

Maths Circle India

TIFR-STCS Maths Circle Team

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4 Knowing without knowing: 1

This problem was suggested by Varun Narayanan.

Often, Arun and Barun want to decide together where they want to play a game of chess. However, they are afraid that if one of them reveals that he wants to (or wants not to) play, the other might feel pressured to change his choice accordingly. For example, if Barun learns that Arun wants to play, he might decide to play just to humour his friend, even though he might not have wanted to play to begin with.

So they want to make sure that they find out whether both of them want to play, in such a way that neither of them learns anything about the other person's choice until the decision is made. Further, even after the decision has been made, they should not learn anything about the other person's choice that is not already implied by the decision they reached. For example, if the final decision is to not play, and Barun's choice was to not play, Barun should not learn whether Arun wanted to play or not (since the decision would be the same in both those cases).

They have convinced themselves that this cannot be done when their friend Kiron, who has been overhearing their discussion, gives them a usual pack of cards and shows them how to do this. (A pack of cards contains 52 cards. One side of each card contains exactly the same design: like a picture of a valley. The other side has a different design on each card: half the cards have red designs, and the other half have black designs).

What did Kiron tell Arun and Barun to do?