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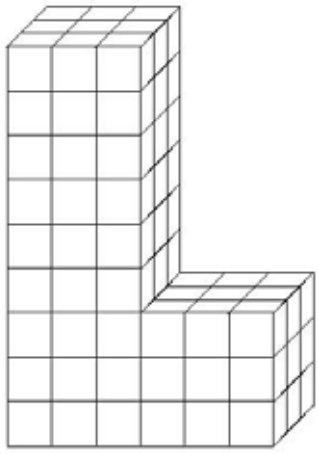
INTERNATIONL MATHENATICS AND SCIENCE OLYMPIAD FOR PRIMARY SCHOOLS (IMSO) 2004

Mathematics Contest in Taiwan
The Second Round
Exploration Examination

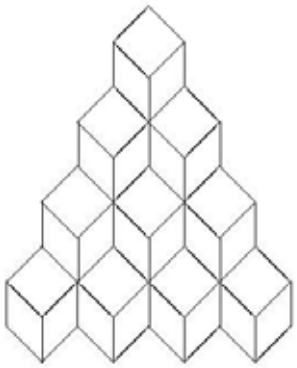
Name:_____ School:_____ Grade:_____ ID number:_____

Show your detailed solution in the space provided after each question. Each question is worth 10 points.

1. This is a tower made from cubes (see figure). The outside part of this tower is painted. How many cubes are painted on:
   (a) three sides
   (b) two sides
   (c) one side



2. Mark wants to make a building, 4 cubical tall, from cubes. (see figure)
   (a) How many cubes does Mark need?
   (b) If Mark wants to build a similar building but has 8 cubical height, how many cubes does Mark need?



3. Two people want to play a game with some marbles in a box. The game rule is that each person can take one or two marbles at a time. After the first person takes marble(s), the other person will have the same opportunity. The loser is the person who takes the last marble.

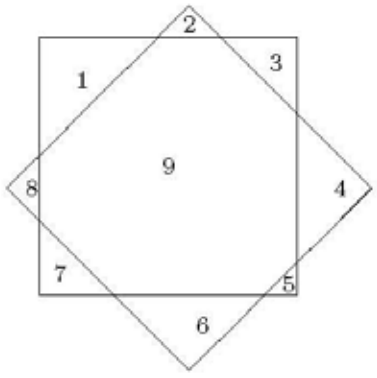
   (a) If it is your turn to take marble(s) and there are only 6 marbles left in the box, how many marble(s) will you take to be sure you are going to win?

   (b) If it is your turn to take marble(s) and there are only 8 marbles left in the box, how many marble(s) will you take to be sure you are going to win?

   (c) If it is your turn to take marble(s) and there are only 20 marbles left in the box, how many marble(s) will you take to be sure you are going to win?

   (d) Now we change the rule. There are 100 marbles and each player can take 1, 2, 3 or 4 marble(s). If you get the first turn to play, how many marble(s) will you take to be sure you are going to win?

4. Two squares that are put on top of each other can make 9 regions (see figure).

   (a) How many regions at most can be constructed from 3 squares?

   (b) Using 4 squares, construct as many regions as possible by using the grid transparent paper, scissors and glue. Put the result in the envelope.

   (c) How many regions at most can be constructed from 4 squares?