



1. Sophie and René take turns breaking up a rectangular chocolate bar 4 squares wide by 6 squares long. They may break the bar only along the lines between the squares. They may not stack pieces. Sophie and René continue breaking up the pieces until only the individual squares remain. Whoever makes the last break wins the game. If Sophie goes first, who will win?
2. There are three piles of stones: one with 10 stones, one with 15 stones, and one with 20 stones. Carl and Mary take turns choosing one pile and dividing it into two smaller piles. The loser is the player who cannot make a move because each pile has exactly one stone. If Carl goes first, who will win?
3. Ten 1's and ten 2's are written on a blackboard. Isaac and Julia take turns erasing any two numbers and replacing them with a single number. If the two numbers erased are the same, they are replaced with a 2. If the two numbers erased are different, they are replaced with a 1. Isaac wins if a 1 is left at the end, and Julia wins if a 2 is left at the end. If Isaac goes first, who will win?
4. The numbers 1 through 20 are written in a row. Emmy and Louis take turns putting a plus or minus sign between each pair of numbers. When they're done, the resulting expression is evaluated (by performing the resulting additions and subtractions). Emmy wins if the result is odd and Louis wins if the result is even. If Emmy goes first, can she win?
5. There are two piles of 13 stones each. At each turn, Marie and Jacob remove any number of stones from a single pile. The loser is the player who cannot move. If Marie goes first, who will win?
6. There are two piles of stones: one has 30 stones and the other has 20 stones. Leonardo and Sofia take turns removing as many stones as they wish, but only from one pile. The player removing the last stone wins. If Leonardo goes first, who will win?
7. A checker is placed at each end of a strip of squares measuring 1×20 . Joseph and Henri take turns moving one checker in the direction of the other, either by one or by two squares. A checker cannot jump over another checker. The player who cannot move loses. If Joseph goes first, who will win?
8. Blaise and Évariste play a game that begins with the number 2. In one turn, a player can add to the current number any positive number smaller than it. Whoever reaches the number 1000 wins. If Blaise goes first, who will win?
9. The numbers 18 and 11 are written on a blackboard. At each turn, Georg and Hypatia write the positive difference between any two numbers already on the board, if this number does not already appear. The loser is the player who cannot write a number. If Georg goes first, who will win?

10. David and Leonhard play a game on a 9×10 rectangular grid. At each turn, a player can cross out any row or column that has not yet been completely crossed out. Whoever cannot make a move loses. If David goes first, who will win?
11. There are two piles of candy. One contains 20 pieces and the other 21 pieces. Albert and Ada take turns eating all the candy in one pile and separating the remaining candy into two piles (not necessarily equal in size). The player who cannot move loses. If Albert goes first, who will win?
12. Pierre and Kurt play a game that begins with the number 1. In one turn, a player can multiply the current number by any integer from 2 to 9. The player who first reaches a number greater than 1000 wins. If Pierre goes first, who will win?

Adapted from *Mathematical Circles (Russian Experience)* by D. Fomin, S. Genkin, I. Itenberg. American Mathematical Society, 1996.

Famous Mathematicians and Scientists

Jacob Bernoulli
Georg Cantor
Augustin Louis Cauchy
Marie Curie
René Descartes
Albert Einstein
Leonhard Euler
Pierre de Fermat
Leonardo Fibonacci
Jean Baptiste Joseph Fourier
Évariste Galois
Carl Friedrich Gauss
Sophie Germain
Kurt Gödel
David Hilbert
Hypatia
Sofia Kovalevskaya
Augusta Ada Lovelace
Sir Isaac Newton
Emmy Noether
Blaise Pascal
Julia Robinson
Mary Fairfax Sommerville
Alan Turing