Elementary Mathematics International Contest

TEAM CONTEST

Time：60 minutes

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 40 points and complete solutions of problem 2, 4, 6, 8 and 10 are required for full credits. Partial credits may be awarded. In case the spaces provided in each problem are not enough, you may continue your work at the back page of the paper. Only answers are required for problem number 1, 3, 5, 7 and 9.
- 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 solutions 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.

English Version

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20th July 2011 Bali, Indonesia

Team： Score：

1. There are 18 bags of candies. The first bag contains 1 piece. The second bag contains 4 pieces. In general, the k-th bag contains k^2 pieces. The bags are to be divided into three piles, each consisting of 6 bags, such that the total number of pieces inside the bags in each pile is the same. Find one way of doing so.

Answer:
1st pile：
2nd pile：
3rd pile：

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2. There are eight positive integers in a row. Starting from the third, each is the sum of the preceding two numbers. If the eighth number is 2011, what is the largest possible value of the first one?

Answer: ______________________

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3. O is the centre of a circle. A light beam starts from a point A_0 on the circle, hits a point A_1 on the circle and then reflects to hit another point A_2 on the circle, where $\angle A_0A_1O = \angle A_2A_1O$. Then it reflects to hit another point A_3, and so on. If A_{95} is the first point to coincide with A_0, how many different choices of the point A_1 can there be?

Answer: ______________________ different choices

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4. The capacities of a large pipe and four identical small pipes, in m^3 per hour, are positive integers. The large pipe has a capacity of 6 m^3 per hour more than a small pipe. The four small pipes together can fill a pool 2 hours faster than the large pipe. What is the maximum volume of the pool, in m^3?

Answer: ______________________ m^3

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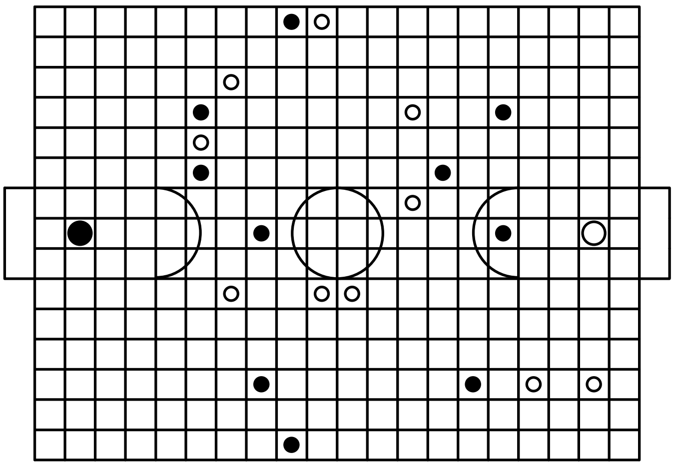
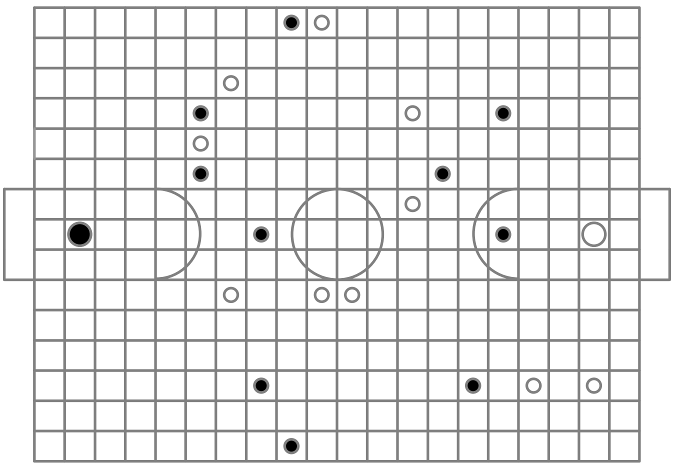
5. The boys in Key Stage II, wearing white, are playing a soccer match against the boys in Key Stage III, wearing black. At one point, the position of the players on the field are as shown in the diagram below. The ball may be passed from one team member, in any of the eight directions along a row, a column or a diagonal, to the first team member in line. The ball may not pass through an opposing team member. The goalkeeper of Stage II, standing in front of his goal on the right, has the ball. Pass the ball so that each member of the white team touches the ball once, and the last team member shoots the ball into the black team's net.



Answer:



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6. A palindrome is a positive integer which is the same when its digits are read in reverse order. In the addition 2882+9339=12221, all three numbers are palindromes. How many pairs of four-digit palindromes are there such that their sum is a five-digit palindrome? The pair (9339, 2882) is not considered different from the pair (2882, 9339).

Answer: ______________________ pairs

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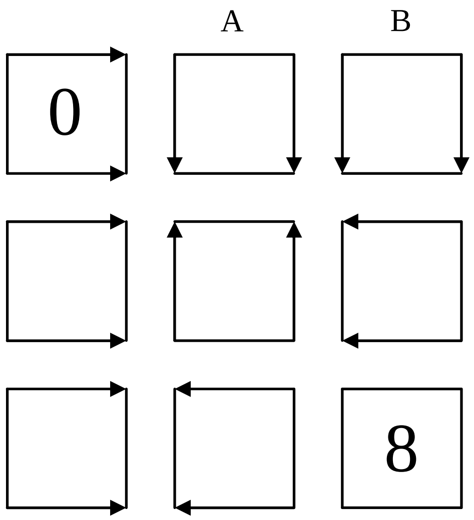
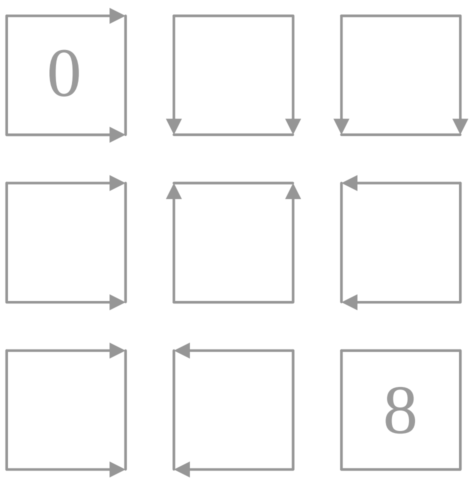
7. Place each of 1, 2, 3, 4, 5, 6 and 7 into a different vacant box in the diagram below, so that the arrows of the box containing 0 point to the box containing 1. For instance, 1 is in box A or B. Similarly, the arrows of the box containing 1 point to the box containing 2, and so on.



Answer:



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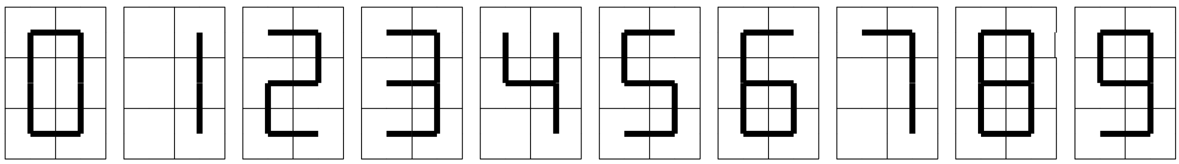
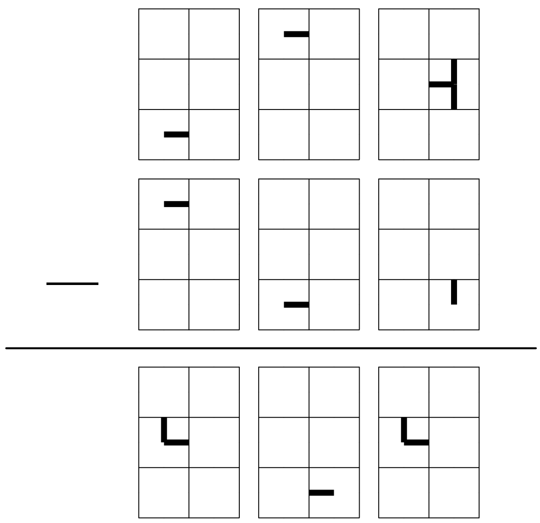
8. On calculators, the ten digits are displayed as shown in the diagram below, each consisting of six panels in a 3×2 configuration.



A calculator with a two-dimensional display was showing the subtraction of a three-digit number from another three-digit number, but the screen was malfunctioning so that only one panel of each digit was visible.
What is the maximum value of the three-digit difference?



Answer: ________________

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9. Six villages are evenly spaced along a country road. It takes one hour to ride on a bicycle from one village to the next. Mail delivery is once a day. There are six packets of letters, one for each village. The mailman's introductions are as follows:
   (1) Ask the Post Office van to drop you off at the village on the first packet and deliver it.
   (2) Ride the bicycle non-stop to the village on the second packet and deliver it.
   (3) Repeat the last step until all packets have been delivered.
   (4) Phone the Post Office van to pick you up.

   The mailman is paid 20000 rupiahs an hour on the bicycle. Taking advantage that the Post Office has no instructions on how the packets are to be ordered, what is the maximum amount of money he can earn in a day?

Answer: ______________________ rupiahs

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10. How many different ways can 90 be expressed as the sum of at least two consecutive positive integers?

Answer: ______________________________