

How to win at ‘Rock, Paper, Scissors’, ‘Hangman’ and ‘Connect 4’

ROCK, PAPER, SCISSORS

It turns out that initially people choose scissors, paper, or stone with a probability of around one-third, distributing their affections randomly. By round two, however, players who have just won are more likely to stick with their previous choice—after all, it worked once, so it might do so again. For exactly the same reason, losing players tend to change—and to change in a more “powerful” direction. If, for instance, they lost by playing paper, they will shift to scissors rather than rock, as scissors beats rock but stone does not.

For the serious games strategist, the conclusion is simple: If you lose a round, in the next round make the choice that would have meant you had won instead—your opponent is likely to stick with their stance. If, conversely, you win a round, look at the choice they lost on and go for whatever would lose to it: if they lost on stone, choose scissors; if they lost on scissors, choose paper; if they lost on paper, choose stone.

If in doubt, go with paper. According to the ‘World Rock, Paper, Scissors Society’, in competition play scissors are used 29.6% (less than a third) so paper will give you an edge.



HANGMAN

Beating the executioner in Hangman is fundamentally a matter of letter frequency analysis. Which letter can you guess that has the most chance of being in a randomly chosen word?

One common approach is for people to try all the vowels first or, gaining sophistication, look at the number of times letters pop up in the dictionary, going with the ordering ETAOIN, representing letters' occurrence in decreasing frequency.

The problem is, a dictionary of likely hangman words is different from a dictionary of all words. We have so many glue words like the and on and an, that it skews the distribution. If we exclude those then you get a different frequency: ESIARN.

That is just the beginning, though, for the smart hangman player. Letter frequency analysis is a very well-developed science, in part because of cryptography, where simple letter substitution codes have been cracked for centuries by looking at which letters occur most often in written text. In some codes—and in hangman—you have more information than just the letters, you also have the length of the word. And while E might be the most common letter in the English language, it is not the most common letter in five-letter words. S is. Neither is it the most common in four-letter words. That honor goes to A.

But there are further complications. In a six letter word, E might be the most common letter in six-letter words, and S the second most common, but what if you guess E and E is not in it then A is the next best letter to guess.

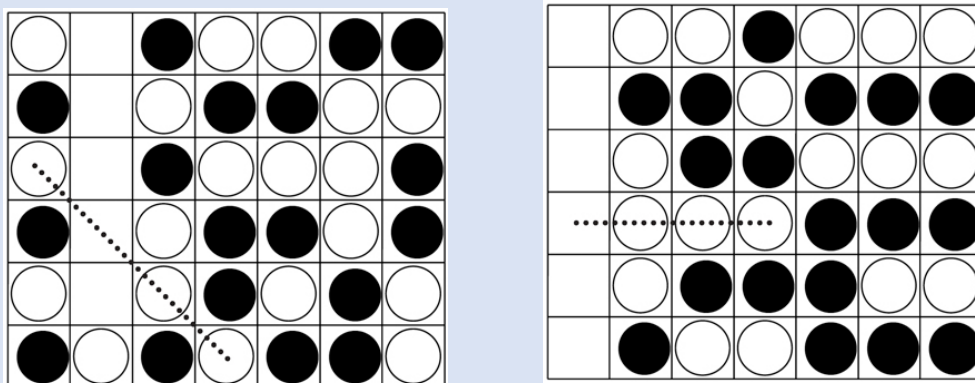
If you are the one choosing the word, the best way to defeat someone is to choose the word 'jazz'.

Number of letters	Optimal calling order
1	A I
2	A O E I U M B H
3	A E O I U Y H B C K
4	A E O I U Y S B F
5	S E A O I U Y H
6	E A I O U S Y
7	E A I O U S
8	E A I O U
9	E A I O U
10	E A I O U
11	E A I O D
12	E A I O F
13	I E O A
14	I E O
15	I E A
16	I E H
17	I E R
18	I E A
19	I E A
20	I E

CONNECT 4 (aka how Beyonce beat Kanye)

A Connect 4 game between two closely matched players often ends the same way. Both players get a few sets of three tiles in a row. These sit on the board, their end dangling threateningly in midair, waiting for the other player to put their tile below, so they can be completed. The rest of the board then fills up, leaving free the column containing this threat until, eventually, the players have to fill the column and—depending on whose go it is—one player is forced to put a tile where she doesn't want to, giving victory to the opponent.

How to win: to start with -go first, and take the centre slot! There are 42 spaces on a Connect 4 board—seven columns by six rows. If six columns are filled, that means 36 tiles have been placed. Half are red, half are yellow. The 37th tile, the one that has to go at the bottom of the unfilled column, must therefore be filled by the player who went first. If the other player has their threat on the second row of that column, this is bad news for the first player, who is forced to facilitate their victory. Conversely, if the first player has a possibility to complete four tiles on the third row of that column, it is very good news indeed.



This scenario happens all the time, and normally holds true even if a column does not remain empty.

So, to win, ensure your threatened four in a row will be completed by putting a tile on an odd row—the third or fifth (the first is no use, because your opponent will block a threat there instantly).

If you go second, ensure it is completed by putting a tile on an even row—the second, fourth, or sixth.