亞洲國際數學奧林匹克聯合會

ASIA INTERNATIONAL MATHEMATICAL OLYMPIAD UNION

亞洲國際數學奧林匹克公開賽初賽

Asia International Mathematical Olympiad Open Trials

中一組 Grade 7

時限：70 分鐘

Time allowed: 70 minutes

樣本試題

Sample Questions

本試題不可取走。

THIS QUESTION PAPER 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 Paper without approval of the examiner.
Otherwise, contestant may be DISQUALIFIED.

請將答案寫在 答題紙 上。

All answers should be written on the ANSWER SHEET.

甲部：每題 4 分

Section A – each question carries 4 marks

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1) 現有甲、乙兩種酒精溶液。已知甲的濃度為 3%、乙的濃度為 4%，如果把甲、乙按照5 : 3的質量比混合，求混合溶液的酒精濃度。（答案請以小數表示）
Alcohol solution A has a concentration of 3% and Alcohol solution B has a concentration of 4%. Solution A and solution B are mixed in ratio of mass of 5 :3. Find the concentration of the mixed solution.

2) 已知一正方形和一矩形的面積均為 100，求兩者周界之差的最小值。
There is a square and a rectangle. The area each of them is 100. Find the minimum possible difference between their perimeters.

3) 某物質每 10 分鐘增加其體積一倍。在《港澳盃》中一組比賽開始時，把少量物質放在一容器內，當比賽結束時該容器恰好被全部充滿。已知該容器內部的體積為 1000 立方厘米，求在比賽開始時物質的體積。（如有需要，答案請以小數作答。）
A substance will double its volume every 10 minutes. When the 2016 Hong Kong & Macao Mathematical Olympiad Open Secondary 1 section starts a small amount of the substance is put in a container. The container is just fully occupied at the end of the competition. Given the internal volume of the container is $1000cm^3$, find the volume of the substance at the beginning of the competition. (Show your answer in decimals when necessary)

4) 求 $3.\dot{1}\dot{3}+2.0\dot{1}\dot{6}$ 的值，並以循環小數表示答案。
Find the value of $3.\dot{1}\dot{3}+2.0\dot{1}\dot{6}$ and show your answer in recurring decimals.

5)

6)

7)

8)

~ 甲部完 ~
~ End of section A ~

請以最簡形式填寫答案。若計算結果是分數，請化至最簡，並確保為真分數或帶分數，或將計算結果寫成小數。
答案可以根式表示，唯該根式必須是最簡形式。除特別註明外，毋需填寫單位。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. You may use square root to represent the answer which is in the simplest form.
Unless otherwise stated, no need to write down any unit. Marks will NOT be given for incorrect unit.

請將答案寫在 答題紙 上。

All answers should be written on the ANSWER SHEET.

乙部：每題 5 分

Section B – each question carries 5 marks

9) 已知有理數 $x>0$ 且 $x=3\sqrt{3\sqrt{3\sqrt{\ldots}}}$ ，求 x 的值。

It is known that x is rational, $x>0$ and $x=3\sqrt{3\sqrt{3\sqrt{\ldots}}}$. Find the value of x.

10) 已知 $390625=5^8$ ，求 $1+5+25+125+625+\ldots+390625$ 的值。

If $390625=5^8$, find the value of $1+5+25+125+625+\ldots+390625$.

11) 在「平面直角坐標系」中，已知 $M(x,y)$ 是 $A(3,13)$ 和 $B(9,-3)$ 的中點。求 $x+y$ 的值。

In rectangular coordinate system. If $M(x,y)$ is the mid-point of $A(3,13)$ and $B(9,-3)$. Find $x+y$.

12) 已知某直角三角形的兩條直角邊的長度比為 $1:3$ 。若斜邊為 12，求三角形的面積。

It is known the two sides adjacent to the right angle of a right-angled triangle are in the ratio of $1:3$. If the length of the hypotenuse is 12, find the area of the triangle.

13)

14)

15)

16)

~ 乙部完 ~

~ End of section B ~

請將答案寫在 答題紙 上。
All answers should be written on the ANSWER SHEET.
丙部：每題 7 分
Section C – each question carries 7 marks

17) 在「平面直角坐標系」中，已知 A 和 B 的坐標分別是$(-14,6)$和$(7,-3)$，且 M 是 AB 上的一點使得 $AM:MB=2:1$。若線段 AB 沿 M 點順時針旋轉某角度後，B 點落在$(3,-7)$，求 A 點的新坐標。
In Cartesian coordinate system. It is known the coordinates of A and B are $(-14,6)$ and $(7,-3)$ respectively. M is a point on AB such that $AM:MB=2:1$. The line segment AB rotates about M, if the new position of B becomes $(3,-7)$, find the corresponding new coordinates of A.

18) 設 $a=3.13+3.113+3.1113+\ldots+3.\underbrace{111\ldots}_{100\text{個「1」}}13$ ，求 a 的整數部分。
Let $a=3.13+3.113+3.1113+\ldots+3.\underbrace{111\ldots}_{100\text{ '1's}}13$, find the integral part of a.

19)

20)

~ 全卷完 ~
~ End of Paper ~

請以最簡形式填寫答案。若計算結果是分數，請化至最簡，並確保為真分數或帶分數，或將計算結果寫成小數。
答案可以根式表示，唯該根式必須是最簡形式。除特別註明外，毋需填寫單位。錯誤單位將不給予任何分數。
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