思維

1. According to the pattern shown below, what is value of 25<sup>th</sup> number?

按以下規律, 求第 25 個數字。

1 、 3 、 6 、 10 、 15 、 21 、 ....

2. In the puzzle below, each of the empty grid should be filled up with a number from 1 to 9. The number in each grid is different. If the numbers are filled in so every equation is correct, find the number represented by A.

將 1 至 9 (數字不可重複使用) 填寫空格內, 使橫行及直行的算式都正確。求 A 的值。

	×		-		=	29
×		+		+		
(	+	)	×		=	51
+		×		×		
	-		+	A	=	9
=		=		=		
61		21		13		

3. It takes 2 minutes for a train of 120m long to pass through a bridge of 2760m long completely. What is the speed of the train in meter/seconds (m/s)?  
一列車長 120 米的火車, 完全通過一座 2760 米長的大橋需要 2 分鐘。那麼這列火車的速率是多少米每秒?
4. In an arithmetic sequence, its 50<sup>th</sup> term is 664 and its common difference is 13. If there are 99 terms in the sequence, find the average.  
有 1 個等差數列, 第 50 項是 664 及等差是 13。若該數列有 99 項, 求其平均數。
5. Mother has a ribbon which is 30 meters long. She cuts the ribbon into threads with length of  $\frac{3}{4}$  m each. How many thread(s) could be cut this way?  
媽媽有一條 30 米長的絲帶, 將每  $\frac{3}{4}$  米分成一小段。問共可分成多少段?
6. 10 children queue in the single line. The distance between any two adjacent children is the same and the distance between the first child and the last child is 90 meters. Alice is the 3<sup>rd</sup> and Betty is the 9<sup>th</sup> child in

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the queue, what is the distance between them in meters?

有 10 個小朋友正在排隊，兩端的小朋友相距 90 米而每兩個小朋友的間距都相同；現在小艾排在第 3 位，小貝則排在第 9 位，那麼她們兩人相距多少米？

Arithmetic

算術

7. Find the value of  $1013 \times 987 + 169$ .  
求  $1013 \times 987 + 169$  的值。
8. Find the value of  $4 + 8 + 12 + 16 + 20 + 24 + 28 + 32 + 36 + 40 + 44 + 48 + 52 + 56$ .  
求  $4 + 8 + 12 + 16 + 20 + 24 + 28 + 32 + 36 + 40 + 44 + 48 + 52 + 56$  的值。
9. Find the value of  $128 \div 25 \div 1024 \times 625 \times 32$ .  
求  $128 \div 25 \div 1024 \times 625 \times 32$  的值。
10. Find the value of  $2 + 4 + 6 + 8 - 10 + 12 + 14 + 16 + 18 - 20 + \dots + 96 + 98 - 100$ .  
求  $2 + 4 + 6 + 8 - 10 + 12 + 14 + 16 + 18 - 20 + \dots + 96 + 98 - 100$  的值。
11. Find the value of  $977^2 + 454^2 - 5 \times 23^2$ .  
求  $977^2 + 454^2 - 5 \times 23^2$  的值。
12. Find the value of  $2015 \times 726 - 2016 \times 725$ .  
求  $2015 \times 726 - 2016 \times 725$  的值。

Number Theory

數論

13. Define  $a \oplus b = (1 \times 2 \times 3 \times \dots \times a) \div [1 \times 2 \times 3 \times \dots \times (a - b)]$ . Find the value of  $10 \oplus 4$ .  
定義  $a \oplus b = (1 \times 2 \times 3 \times \dots \times a) \div [1 \times 2 \times 3 \times \dots \times (a - b)]$ ，求  $10 \oplus 4$  的值。
14. Find the unit digit of  $4^{16} + 5^{25} + 6^{36} + 7^{49} + 8^{64} + 9^{81}$ .  
求  $4^{16} + 5^{25} + 6^{36} + 7^{49} + 8^{64} + 9^{81}$  的個位數。
15. Find the remainder of  $\underbrace{1234512345 \dots 12345}_{2015} \div 15$ .  
求  $\underbrace{1234512345 \dots 12345}_{2015} \div 15$  的餘數。
16. The sum of 8 consecutive even numbers is 376. Find the value of the smallest even number.

請以最簡形式填寫答案，若計算結果是分數，請確保為真分數或帶分數，或將計算結果寫成小數。錯誤單位將不給予任何分數。

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8 個連續偶數之和是 376，求最小的偶數的值。

17. The sum of 2 numbers is 240. The bigger one is 15 times as the smaller one. Find the value of the bigger one.

2 個數之和是 240，而大數是小數的 15 倍。求大數的值。

18. Find the largest 4-digit number which is divisible by 24.

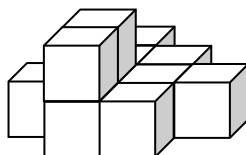
求最大的四位數可以被 24 整除。

### Geometry

#### 幾何

19. Refer to the figure below, the length of the edge of each smaller cube is 2. Find the volume of the 3-D figure.

參考附圖，每個正方體的邊長都是 2，求立體的體積。



Question 19

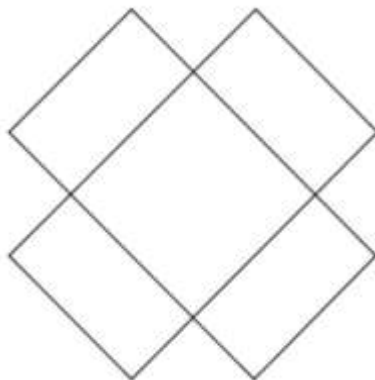
第 19 題

20. If a polyhedron (a solid which all its faces are polygons) has 15 edges and 7 faces, find the number of vertices.

若一個簡單多面體有 15 條棱及 7 個面，求它的頂點數目。

21. The figure below is formed by 2 identical rectangles. If the length and width of each rectangle are 11 and 5 respectively, find the area of the figure.

參考附圖，由 2 個相等長方形組成。若長方形的長和闊分別是 11 和 5。求附圖的面積。



Question 21

第 21 題

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22. A large rectangle is formed by combining a smaller rectangle with dimensions  $12\text{cm} \times 7\text{cm}$  and 3 smaller rectangles with dimensions  $4\text{cm} \times 7\text{cm}$ . Find the shortest possible perimeter of the larger rectangle.  
1 個長 12 厘米，闊 7 厘米的長方形與 3 個長 7 厘米，闊 4 厘米合併成 1 個大長方形。問該大長方形的周界最短是多少厘米？
23. 6 equilateral triangles are formed by cutting a regular hexagon. If the perimeter of the hexagon is 96cm, find the sum of the perimeter of those 6 triangles formed in cm.  
一個正六邊形被分成 6 個等邊三角形，六角形的周界是 96 厘米，問所有三角形的周界共有多少厘米？
24. At most how many line(s) can be formed by using 15 points on a plane?  
在平面上畫 15 點，最多可連成多少條線？

Combinatorics

組合數學

25. If the weight of 8 apples and 7 oranges is 4180 grams and the weight of 2 apples equals to that of 3 oranges. What is the total weight of 1 apple and 1 orange in grams?  
已知 8 個蘋果和 7 個橙共重 4180 克，而 2 個蘋果的重量與 3 個橙的重量相等。求 1 個蘋果和 1 個橙共重多少克？
26. Find the largest 3-digit number which has only 3 positive factors.  
某三位數只得 3 個正因數，求該數的最大值。
27. In Class 4A, students share some chocolates. 20 pieces of chocolate remained if each student eats 5 pieces, and lacks 12 pieces of chocolate if each student has 7 pieces. How many piece(s) of chocolates is / are there?  
4A 班同學正在吃朱古力，若每人吃 5 塊，還餘 20 塊；若每人吃 7 塊，還欠 12 塊。問共有朱古力多少塊？
28. Use 0, 2, 4, 6 and 8 to form a 2-digit number and a 3-digit number. Find the largest product of these two numbers.  
將 0、2、4、6、8 分為一個 2 位數和一個 3 位數，求這兩個數的積之最大值。
29. How many different proper fractions in its simplest form can be formed by using numbers 1 to 10?  
用 1 至 10 十個數字，可以組成多少個不同的最簡真分數？
30. It is known that tael and catty are units of weight and half of a catty equals to 8 taels. If we distribute 15 catties of peanuts into 4 piles of equal weights, how heavy is each pile in taels?  
半斤相等於 8 兩。若將 15 斤花生平均分成 4 等份，每份花生重多少兩？

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~ 全卷完 ~

~ End of Paper ~

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