Card Game

Question

Ken and Barbie are gambling on a card game with £96 in the pot. A standard pack of cards is shuffled and the cards are turned over two at a time. If the cards consist of one red and one black they are discarded; if they are both red Ken gets them and if they are both black Barbie gets them. At the end of the game the player with more cards wins.

They have reached the point where four cards are remaining when the game has to be abandoned. At this point Ken has two cards more than Barbie. They argue about how to divide the stake.

Ken argues, “The Law of Averages says that over the last two rounds each of us will do equally well, so I will win the game and should collect all the money.”

Barbie argues, “When two cards are turned over there is a 0.5 probability that there is one of each colour, 0.25 that it is two reds and 0.25 that it is two blacks. There is therefore a 1 in 16 chance that I will win the game by getting four cards from the last two rounds, so I should get 1/16 of the stake. It should be divided £90 to Ken and £6 to me.”

Who is right? Why? How should the money be divided most fairly?

Solution

Ken is wrong. The “Law of Averages” relates to likely outcomes over the long term and cannot guarantee a result like this. He is not certain to win.

Barbie is also wrong! She assumes the probability of each pairing is independent of each other and of previous pairings. In fact the pack of cards initially contains the same number of red and black cards. When a pair of opposite colours is turned over, one card of each colour is discarded, so the cards given to each player are equally divided between red and black. The game is sure to end in a draw.

How the money should be divided fairly between two incompetent gamblers is open to argument, but the game is pointless!