Junior BINGO

Let's generically call BINGO a game of luck where each player has a set of numbers written on a card, and where numbers are called out, the aim being to be the first to outrun the numbers in the card. Beyond having luck, a player has to pay attention: one has to listen to the numbers that are called out and mark them on the card.

An inclusive game: In fact, BINGO can be a team game, if players share their card, or if one provides assistance to younger or differently able players. Notice that the game can also be adapted to people with special needs: for example numbers can be displayed rather than called out, or BINGO cards can be written in Braille.

There are many possible BINGO variants, for every taste.

- Educators can choose the numbers of the game according to the *numeracy* of the players. One can have for example numbers from 1 to 5, from 1 to 10, from 1 to 20, from 1 to 50, from 1 to 100. For the youngest players, there is the variant **MINI-BINGO**, with cards consisting of two distinct numbers from 1 to 5 (there are 10 distinct cards). Notice that, as small children may need assistance for identifying the numbers, a small amount of players (or small teams) is preferable. Players train the ability of identifying the numbers, and an additional player could have the role of extracting the numbers and calling them aloud. Notice that the numbers can also be simply decided by rolling a dice, or can be called at random by the special player. One advantage of the MINI-BINGO is that games are very short.
- Notice that *identifying numbers* in the card has different level of difficulties, and it is a visual list search. A simplification is that the numbers are ordered increasingly. Moreover, the card can be subdivided in rows and columns, and the numbers in each row could have the same first digit. The matrix structure of the card also allows for *intermediate winners*, because one can celebrate the first player (or players) finishing one row, one column, the main diagonal…
- The **MULTIPLICATION-TABLES-BINGO** would be the variant where only the product of two numbers from 1 to 10 are used, and where for example one calls either 6x7 or 7x6 rather than 42. Another possibility would be having cards where the multiplications are displayed, and where the results are called out Similarly, one can conceive the **ADDITION BINGO** for adding one-digit numbers.
- More generally, one could play **NICKNAME BINGO,** where the educator invents a description for the numbers that are extracted, which can be for example the result of a computation, the solution to an algebraic equation or congruence, a prime number or a number with certain divisibility properties within some interval (to differentiate, more games can be played simultaneously, so that math-talents have more challenging tasks). Notice that this BINGO variant can also be played

at home, where simply a set of exercises is given and the results have to be marked on the BINGO card.

- In high-school, pupils can play the **CUSTOM BINGO**, where each player can invent their own BINGO cards and different game rules allow to explore probability, for example if the numbers can be repeated. An alternative game rule could be that 20 numbers are extracted and one should have marked as close as 10 numbers on the card. A simpler version of this variant is that players choose their cards among some given cards. Notice that game outcomes are statistical data that can be mathematically analysed.
- A detailed mathematical study of BINGO with different sets of numbers is also possible (eventually, as a long term and possibly open-ended exercise). For example, one can estimate the expected amount of numbers that need to be extracted so that one player wins, or the probability of having a tie (as some numbers may appear on the cards of more than one player). And, given this analysis, one can produce a BINGO card suitable for a given amount of players.
- As BINGO games are very long, impatient players can appreciate the variant **OGNIB BINGO**, where any called out number immediately rules out all players whose card contains the given number.
- Instead of numbers, one could have sets of symbols, and this is the variant to the classical BINGO which is in fashion for small children: this variant could be called **ITEM BINGO.** For the purpose of teaching mathematics, we would recommend the **GEOMETRY BINGO**, with geometrical shapes that are called out either with their precise name or with a description. Notice that for this variant it would make sense to have a description that suits more than one item, for example “a quadrilateral with two equal sides”.

Some of the above variants are currently being explored, the results and related material will be uploaded on the webpage https://www.antonellaperucca.net.

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