

5.2 Tree diagrams and sets (Higher)

Name: _____ Class: _____ Date: _____ **Total: 26 marks**

KEY WORDS tree diagram • conditional probability

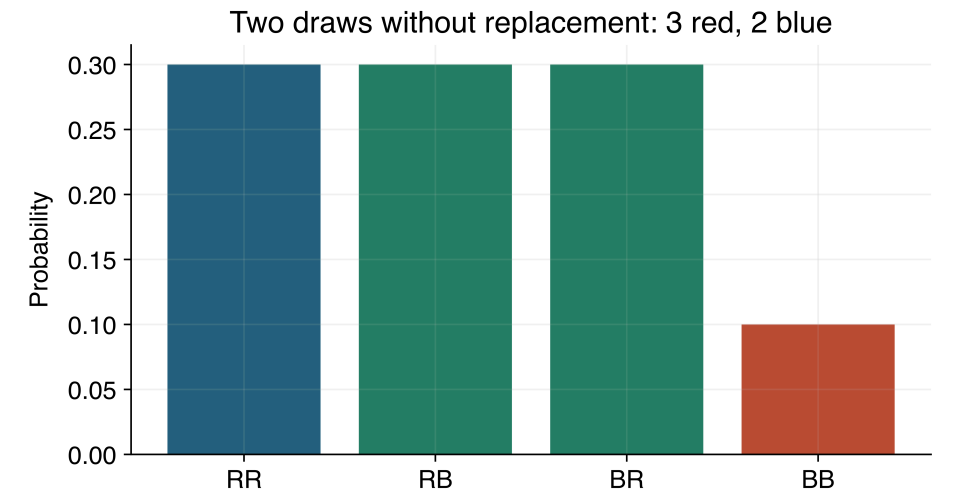
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Objective

Use tree diagrams for independent and dependent combined events, construct possibility spaces, and calculate and interpret conditional probabilities with two-way tables, trees and Venn diagrams (rows P7–P9).

1 Key knowledge and worked examples

Trees and conditioning. Multiply along a path, add disjoint paths. With replacement keeps every denominator fixed (independence); without it, the second-stage denominators shrink. Conditional probability $P(A \mid B) = \frac{P(A \cap B)}{P(B)}$: the denominator is the GIVEN group’s total – reversing the condition changes the answer.



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

2 Practice

2.1 A bag has 3 red and 2 blue counters. One is drawn, REPLACED, and another drawn. Find $P(\text{two red})$. [3]

2.2 The same bag, now WITHOUT replacement. Find $P(\text{two red})$. [3]

2.3 Without replacement, find $P(\text{one of each colour})$. [3]

2.4 (*June 2024 2H Q4(a), adapted.*) A fair spinner has six equal sections labelled 5, 6, 7 or 8, each appearing at least once, and $P(\text{even}) = P(7)$. Work out $P(5)$. [2]

2.5 In a class of 30, 18 cycle, 12 swim and 7 do both. Find $P(\text{swims} \mid \text{cycles})$ and $P(\text{cycles} \mid \text{swims})$. [3]

3 Exam-style questions

3.1 (*June 2024 3H Q12(b), adapted.*) A machine fails on a given day with probability 0.05, independently each day. Find the probability that it fails on at least one of two days. [3]

3.2 (*Original, expected frequencies.*) A condition affects 20% of a population of 1000. A test is positive for 90% of those with the condition and for 10% of those without it. Work out the probability that a person chosen at random from those testing positive has the condition. [4]

3.3 (*Original.*) $P(A) = 0.4$, $P(B) = 0.3$ and $P(A \cap B) = 0.12$. Are A and B independent? Show working. [3]

3.4 (*Original.*) Two fair dice are rolled. Find $P(\text{total is at least } 11)$. [2]
