



奧冠教育中心

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泰國國際數學競賽初賽 2020 - 2021

**THAILAND INTERNATIONAL  
MATHEMATICAL OLYMPIAD  
HEAT ROUND 2020 - 2021**

中學一年級 Secondary 1

時限：90 分鐘

Time allowed: 90 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 5 題，共 25 題，每題 4 分，總分 100 分，答錯不扣分。

There are 5 exam areas and 5 questions in each exam area. There are a total of 25 questions in this Question-Answer Book. Each carries 4 marks. Total score is 100 marks. No points are deducted for

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
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 上。

All answers should be written on the ANSWER SHEET.

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incorrect answers.

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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.

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.**

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Open-Ended Questions (1<sup>st</sup> ~25<sup>th</sup>) (4 points for correct answer, no penalty point for wrong answer)

Logical Thinking

1. There are some chickens and rabbits in a cage. The number of rabbits is 4 times as the number of chickens. The total legs of rabbit's is 126 more than that of chicken's. How many rabbit(s) is / are there?

Terdapat sejumlah ayam dan kelinci di sebuah kandang. Jumlah kelinci 4 kali lebih banyak dari jumlah ayam. Jumlah kaki kelinci 126 lebih banyak dari jumlah kaki ayam. Berapa jumlah kelinci yang ada di sana?

2. Alice goes north for 18km, then goes east for 24km. How many km is she now from the original position?

Alice pergi ke arah utara sejauh 18km, kemudian dia pergi ke arah timur sejauh 24km. Berapa km sekarang Alice dari posisi awal?

3. Peter bought fruit from a market. It is known that a watermelon, an apple and an orange cost \$32, \$4 and \$2 respectively. He used \$460 to buy 20 fruits and bought at least 1 for each type. How many apples did he buy?

Peter membeli buah-buahan dari supermarket. Diketahui harga sebuah semangka, sebuah apel dan sebuah jeruk berturut-turut adalah \$32, \$4 dan \$2. Dia menghabiskan \$460 untuk membeli 20 buah buah-buahan dan membeli setidaknya 1 setiap jenis buah. Berapa banyak apel yang Peter beli?

4. According to the pattern shown below, what is the number in the blank?

Berdasarkan pola di bawah ini, bilangan berapakah yang seharusnya ada pada “\_\_” ?

1 、 7 、 19 、 43 、 91 、 \_\_ 、 ....

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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5. There are 7 people arguing which day of week is today. Their statements are quoted as below:

- A: Yesterday was Monday.
- B: Tomorrow will be Friday.
- C: Tomorrow will be Thursday.
- D: The day after tomorrow will be Wednesday.
- E: Today is neither Monday, Wednesday nor Thursday.
- F: Today is neither Tuesday, Thursday nor Saturday.
- G: Today is either Wednesday, Thursday or Friday.

Given that among them only one statement is correct, which day of week is today?

Ada 7 orang saling beradu argumen tentang hari apakah hari ini. Pernyataan mereka adalah sebagai berikut :

- A : Kemarin adalah hari Senin.
- B : Besok adalah hari Jumat.
- C : Besok adalah hari Kamis.
- D : Lusa adalah hari Rabu
- E : Hari ini bukanlah hari Senin, Rabu atau Kamis.
- F : Hari ini bukanlah hari Selasa, Kamis atau Sabtu.
- G : Hari ini adalah hari Rabu, Kamis atau Jumat.

Di antara pernyataan di atas hanya 1 pernyataan yang benar, hari apakah hari ini?

### Algebra

6. Find the value of  $x$  if  $(6x-2)-(2x+6)=16$ .

Carilah nilai  $x$  jika  $(6x-2)-(2x+6)=16$ .

7. How many integral solution(s) is / are there for  $x$  if  $-3 < \frac{3x+5}{2} < 19$ ?

Ada berapa banyak solusi bulat yang ada untuk  $x$  jika  $-3 < \frac{3x+5}{2} < 19$ ?

8. Given  $a$  is an integer and  $|a-2|+|a+4|=6$ , find the sum of all possible value of  $a$ .

Diketahui  $a$  adalah bilangan bulat dan  $|a-2|+|a+4|=6$ , carilah hasil penjumlahan dari semua nilai yang mungkin dari  $a$ .

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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9. Factorise  $3x^2 - 9x - 210$ .

**Faktorisasikan**  $3x^2 - 9x - 210$ .

10. Given that  $a$  is a negative real number and  $a \neq -1$ . If  $a + \frac{18}{a+1} = -10$ , find the minimum value of  $a$ .

**Diketahui  $a$  adalah bilangan riil negatif dan  $a \neq -1$ . Jika  $a + \frac{18}{a+1} = -10$ , carilah nilai minimum dari  $a$ .**

### Number Theory

11. When a 3-digit number is divided by 4, 6 or 9, the remainder is 3. What is the maximum possible value of that 3-digit number?

**Ketika bilangan 3-angka dibagi 4, 6 atau 9, sisanya adalah 3. Berapakah nilai maksimum yang mungkin dari bilangan 3-angka tersebut?**

12. Find the unit digit of  $A$  if  $A = 1^1 \times 9^2 \times 11^3 \times 19^4 \times 21^5 \times \dots \times 91^{19} \times 99^{20}$ .

**Carilah angka satuan dari  $A$  jika  $A = 1^1 \times 9^2 \times 11^3 \times 19^4 \times 21^5 \times \dots \times 91^{19} \times 99^{20}$**

13. Find the remainder when  $27^{38}$  is divided by 13.

**Carilah sisa dari  $27^{38}$  dibagi dengan 13.**

14. The difference between two square numbers is 115. Find the minimum value of the larger square.

**Selisih antara 2 bilangan kuadrat adalah 115. Carilah nilai minimum dari bilangan kuadrat yang lebih besar.**

15. How many simplest fraction(s) whose denominator is 1215 is / are there?

**Berapa banyak pecahan paling sederhana dengan penyebut 1215 yang ada?**

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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Geometry

16.  $M(3y, 2x)$  is the mid-point of  $A(x, 21)$  and  $B(8, y)$ . Find the value of  $x + y$ .

$M(3y, 2x)$  adalah titik tengah dari  $A(x, 21)$  dan  $B(8, y)$ . Carilah nilai dari  $x + y$ .

17. An interior angle of a  $n$ -sided polygon is 8 times of an exterior angle. Find the value of  $n$ .

Sebuah sudut dalam/interior dari sebuah segibanyak bersisi- $n$  besarnya 8 kali dari sebuah sudut luar/eksterior. Carilah nilai dari  $n$ .

18. Combine 678 equilateral triangles with sides 1 unit to form a quadrilateral. Find the minimum perimeter of that quadrilateral.

Kombinasikan 678 segitiga samasisi dengan panjang sisi 1 untuk membentuk sebuah segiempat. Carilah keliling minimum dari segiempat tersebut.

19. If the radius of a circle is 14 and the area of the circle is the 14 times as the perimeter of a square, find the area of the square. (Take  $\pi = \frac{22}{7}$ )

Jika jari-jari dari sebuah lingkaran adalah 14 dan luas dari lingkaran tersebut adalah 14 kali keliling sebuah bujursangkar, carilah luas dari bujursangkar tersebut. (Gunakan  $\pi = \frac{22}{7}$ )

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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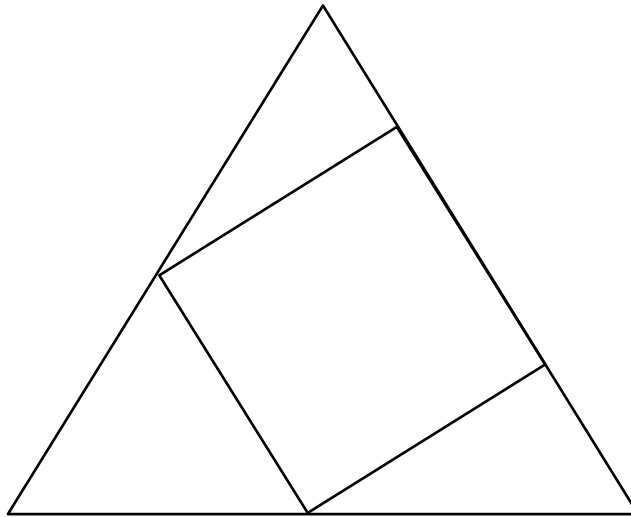
請將答案寫在 答題紙 上。

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20. The figure below is formed by an equilateral triangle with side length 1 and a square. Find the area of the square. (Answer in surd form)

Bangun di bawah ini dibentuk dari sebuah segitiga samasisi dengan panjang sisi 1 dan sebuah bujursangkar. Carilah luas dari bujursangkar tersebut (Jawablah dalam bentuk akar)



Question 20

Soal No. 20

Combinatorics

21. A fair 6-face dice is thrown 3 times. Find the probability that the product of numbers obtained is a multiple of 3 or 5.

Sebuah dadu 6 sisi dilempar 3 kali. Carilah peluang hasil kali dari bilangan yang didapatkan adalah kelipatan 3 atau 5.

22. Choose 3 digits, with repetition, from 0, 1, 2, 4, 6 to construct 3-digit numbers. Of these 3-digit numbers, how many of them are divisible by 4?

Pilih 3 angka, dengan pengulangan, dari 0, 1, 2, 4, 6 untuk membentuk bilangan 3-angka. Dari bilangan-bilangan 3-angka yang telah dibentuk tersebut, berapa banyak bilangan yang dapat dibagi 4?

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23. Numbers are drawn from the 2020 integers 1 to 2020. At least how many numbers are drawn at random to ensure that there are two numbers whose difference is 219?

Bilangan diambil secara acak dari 2020 bilangan bulat dari 1 sampai dengan 2020. Setidaknya berapa banyak bilangan harus diambil untuk memastikan ada dua bilangan yang selisih keduanya adalah 219?

24. Olympiad Mathematics team has 12 members. How many different ways are there to send 7 teammates to participate in a competition in which one of them is the captain?

Tim Olimpiade Matematika beranggotakan 12 orang. Berapa banyak cara berbeda yang ada untuk mengirim 7 orang untuk berpartisipasi dalam kompetisi di mana salah seorang di antaranya adalah seorang kapten?

25. Find the number of 3-digit numbers such that the unit digit is greater than the tenth digit greater than the hundredth digit.

Ada berapa banyak bilangan 3-angka dimana angka satuannya lebih besar angka persepuluhannya yang lebih besar dan angka perseratusannya?

~ 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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