

# 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

小六組 Grade 6

時限：70 分鐘

Time allowed: 70 minutes

試題

Question Paper

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.

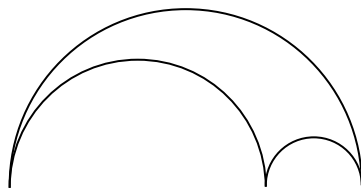
Otherwise, contestant may be DISQUALIFIED.

All answers should be written on the ANSWER SHEET.

Section A – each question carries 4 marks

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- 1) There are two approaches for Charles to go home, either he directly goes home or goes home via the library. If there are 2 routes from the school to the library, 3 routes from the library to his home, and 4 ways to go home directly, how many different ways are there for Charles to go home?
- 2) Represent  $17 \div 22$  in recurring decimals.
- 3) Find the value of  $2016 \times 1984$ .
- 4) The confectionary sells some candies at a price of \$8. When half of the candies are sold, the cost are covered; when candies are sold he has a profit of \$400. How many candies are there?
- 5) A rectangle has an area of  $2016\text{cm}^2$ . If the length and width of the rectangle are both integers in cm, what is the least possible perimeter among that rectangle?
- 6) When a 4-digit positive number is divided by 12, it has a remainder of 8; when it divided by 13, it has a remainder of 9; when it is divided by 15, it has a remainder of 11. Find the least possible value of the number.
- 7) The hour-hand and the minute-hand of an analog clock overlaps at  $x$  minutes past 2. Find the value of  $x$ , show your answer in fractional form, given  $x$  is not an integer.
- 8) The figure below is formed by three semi-circle, the radius of the biggest semi-circle is 100cm. Find the perimeter of the figure. ( $\pi = 3.14$ )



~ 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.

All answers should be written on the ANSWER SHEET.

Section B – each question carries 5 marks

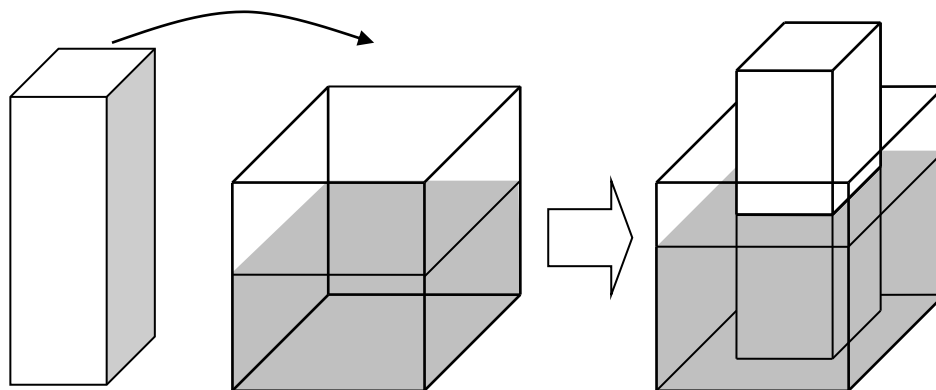
- 9) Among 20 students including Lan and Wah, 3 are chosen to join a competition. If at least one of Wah and Lan has to join the competition, how many different ways are there to choose the 3 students?
- 10) Find the value of  $0.\overset{\cdot}{3}\overset{\cdot}{6} + 0.\overset{\cdot}{2}\overset{\cdot}{9}\overset{\cdot}{6}$  and show your answer in fractions.
- 11) Find the value of  $49\frac{38}{63} + 4\frac{121}{126} + \frac{125}{252} + \frac{25}{504} + \frac{5}{1008} + \frac{1}{2016}$ .
- 12) A shop buys some food and marks the price at an expected profit of 60%. After 60% of the product are sold, the shop sold the remaining product at half the price. What is the percentage profit of the shop selling this food?
- 13) Three numbers are formed by using numerals 0, 1, 2, 3, 6 and 8. The three numbers are then multiplied. Find the smallest possible product.
- 14) A solid cuboid is formed by merging 2016 cubes with side length 1cm. Find the total surface area of the cuboid when the cuboid is arranged in a way that the total surface area is at its minimum.
- 15) It takes Sam, Leo, and Benson 14, 21 and 70 days respectively to finish the job alone. If three people work together, at which day the job is finished?
- 16) Bottle A and Bottle B each contain saline with concentration 70% and 40% respectively. If the contents of both bottles are mixed a saline with concentration 50% is formed, and an additional 600 grams of 20% solutions will yield a solution with concentration 35%. Find the mass of content of Bottle A.

~ End of section B ~

All answers should be written on the ANSWER SHEET.

Section C – each question carries 7 marks

- 17) The figure below shows a cubic container whose inner length is 54cm containing paint with 25cm deep. The base of the iron cuboid is a square with side length 36cm. The iron cuboid is inserted vertically into the container until the base of the cuboid reaches the inner base of the cubic container. It is known that no paint is spilled and the cuboid is not fully submerged in the paints. Find the area of the cuboid in paints.



- 18) At certain minutes past 5, '6' on the clock is at the middle of the minute-hand and the hour-hand. How many minutes later '6' on the clock is at the middle of the minute-hand and the hour-hand again?
- 19) How many ways are there for 20 rectangular brick with dimensions  $1\text{ cm} \times 3\text{ cm}$  to fill a grid with dimensions  $3\text{ cm} \times 20\text{ cm}$ ?
- 20) In a ranch there is a grassland. It is known the grass in the grassland grows at a constant rate and the growing rate of every hectare of grassland is equal. It is known that 48 sheep can consume all grass of a 10-hectare grassland in 18 days; 21 cows can consume all grass of a 30-hectare grassland in 36 days. It is also known that a cow consumes 4 times as much grass as a sheep and the consuming speed of both animals remained constant throughout the process. How many sheep are needed to consume all the grass of a 60-hectare grassland in 10 days?

~ 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。

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.