

## 2-Rules of Take-1-2-3

To start with I'll call this game 1-2-3 for short.

1. The game of 1-2-3 begins with a pile of toothpicks or any other small objects. Perhaps you wonder: How many in the pile? Well, we can play 1-2-3 with any number in the pile.
2. The players take turns reducing the size of the pile by taking either 1 or 2 or 3 toothpicks away.
3. When a player can't move that player loses.

To show a sample game on paper, I won't actually use pictures of toothpicks; instead I'll use a number which represents the size of the pile. In this sample game, we start with a pile of 15. Note that the play in this sample game is legal but not correct. That is to say both players miss opportunities to force a win.

Pile size	Move by 1	Move by 2
15	-2	
13		-1
12	-3	
9		-2
7	-3	
4		-3
1	-1	
0		

Player 1 wins since player 2 now has no move.

Now play some games with your neighbor. Try to find a winning strategy for those positions where forcing a win is possible.