

Card Counting

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The object of the game Hi/Lo is to guess whether or not the next card is higher or lower than the card already flipped. The dealer starts with a standard deck of cards and flips the top card over. The player then has to decide whether or not the next card will be higher or lower than the card already flipped. If the player guesses correctly whether it is higher or lower the player wins that round. If the player guesses incorrectly the dealer wins the round. If the second card flipped is equal to the first card then it is a draw and nobody wins the round.

The mathematics part of the game is simply probability. In this game we are going to say that Aces are low and Kings are high. When the first card is flipped the player needs to think about the chances of the card being lower, higher, and equal to that card. Let's say that the dealer flips over a four of clubs as the first card. The player now needs to think about what the probability of the next card being lower, higher, and equal to that card. There are 15 cards that are lower than or equal to the four of clubs. For example; four aces, four two's, four three's, and three more four's. There are 52 cards in a deck, after you flip over one you are left with 51 cards. To figure out the probability of the next card being higher than the four of clubs the player needs to take 51, the number of cards left in the deck, and subtract 15, the cards that are lower than the four. This leaves the player with a probability of $36/51$ or 71%. This means that you will guess correctly 71% of the time.

You have turned over a total of 13 cards; each one being of a different value (ace through king). The most recent card you have turned over was a seven. What is the probability of the next card being lower than a seven?

$52 - 13 = 39$	number of cards left in deck
6	the number of card values left
3	the amount of cards left at every value
$6 * 3 = 18$	the amount of cards left in deck below 7
$18 / 39 = 46\%$	the chance the card is lower than 7

Card counting is not just applied to the game Hi/Lo, but in many other gambling games such as blackjack. Many books and movies have been written and published on the strategies and methods of counting cards. *Blackjack: Take the Money and Run* by Henry Tamburin is one of the books we found while researching card counting. This book is ideal for recreational casino players that want to learn how to play blackjack in a casino and more importantly how to win the game. The book contains three levels of playing strategies for the beginner, intermediate and advanced players. The most recent movie produced about the methods of card counting, and its advantages and disadvantages is the movie 21. In this movie a group of students attending MIT decide to use the methods card counting in the Las Vegas casinos to earn some extra money. One of the students goes a little too far and does not stop when he should have. He is caught by the casino, but makes a deal with them trading his professor, who taught him the art of card counting, for his winnings.

Is card counting really worth the effort? Some have stated that without counting the cards the game being played has a negative expectation. People who do not know how to count cards will most likely always lose. Dealers know how to count cards and therefore the odds are in their favor. To make the game fair on both sides people say they must count cards, without it they will lose. The dealer has an unfair advantage over the players and counting cards will even this out. But if caught by the dealer or the casino you are playing in you could face major fines and banishment from the casino. It is looked down upon by all casinos. Our conclusion is, it is worth it if you are good and you know you will not be caught.

Below is a chart that shows what card was last flipped over and the probability you have of guessing higher or lower correctly for the next card.

Guessing Higher

- Ace~ 48/51
- 2~ 44/51
- 3~ 40/51
- 4~ 36/51
- 5~ 32/51
- 6~ 28/51
- 7~ 24/51
- 8~ 20/51
- 9~ 16/51
- 10~ 12/51
- Jack~ 8/51
- Queen~ 4/51
- King~ 0/51

Guessing Lower

- Ace~ 0/51
- 2~ 4/51
- 3~ 8/51
- 4~ 12/51
- 5~ 16/51
- 6~ 20/51
- 7~ 24/51
- 8~ 28/51
- 9~ 32/51
- 10~ 36/51
- Jack~ 40/51
- Queen~ 44/51
- King~ 48/51

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