



Philippine International Mathematics Competition

2009 Asia Inter-Cities Teenagers Mathematics Olympiad

Puzzle Competition Solution

Puzzle 1.

Hints :

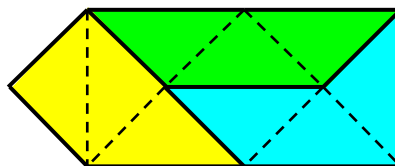
The obvious first step is to fold the piece of paper into a 1×3 stack. If you think of diagonal folds, it is very easy from this point on.



Puzzle 2.

Hints :

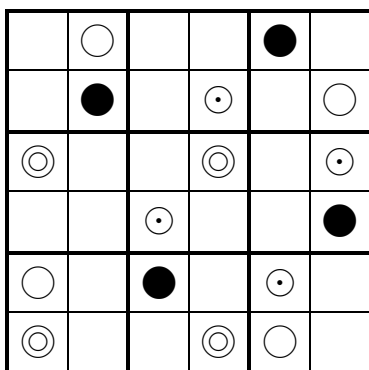
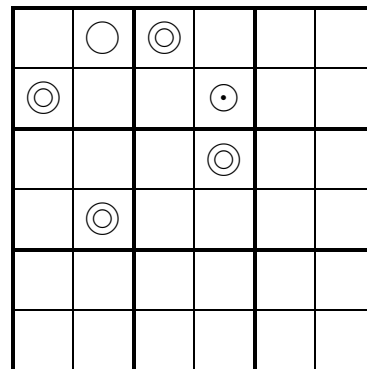
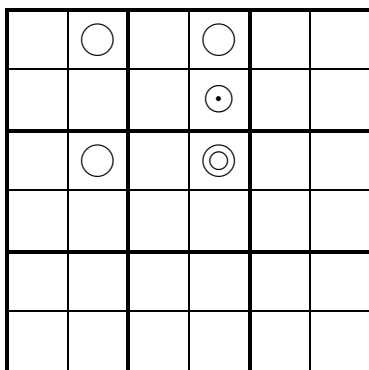
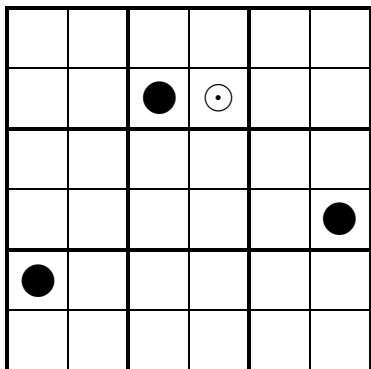
The figure will consist of 9 right isosceles triangles. Try to arrange these triangles into a shape with an axis of symmetry.



Puzzle 3.

Hints :

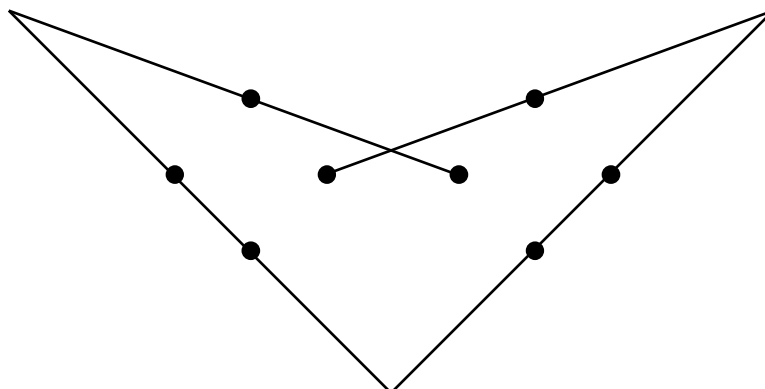
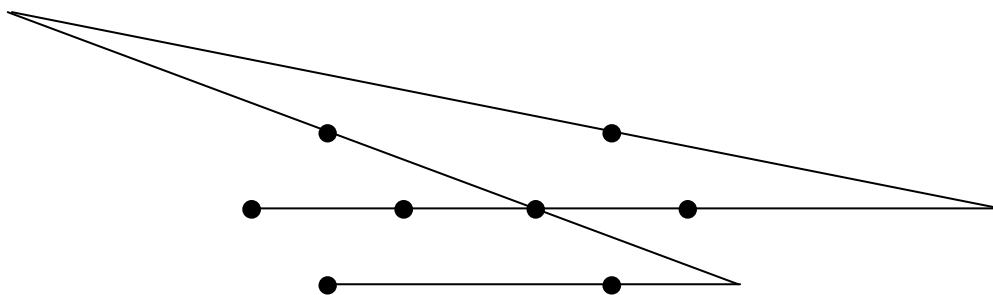
There are four ways to fill the 2×2 square in the middle of the top row. Three of them are shown in the diagram below. On the left, we have to go outside the 4×4 square to form the square with black dots. In the middle, a circled dot is preventing us from forming the square with white dots. On the right is the only way to complete the square with circled dots, but we do not have a piece like the one required in the left 2×2 square of the top row.



Puzzle 4.

Hints :

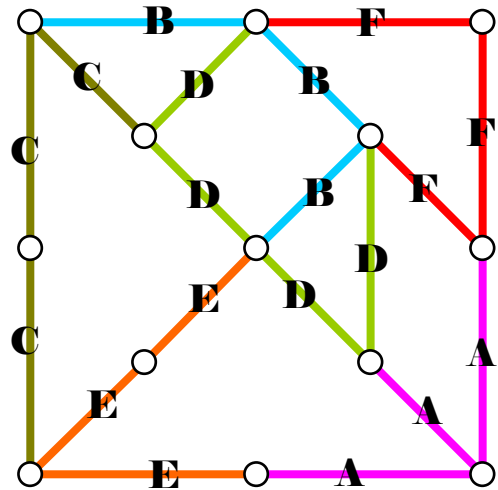
There is a line which passes through 4 points. It is not hard to pass through 4 more points with three addition lines. However, it is not necessary to use the line passing through 4 points since we have four lines and only 8 points.



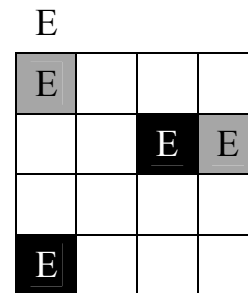
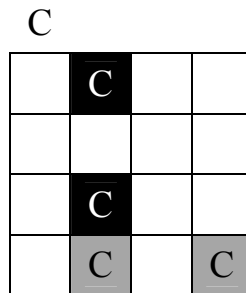
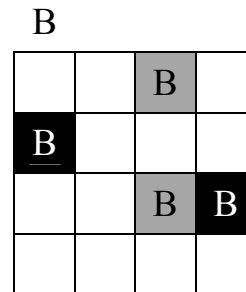
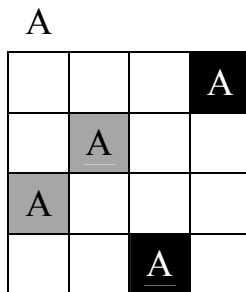
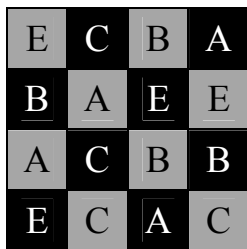
Puzzle 5.

Hints :

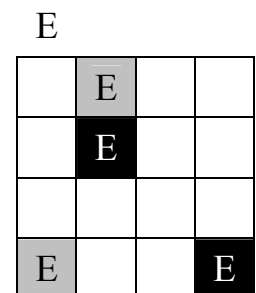
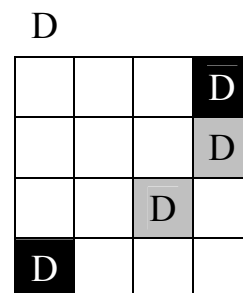
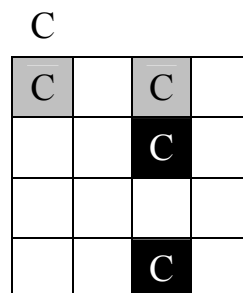
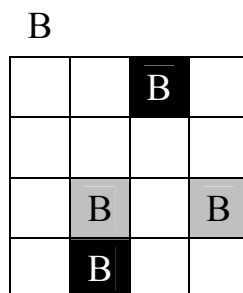
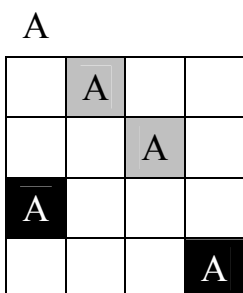
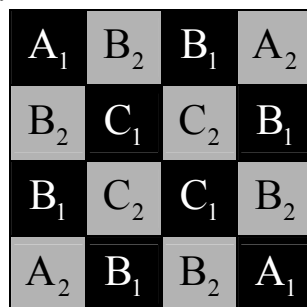
The piece F can go in three places. Once it is placed, it further limits the possible placements of the piece B. The piece A also has only three possible placements. Placing these three pieces will give you a good start.



Puzzle 6.



Labeling the board as following:



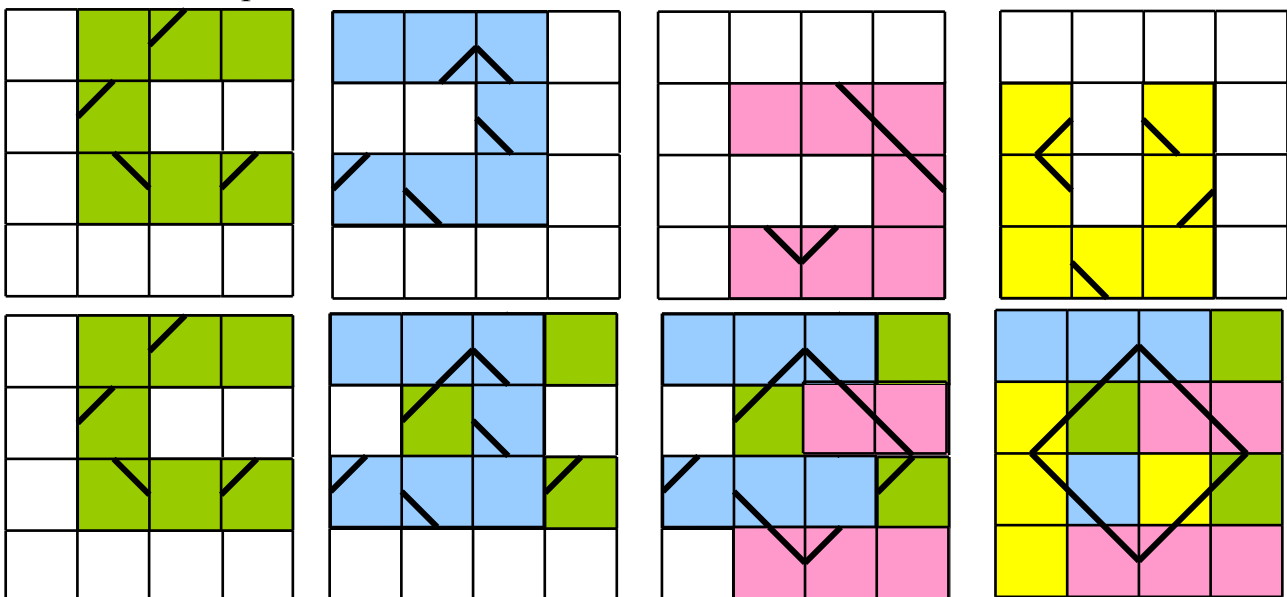
The black and gray squares of transparent A covered A_1, B_1, B_2 and C_2 .
 The black and gray squares of transparent B covered B_1, B_1, B_2 and C_2 .
 The black and gray squares of transparent C covered A_1, B_1, B_2 and C_2 .
 The black and gray squares of transparent D covered A_2, A_2, B_1 and C_1 .
 The black and gray squares of transparent E covered A_1, A_2, B_2 and C_1 .
 If we chose transparent D, then we can not use transparent A and E. It is impossible.
 Hence we can not use transparent D. Try to place them just using A, B, C and E.

Puzzle 7.

Hints :

Each piece has one or two squares with superfluous line segments, and these squares must be covered up by other pieces. Three of the pieces have line segments joined at a right angle. They are likely the corners of the diamond in the final configuration.

In the diagram below, the first row shows the positions of the individual pieces on the 4×4 square. The second row shows how they are to be stacked and intertwined to yield the final configuration. Double lines indicate where one piece goes over or under another piece.



Puzzle 8.

Hints :

The 14 pieces have altogether 84 corners, 42 with large circles and 42 with small circles. Of the 36 corners on the edge of the grid, 21 are with large circles and 15 with small circles. Hence of the 16 interior points, 7 are surrounded by large circles and 9 by small circles. The pieces A, B, C, D and M are predominantly with small circles, while the pieces I, J, K, L and N are predominantly with large circles. Try to place them before using E, F, G and H.

