

6.4 Probability foundations

Name: _____ Class: _____ Date: _____ **Total: 19 marks**

KEY WORDS sample space • complement

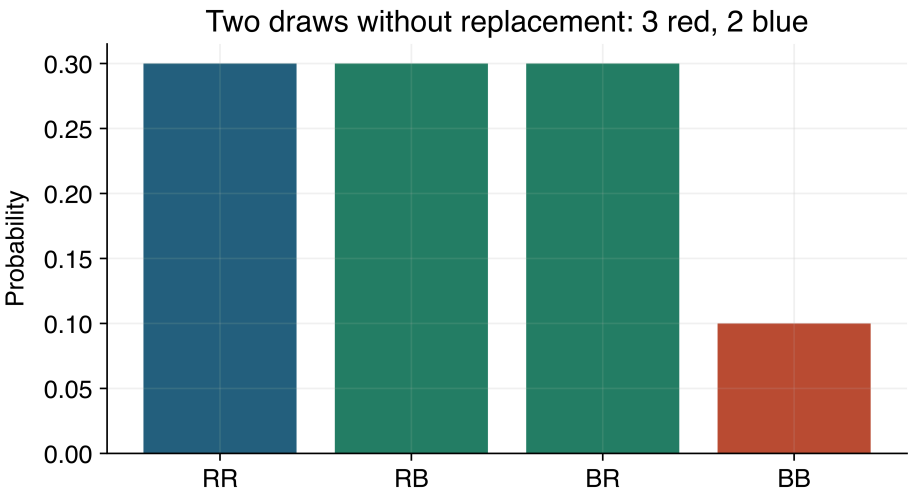
Probability foundations

Objective

Use the probability scale, theoretical and experimental probabilities, sample spaces and systematic listing, Venn diagrams with the addition rule, and complements (objectives Foundation 6.3 A–H).

1 Key knowledge and worked examples

- Scale and estimates.** Probability runs 0 (impossible) to 1 (certain). Theoretical: count equally likely outcomes; experimental: successful trials over total trials. Sample space for two successive events: a grid or systematic list; the complement rule $P(A') = 1 - P(A)$.
- Venn diagrams.** Regions sum to 1 (or to the total); $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. 30 students, 18 cricket, 15 tennis, 7 both: $P(C \cup T) = 26/30$, $P(\text{neither}) = 4/30 = 2/15$.



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

2 Practice

- 2.1** A spinner lands on red 23 times in 100 spins. Estimate $P(\text{red})$. [1]

- 2.2** List the sample space for rolling two dice and total the ways to score 8. [2]

- 2.3** If $P(\text{rain}) = 0.3$, find $P(\text{no rain})$ [1]

- 2.4** In a class of 25, 14 play football, 11 basketball, 5 both. Draw or describe the Venn regions and find $P(\text{neither})$ [3]

3 Exam-style questions

3.1 (*Original.*) Two fair coins are tossed. (a) List the sample space. (b) Find $P(\text{exactly one head})$. (c) Find $P(\text{at least one tail})$, using the complement. [4]

3.2 (*Original.*) A card is drawn from a standard 52-card deck. Find $P(\text{heart})$, $P(\text{king})$, $P(\text{heart or king})$, showing the overlap subtraction. [4]

3.3 (*Original.*) A survey of 40 people: 22 read paper A, 18 paper B, 7 read both, and 7 read neither. (a) Verify the four Venn regions total 40. (b) A reader of paper A is chosen at random: find the probability they also read B. [4]
