



奧冠教育中心

OLYMPIAD CHAMPION EDUCATION CENTRE

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世界國際數學競賽總決賽 2018

WORLD INTERNATIONAL MATHEMATICAL OLYMPIAD FINAL 2018

小學五年級 Primary 5

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.

請將答案寫在

 上。

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本試題不可取走。

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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填充題 (第 1 至 30 題) (每題 5 分, 答錯及空題不扣分)

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

Logical Thinking

邏輯思維

1. A is $\frac{3}{5}$ of C , B is $\frac{2}{7}$ of C . If the value of B is 400, what is the value of A ?

A 是 C 的 $\frac{3}{5}$, B 是 C 的 $\frac{2}{7}$ 。如果 B 是 400, 求 A 的值。

2. Fruits are shared among students in class 5A, including apples, pears, oranges, strawberries and kiwis. There are 1000 fruits of each type available. If each student picks two fruits randomly, at least how many students are there so that we are sure that two students picked the exactly two same fruits?

5A 班同學分享水果, 有蘋果、梨、橙、草莓和奇異果 5 種, 每種各 1000 個。如果每位同學任意拿兩個, 那麼至少多少位同學拿過後才一定會出現兩人拿的水果是相同的。

3. It takes Amy 10 days and Fanny 8 days to complete $\frac{3}{8}$ of a task; it takes Amy 15 days and Fanny 17 days to complete $\frac{2}{3}$ of the same task. If Amy and Fanny work together, how many day(s) are needed to take for to complete the task?

一項工作, 小艾 做 10 天後、小芳 然後單獨做 8 天可以完成整份工程的 $\frac{3}{8}$; 而 小艾 做 15 天、小芳 然後單獨做 17 天可以完成整份工程的 $\frac{2}{3}$ 。那麼 小艾、小芳 兩人合作完成這份工程需要多少天?

4. There is a car. In order to travel $\frac{1}{5}$ less the distance in half of the travel time, what would be the percentage increase in speed to achieve the goal?

現在有一架汽車。若汽車的行駛距離少 $\frac{1}{5}$, 但行駛時間要比原來少一半, 問速度要增加多少個百分比?

5. David attended 4 English tests and attained an average mark of 82. David wants to improve his performance and hopes to get an average mark higher than 85 after attending the 5th test. At least how many mark(s) does he need to get in the 5th test? (All test marks are integers)

小偉 參加了 4 次英文測驗, 平均分是 82 分。小偉 心想要令自己成績變得更好, 所以希望自己在第 5 次測驗之後的平均分提升至高於 85 分, 那麼他第五次測驗至少要獲得多少分? (測驗分數只可能是整數)

6. How many integer(s) should be selected from 1 to 100 (1 and 100 inclusive) so that there must exist two of them whose product is 720?

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。

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.

請將答案寫在

答題紙

 上。

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在 1 至 100 這 100 個數中 (包括 1 及 100) 最少挑出多少個整數，才可以肯定當中有兩個數之乘積是 720 ?

Arithmetic

算術

7. Find the value of $2 \times 51 \times 98 \times 2015$.

求 $2 \times 51 \times 98 \times 2015$ 的值。

8. Find the value of $\frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \frac{1}{42} + \frac{1}{56} + \frac{1}{72} + \frac{1}{90}$.

求 $\frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30} + \frac{1}{42} + \frac{1}{56} + \frac{1}{72} + \frac{1}{90}$ 的值。

9. Find the value of $0.\dot{7}\dot{6} + 0.\dot{1}3\dot{5} + 0.\dot{3}\dot{2}$. (Express your answer in recurring decimals)

求 $0.\dot{7}\dot{6} + 0.\dot{1}3\dot{5} + 0.\dot{3}\dot{2}$ 的值。(答案以循環小數表示)

10. Find the value of $85^2 - 81^2 + 77^2 - 73^2 + 69^2 - 65^2 + \dots + 5^2 - 1^2$.

求 $85^2 - 81^2 + 77^2 - 73^2 + 69^2 - 65^2 + \dots + 5^2 - 1^2$ 的值。

11. Find the value of $\frac{1}{3 \times 6 \times 9} + \frac{1}{6 \times 9 \times 12} + \frac{1}{9 \times 12 \times 15} + \dots + \frac{1}{42 \times 45 \times 48}$.

求 $\frac{1}{3 \times 6 \times 9} + \frac{1}{6 \times 9 \times 12} + \frac{1}{9 \times 12 \times 15} + \dots + \frac{1}{42 \times 45 \times 48}$ 的值。

12. Find the value of $2016 \times 726 - 2017 \times 725$.

求 $2016 \times 726 - 2017 \times 725$ 的值。

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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Number Theory

數論

13. In the following sequence, find the unit digit of the 2015th number.

在以下數列中，找出第 2015 個數字的個位。

1, 3, 4, 7, 11, 18, 29, 47 ...

14. Two factors are chosen from a natural number. If the largest possible sum of the two factors is 11682 and the least possible sum of the two factors is 3, what is the natural number?

有某個自然數，把它的其中兩個不同的正因數相加，該和最小可以是 3，最大可以是 11682。問該自然數是多少？

15. Find the value of $\frac{2}{3 + \frac{1}{5 + \frac{1}{23}}}$. (Express your answer in fraction)

求 $\frac{2}{3 + \frac{1}{5 + \frac{1}{23}}}$ 的值。(答案以分數表示)

16. There is a natural number. The remainder is 11 when it is divided by 12. The remainder is also 11 when it is divided by 35. What is the remainder when it is divided by 10?

某個自然數被 12 除餘 11，被 35 除亦餘 11，求這個自然數被 10 除的餘數。

17. Find the integer closest to $\sqrt{2015}$.

求最接近 $\sqrt{2015}$ 的整數。

18. If the product of a positive integer a and 211,140 is a perfect square, find the smallest value of a .

一個正整數 a 與 211,140 的乘積是一個完全平方數，求 a 的最小值。

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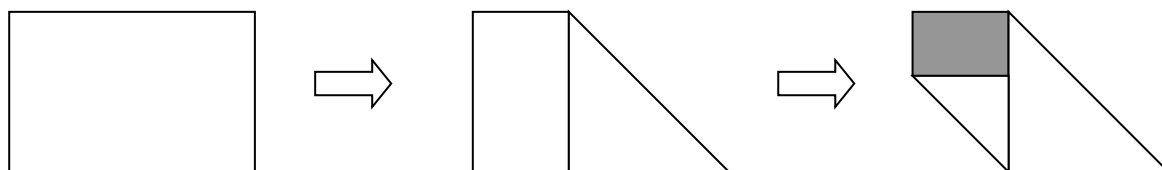
All answers should be written on the ANSWER SHEET.

Geometry

幾何

19. There is a rectangular paper with length 22cm and width 14cm. Then the paper is folded its upper right corner to the lower edge and is folded its lower left corner to meet the first triangle as shown in the figure below. Find the area of the shaded region.

有一張長 22 厘米，寬 14 厘米的長方形紙片，若以圖中的方法把它的右上角往下折疊，再把左下角往上折疊。求陰影部分的面積。

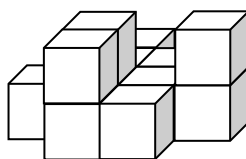


Question 19

第 19 題

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

參考附圖，每個正方體的邊長都是 3，求立體的體積。



Question 20

第 20 題

21. The figure below shows a triangle $\triangle ABC$ which area is 525cm^2 . If $AD:AB=1:5$, $BE:EC=1:4$, $CF:CA=1:5$, find the area of $\triangle DEF$.

三角形 $\triangle ABC$ 的面積是 525 平方厘米， $AD:AB=1:5$ ， $BE:EC=1:4$ ， $CF:CA=1:5$ ，求 $\triangle DEF$ 的面積。

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。

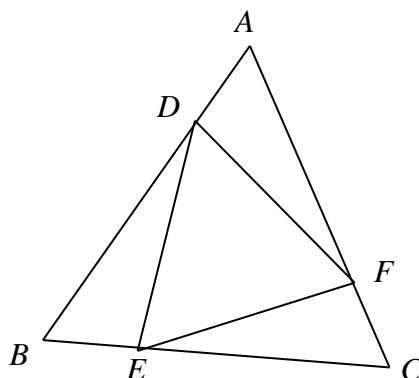
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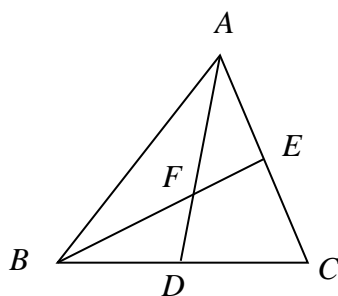


Question 21

第 21 題

22. It is known that the area of $\triangle ABC$ is 2016. If $BD = DC$ and $AD = 3DF$, find the area of quadrilateral $CDEF$.

已知 $\triangle ABC$ 的面積是 2016，且 $BD = DC$ ， $AD = 3DF$ 。求四邊形 $CDEF$ 的面積。



Question 22

第 22 題

23. 6 equilateral triangles are formed by cutting a regular hexagon. If the perimeter of the hexagon is 144cm, 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 144 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 20 points on a plane?

在平面上畫 20 點，最多可連成多少條線？

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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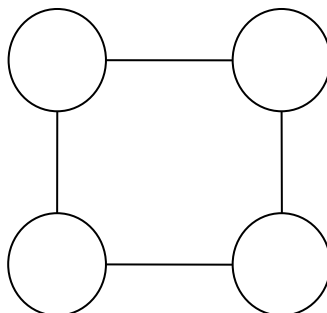
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Combinatorics

組合數學

25. The figure below shows four areas linked by lines. By using 7 colours, how many different way(s) is / are there to paint the areas if adjacent areas cannot have the same colour?

有 7 種顏色對下圖 4 個圓形塗上顏色，如果被直線連著的圓形的顏色不能相同，有多少種塗色方法？



Question 25

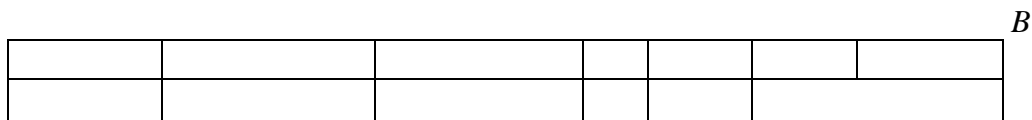
第 25 題

26. From 2015 to 5000 (including 2015 and 5000), how many number(s) is / are divisible by 2, 5 or 7?

2015 至 5000 中 (包括 2015 和 5000)，能被 2、5 或 7 整除的數字有多少個？

27. In the diagram shows a map. If it is allowed to move upwards or rightwards only, how many way(s) is / are there to move from A to B?

如果從 A 點走到 B 點，每步只能向上或向右走，共有多少種走法？



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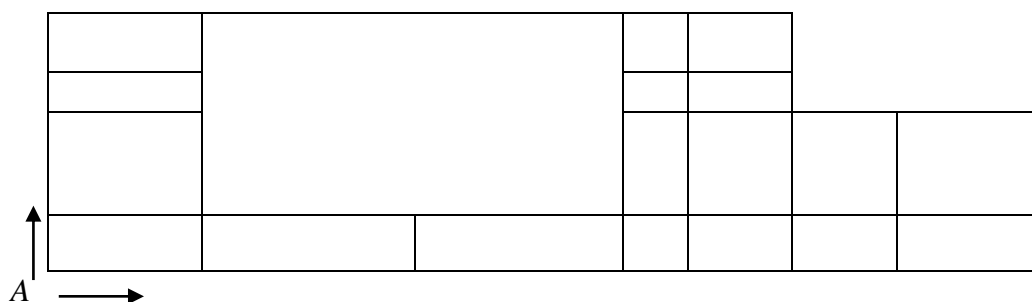
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Question 27

第 27 題

28. Primary Five students have reserved a number of barbeque grills for picnic. 4 students will have no grill to use if there are 8 students in each grill whereas 3 grills would be spared if there are 12 students in each grill. Now if two extra grills are rented, how many people, on average, are distributed in each grill?
五年級同學去旅行，並已租借了若干燒烤爐。如果燒烤爐的數量不變，且每 8 人使用一個燒烤爐，則有 4 人無法燒烤；如果想剛好減少租借 3 個燒烤爐，則要每 12 個人使用一個燒烤爐。如果租借多 2 個燒烤爐，每個燒烤爐平均可以供多少人使用？
29. Eric uses four numbers “1”, “2”, “4”, “5” to form a 5-digit password. (Every number will be used). How many different password(s) can be formed?
小力用「1」、「2」、「4」、「5」這四個數字組成一個五位數的密碼（每個數字均會使用），一共可以組成多少個不同的密碼？
30. If 20 bottles of orange juice are evenly shared by 15 students, each student gets 75mL; if 16 bottles of orange juice are evenly shared by 9 students, how much orange juice will be shared by each student in mL?
如果把 20 瓶橙汁平均分給 15 人，每人可分得 75 毫升；如果把 16 瓶橙汁平均分給 9 人，每人可分得多少毫升？

~ 全卷完 ~

~ End of Paper ~

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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