 Hot streaks

The problem

Students have been asked to flip a coin 50 times. Some of them couldn’t be bothered and decided to fake their results instead. Can you tell the difference?

Your investigation

Task 1 – Examining real data

1. Flip a coin 50 times and record the results.
2. Collect results from 3 of your friends.
3. What are the total number of heads and tails in each trial?
4. What is the longest run of heads or tails (called the maximum streak length) in each trial?
5. How often does each trial change between heads and tails (called the mean streak length)?

For example, in the trial, “HHTTTHTHT”, the mean streak length would be (2+3+1+1+1+1)6 = 1.5

Task 2 – Determining the fakes

Here are the results from 3 students:

Student 1: HHHHH|HHHHH|HTHHH|HHHTT

Student 2: HHHHH|HTTTT|TTTHH|HHHHH

Student 3: HTHTH|THTHT|HTHTH|THTHT

1. Do you think these coin flip results are real or fake?
2. What makes you think that? How do these results compare with your ‘real’ results above?
3. Make a list of reasons to support your decision. You may like to consider the total number of heads and tails, the maximum streak length and the mean streak length.

What about these results?

HTHTT|HTTHT|HHHTT|HHTTH|HTTHT| THTTH|HTHHT|HTHTT|HHTHT|TTHHT

1. Do these results differ to the ones above? Were they harder or easier to analyse?

Task 3 – Your turn

1. You are to create your own set of fake results for the 50 coin toss. Try to make them as undetectable as possible.
2. Explain the strategies you used to make your ‘fake results’ undetectable. You may like to compare them to the ‘real’ data you collected in Task 1.

Outcomes

* MA5.1-1WM uses appropriate terminology, diagrams and symbols in mathematical contexts
* MA5.1-2WM selects and uses appropriate strategies to solve problems
* MA5.1-3WM provides reasoning to support conclusions that are appropriate to the context
* MA4-20SP analyses single sets of data using measures of location, and range
* MA4-21SP represents probabilities of simple and compound events
* MA5.1-12SP uses statistical displays to compare sets of data, and evaluates statistical claims made in the media

All outcomes referred to in this unit come from [Mathematics K-10 Syllabus](https://educationstandards.nsw.edu.au/wps/portal/nesa/k-10/learning-areas/mathematics/mathematics-k-10) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2012