

Simulation at scale

NAMES _____

CLASS _____

STEP 1 — SET UP

My chance device is:

The outcome I am following is:

Its probability is:

Step 2 · Run it at every scale

Predict and lock in before each run. Then fill in this row.

TRIALS	OBSERVED	EXPECTED	DIFFERENCE observed – expected	RELATIVE FREQUENCY observed ÷ trials
20				
200				
2,000				
20,000				

THE NEW WORD TODAY — RELATIVE FREQUENCY

Relative frequency = observed ÷ trials.

It turns your count into a number you can compare straight to the probability.

Example: 11 reds out of 20 trials → $11 \div 20 = 0.55$

BEFORE YOU TURN OVER

Look down the DIFFERENCE column. Is it getting bigger or smaller?

Now look down the RELATIVE FREQUENCY column. Is it getting closer to the probability?

Those two answers are not the same. That is not a mistake — it is the point of today.

WORKING SPACE

Part B · Show your thinking

SF

1. Out of 250 spins, a spinner landed on red 137 times.

What is the relative frequency? Give it as a decimal.

CF

2. A simulator ran 2000 trials. The relative frequency came out at 0.336.

What is the probability most likely to be? Explain how you decided.

CU

3. Ali says more trials made it worse, because the difference got bigger.

Bo says more trials made it better. They are both looking at real numbers.

What is each of them looking at? Who is answering the right question?

GOING FURTHER

- Before you run 20 000, predict the relative frequency to three decimal places.
How confident are you? Say why.
- Run 2000 three separate times. How different are the three answers?
Now do the same at 20 trials. What do you notice?

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If the devices are not working

These are real results from a fair coin. You can do all of today's thinking from them.

TRIALS	OBSERVED	EXPECTED	DIFFERENCE observed – expected	RELATIVE FREQUENCY observed ÷ trials
20	11			
200	96			
2,000	1,013			
20,000	10,024			

The probability of heads is 0.5. Fill in the other three columns yourself.

Exit ticket

Hand this in at the end of the lesson.

1. A simulator ran a fair coin 500 times and got 262 heads.

What is the relative frequency of heads? Give it as a decimal.

2. Is 262 heads close to what you would expect? Explain.

3. Jo ran the same coin 40 times and got 24 heads.

Whose result is better evidence that the coin is fair? Explain.