Rolling Dice

Purpose:
The purpose of this activity is to engage students in finding an expected number that is based on equally likely outcomes.

Achievement Objectives:
S2-3: Investigate simple situations that involve elements of chance, recognising equal and different likelihoods and acknowledging uncertainty.

Description of mathematics:
In readiness for this problem, the students should have familiarity with each of the following components of mathematics. The problem may be solved with different combinations of these components.

• basic addition facts
• probability - equally likely outcomes
• expressing probabilities - unlikely, likely, etc
• carrying out a probability experiment
• finding an expected value

This activity may be carried out with 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:
Playing a board game, Otis needs to roll doubles in order to start.

How many turns do you expect it will take before Otis gets to start?
The procedural approach
The student is able to carry out an experiment to find an expected value, with guidance, in a situation involving equally likely outcomes.

Prompts from the teacher could be:

1. What materials will you need to model this situation?
2. Try ‘rolling the dice’ for twenty rolls.
3. How many times did you get doubles in this experiment.
4. How many rolls is it likely to take to get one set of doubles?

T: How did you work this out? That you expect it to take 4 rolls to get a double?
S: Well I did 20 rolls and got doubles 5 times. So I thought that it is 5 times what to get to 20.
T: That’s great. Does it mean that every time Otis plays it will take 4 rolls to get one?
S: Nah, like my experiment, sometimes it takes 4 rolls, sometimes more and sometimes the first roll you do is a double. 4 is just the most common number it takes.
The conceptual approach

The student is able to find an expected value in a situation involving equally likely outcomes.

Prompts from the teacher could be:

1. How can you model this situation?
2. If you have, say, 20 rolls, how many times would you get doubles?
3. How many rolls is it likely to take to get one set of doubles?