Factors and Multiples Game

This is a game for two players.

You will need a 100 square, or 1 – 100 numbered cards.

The first player chooses a positive even number that is less than 50, and crosses it out on the grid.

The second player chooses a number to cross out. The number must be a factor or multiple of the first number.

Players continue to take it in turns to cross out numbers, at each stage choosing a number that is a factor or multiple of the number just crossed out by the other player.

The first person who is unable to cross out a number loses.

You Will Need:
- 1 – 50 grid or numbered cards
- 1 – 100 grid or numbered cards

Teachers' Notes

Why do this problem?

This game can replace standard practice exercises finding factors and multiples. In order to play strategically, pupils must start to think of numbers in terms of their factors, utilising primes and squares to develop winning moves.

Possible approach

Play the game as a class, on the board, to introduce the rules, then dedicate the last twenty minutes of each lesson for a week, to playing in pairs. When pupils have finished a game, they could play the next game against someone they've not yet played. At the end of each game, ask pairs to analyse why the last few moves led to its end - working out better moves that could have been made.

To start with you could choose not to mention the initial rule that restricts the starting number to a positive even number that is less than 50. Wait until pupils discover that the first player can win after just three numbers have been crossed out before discussing the need to restrict the initial number.

Encourage pupils to consider the probable next few moves when placing a counter. Game strategies form a natural context for developing deductive logic.

Teachers may find it interesting to read the NCETM Mathemapedia Entry "Presenting Tasks and Initiating Activity". There are many ways in which to introduce tasks and provoke mathematical thinking. You may want to add your own ideas to the Mathemapedia entry.

Key questions

Do you have any winning strategies?
Are there any numbers you shouldn't go to?

Possible extension

Switch the challenge from winning the game to covering as many numbers as possible. Pupils can again work in pairs trying to find the longest sequence of numbers that can be crossed out. Can more than half the numbers be crossed out?

This challenge could run for an extended period: the longest sequence can be displayed on a noticeboard and pupils can be challenged to improve on it; any improved sequences can be added to the noticeboard.

Ask pupils to explain why their choice of numbers is good.

Possible support

Use a smaller number board, eg 1–50 (or 1–49 in a square. This makes the mental calculations much easier, without watering down the mathematics. The lesson could focus on accuracy of calculation - with teacher interventions to get pupils sharing their mental strategies.