Worked answers | Probability

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 $P(\text{blue}) = 0.4$ and $P(\text{red}) = 0.6$. [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 $P(\text{at least one head})$. [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: $\frac{18}{24}=\frac{3}{4}$.

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 $\frac{6}{36}=\frac{1}{6}$.