

Marin Math Circle – Elementary Group
Feb. 8, 2012

Class discussion:

1. Place 12 tiles in the cells of a 4 x 4 square so that every row and every column has an odd number of tiles.

Here are some examples of the solution:

○ ○ ○	○ ○ ○
○ ○ ○	○ ○ ○
○ ○ ○	○ ○ ○
○ ○ ○	○ ○ ○

We noticed that there is only one empty space in each column and each row. We discussed that it is easier to solve a reverse problem where we would have to put just 4 tiles instead of the empty spaces in the problem above. The empty spaces are marked by X, see below.

X ○ ○ ○	○ X ○ ○
○ X ○ ○	X ○ ○ ○
○ ○ X ○	○ ○ X ○
○ ○ ○	○ ○ ○ X

2. Place 10 tiles in the cells of a 4 x 4 square so that every row and every column has an even number of tiles.

Here are some examples of the solution:

○ ○	○ ○	○ ○
○ ○	○ ○	○ ○
○ ○	○ ○	○ ○ ○ ○
○ ○ ○ ○	○ ○ ○ ○	○ ○

For this problem we also discussed the reverse problem:

X X O O	O X X O	X O X O
X O X O	X O X O	X O O X
O O O O	X X O O	O O O O
O O O O	O O O O	O O X X

3. What is a circle? A special point is called the center. A line that has all its points on the same distance from the center is called the circle. The distance is called the radius. A good example is the dog on a leash. If we put a hook for the dog and let the dog run, then the farthest points that can be reached by the dog will form a circle. The hook for the leash is the center of this circle. We draw 1, then 2 and 3 circles on the plane and then discussed on how many parts the circles would cut the plane.

The number of parts for one circle is 2, for 2 circles is 3 and 4, for 3 circles 4, 5, 6, 7 and 8.

4. We discussed the previous HW:

2 corners on one diagonal of a 4 x 4 checkerboard are cut out. Can one cover this board by 1 x 2 dominoes?

The domino has to cover one grey and one white square. It means that there should be the same number of white and grey squares on the checkerboard to cover it with dominoes. Since in our case we have 8 grey squares and 6 white squares, the task is impossible.

Homework:

How many 4-digit, 5-digit, 6-digit palindromes are there?
(previous HW)

2 corners on one diagonal of a 16x16 checkerboard are cut

out. Can one cover this board by 1×2 dominoes?