UNIT 3: Probability	Teaching time
Mutually exclusive events; Independent events (3.1)	3 hours

SPECIFICATION REFERENCES

3.1   Understand and use mutually exclusive and independent events when calculating probabilities
Link to discrete and continuous distributions

PRIOR KNOWLEDGE

GCSE (9–1) in Mathematics at Higher Tier

P1   Record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees

P2   Apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments

P3   Relate relative expected frequencies to theoretical probability, using appropriate language and the 0–1 probability scale

P4   Apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one

P6   Enumerate sets and combinations of sets systematically, using tables, grids

P7   Construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities

P9   Tree diagrams and Venn diagrams

KEYWORDS

Sample space, exclusive event, complementary event, discrete random variable, continuous random variable, mathematical modelling, independent, mutually exclusive, Venn diagram, tree diagram.

AS Mathematics: Statistics

OBJECTIVES

By the end of the sub-unit, students should:

- understand and be able to use mutually exclusive and independent events when calculating probabilities;
- be able to make links to discrete and continuous distributions.

TEACHING POINTS

Tree and Venn diagrams should have been covered at GCSE but will need to be recapped as one way of looking at probabilities.

The focus at this level is on independent and mutually exclusive events in probability calculations. Students should be confident in the definitions of both independent and mutually exclusive events and how to use their properties to solve real-life probability problems.

Cover showing independence but be aware that the use of set notation is not required at AS level. At this level this is done by showing the product of the probabilities of two events gives the probability of both events occurring together. Understanding of conditional probability is not expected at AS level.

Students do not need to be aware of probability density functions however they should understand that probability is represented by the area under a curve in a continuous distribution. This could be mentioned here and comparisons drawn by using the binomial model as a bar chart in the next unit.

OPPORTUNITIES FOR PROBLEM SOLVING/MODELLING

Include questions of the type where A and B are independent which use Venn diagrams and informal use of the addition rule but where both $P(A)$ and $P(A \cap B)$ for example are unknown; the solution relies on a knowledge of independence. (Set notation not required)

COMMON MISCONCEPTIONS/EXAMINER REPORT QUOTES

Students may confuse 'independent' and 'mutually exclusive'.

Using a diagram almost always helps students to answer probability questions. When drawing a Venn diagram, students should remember to include a box defining the universal set.