Lucky Sausages

Purpose:

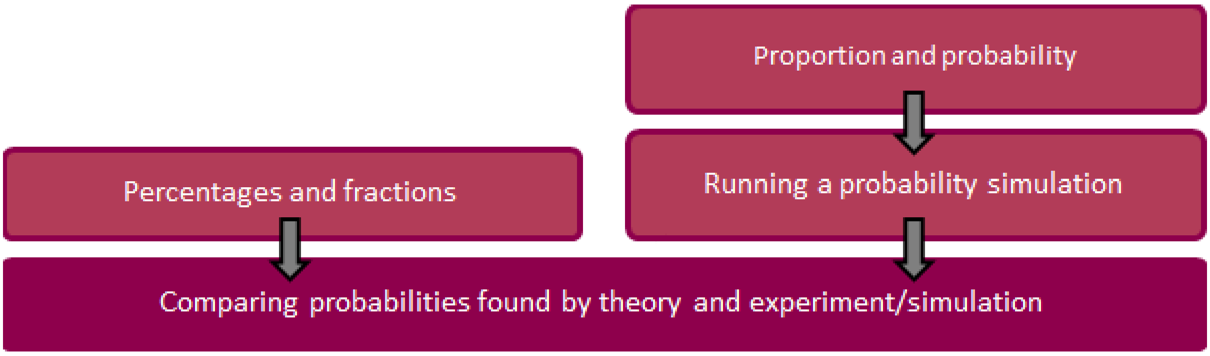
The purpose of this activity is for students to set up and run a simple probability simulation and to compare their experimental value of probability with the theoretical value.

Achievement Objectives:

S4-3: Investigate situations that involve elements of chance by comparing experimental distributions with expectations from models of the possible outcomes, acknowledging variation and independence.

Description of mathematics:

The background knowledge and skills that need to be established before and/or during this activity are outlined in the diagram below:



Percentages and fractions
Write 12.5% as a fraction.

Proportion and probability
If I have five white socks and one green sock, what is the probability that when I randomly select a sock, it is green?

Running a probability simulation
To model forgetting my lunch (probability = 1/5), I use one blue counter to represent forgetting and four red counters to represent remembering to pack my lunch. Randomly select a counter, record the colour and replace the counter. Repeat this 50 times to find how many times I can expect to forget my lunch in a term.

Comparing probabilities found by theory and experiment/simulation
The probability of my forgetting to pack my lunch is 1/5. Calculate the number of times I can expect to forget my lunch in a term (50 days). Set up and run a simulation using random numbers to model this problem. Compare the theoretical and your experimental values for the probability that I will forget my lunch in a term.

This activity may be carried out with step by step guidance, or by allowing the student to follow their own method of solution. The approach should be chosen in sympathy with students' skills and depth of understanding.

Activity:

A group of parents running a fundraising sausage sizzle are struggling to keep up with demand, so have got the BBQ turned up to the hottest setting.

As a result, one third of the sausages are burnt, a quarter are sold before they are cooked properly, but the rest are fine.

Use coloured counters to model this situation, to find the percentage probability, that the next customer is lucky enough to get a properly cooked sausage.

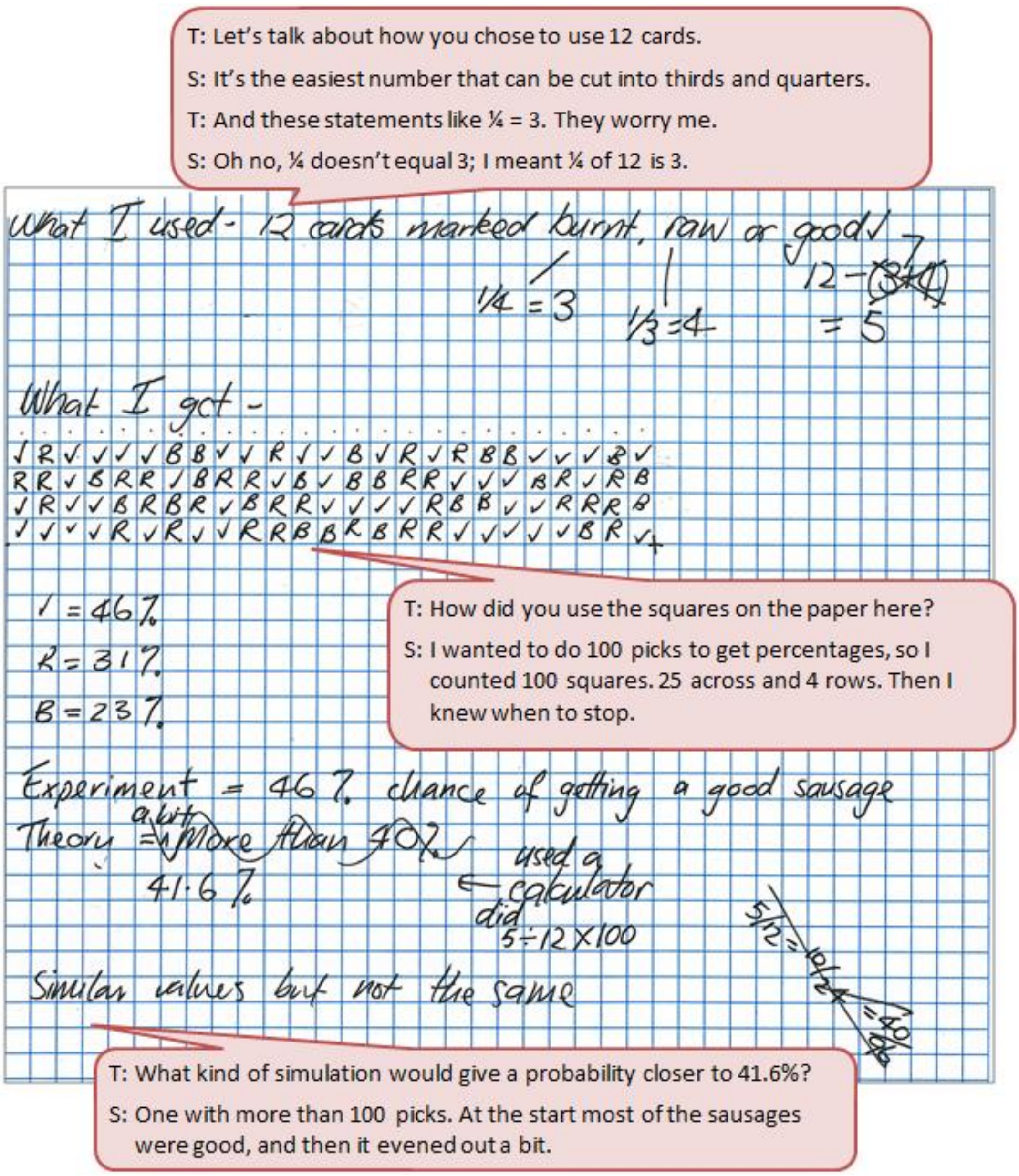
Comment on the results of your experiment.

The procedural approach

The student is able to set up and run a simple probability simulation, with guidance and to compare the experimental value with the theoretical value of the probability.

Prompts from the teacher could be:

1. To run a simulation picking counters or cards, you will need to be able to assign 1/3 as raw and 1/4 as burnt. How many counters will you use?
2. Run your simulation and record the results. (Hint: 100 trials will give the same values as the probabilities as percentages)
3. Find the probability, as a percentage, that the next sausage served is properly cooked. This is the experimental probability.
4. Work out the theoretical probability, as a percentage, that the next sausage served is properly cooked.
5. Comment on the similarity or difference between the experimental and the theoretical values for the probability, as a percentage, that the next sausage served is properly cooked.



The conceptual approach

The student is able to set up and run a simple probability simulation, and to compare the experimental value with the theoretical value of the probability.

Prompts from the teacher could be:

1. How many counters will you use to run a simulation of this problem?
2. Run your simulation and record the results.
3. Find the probability, as a percentage, that the next sausage served is properly cooked.
4. Work out the theoretical probability, as a percentage, that the next sausage served is properly cooked.
5. Comment on the similarity or difference between the experimental and the theoretical values for the probability, as a percentage, that the next sausage served is properly cooked.