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Challenging variants of the “Guess who?” game

It is a joke (with more than a spark of truth) that mathematicians play “Guess who?” as follows: *Does your person have green eyes if and only if they have black hair and wear glasses?* Indeed, the best strategy is asking a question whose answer excludes roughly half of the remaining people in the game.

We suggest improving the game skills of pupils by presenting some game scenarios to the class and brainstorming about a clever question. The pupils should understand to ask questions like: *Does your person have green eyes and black hair? Does your person have green eyes or black hair (or both)?*

The pupils could also understand the number of moves needed with the above “binary search” strategy (in the worst-case scenario): would the number of initial objects be a power of 2, then the number of moves would be the binary logarithm minus 1. In general, if there are n objects, then the number of moves is the same as for the smallest power of 2 larger than or equal to n .

Remark that for a competitive game with two parallel searches the above strategy could be too slow: if the adversary is ahead, then one should choose a more unbalanced question to catch up (taking a higher risk is more likely to fail, so one should try chance as little as needed).

A variant of the game consists in asking all questions at once, however this one-round variant is rather the mathematical problem of minimizing the number of questions that solve all games. It could be presented to pupils with a smaller set of people (say, 6 people).

A better variant for pupils is having to identify two (possibly, more) people rather than one. Remark that this variant can also be played with card decks (for example, *Set* cards have four parameters, namely the number, the color, the symbol, and the shading). This variant is challenging because one may not be able to discard people, for example, after the question *Are your two people women?* (if the two people are a woman and a man). In general, one might resolve to asking questions like *Does at least one of the two people have green eyes and wear glasses?*

Clearly, applying logic to games is positively playful. And the pupils who played “Guess who?” as kids will rejoice in playing it again, in a spiced-up version that provides new challenges.