Compound-event simulations and describing results

6 questions | 16 marks

Equivalent correct methods earn the corresponding marks.

1. Map equally likely digits 0-9 to P(blue)=0.4 and P(red)=0.6. [2 marks]

Four labels versus six gives the required probabilities.

Answer: For example, 0-3 blue and 4-9 red.

2. Two tokens are drawn without replacement in a trial. When is the full bag restored for repeated trials? [2 marks]

Restoring between draws changes the experiment.

Answer: After both draws, before the next complete trial.

3. Why does a uniform random integer from 2 to 12 not simulate a fair two-dice sum? [3 marks]

The required outcome multiplicities differ.

Answer: It treats sums 2 and 7 equally although they have 1 and 6 physical pairs.

4. Use the table to estimate P(at least one head). [2 marks]

Original practice simulation: 24 trials of two fair coins

Outcome	Count
HH	5
HT	7
TH	6
TT	6

Count HH,HT,TH:5+7+6=18.

Answer: 18/24=3/4.

5. A student deletes all TT trials as uninteresting. Explain the problem. [3 marks]

All complete trials must be recorded.

Answer: Selective removal changes the denominator and distribution.

6. Describe a reproducible simulation of two dice and sum 7, including a check. [4 marks]

Each ordered pair is modelled fairly and the trial count is reported.

Answer: Generate two independent integers 1-6 each trial, count sum 7, divide by trial count, and compare with 6/36=1/6.