

## MathSnacks by Marty Ross, Burkard Polster, and QED (the cat)

### Bad Bets!

### Clever Coins



Throw four coins in the air. Then, you “expect” two heads and two tails to come up. But would you bet on it?

There are  $2^4 = 16$  different ways the coins can fall. And, only 6 of these ways result in exactly two heads and two tails. So, the probability is  $6/16 = 3/8$ . A bad bet!

### Sneaky Note



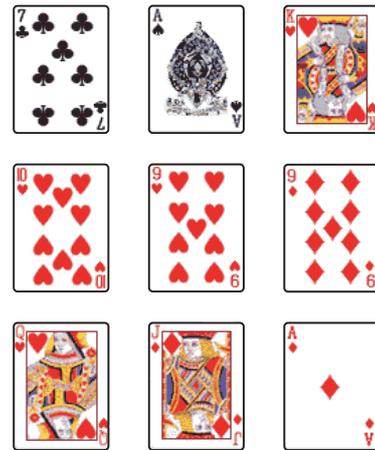
Every Australian banknote has eight digits in its serial number. Your opponent has a banknote, and you have to think of two distinct digits. Would you bet that your two digits appear on the banknote?

If all eight digits on the banknote are distinct, then the probability that your two digits are included is  $28/45$ . But overall, the probability is 0.31. A bad bet!

## Ripper How to Cheat at Everything, Simon Lovell, 2007

### Reference Thunder's Mouth

### Cunning Cards

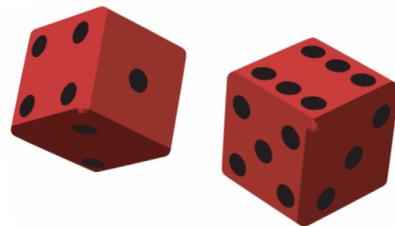


7 red cards and 2 black cards are chosen from a deck of cards, and are arranged face down in a  $3 \times 3$  square. You want to choose a line, either horizontal or vertical or diagonal, which contains 3 red cards. Would you bet that you can do it?

Once you have chosen your line, there are 6 spots remaining. So, there are  $6 \times 5 = 30$  ways to place the black cards to avoid your line. And, overall there are  $9 \times 8 = 72$  ways to place the black cards. So, the probability of choosing a completely red line is  $30/72 = 5/12$ . A bad bet!



### Dodgy Dice



A pair of dice is thrown over and over. You want a total of 7 to appear twice. Your opponent is waiting until a total of 6 and a total of 8 have appeared. Would you bet that you can get there first?

On any given roll, a total of 7 is most likely, with a  $1/6$  probability of occurring. But the probability of either a 6 or an 8 occurring is  $10/36 = 5/18$ . Overall, the probability of getting your two 7's first is  $3519/7744$ . A bad bet!