	Season	2
Sprouts	Episode	18
	Time frame	2 periods

Objectives :
- Introduce the vocabulary of Graph theory.
- Show how a game can be solved by exhaustion.

Materials :
- *Rules.*
- **A large room, with not too many tables and chairs, would be better suited for this activity.**

Period 1

1 – The rules of the game   10 mins

The rules of the game are explained, with a few games played on the board by the teacher and some students. Vocabulary is introduced.

Graph – Vertex – Edge – Order of a graph – Degree of a vertex

2 – Playtime   10 mins

Students play some game of sprouts by pairs.

3 – Solving the 1-vertex game   5 mins

The 1-vertex game is completely solved and it is shown that it's a second-player win.

4 – Solving the 2-vertices game   30 mins

Students have to collectively solve the 2-vertices game and find out if there is a winning strategy. Teacher's input should be minimal during this part.
- The class is divided in four groups.
- Each group is given some large paper sheets (half clip-board sheets) and some pens.
- Each group has to build a large tree showing all the possible moves, with one move on each paper. Equivalent moves must not be differentiated.
- Each group has to devise a winning strategy for the first or second player.

Period 2

5 – Solving the 2-vertices game (continued) `10 mins`

Students are given some time to take a look at the tree they did during the previous period and review the winning strategy.

6 – Championship `35 mins`

Each group plays a 2-vertices game against every other group twice (switching first and second players in each game).

	G1	G2	G3	G4
G1				
G2				
G3				
G4				

A mark is then awarded to the group depending on the number of wins :

1 win : 12 points ;

2 wins : 15 points ;

3 wins : 18 points ;

4 wins : 19 points ;

5 or 6 wins : 20 points.

1 Origin and rules

The game called "Sprouts" was created in 1967 by mathematicians Michael S. Paterson and John H. Conway (the creator of the game of Life).

This is a two-players game, played with just pencil and paper. Start with a number of spots, or vertices. The two players take turns drawing a line (not forcedly straight) between two vertices or from a vertex to itself, and placing a new point on the line. A turn is also called a *move*. A few rules apply :

- A line must not cross any other line.
- At most three lines can start from any vertex. We say that each vertex has exactly three "lives". When exactly three lines start from one vertex, it is considered *dead* and cannot be used in the game any longer.

The last player to be able to play wins.