

RAM Maths Circle

Date: August 19, 2023

Swami Vivekanand School, Dombivli

In this session, facilitators decided to give six mathematical games to students. Students were asked to play along with the group and come up with winning strategies. Some of them were playing with each other while the others were working them out on the board. List of games is as follows:

- **10 cells in a row**

There are 10 cells in a row and in the first and second cell, there are two coins (one in each cell). Two players take turns to move the coins further ahead. The coins cannot be moved backwards; neither the coin in the first cell jumps over the coin in the second cell at any point. Each player can place a coin to any of the empty cells ahead. The person who cannot make any more moves loses the game. Who will win? Is there a winning strategy in this game?

- **3 piles of stones**

This is a two player game. There are three piles of stones: one with 10 stones, one with 15 and the third with 20 stones. At each turn, a player can choose one of the piles and divide it into two smaller piles. The loser is the player who cannot divide any further. Who will win? Is there a winning strategy in this game?

- **1 to 20 with + & -**

The numbers 1 to 20 are written in a row. Two players take turns putting plus signs and minus signs between the numbers. When the signs have been placed, the resulting expression is evaluated. The first player wins if the sum is even and the second player wins if the sum is odd. Who will win? Is there a winning strategy in this game?

- **Ten 1's and ten 2's**

Ten 1's and ten 2's are written on a blackboard. In one turn, a player may erase any two figures. If the two figures erased are identical, they are replaced with a 2. If they are different, they are replaced with a 1. Then the first player wins if a 1 is left at the end, and the second player wins if a 2 is left at the end. Can there be a strategy to win this game?

- **6 x 8 chocolate bar**

Two children take turns breaking up a rectangular chocolate bar 6 squares wide by 8 squares long. They may break the bar only along the divisions between the squares. If the bar breaks into several pieces, they keep breaking the pieces until only the individual squares remain. The rule for breaking is that a piece can be broken only into two pieces and not more than two pieces. The player who cannot make a break loses the game. Who will win? Is there a winning strategy in this game?

- **Difference of numbers**

This is a two-player game. The numbers 25 and 36 are written on a blackboard. At each turn, a player writes on the blackboard the difference between two numbers already on the blackboard - if this number does not already appear on the blackboard. The loser is the player who cannot write a number. Who will win? Is there a winning strategy in this game?

