

A chessboard and dominoes

Euro 1^{re}

Assemble by teams of 2 and try to find the answers to the following problems.

For each problem solved, you get 3 points, the team with the most points wins the game.

If need be, you can always ask the teacher for a hint, but it will cost you one point.

Problem 1

Is it possible to cover a whole chessboard with non-overlapping dominoes ?

Problem 2

One corner has been removed from a chessboard. Is it possible to cover the remaining portion of the board with dominoes so that each domino covers exactly two squares?

What if two opposite corners are removed ?

Problem 3

Two arbitrary but adjacent squares have been removed from a chessboard. Is it possible to cover the remaining portion of the board with dominoes?

Problem 4

Two arbitrary squares of different colors have been removed from a chessboard. Is it possible to cover the remaining portion of the board with dominoes?

Problem 5

Two arbitrary pairs of squares of different colors have been removed from a chessboard. Is it always possible to cover the remaining portion of the board with dominoes?

Problem 6

Three arbitrary pairs of squares of different colors have been removed from a chessboard, so that the chessboard does not split into two or more separate pieces. Is it always possible to cover the remaining portion of the board with dominoes?

Problem 7

A domino has two edges, a long edge and a short edge. Two adjacent dominoes must be in one of the only three possible configurations : long edge to long edge, short edge to short edge and long edge to short edge.

In a domino tiling of a chessboard, what is the minimum number of long-edge to long-edge pairs ?

Problem 8

Prove that in any cover of a whole chessboard with dominoes, the number of horizontal dominoes with a black left square and the number of horizontal dominoes with a white left square are equal.