Malaysia International Mathematics Olympiad Competition 2016

26th November, 2016

11.10 am – 12.10 pm

- Middle Primary Paper-

TEAM CONTEST

Time：60 minutes

Jointly Organised by :

Persatuan Matematik Olimpiad Malaysia(PERMATO)
Sekolah Jenis Kebangsaan (Cina) Lai Meng Bukit Jalil, Kuala Lumpur
Sekolah Jenis Kebangsaan (Cina) Lick Hung，Subang Jaya
E Mathematics Olympiad System

马来西亚数学奥林匹克学会

黎明华文学校

力行国民型华文学校

数学奥林匹克学研中心

联合主办

Instructions:

- Do not turn to the first page until you are told to do so.
- Remember to write down your team name in the space indicated on every page.
- There are 10 problems in the Team Contest, arranged in increasing order of difficulty. Each question is printed on a separate sheet of paper. Each problem is worth 10 points. **For all problems only numerical answers are required.**
- The four team members are allowed 10 minutes to discuss and distribute the first 8 problems among themselves. Each student must attempt at least one problem. Each will then have 35 minutes to write the answers of their allotted problem independently with no further discussion or exchange of problems. The four team members are allowed 15 minutes to solve the last 2 problems together.
- No calculator or calculating device or electronic devices are allowed.
- Answer must be in pencil or in blue or black ball point pen.
- All papers shall be collected at the end of this test.

No.	1	2	3	4	5	6	7	8	9	10	Total	Sign by Jury
Score												
Score												

Malaysia International Mathematics Olympiad Competition 2016
TEAM CONTEST（MP）

School（学校）：＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿ Student ID （编号）：＿＿＿＿＿＿

Name（姓名）：＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

1. Aladdin's Treasure: Known that in each box at most only has a gem, there is no gem in the box with number, and the number in the box indicates the number of gems that surround it

Eg.

A	D	1
B	2	F
C	E	G

This indicates that surrounding number 1, which is D or F has 1 gem.
A、B、C、D、E、F、G is surrounding number 2, will have 2 gems in total.

There are 10 gems hiding in the figure below. Please follow the rules above, use "▲" to identify the 10 gems out.

阿拉丁的宝藏：已知每个方格中最多只藏有一个宝石，写有数字的方格中没有宝石，而方格中的数字则代表它的周围所藏宝石的数量。

例如

A	D	1
B	2	F
C	E	G

表示 1 的周围 D、F 之中，有一个宝石。2 的周围 A、B、C、D、E、F、G 这 7 格中有 2 个宝石。

下面方格中藏有 10 个宝石，请依上述的规定，在有宝石的地方以"▲"表示出来。

		1			1	
1				3		
		4			3	
1				1		2
	1		1			
				1		
	2					
			3		1	

Answer：＿＿＿＿＿＿＿＿＿

		1			1	
1				3		
		4			3	
1				1		2
	1		1			
				1		
	2					
			3		1	

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TEAM CONTEST（MP）

School（学校）：_____ Student ID （编号）：_____

Name（姓名）：_____

2. In the 3x3 square box below, fill in the natural number from 1 to 9 with no repeat and without any number missing. Ensure that the sum of the 3 natural numbers in every column, row and diagonal are not equal. The number 1 and 5 had been filled in.

在 3×3（三行三列）的正方形方格中，既不重复又不遗漏地填上 1—9 这 9 个连续的自然数，使每行、每列、每条对角线上的三个自然数的和均不相等。其中，数字 1 及 5 已填上。

1		
		5

1		
		5

Answer：_____

School（学校）： _____ Student ID （编号）： _____

Name（姓名）： _____

3. If I multiply the two digits of a number, then add 19 and multiply the digits again, the answer is one less than the number I originally started with. What was the number I had originally thought of ?

若我将一个两位数的 2 个数码相乘，再加上 19，再将答案中的每个数码相乘，所得的答案比原来的这个两位数少 1. 问：原来的两位数是多少?

Answer ： _____

School（学校）：_____ Student ID （编号）：_____

Name（姓名）：_____

4. We need to make a rectangle with sides 2x5 from a small rectangle with sides 2×1.
   用边长为 2×1 的小长方形，组成一个边长为 2×5 的大长方形。
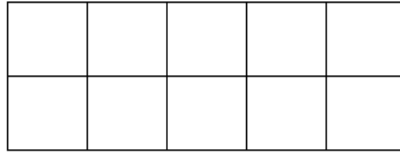
The 2x1 rectangles can be placed horizontally or vertically.
这个 2×1 的小长方形，可以置放成水平或直竖的方式。
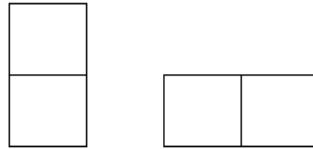
How many ways can a 2x5 rectangle be formed?
有多少种不同的方式来组成 2×5 的长方形?

Answer ：_____

School（学校）：_____ Student ID （编号）：_____

Name（姓名）：_____

5. Find the smallest value of A such that the product of the following multiplication has four trailing zeroes : $972 \times 975 \times 935 \times A$

   要使 $972 \times 975 \times 935 \times A$ 的乘积最后面有 4 个零，A 的最小值是多少?

Answer ：_____

School（学校）：_____ Student ID （编号）：_____

Name（姓名）：_____

6. Four colored balls are placed in a bag. One is green, one is red, and 2 are blue. Ai-Ling draws 2 balls from the bag and place one of them, which is blue, on a table. What are the chances the second ball Ai-Ling still has in her hand is the other blue ball ?

一个袋子里有 4 个球，一个是绿色，一个是红色，另外两个都是蓝色的。爱玲从中取出两个球，将其中的一个蓝色球放在桌上。问：爱玲手上的另外一个球也是蓝色的机会（概率）是多少？

Answer ：_____

School（学校）：_____ Student ID （编号）：_____

Name（姓名）：_____

7. There are six small balls that were labelled as 2,4,5,6,8,10 arranging in the following figure. However，Mr.Chen asked the students to rearrange the balls according to the following rules, rearrange them. Please fill the correct answer in the circles. (All of the numbers fill in has to be correct to obtain the points)

有六个小球分别被标上 2，4，5，6，8，10 排列成下图。但是陈老师要求学生按下面的规定，将它们重新排列。请将正确答案填入圆圈中。 （每个数的位置,全部要填对才有分）

(1) Ball no.4 is neither adjacent to Ball no.5 nor Ball no. 6

4 号球与 5 号球和 6 号球不相邻

(2) Ball no.8 is adjacent with another 4 balls.

8 号球和四个球相邻

(3) Ball no.4 is at the right of Ball no.6

4 号球在 6 号球的右边

(4) Ball no.10 is located on top of the two balls that give a total of 13.

10 号球在两个球加起来等于 13 的球的上面
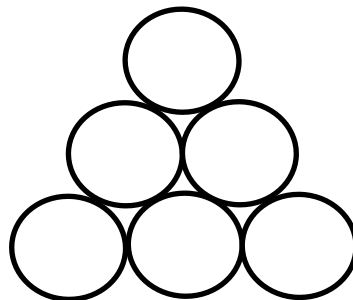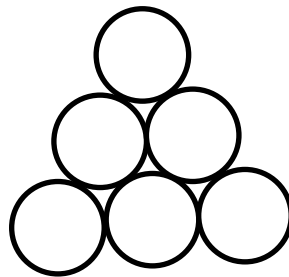
Answer：_____

School（学校）：_____ Student ID （编号）：_____

Name（姓名）：_____

8. There are 2016 piles of steel balls with the same appearance. In each pile, there are 2016 balls. It is known that among them, 2015 piles of balls are quality products and 1 pile of balls are defective products. A quality ball weighs 2016 mg each and a defective ball weighs 2017 mg each. How many times at least must the balls be weighed by a scale until the pile of the defective balls can be found?

有 2016 堆外表一样的钢球，每堆有 2016 个，已知其中 2015 堆是正品，一堆是次品，而正品钢球每个重 2016mg，次品钢球每个重 2017mg，那么用天平至少要称多少次，能把那堆次品找出来?

Answer ：_____

9. There is a small island, where the island has many aircraft. The performance of each aircraft is the same, and each aircraft's fuel tank is loaded with fuel enough for the aircraft to fly exactly half way around the earth, along a great circle. The fuel can be transferred by an aircraft to another aircraft during the flight. Aircraft's fuel can be obtained only from the island. Assumption: The time of refuelling can be ignored, may it be on ground or in flight. To ensure an aircraft flying around the earth, what is the fewest numbers of aircraft need to be dispatched all the way?

Assume that the speed of the aircraft is always the same, the fuel consumption rate is the same, and all the aircraft must return safely to the island.

有一座小岛，岛上有许多架飞机。每架飞机的性能都一样，而且每架飞机的油箱都装载了供飞机环绕地球飞行半周（半圈）的油料。油料可以靠飞行中一架飞机给另一架飞机输油的方式来传递。只有该岛上可以获得飞机的油料。假设：无论在地面还是在空中，加油都不占时间。要保证让一架飞机环球飞行一周，至少需要出动多少架飞机？

假设飞机的速度始终不变，耗油率相同，而且所有飞机必须全部安全飞回到这个岛上。

Answer ：_____

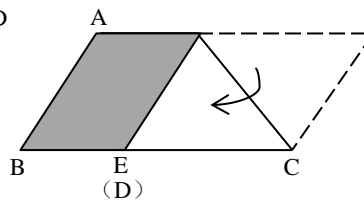School（学校）：＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿ Student ID （编号）：＿＿＿＿＿＿

Name（姓名）：＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿

10. Alice has a parallelogram paper (Figure 1), and she folds it down from the upper right corner as shown in Figure 2. The shaded area is $\frac{3}{8}$ of the original area. Alice then fold the bottom left corner again as shown in Figure 3. What is the fraction of the shaded area in figure 3, comparing to the original parallelogram area in figure 1?
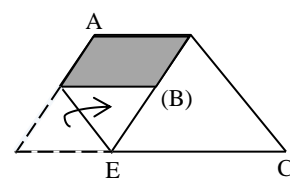
爱丽丝将一张平行四边形的纸（如图一），按图二的方式把它的右上角折叠起来，阴影部分的面积占原来面积的$\frac{3}{8}$。爱丽丝再把左下角往上折叠成图三时，请问图三中的阴影部分的面积占原来平行四边形面积的几分之几?
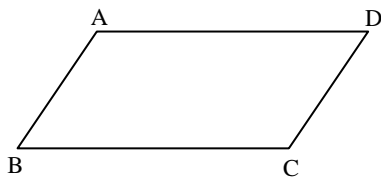
（圖一）Fig. 1　　（圖二）Fig. 2　　（圖三）Fig. 3

Answer ：＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿