RAM Maths Circle

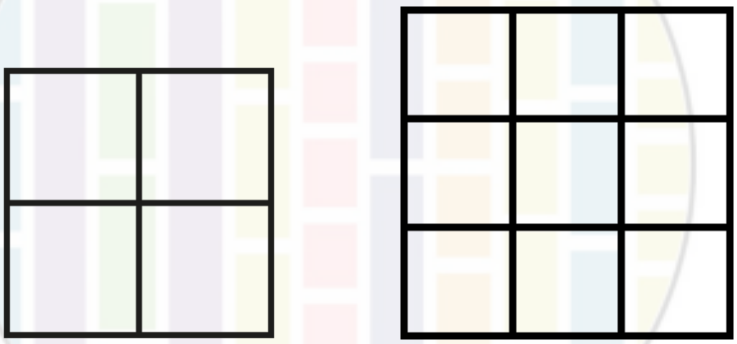
December 15, 2024

Nagpur

This was the second session for the Math Circle, Nagpur chapter. The questions were just to introduce problem solving to the students. To our surprise, they were able to come up with a generalized answer for a $n \times m$ grid. And all the possible solutions for the second question as well.

Questions

1. Suppose that you are on a 2×2 grid and want to go from the bottom left to the top right. How many different paths can you take? Conditions are that you can only go right and up. (Similar question for a grid 3×3)



2. There are 210 boys and 308 girls in a school. The principal wants to divide them into sections so that a section can have only boys or only girls. If all sections should have the same number of students and the principal wants to have as few sections as possible, find the number of sections in the school.

   (a) What is the maximum number of classes following the same constraints?

   (b) Are there any other possibilities for the number of students in a section with the same constraints?

Game: Two Stacks of Coin

Objective: The goal of the game is to pick the **last coin** and win the game.

Rules of the Game:

1. The game starts with **two stacks of coins**, containing x and y coins respectively, where x and y are positive integers.

2. The game is played between **two players** who take turns alternately.

3. On their turn, a player must:
    - Select one of the two stacks.
    - Remove **any number of coins** (at least one) from the selected stack.
4. The game ends when a player picks the **last coin**. That player is declared the **winner**.

Task for Students:

This game was given at the end of the class. The students were tasked with analyzing the game and developing a **winning strategy**. The strategy must ensure that they **always win**, provided they play optimally. The students were also allowed to choose whether they would prefer to **go first** or allow their opponent to start.