



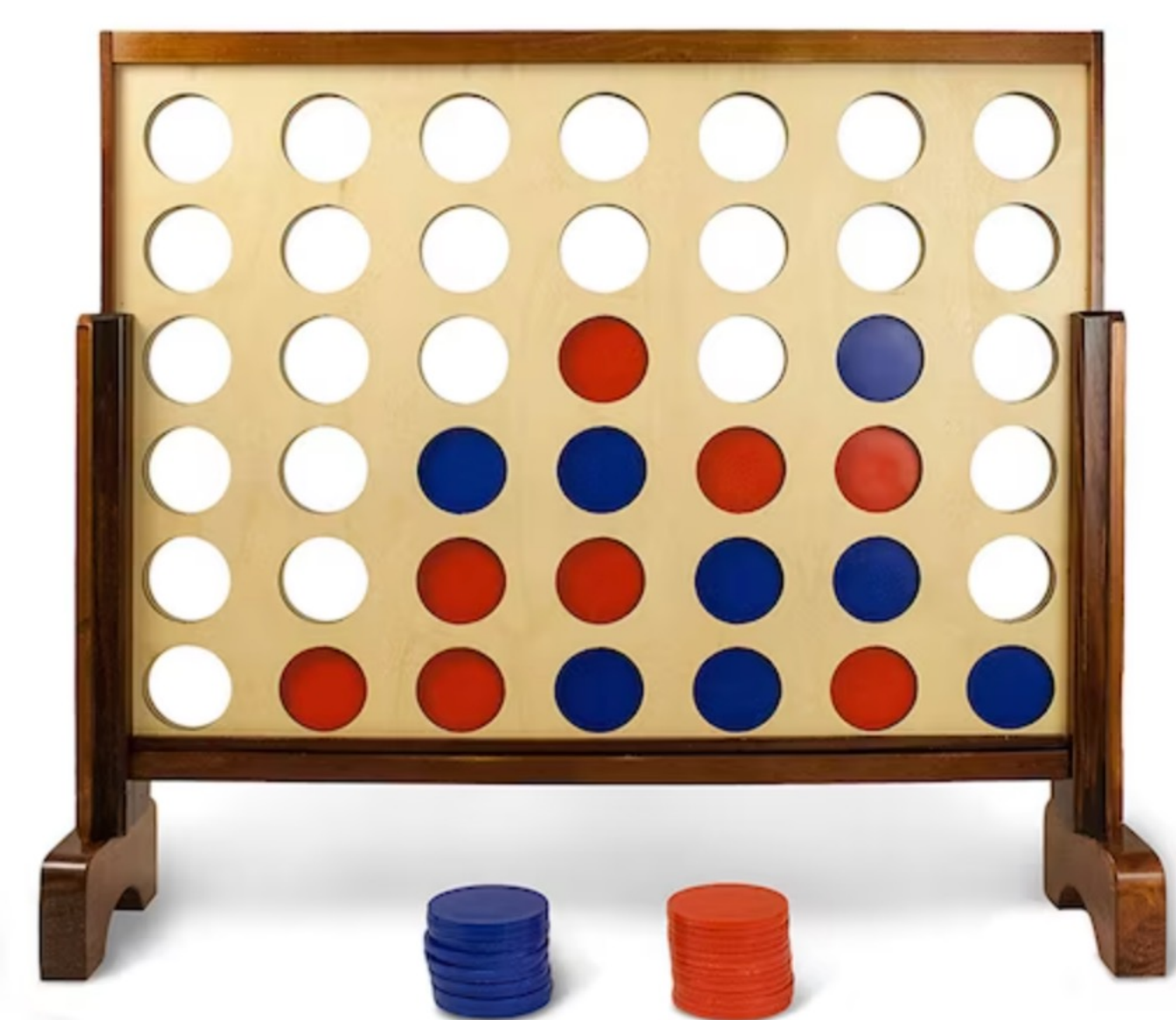
Connect Four and Grid Games

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Connect Four

- Two players take turns.
- Six by seven grid in which the chips fall to the bottom.
- A win is four chips in a row (vertically, horizontally, or diagonally).
- Extensively studied and solved, using VICTOR. (Victor Allis)
- Player 1 has an advantage.



Tic-Tac-Toe Strategy

1. Take winning move if available.
2. If the opponent can win in a square by his next move, play to block.
3. Taking the **central square** is more important than taking other squares.
4. Taking **corner** squares is more important than taking squares on the **edges**.

*Game ends in a tie.

3 by 3 Connect 3 Modified Strategy

- Apply Tic-Tac-Toe strategy to 3 by 3 Connect 3.
- *The game chips drop to bottom of grid.
- **Game ends with a Player 2 win.

Using Tic-Tac-Toe Strategy

Legend:

- Player 1 denoted by X
- Player 2 is denoted by O
- Xn denotes nth move for X.

Tic-Tac-Toe

O2	X5	X4
X3	X1	O3
O1	O4	X2

3 by 3 Connect 3

O2		O3
X2	O4	X3
X1	X4	O1

Using Modified Strategy:

- For **n rows** and **3 columns**

*X starts in a corner, but O wins.

Setup of Connect Four

6							
5							
4							
3							
2							
1							
	a	b	c	d	e	f	g
	-2	-1	0	1	0	-1	-2

X can win in 21 moves.

“Best” Strategic Move in Connect 4

<https://connect4.gamesolver.org/>

6	X10	O10	O12	O6		X17	X20
5	O9	X7	X12	X3	X21	O16	O19
4	X9	X6	O11	O2	O20	X16	X19
3	O8	O5	X11	X2	O14	O15	O18
2	X8	X5	O7	O1	X14	X15	X18
1	O3	O4	X4	X1	X13	O13	O17
	a	b	c	d	e	f	g

VICTOR

VICTOR generates all the possible positions that follow from the current state of the game, and gives a value for each possible move.

If X does not start in the middle column, VICTOR provides strategic rules that O can use to draw or win the game.

If Player 1 Starts in a Corner

6							
5							
4							
3							
2							
1	X1						
	a	b	c	d	e	f	g
	-1	2	1	2	-1	1	-1

O can win in 20 moves.

6							
5							
4							
3							
2							
1	X1	O1					
	a	b	c	d	e	f	g
	-2	-2	-3	-2	-2	1	-2

X loses in 19 moves.

6	X5	X7	O9	X16		X17	O19
5	O4	O6	X9	O15		O16	X19
4	X4	O5	O8	O11	O20	X15	O18
3	O2	O3	X8	X11	X20	O14	X18
2	X2	X3	O7	O10	X13	O13	O17
1	X1	O1	X6	X10	X12	O12	X14
	a	b	c	d	e	f	g

	Player 1 wins	Draw	Player 2 wins
1st move	d	c, e	a, b, f, g

Other Games

Expansion of grids and moves can result in longer and more strategic games such as:

- Score Four
- Dawson's Chess
- Chess

References

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