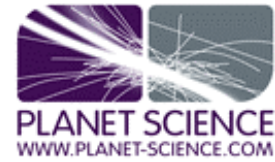




## Scary Medical Statistics: Lost In Interpretation!

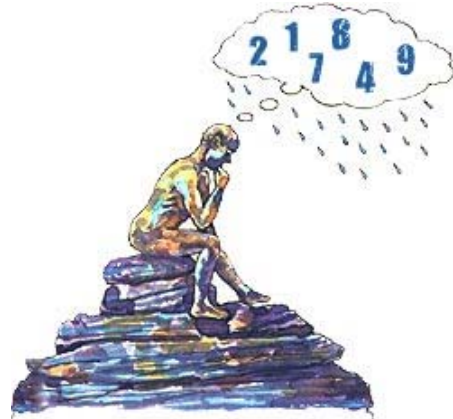
### Background Notes



## Probabilities, Statistics, Percentages and Numbers

Numbers are everywhere, and it seems obvious that if you have two pounds and you add two pounds to them, you have four pounds. But did you know it may have taken man millions of years to be able to think in numbers? To this day, it's the hardest concept to teach children.

In ancient times, if a man wanted to tell someone how many animals he had, he would put a stone or pebble into a bag for each animal. The more animals, the more stones. Which could explain where the word "calculate" comes from: the Latin word *calculus* means "stone"!



We live in a world of uncertainty, saying things like, "I'll be back *around* 3pm" or "I *might* be able to do that." To express uncertainty in maths, we use numbers. A scale of 0 to 1 is usually used to describe the likelihood of something happening, i.e. 0 representing something impossible, and 1 representing something certain!

To find out the probability of something happening, we divide the number of successful outcomes by the total number of possible outcomes. So when you flip a coin, you have a total of two possible outcomes: heads or tails. The probability of the coin landing "heads up" (your favourable outcome), is  $1/2$ . This fraction can be placed on the probability scale, as mentioned above, at 0.5.

A basic understanding of probability helps us understand everything from cricket scores to "predicting" the weather or even the possibility that you could win the lottery!

## Weather Forecasting

If the weatherman on the telly says that the chance of rain is 70%, what does he mean? Where does he get a percentage like that? Well, a bunch of clever meteorologists at the MET Office (<http://www.metoffice.gov.uk/>) calculate these probabilities based on all days from the past which occurred at a similar time in the year and with similar characteristics (temperature, humidity, air pressure etc.). If they have data for 100 days, and it rained on 70 days, the probability that it will rain on the next similar day is  $70/100$  i.e. 70%!

So that's how they do it! And since 70% is more than 50% (a probability where an event is just as likely to occur as not), it means we're more likely to get rained on!

## Did You Know?

The only man in the world to be struck by lightning seven times was ex-park ranger Roy Sullivan, who is now known as the 'human lightning conductor' of Virginia, USA. A single lightning strike is made up of several 100 million volts with a peak current of approximately 20,000 amps.

## Is Lady Luck On Your Side?

Probability is our way of expressing the fact we're not able to predict....unless you're psychic, but let's not get into the pseudoscience of that one!

Gamblers expect the laws of probability in a large population to be represented in much smaller populations, but others throw out the mathematics of probability completely and associate the times they won with a coincidental event (e.g. the day I wore those shorts I won £1000 on the lottery!).

Professor Mark Griffiths (International Gaming Research Unit, Nottingham Trent University) has consistently shown that slot machine players have their favourite machine. He says, "In North America, casino operators commonly complain that hard core slot machine players urinate into the plastic coin cups or onto the floor rather than leave a machine they are convinced is about to pay out a jackpot!"



*The Gambler's fallacy:* Just say you wanted to flip a coin 10 times. You've flipped it 8 times, and each time it lands heads up. Ask people to guess what will happen on your ninth go. You're likely to find that more people will bet that it will land tails up. Why? There's still only a 50/50 chance of it being either heads or tails.