

Rim

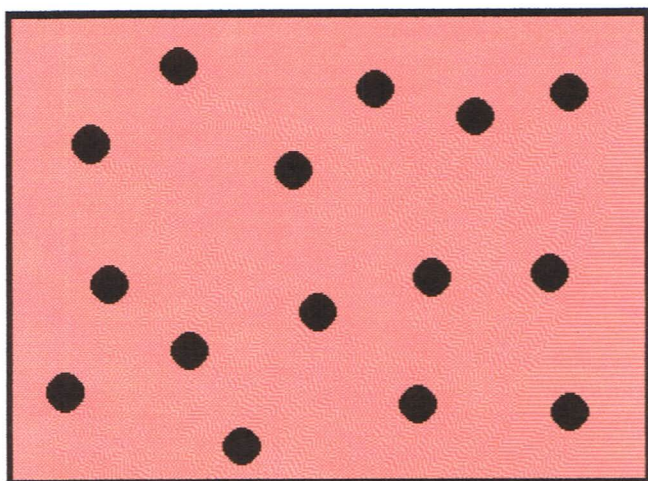
This game is taken from the book *On Numbers and Games* by John Conway (Academic Press, 1976). When this game is combined with ideas from the game of [kayles](#), then you have the game [Rayles](#)

What you need

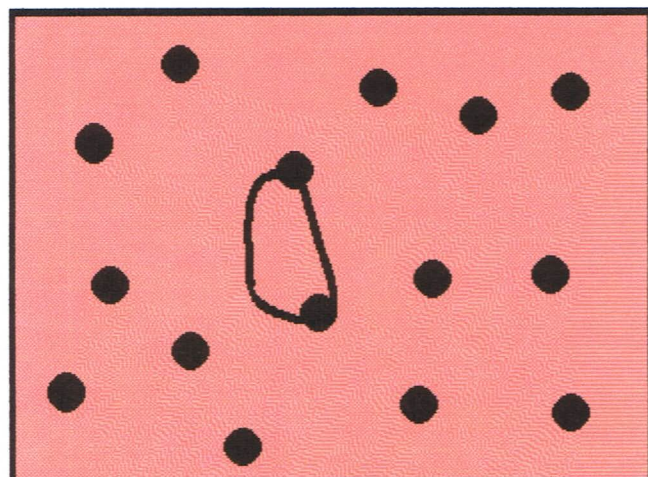
- Paper and pencil

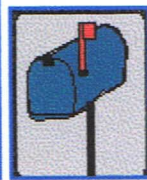
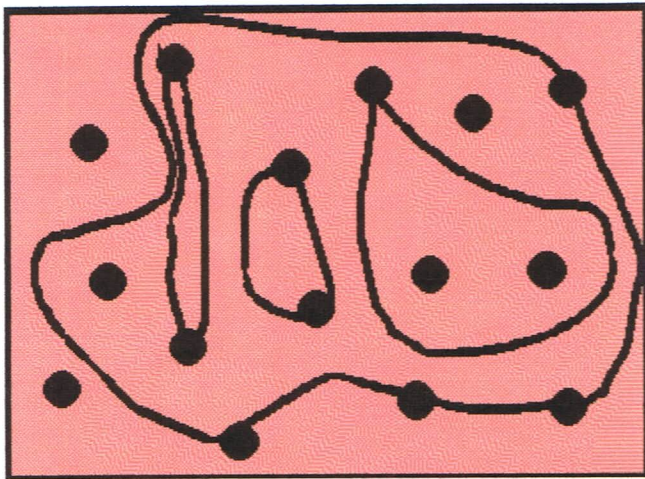
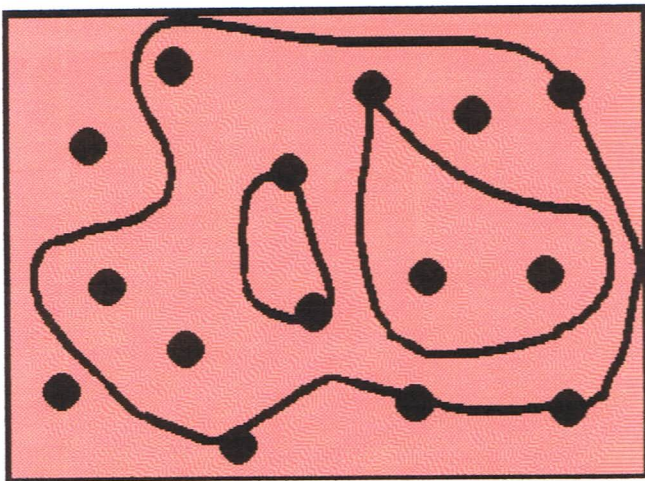
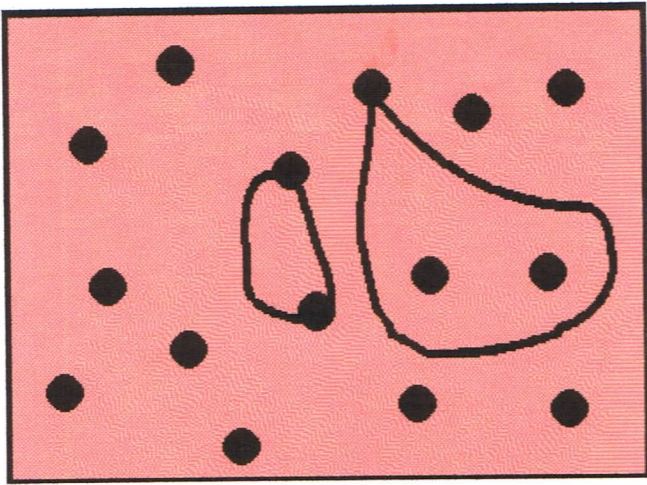
How to play

- To set the game up, draw some dots that are randomly placed on the paper, like this:



- At each turn, a player draws a closed loop that goes through at least one dot and does not meet any other loop. (A closed loop is a line that starts and stops on the same dot and doesn't cross itself anywhere in between.)
- The player who draws the last possible loop loses.
- Here is how a round which starts with the dots above might begin:





Stop-Gate

This game is taken from the book *On Numbers and Games* by John Conway (Academic Press, 1976) and is attributed to Goran Andersson.

What you need

You can use any of the following to play this game

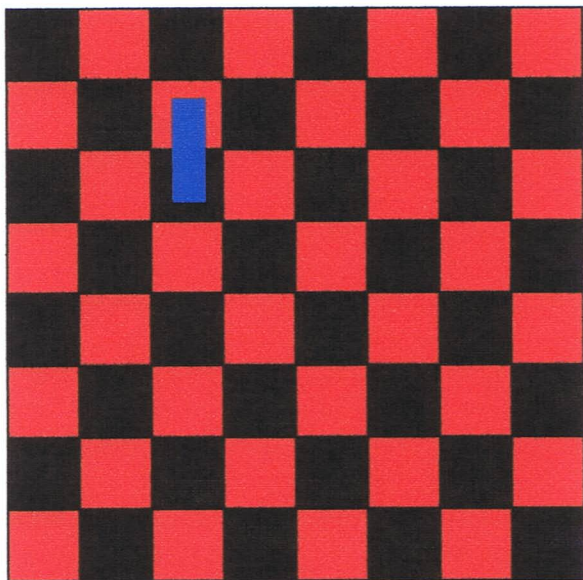
- Checkerboard and a set of dominoes
- Checkerboard and strips of paper
- Graph paper and a pencil
- A grid of dots and a pencil

Stop Gate with a Checkerboard and Dominoes

The dots on the dominoes are irrelevant for this game, so you can turn them upside down. If you don't have dominoes, you can use domino-sized strips of paper or two checkers (or poker chips, or unifix cubes) placed side by side. (In the pictures that follow, the dominoes are shown in blue, instead of their traditional black, so they can be distinguished from the black squares on the checkerboard.)

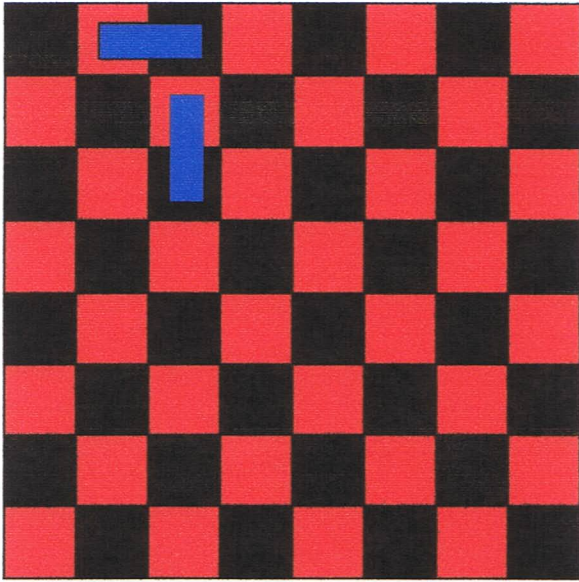
To play

- One player starts by placing a domino over two adjacent squares on the checkerboard. The domino can go in an up-down direction or left-right but not diagonally. Whatever direction the player chooses will be the direction in which that player *always* places dominoes during the game. In the example below, the first player has chosen the up-down direction.

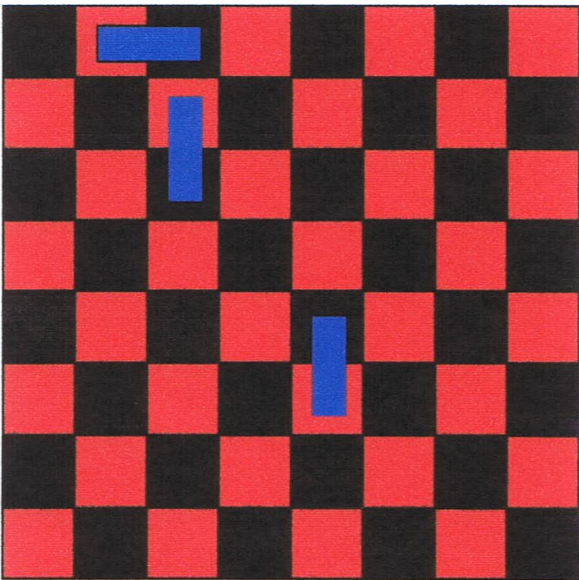


- The second player places a domino over two adjacent squares in the direction not chosen by the first player. The domino may not be in any squares that are already occupied by a domino. This is a move the second player could

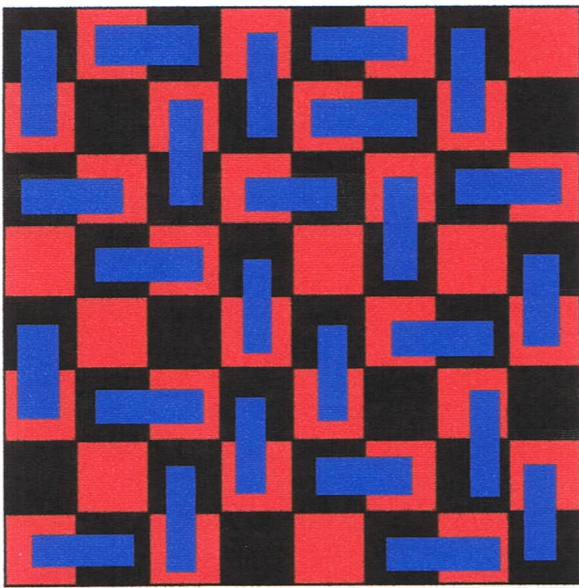
choose in this game.



- The first player places another domino in the correct direction.

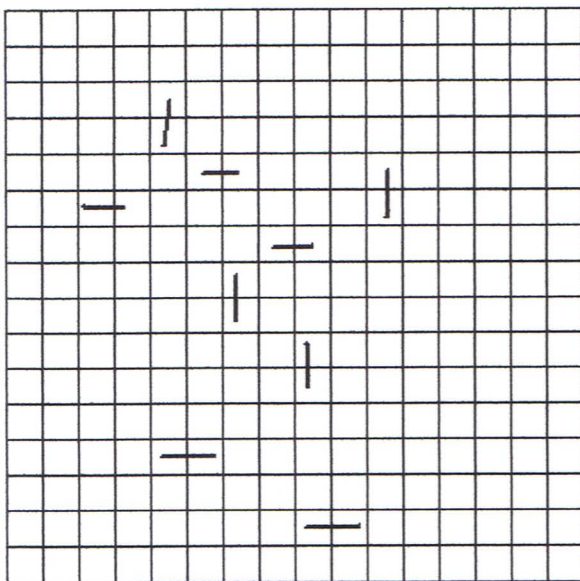


- And then it is the second player's turn.
- The game ends when one of the players is unable to find a place to put a domino.
- The the player who was unable to play loses.
- This is how the game that was started above might look by the time it is finished. (Who won?)



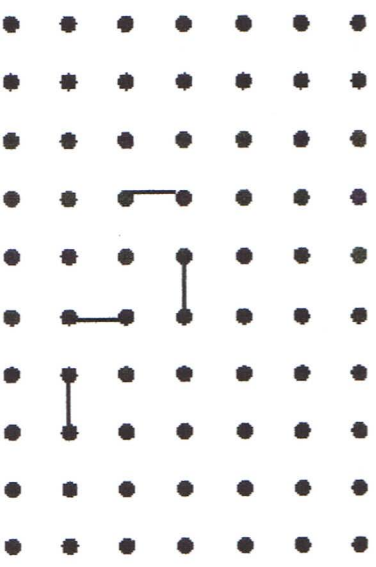
Stop Gate with paper and pencil

You can use graph paper of any size to play stop gate. You don't have to limit yourself to the size of the checkerboard. You don't need dominoes, either. Draw lines with a pencil to show where the dominoes go. A game of Stop-Gate on graph paper might start out looking like this.

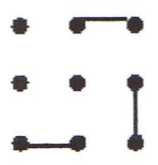


If you don't have graph paper and you don't have a checkerboard, you can still play if you have a blank sheet of paper on which you have drawn a grid of dots. (The grid can be any size.)

Here is how a game on a grid of dots might look after a few turns.



Notice that only one line can touch a dot.



This is okay:



Two lines touch a dot here. It is **not legal!**

Hackenbush Unrestrained

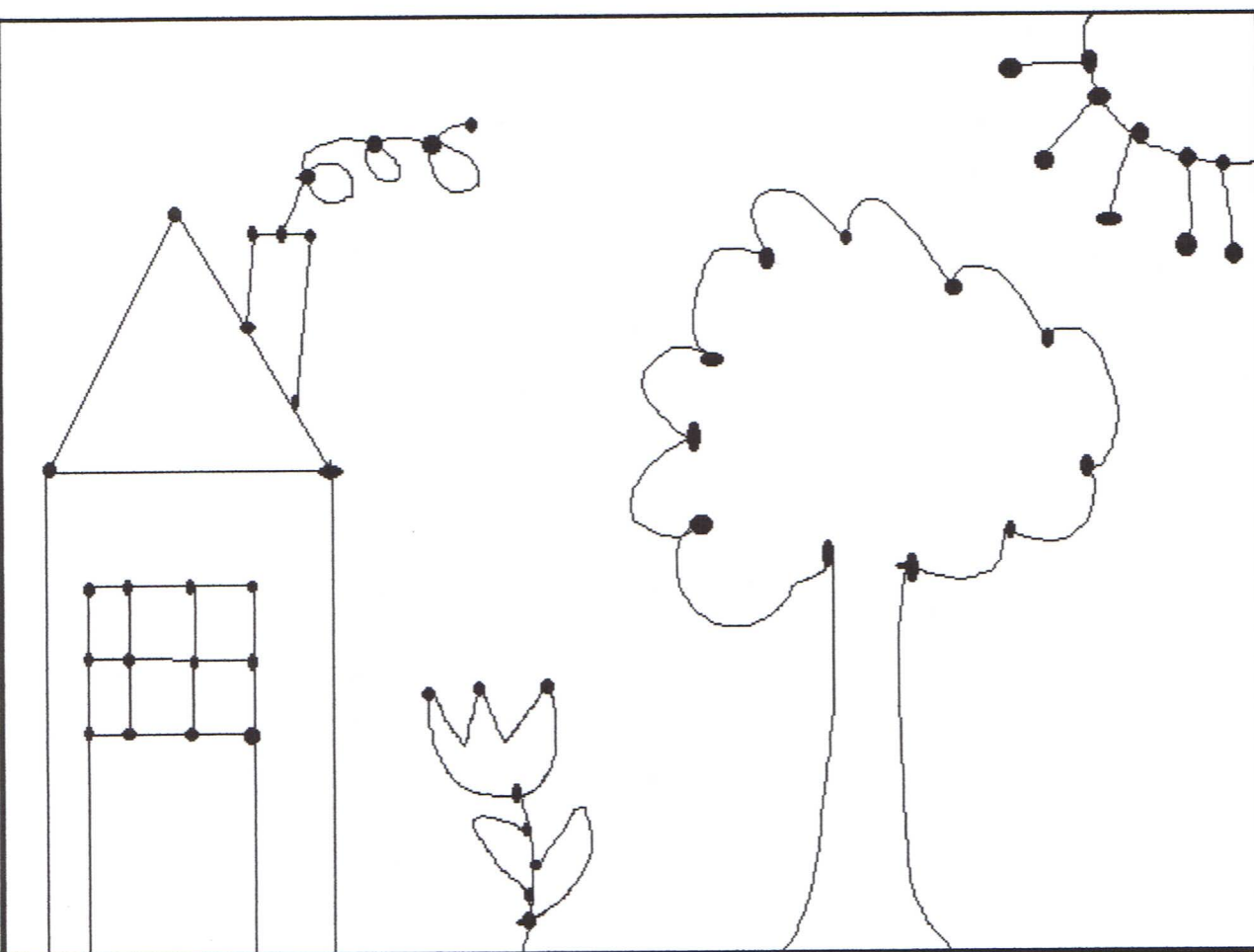
This game is taken from the book *On Numbers and Games* by John Conway (Academic Press, 1976). This is the most basic form of Hackenbush. More complicated versions of the game are [Hackenbush Restrained](#), [Hackenbush Hotchpotch](#), and [Technicolor Hackenbush](#).

What you need

- A Hackenbush Picture (see below). It works well to draw it on a chalkboard. It is okay to use a picture that has been drawn with paper and pencil, but the erasing will be a bit more difficult.

Hackenbush Pictures

A Hackenbush Picture looks a little bit like a connect-the-dots picture that is inside a frame. Here is an example:



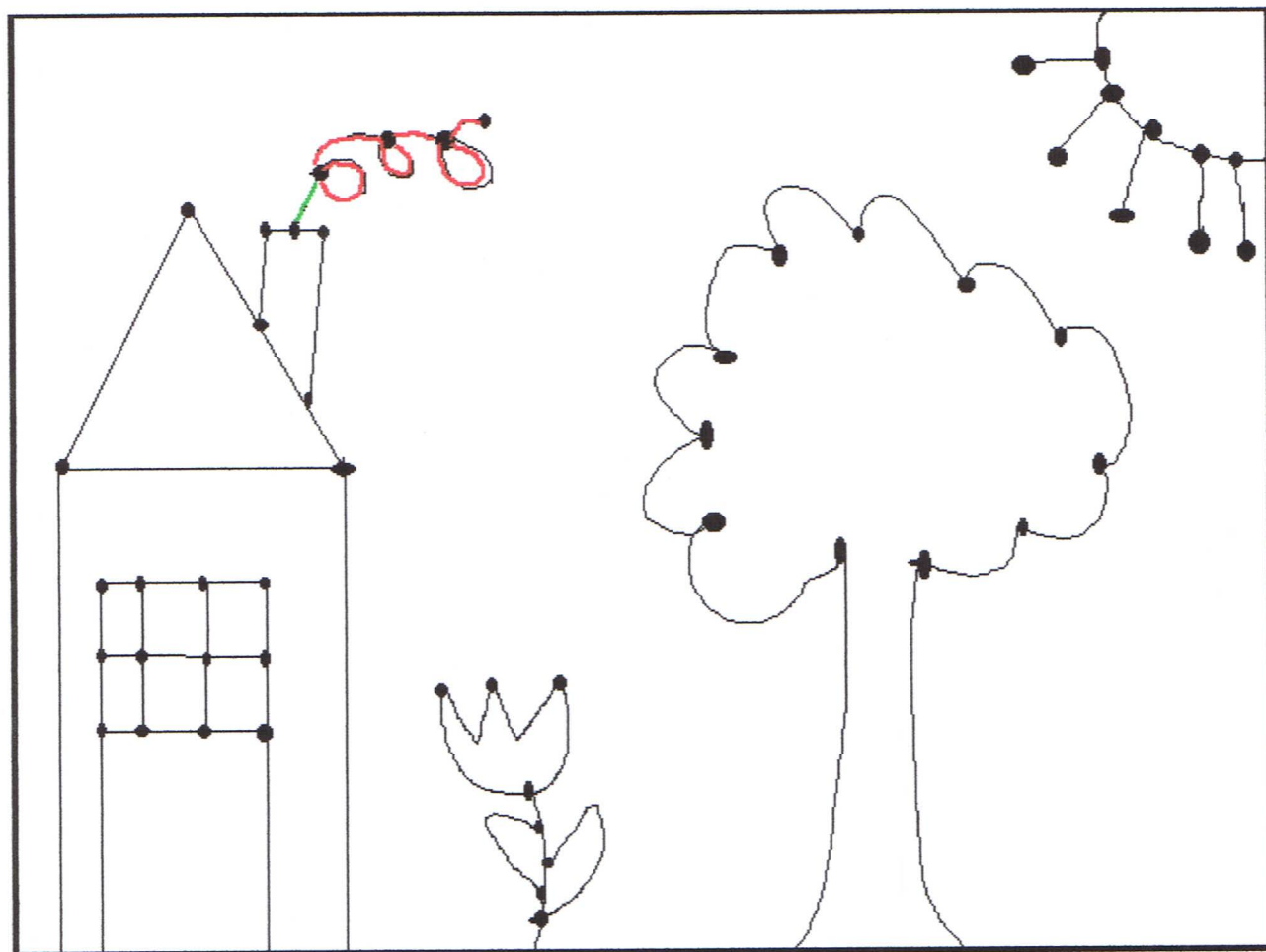
Notice that:

- The picture is drawn with jointed lines.
- Lines can be straight or curved.
- Every at each joint, there is a dot.

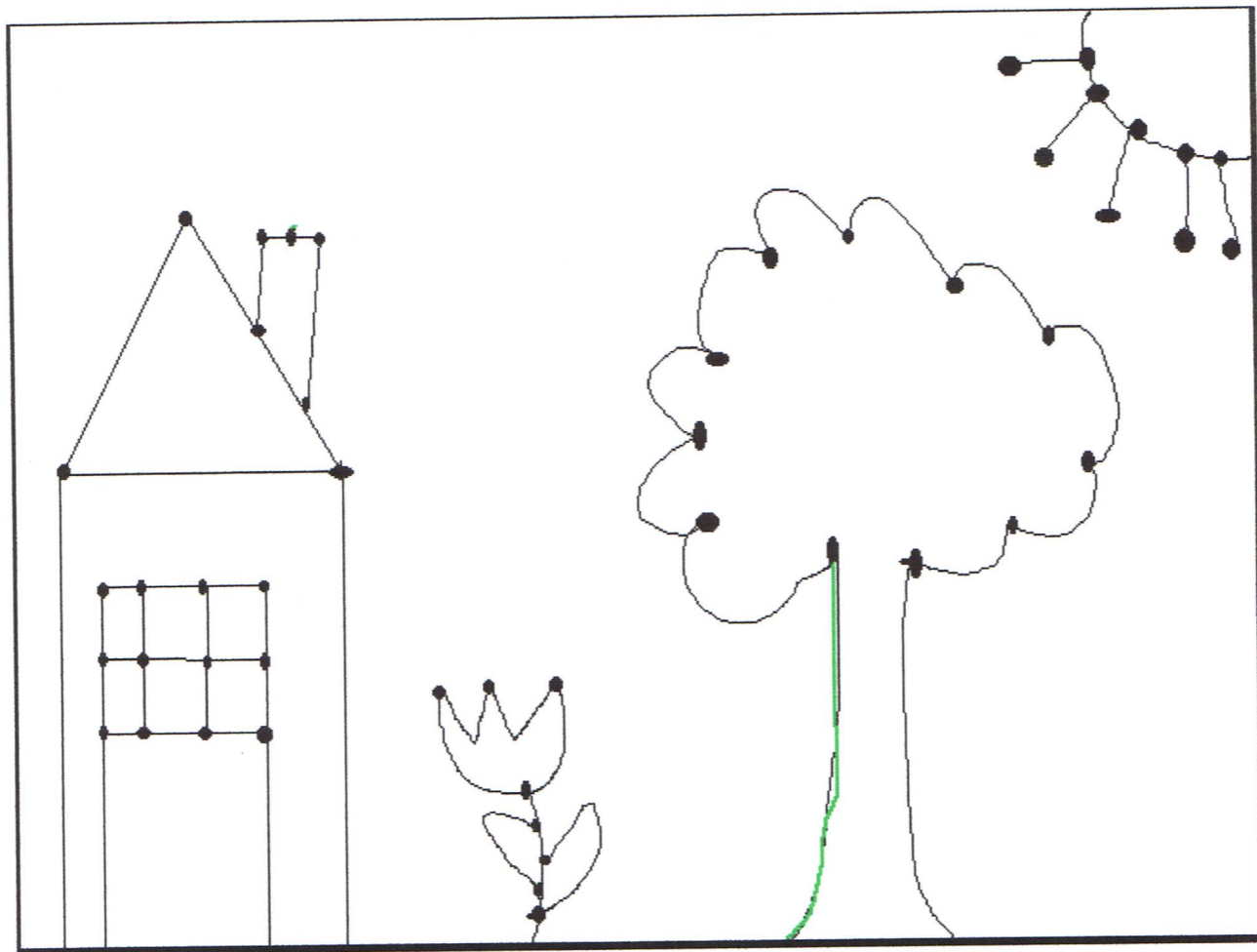
- Every part of the picture is connected to the frame.
- There is no dot where the lines touch the frame.
- Every line has a dot at both ends, unless the end touches the frame.
- A line can begin and end on the same dot.

How to play

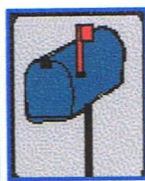
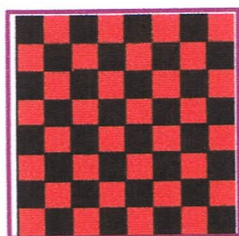
- At each turn, a player begins by removing (erasing) one line.
- If, after that one line is removed a part of the picture has become disconnected from the frame, that section of the picture must be removed, also.
- Notice how, in the example below, if the line shown in green is removed, all the red lines must also be removed.



- In the next example, no additional lines will need to be removed when the green line is erased.



- The player who removes the last bit of the picture, leaving only the frame, is the winner.

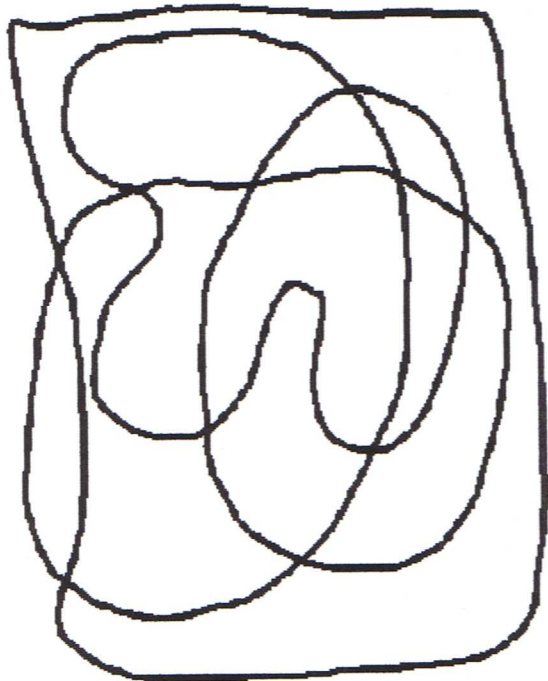


The Game of Col

This game is taken from the book *On Numbers and Games* by John Conway (Academic Press, 1976) and is attributed to Colin Vout. Do you think the game is named after the inventor or for the fact that it has to do with coloring?

What you need

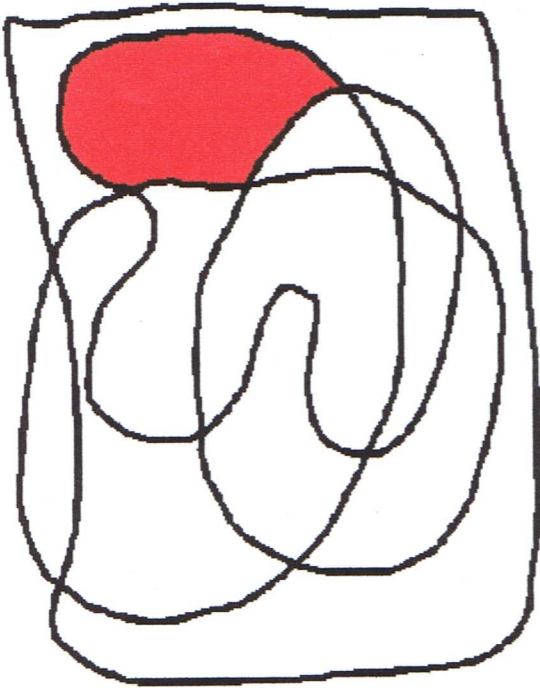
- A [map to color](#). This one will do to start.



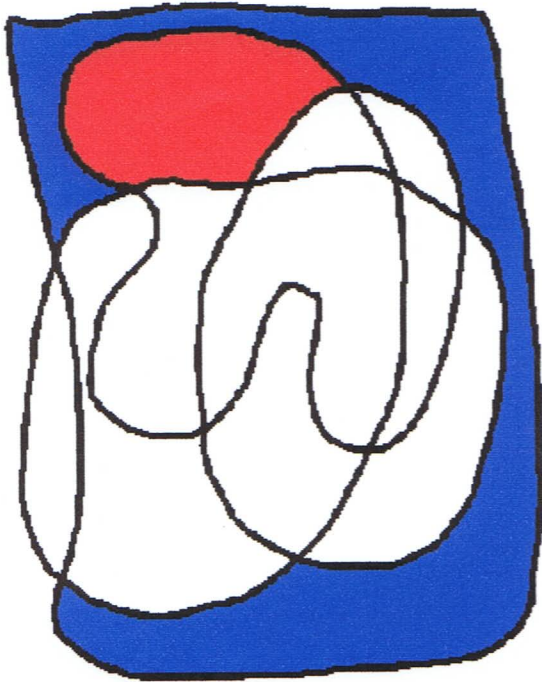
- A different color of crayon for each of the 2 players.

How to Play

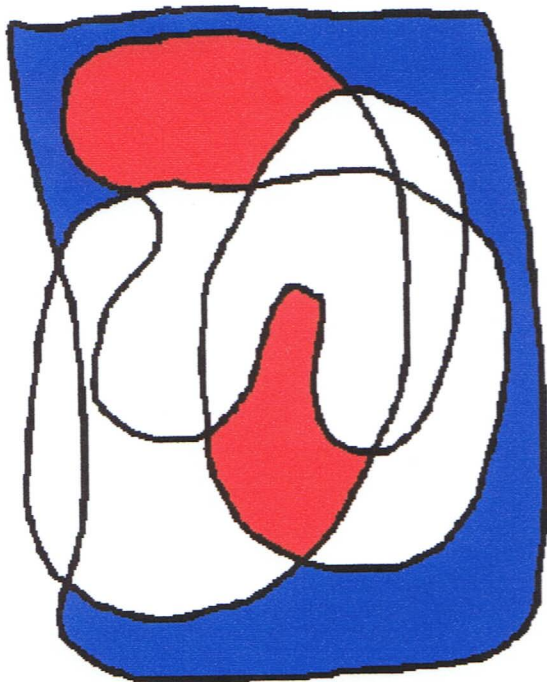
- The first player colors any region of the map, and uses that color throughout the game.



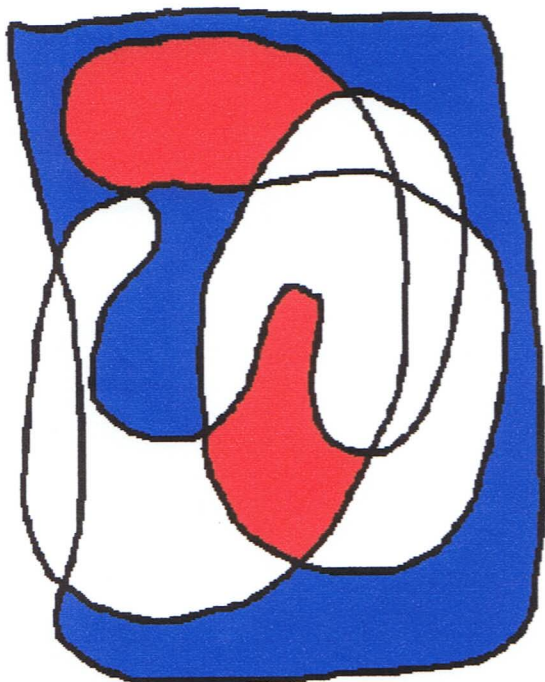
- The second player uses a different color and colors any region of the map. The second player also keeps the same color throughout the game.



- The first player colors a region of the map, but cannot color a region that would cause 2 regions that share a boundary to have the same color.



- The second player colors a region, but again, it must be a region that does not share a boundary with a region that is already colored in the color that the second player is using. Notice, however, that two regions can be the same color if they meet only at a single point. A boundary has to be a line.



- The game ends when one of the players is unable to find a region to color. That player loses. If these players finished like this, who won?

Digital Deletions

This game is taken from the book *On Numbers and Games* by John Conway (Academic Press, 1976).

What you need

- Chalkboard and chalk. (You can play with paper and pencil, too, but the erasing can get kind of messy.)

How to play

- Begin by writing down a string of digits (numbers) that's as long or as short as you like. The digits can be 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 and appear in any combinations that you like. You don't have to use them all. Here is an example:

536042860636053803

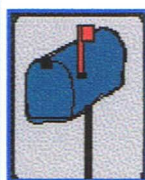
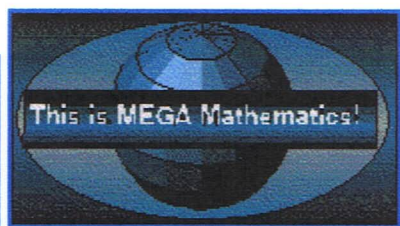
- On a turn a player may either:
 - Change any one of the digits to a value less than the number that it is. (No negative numbers are allowed.) For example, you could change a 5 into a 4, 3, 2, 1, or 0.
 - Erase a zero and all the digits to the right of it.
- The player who removes the last digit loses.
- The game that begins with the string of numbers above could proceed like this::

536042860636053703

5360428606360537

5360408606360537

53604

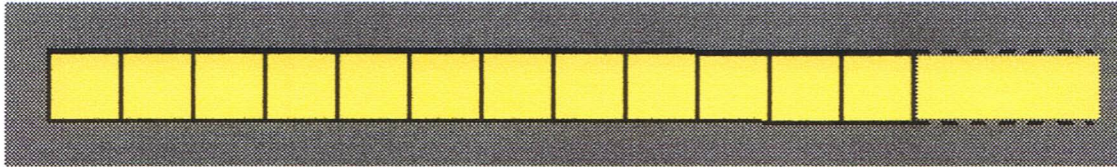


Coin Strip

This game is taken from the book *On Numbers and Games* by John Conway (Academic Press, 1976). This game is quite similar to [Welter's game](#).

What you need

- A strip of paper, any length, marked off into squares, like this..



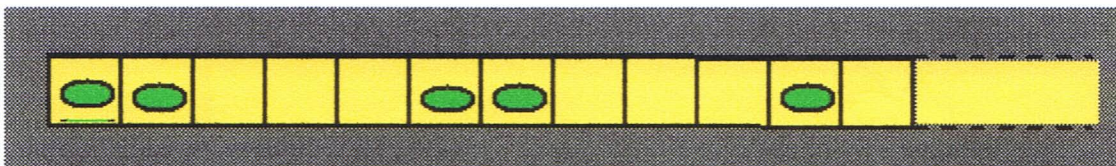
- A bunch of coins, or poker chips, or unifix cubes, or scraps of paper to use as markers.

How to play

- Set up the game by laying out the strip of paper and placing any number of coins anywhere on the paper, one coin per square, leaving as many squares as you like empty.



- Each of the players takes turns moving a coin. This is how coins may be moved:
 - Two coins may not share a square.
 - No coin may pass another coin.
 - Coins only move to the left
 - Within these restrictions, coins can move any number of spaces.
 - Here are a few moves that these players could make:





- When all the coins are lined up on the left, no more coins can be moved. The last player to move a coin is the winner. (Which is to say the first person who cannot move a coin loses.)

