

## 6.2 Probability

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

**KEY WORDS** conditional probability

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

### Objective

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

### 1 Key knowledge and worked examples

■ **Probability trees and outcomes · Foundation**

A probability lies between 0 and 1. Exhaustive, mutually exclusive outcomes have probabilities summing to 1. Multiply successive branch probabilities and add separate routes to an outcome.

$$P(RR) = P(R_1)P(R_2 \mid R_1)$$

A bag contains 3 red and 2 blue counters. With replacement,  $P(\text{two red})=3/5 \times 3/5=9/25=0.36$ . Without replacement, the red-red branch is  $3/5 \times 2/4=0.3$ . Label each branch before multiplying.

Mutually exclusive means no overlap; independent means that knowing one event does not change the other’s probability. Two disjoint events with positive probability are not independent.

Use a frequency table or a simple tree before calculating. Formal conditional probability formulae are outside this Foundation/Core support lesson.

■ **Probability, trees and conditional reasoning · Higher**

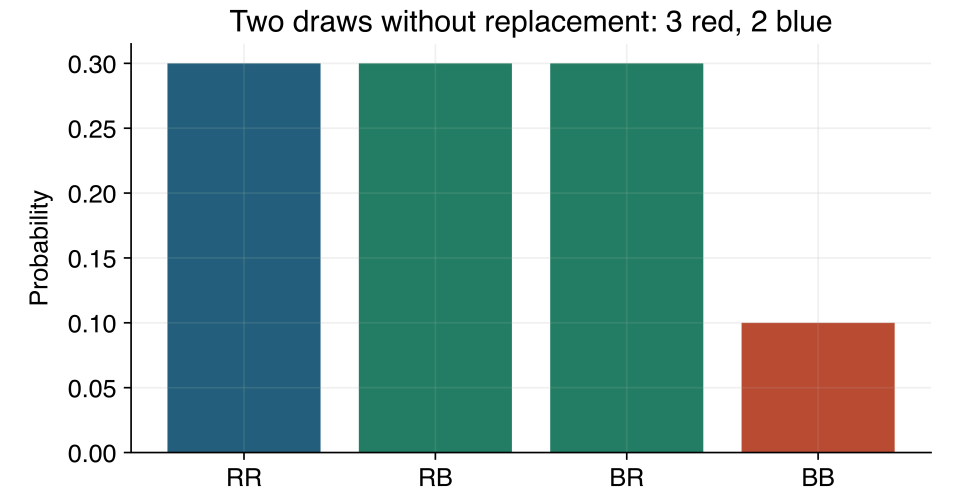
Multiply along a tree branch and add disjoint branches. With replacement, the composition stays fixed. Conditional probability is  $P(A \text{ given } B)=P(A \cap B)/P(B)$ , for  $P(B)>0$ .

$$P(A \mid B) = \frac{P(A \cap B)}{P(B)}, \quad P(B) > 0$$

Without replacement,  $P(\text{two red})=3/5 \times 2/4=3/10$ .  $P(\text{one of each})=3/5 \times 2/4+2/5 \times 3/4=3/5$ . If  $P(A \cap B)=0.12$  and  $P(B)=0.3$ ,  $P(A \text{ given } B)=0.4$ .

Mutually exclusive means no overlap; independent means that knowing one event does not change the other’s probability. Two disjoint events with positive probability are not independent.

A two-way table makes the restricted denominator visible. Before using a product  $P(A)P(B)$ , justify independence from the context or the supplied information.



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

### 2 Practice

**2.1** (Foundation) Find the probability of two red from 3 red and 2 blue without replacement.

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**2.2** (Foundation) Find the probability of blue on a single draw from 3 red and 2 blue.

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**2.3** (Foundation) Find the probability of one red and one blue in that bag.

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**2.4** (Higher) Find  $P(A \text{ given } B)$  if  $P(A \cap B)=0.12$  and  $P(B)=0.3$ .

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**3 Exam-style questions**

**3.1** Decide whether this claim is true. Justify with a concrete calculation or counterexample: Mutually exclusive events with positive probabilities must be independent.

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## Solutions

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**2.1** Without replacement,  $P(RR)=3/5 \times 2/4=0.3$ .

**2.2** A single blue draw has probability  $2/(3+2)=0.4$ .

**2.3** Add the two orders:  $3/5 \times 2/4 + 2/5 \times 3/4=0.6$ .

**2.4**  $P(A|B)=P(A \cap B)/P(B)=0.12/0.3=0.4$ .

**3.1** False. A fair die shows 1 with probability  $1/6$  and 2 with probability  $1/6$ . The events cannot occur together, so their joint probability is zero. Independence would require  $1/36$ .

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