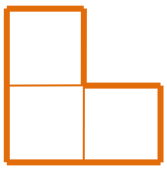
2011-2012 Puzzle of the Month Contest

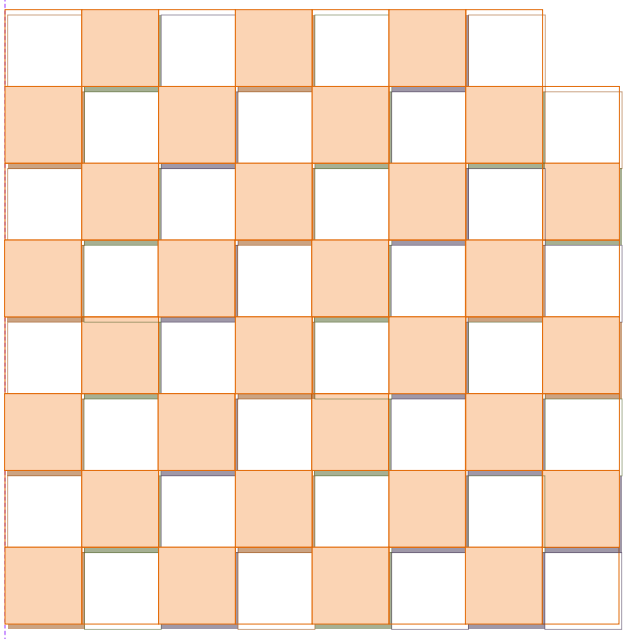
Solutions for Contest #2

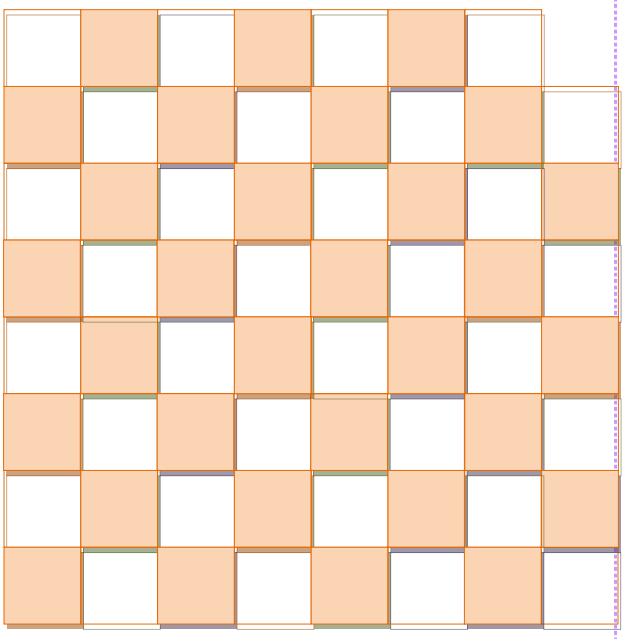
Grades 5 and Up Puzzle Solutions:

1. TWO PROBLEMS ABOUT A COVERAGE

COULD YOU COVER a chess board with a cut corner cell by the shapes:

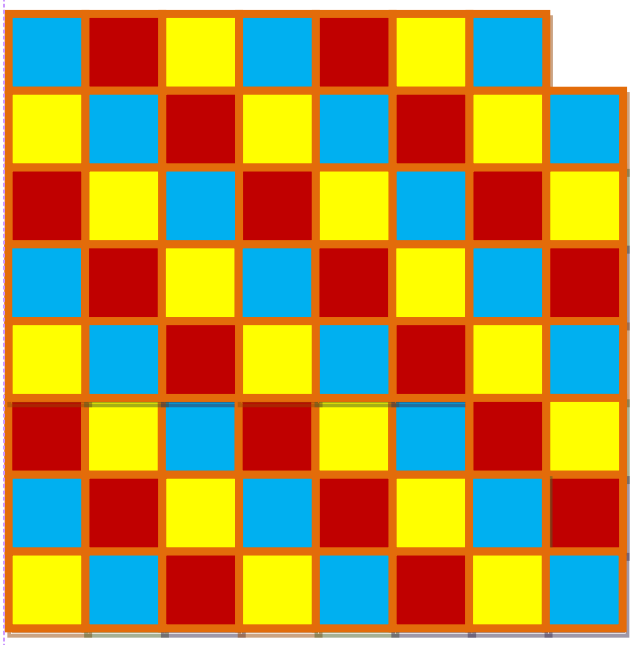
a)  **(25 pts)**; b)  **(25 pts).**



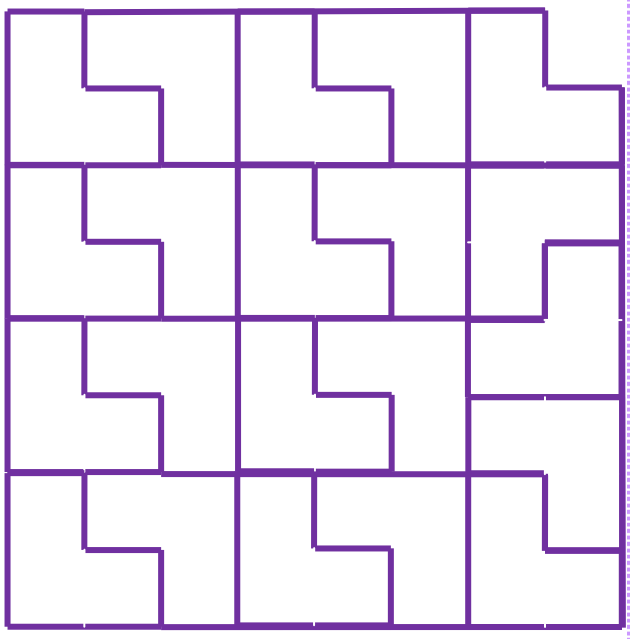


Answer: b) It is impossible, a) Solution is shown on the picture b) below

The problem b) solution: Let's color cells of the board in three colors, as shown in the picture a) below. The 1 x 3 rectangle covers one cell of each color. If a cover is possible, then the figure would be with 21 square yellow, with 21 blue and 21 red cells. But there are 22 blue colored cells. Consequently, the cover is impossible



a)



b)

2. THE PUZZLE FOR FANS OF THE MATH AND A CANDY

TWO PILES HAVE 18 CANDIES and 23 ones in each. Two students who are fans of the Math (or a candy) play the game. The move in this game is: you have to eat a pile of candy and to divide another pile into two piles. The loser is the one who can not make a move, Who is a winner in this game and by what way can he (she) win? **(30 pts)**;

Answer: Who starts is winner.

Proof: The first player (who starts) eats all 23th- candies pile (the "odd" pile) and divides 18^{th}-candies pile (the "even" pile) into two odd number parts.

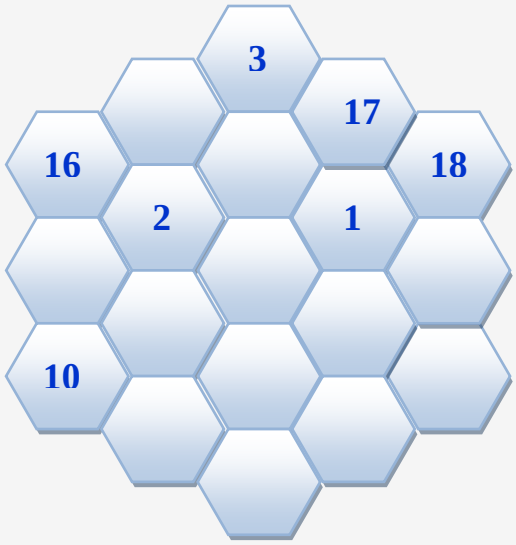
The second player eats any from two piles and divides the other part into two parts with even and odd number of candies in each (by this way only!).

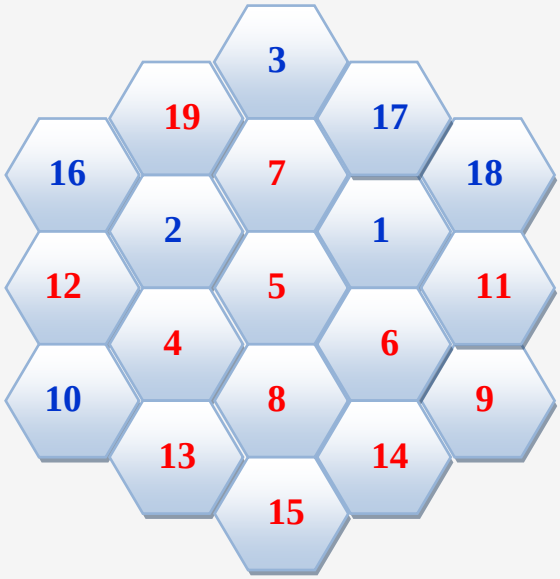
The first player eats all the "odd" pile and divides other pile by the "odd" parts.

These moves are continuing until the second player gets two piles with one candy in each. He (she) can not do next move. Thus he (she) lost

3. THE MAGIC HEXAGON

FILL IN EMPTY CELLS of the "hexagon" (see the picture below) by different numbers from 1 to 19 so that sum (the *magic sum*) of the numbers placing in all vertical and inclined rows would be the same for a row. **(20 pts)**





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Answer: See the pictures above:

Solution: Since one of the rows is filled with given numbers you can find the amount of in a row. It is 3 + 17+ 18 = 38. We can now put the number in many cells making the magic sum 38. They are 12, 19, 7, 11, 9. The numbers 4, 5, 6, 8, 13, 14, and 15 should be placed in 7 empty cells remained. Consider an inclined row with the numbers 10, 1, 18. We should take two cells for numbers of sum 9 in it. Then 4 and 5 are possible. Now consider the inclined row with the numbers 16, 2, 9. We should take two cells for numbers of sum 11 in it. It may be only 5 and 6. So, 5 is in the center and the other numbers in inclined rows are 4 and 6. Now we can fill the whole magic hexagon definitely.