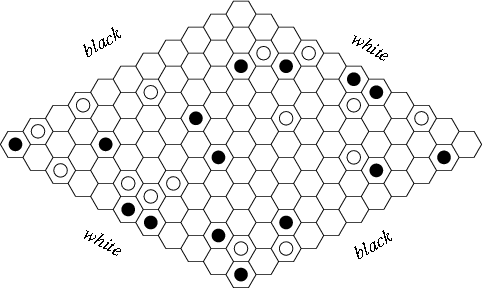
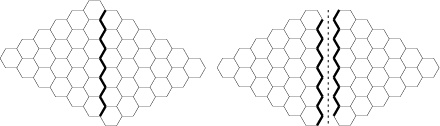
**Game of Hex**



Hex is a two-player [game](http://mathworld.wolfram.com/Game.html) invented by Piet Hein in 1942 while a student at Niels Bohr's Institute for Theoretical Physics, and subsequently and independently by John Nash in 1948 while a mathematics graduate student at Princeton. The game was originally called Nash or John, with the latter name at the same time crediting its inventor and referring to the fact that it was frequently played on the tiled floors of bathrooms (Gardner 1959, pp. 74-75). The name Hex was invented in 1952, when a commercial version was issued by the game company Parker Brothers.

Hex is played on a diamond-shaped board made up of hexagons. The game is usually played on a boards of size 11 on a side, for a total of 121 hexagons, as illustrated above. In the game, one player plays white pieces, while the other plays black, with play alternating between players and placement only allowed on unoccupied hexagons. Alternate sides of the board are designated white and black as shown above, and the goal of the game is to complete a chain of pieces between one player's two sides. The game cannot end in a [draw](http://mathworld.wolfram.com/Draw.html) since no chain can be completely blocked except by a complete chain of the opposite color.

In 1949, Nash showed using a reductio ad absurdum proof that there is always a winning strategy for the first player on an Description: n×nboard of any size. However, this provides only an existence proof. The win/lose status has been determined for every move in Description: 7×7hex (Hayward). A winning strategy is known for Description: 8×8and Description: 9×9boards assuming a first play at the center of the board (Yang), but not larger square boards. C. F. Shannon and E. F. Moore built a hex-playing machine that associated a two-dimensional electrical charge distribution with any given Hex position. This machine then made decisions based on properties of the corresponding potential field (Shannon 1953).



For play on a Description: n×(n+1)board, the second player, playing the shorter direction, can always win by playing a mirror image move, as illustrated above (Gardner 1959).

A modified version changes the rules so that the first player to form a chain *loses*. For this variant, there is a winning strategy for the first player if there is an even number of cells on each side; otherwise, there is a winning strategy for the second player (Gardner 1959, p. 78).



**DUAL GAMES ON HEXAGONAL GRIDS (use a three by three grid)**

**SHANNON SWITCHING GAME**

**One player called SHORT aims to traverse a connected graph from vertex A to vertex B; one 'go' consists colouring one edge. The other player called CUT aims to prevent this by removing edges: one 'go' consists of removing one edge. SHORT wins if the connection from A to B is made. CUT wins if the connection from A to B is prevented.**

**THE DUAL**

**This game is like Hex except that one player called JOIN aims to join two opposite edges of the grid (use a small one to start with) and the other called CUT aims to cut across the path.**