Teaching randomness

Randomness: a lack of pattern or predictability in events

Understanding randomness is a foundation for understanding probability and statistics. Randomness is specifically mentioned at NCEA level 3 for AS91585, but probability will be better understood if randomness is one of the probability concepts taught at all levels.

Understanding randomness is key to understanding long run probability, experimental estimates of probability, sampling variation, variation due to chance alone etc.

What follows is a list of some classroom tested learning activities which can be used to teach what randomness is like and how it behaves.

The four resources below are available at http://aucksecmaths.wikispaces.com/home:
- **Fooling the teacher** – a 'hands on' introduction to randomness
- **Random scatter** – an excel demo of what randomness looks like
- **Fair die simulator** – an excel demo of random samples
- **3 Probability misconceptions tests** – 3 short tests (with answers) to test student's understanding of probability and randomness.

Benford's Law http://www.nctm.org/resources/content.aspx?id=7636

Charlie is so cool like: randomness
http://www.youtube.com/watch?v=Lf4ZmWc_jmA

HTH and HTT: Coin triplets (http://www.qbyte.org/puzzles/puzzle02.html)
If you look at a run of coin tosses and circle every occurrence of the pattern HTH or HTT, which will be more frequent?
http://www.ted.com/talks/peter_donnelly_shows_how_stats_fool_juries.html

How random is random? (TKI level 7 learning resources)
1. Write 100 numbers from 0-9 "at random" (quickly write these as they come into your mind).
2. Use a random method (tables, calculator, 10-sided dice) to select another sample of 100 numbers from 0-9.
3. Display both sets of results on a frequency table and comment on your results.

X marks the spot
Give each student a piece of paper and ask them to randomly put one cross on it. Where are most of the crosses? [Almost all of them will be close to the diagonals]

Sampling circles
Give students a page of mixed large and small circles. Get them to take a sample that they think is random and find the mean diameter. Then get them to take a sample using simple random sampling, and compare the mean diameter to their original sample (*Practical statistics*, Routledge and Holmes). This can also be done with large and small lollies in a bag.

Lots and lots of hands-on experience with coins, dice and spinners and other situations involving random outcomes (not always equally likely).