Practical Maths

A first look at Probability

This gambling problem is thought to be one of the first to use the ideas behind probability theory. As a result of solving this problem Pascal (with the help of Pierre de Fermat) began working out the theory of probability in its modern form. This problem is particularly useful for helping students interpret and make connections between the different strands of probability they have learnt.

The problem:

Around 1650 the Chevalier de Mere suffered financially for incorrectly assessing his chances of winning two different dice games.

The Chevalier systematically tried his luck with the following dice games:

The first game involved betting on rolling at least one six in four throws of a single die.
The second bet was on rolling at least one double six in 24 throws of a pair of dice.

The Chevalier thought his chances of winning the first game was:

The chance of getting a 6 in a single throw is 1 out of 6.
Therefore, the chance of getting a 6 in 4 rolls is: 4 multiplied by 1 out of 6;
i.e. 2 out of 3.

For the second game, he assessed his chances of winning as follows:

The chance of getting a double six in one roll is 1 out of 36.
So, the chances of getting a double six in 24 rolls is: 24 multiplied by 1 out of 36;
i.e. 2 out of 3.

To his surprise the Chevalier ended up losing badly with the second gamble, so he sought help from one of the great thinkers of his time, Blaise Pascal.

The task:

Correct the Chevalier de Mere's errors.

The hint:

Think about what is not possible, for example with the first game you only lose if you don’t get any sixes in four throws of a single die.