

## 6

# Comparing Theoretical and Experimental Probability

## You will need

- coloured cubes
- paper bag
- dice

### Goal

Compare the theoretical probability of an event with the results of an experiment.

One yellow cube, one blue cube, and two red cubes are placed in a bag. They are mixed up and two cubes are pulled out, one at a time, without looking.

? What is the probability of pulling out a red cube then a blue one?

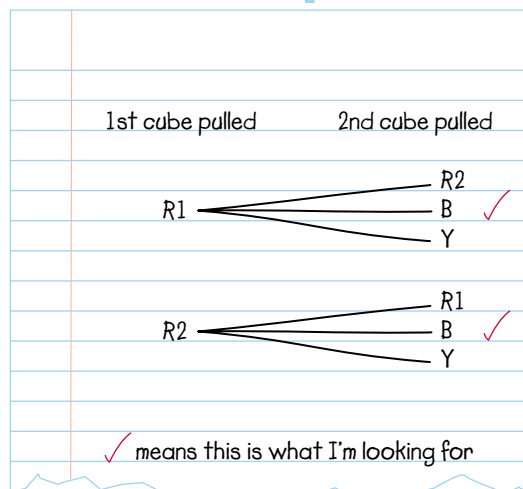


## Maggie's Explanation

I can determine the theoretical probability if I draw a tree diagram or I can do an experiment to get the experimental probability.

I'll do the tree diagram first.

I'll label the first red cube R1 and the second one R2.



- Copy and complete the tree diagram to show all possible orders for drawing the cubes.
- What is the theoretical probability of drawing a red cube and then a blue one?

- C. Perform an experiment where you pull two cubes from a bag like the one described above. Do not put back the first cube before you pull the second one. Repeat the experiment 10 times. Determine the experimental probability that a red cube is chosen and then a blue cube.
- D. Combine your data with the data from other groups. Determine the new experimental probability that a red is chosen before a blue.

	First pull	Second pull
1	Y	R
2	R	B
3		

## Reflecting

1. When you performed the experiment in Part C, why could you stop if the first cube isn't red?
2. How did the experimental and theoretical probabilities compare when you used your own data? What about when you used the combined data?

## Checking

3. There are two red cubes, a blue cube, and a yellow cube in a bag. Compare the theoretical probability and the experimental probability of choosing two different-coloured cubes.

## Practising

4. a) What is the theoretical probability of rolling an even number on a die?  
b) Roll a die 20 times. Compare the experimental probability of rolling an even number to the theoretical probability.
5. a) What is the theoretical probability that, when you roll two dice, both numbers will be a multiple of 3?  
b) Conduct an experiment with at least 20 rolls. What is your experimental probability for this event?  
c) Why might the experimental probability be different from the theoretical probability?
6. a) What is the theoretical probability that, when you roll a die twice, you will roll a number greater than 3 before you roll a number less than 3?  
b) Compare this to an experimental probability. Repeat your experiment at least 20 times.

