

第十屆全港小學數學挑戰賽(2023-2024)
The 10th Hong Kong Primary Mathematics Challenge (2023-2024)

決賽 (二零二三年十二月二日)
Final (2nd December, 2023)

小五組 個人項目 試卷
Primary 5 Individual Event Question Paper

參賽者須知 Instructions to Contestants

1. 在比賽過程中，參賽者必須將准考證放在桌上。
You should place your Admission Form on your desk for the whole session.
2. 於比賽期間必須關掉所有手提電話、通訊工具及其他響鬧裝置。
During the competition, you should switch off your mobile phone and any other electronic or communication devices that can emit sound.
3. 本項目以筆試形式舉行，須於限時 45 分鐘內完成所有題目。
Contestants should finish all questions in this 45-minutes written test.
4. 在答題紙上填寫學校名稱、參賽者姓名、參賽者編號、座位編號。
Write your name, admission number, seat number and school name on the front cover of your answer sheet.
5. 參賽者於比賽時只准使用大會提供之草稿紙。
You can only use the rough work sheet provided by the organizer.
6. 參賽者不可於比賽中使用計算機。
The use of calculators is NOT allowed.
7. 每題只需把答案填寫在大會提供之答題紙上，否則不予評分。參賽者不需填寫計算步驟。
Put your answers on the answer sheet provided, otherwise, the answers will not be marked. You are not required to show the steps in your calculations.
8. 作答時，每題的答案均須以 0 至 9999 之間的整數表示，小於 1000 的答案均須補「0」以湊足四位數字。
Each answer must be given as an integer between 0 and 9999. In case of an answer less than 1000, leading zeros should be included to make up four digits.
9. 除特殊情況外，參賽者於本項目完結前不能提早交卷或離場。
Under normal circumstances, contestants are not allowed to leave the contest venue before the end of this session.
10. 違反比賽規則者有可能被取消參賽資格。
Any contestant who violates the rules and regulations of the competition might risk disqualification.
11. 參賽者如對比賽過程或試題內容有任何疑問或爭議，參賽者須於當天比賽結束後立即向大會提出，否則不予受理。大會保留是次比賽的所有最終決定權。
If you have any queries, you should contact the officer-in-charge immediately after the competition. Late queries will not be entertained. The decision of the organizing committee will be final.

時限：45 分鐘
Time Allowed: 45 minutes

總分：100
Total marks: 100

1. 求 $20232023 \times 2024 - 20242024 \times 2023 + 2024 - 2023$ 的值。 (3 分)
Find the value of $20232023 \times 2024 - 20242024 \times 2023 + 2024 - 2023$. (3 marks)
2. 有一些兩位數，將它的數值除以它的數字和，所得到的商是 6，餘數是 2。請找出這些兩位數的和。 (4 分)
Find the sum of all 2-digit numbers such that when the number is divided by the sum of its digits the quotient is 6 with a remainder of 2. (4 marks)
3. 每個數字也都是質數的最大兩位質數是什麼？ (3 分)
What is the largest two-digit prime number whose digits are also prime? (3 marks)
4. 已知五個數的平均數是 2018，其中四個分別為 2016、2021、2010 和 2024，求最後的一個數。 (3 分)
The average of five numbers is 2018. Four of the numbers are 2016, 2021, 2010 and 2024, find the last number. (3 marks)
5. 彼得寫了四個小於 10 的正整數，它們的積是 360。已知這四個數中只有一個數是合成數，求這四個數之和。 (5 分)
Peter wrote four positive integers which are smaller than 10. The product of these numbers is 360. Given that only one of them is composite number. Find the sum of these four numbers. (5 marks)
6. 五個正整數的乘積等於 2023。請問這五個數的可能有多少種不同的值？ (5 分)
The product of five positive integers equals 2023. How many different values are possible for these five numbers? (5 marks)
7. 在一條環形高速公路上共有三個收費站，按順時針方向它們分別位於 A 點、B 點和 C 點上，且它們的收費標準分別是 1 元、3 元和 5 元。一個人駕駛汽車從 B 點和 C 點之間的某處開始沿順時針方向在高速公路上行駛，當他所交的費用總和為 150 元時，請問他在下一個收費站需要交多少元？ (4 分)
On a circular highway, it has to pay toll charges at three places. In clockwise, there are point A which costs \$1 to cross, point B which costs \$3 to pass through, and point C which costs \$5 to go on top. Starting on the highway between point B and point C, a car goes clockwise and pays toll-charges until the total bill amounts to \$150. How much does it have to pay at the next place if he continues? (4 marks)
8. 某四位正整數被 5、7 和 13 除皆餘 3，求這個數的最大值。 (4 分)
A 4-digit positive integer is divided by 5, 7 and 13 to get the same remainder of 3. What is the maximum value of this number? (4 marks)
9. 若四位數 $\overline{AA77}$ 能被 37 整除，則 A 代表的數字是多少？ (6 分)
If the four-digit $\overline{AA77}$ can be divisible by 37, then find A. (6 marks)

10. 已知 $n^2 = 29p + 1$ ，當中 n 為正整數及 p 為質數，求 n 的值。

(4 分)

It is given that $n^2 = 29p + 1$ where n is a positive integer and p is a prime number. Find the value of n .

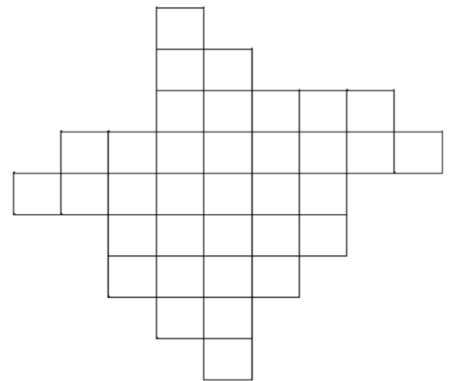
(4 marks)

11. 右圖由 35 個邊長 2 厘米的正方形拼砌而成，問這圖形的最外圍周界是多少？

(6 分)

The figure is made up of 35 squares with a side length of 2 cm.

What is the outermost perimeter of this figure? (6 marks)



12. 求 $\left(\frac{6}{1 \times 7} + \frac{6}{7 \times 13} + \dots + \frac{6}{43 \times 49}\right) \times 343$ 的值。

(4 分)

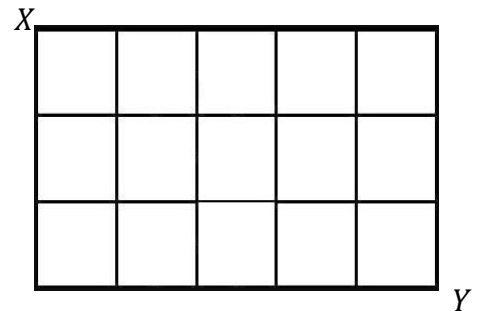
Find the value of $\left(\frac{6}{1 \times 7} + \frac{6}{7 \times 13} + \dots + \frac{6}{43 \times 49}\right) \times 343$. (4 marks)

13. 如圖，從 X 點到 Y 點的最短路線有多少條？

(5 分)

As shown in the figure, how many shortest routes from point X to point Y?

(5 marks)



14. 已知 $\frac{1}{1 - \frac{1}{2 - \frac{1}{3 - \frac{1}{4 - \frac{1}{5 - \frac{1}{x}}}}}} = \frac{577}{224}$ ，求 x 的值。

(6 分)

It is given that $\frac{1}{1 - \frac{1}{2 - \frac{1}{3 - \frac{1}{4 - \frac{1}{5 - \frac{1}{x}}}}}} = \frac{577}{224}$, find the value of x .

(6 marks)

15. 某三個質數的和是 1668，求這三個數的積的最小值。

(5 分)

The sum of three prime number is 1668, find the minimum value for the product of these three numbers.

(5 marks)

16. 若 x 、 y 為整數使得 $x > y$ 及 $\sqrt{15 - 4\sqrt{14}} = \sqrt{x} - \sqrt{y}$ ，求 $x - y$ 值。

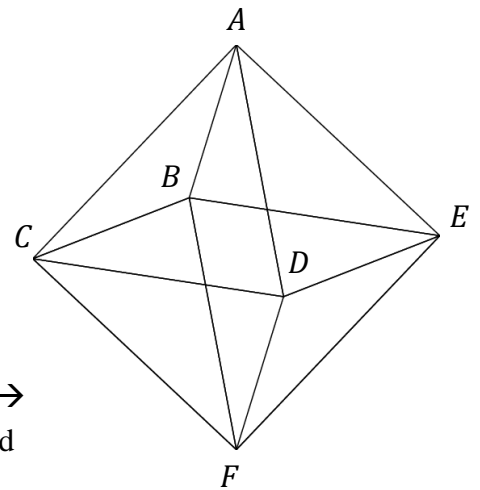
(6 分)

If x 、 y are integers such that $x > y$ and $\sqrt{15 - 4\sqrt{14}} = \sqrt{x} - \sqrt{y}$, find the value of $x - y$. (6 marks)

17. 使用三種顏色在一個 3×3 的透明正方格膠片上填色。已知三種顏色填的格數相同，而且相同顏色的方格是相連的。請問有多少種填色方法？(註：膠片經旋轉或反轉後，若一種填色方法與另一種相同，視為是同一填色方法。) (5 分)

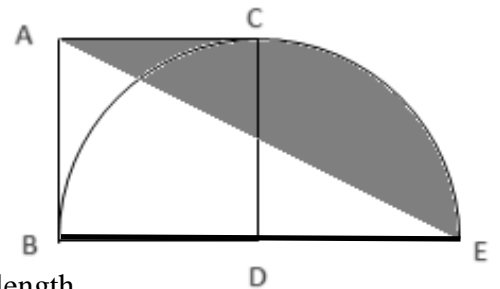
Fill in a 3×3 transparent square of film using three colors. It is known that the three colors fill the same number of squares, and the squares of the same color are connected. How many coloring methods are there? (Note: After the film is rotated or reversed, if one color filling method is the same as another, it is regarded as the same color filling method.) (5 marks)

18. 圖為一正八面體 $ABCDEF$ ，構作路線由 A 作起點沿邊前進，最後回到 A ，這些路線不能重覆通過同一點(起點及終點 A 除外)。例如 $A \rightarrow C \rightarrow F \rightarrow C \rightarrow D \rightarrow A$ 是不可行的； $A \rightarrow C \rightarrow D \rightarrow A$ 與 $A \rightarrow D \rightarrow C \rightarrow A$ 則是兩條不同的路線，求通過 B 的路線總數。 (9 分)



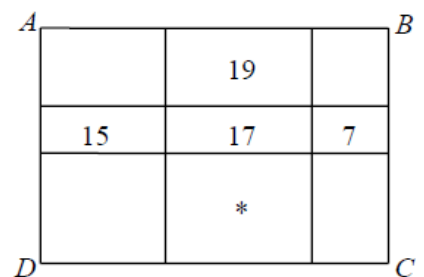
An octahedron $ABCDEF$ is shown in the figure. Let A be the starting point and endpoint of paths along the edges of the octahedron. The paths cannot go through the same vertex twice (except the starting point and endpoint A). For example, $A \rightarrow C \rightarrow F \rightarrow C \rightarrow D \rightarrow A$ is not allowed. However, $A \rightarrow C \rightarrow D \rightarrow A$ and $A \rightarrow D \rightarrow C \rightarrow A$ are considered two different paths. Find the number of such paths *passing through B*. (9 marks)

19. 圖中 $BCED$ 為半圓。 $ABCD$ 是邊長為 2 的正方形和 AC 與半圓相切於 C 點。設陰影部份的面積為 $\frac{x-9}{x-24}$ ，求 x 值。
(取 $\pi = \frac{22}{7}$ 。) (7 分)



In the figure, $BCED$ is a semicircle. $ABCD$ is a square with side length 2 and AC touches the semicircle at C . If the area of the shaded region is $\frac{x-9}{x-24}$, find the value of x . (Take $\pi = \frac{22}{7}$.) (7 marks)

20. 將長方形 $ABCD$ 分成九個較小的小長方形，如下圖所示。已知一些小長方形內部的數代表的是該長方形的周界，單位為 cm ，而其中一個小長方形內部的數是未知數 $*$ 。若整個長方形 $ABCD$ 的周界是 50 cm ，求符號 $*$ 的值？
請注意此圖形繪製並不精準。 (6 分)



A rectangle $ABCD$ is divided into nine smaller rectangles as shown in the diagram. The number written inside a small rectangle denotes its perimeter, in cm . Notice that the perimeter of one of the small rectangles has an unknown value $*$. If the perimeter of rectangle $ABCD$ is 50 cm , what is the value of the symbol $*$? Note that the diagram is not drawn to scale. (6 marks)

試卷完 END OF PAPER