

5.1.3 Sample Spaces

Name: _____ Class: _____ Date: _____

KEY WORDS sample space

<!-- Session 2 native-skill companion -->

Objective

Practise sample spaces within the labelled native lessons. Public original tasks; locally authored answer guidance.

1 Key knowledge and worked examples

■ Systematic possibilities and equally likely outcomes · Foundation

List outcomes systematically using a grid, table or tree. For equally likely outcomes, probability is favourable outcomes/total outcomes. Keep ordered outcomes distinct when the experiments have labelled first and second stages. A grid shows completeness and prevents duplicate counting; unequal probabilities need weights rather than a simple count.

$$P(E) = \frac{\text{favourable equally likely outcomes}}{\text{all equally likely outcomes}}$$

A coin and a fair die have 12 equally likely ordered outcomes: H1 to H6 and T1 to T6. Heads with an even die result has three outcomes, so probability is 3/12=1/4. Two dice have 36 ordered pairs. Total seven arises from (1,6),(2,5),(3,4),(4,3),(5,2),(6,1), so probability is 6/36=1/6. A double has six outcomes and probability 1/6. Total at least eleven occurs in (5,6),(6,5),(6,6), giving 1/12. With a spinner divided into unequal sectors, the named colours are not automatically equally likely; use the sector proportions or a justified experimental estimate.

Counting totals rather than equally likely dice pairs gives wrong weights. State whether order matters. A possibility table lists outcomes; its entries are not automatically equiprobable.

AQA P6/P7 uses tables, grids and trees to enumerate theoretical possibilities. Explain why the selected elementary outcomes have equal probability before dividing counts.

36 equally likely cells; six sums equal seven

Second die	6	7	8	9	10	11	12
	5	6	7	8	9	10	11
	4	5	6	7	8	9	10
	3	4	5	6	7	8	9
	2	3	4	5	6	7	8
	1	2	3	4	5	6	7
		1	2	3	4	5	6
		First die					

Original native-lesson illustration; labels belong to its worked example.

2 Practice

2.1 (Foundation) How many ordered outcomes do two fair dice have?

2.2 (Foundation) How many ordered pairs total seven?

2.3 (Foundation) Find probability of heads and an even result for coin and die.

3 Exam-style questions

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: All possible totals of two fair dice are equally likely.

Solutions

2.1 6 choices for the first and 6 for the second: 36.

2.2 List (1,6) through (6,1).

2.3 3 favourable outcomes out of 12.

3.1 False. Total 2 has one ordered outcome (1,1), while total 7 has six. Their probabilities are $1/36$ and $6/36$.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.