# Year 8 · Probability: Testing Your Luck: Experimental Probability

Name: _____ Date: _____

Hi! This sheet is all about doing chance experiments and working out probabilities from your results. You'll see how experimental probability compares to what should happen in theory, and why doing MORE trials usually gets you closer to the truth.

## Warm-up

1. Ava flips a coin 40 times and gets 22 heads. What is the experimental probability of getting heads? Give your answer as a fraction and a decimal.

2. A spinner is spun 50 times and lands on red 15 times. What is the experimental probability of landing on red?

3. A die is rolled 60 times and a six comes up 8 times. What is the experimental probability of rolling a six? Give a fraction and a rounded decimal.

4. What is the theoretical probability of rolling a 4 on a fair six-sided die?

## Practice

5. Sione rolls a fair die 30 times and records: 1 → 4 times, 2 → 6 times, 3 → 3 times, 4 → 7 times, 5 → 5 times, 6 → 5 times. Calculate the experimental probability of each outcome.

6. Using Sione's results above, compare his experimental probability of rolling a 4 to the theoretical probability. Why are they different?

7. At the Avondale School gala, Mereana runs a stall with a bag holding coloured cubes. She pulls one out, records the colour, and puts it back, doing this 100 times. Results: green 46, yellow 34, purple 20. Find the experimental probability of each colour.

8. Mereana's bag actually contains 10 cubes: 5 green, 3 yellow, 2 purple. Work out the theoretical probability of each colour and compare it with her experimental results.

9. Two students both roll the same fair die. Tama rolls it 20 times and gets 5 sixes (P = 0.25). Kiri rolls it 120 times and gets 22 sixes (P ≈ 0.18). Whose experimental probability is a better estimate of the true value of 1/6 ≈ 0.17, and why?

10. Explain, in your own words, what the Law of Large Numbers tells us about a chance experiment.

## Challenge

11. Ropata suspects one of his dice is weighted. He rolls it 200 times and gets a six 60 times. (a) Find the experimental probability of a six. (b) What would you expect the count of sixes to be for a fair die over 200 rolls? (c) Do you think the die is weighted? Explain using the Law of Large Numbers.

12. A spinner has 4 unequal sections: A, B, C, D. In 50 spins the results are A 8, B 22, C 14, D 6. (a) Find the experimental probability of each section. (b) The spinner is then spun 500 times, giving A 60, B 250, C 130, D 60. Find the new experimental probabilities. (c) The true (theoretical) probabilities are A 0.12, B 0.50, C 0.26, D 0.12. Which set of trials gave estimates closer to the true values, and what does this show?