**Probability (AS)**

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| **M1** | Understand and use mutually exclusive and independent events when calculating probabilitiesLink to discrete and continuous distributions |

**Commentary**

Many of the aspects related to Probability are covered at GCSE and much of this content is about formalising those ideas. You will want to introduce a range of representations here – Venn Diagrams, Two-way tables and Tree Diagrams as a means of representing events.

Since the ideas of Conditional Probability are covered in the A2 content, you may wish to define Independent Events as those events $A$ and $B$ which satisfy $P\left(A∩B\right)=P(A)×P\left(B\right)$ rather than $P\left(B\right)=P(A)$ although there is scope for teaching the AS and A level content together.

The ideas of probability distributions can come from simple experiments involving rolling dice building up to simple Binomial situations involving small values of $n$. The distribution of probability can be shown in a “line-diagram” and building up a visual idea of the spread of probability from an early stage will help when students move onto the Normal Distribution.

**Sample MEI resource**

‘Thinking about probability’ (which can be found at <https://my.integralmaths.org/integral/sow-resources.php>) is designed for getting to grips with independent and mutually exclusive events.



**Effective use of technology**

‘Probability Venn Diagram’ (which can be found at [www.mei.org.uk/integrating-technology](http://www.mei.org.uk/integrating-technology)) is designed to investigate Venn Diagrams and the connections between events $A, B $and $A∪B$ and $A∩B$.



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| **Title**  | **Time allocation:**  |
| **Pre-requisites*** GCSE: Calculating simple proportions and probabilities
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| **Links with other topics** * Binomial distribution: The theory of Independent Events is essential for the Binomial Probability Distribution to work.
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| **Questions and prompts for mathematical thinking*** Give me an example of a Venn diagram and a tree diagram showing Independent Events A and B.
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| Applications and modelling* Deriving $P\left(A∪B\right)=P\left(A\right)+P\left(B\right)-P(A∩B)$ from a Venn Diagram
* Two players take turns to roll a fair dice; the winner is the first person to roll a six. How much of an advantage is it to go first? What if the game is to pick the car hidden behind one of the doors numbered 1 to 6?
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| Common errors* Using $P\left(A∩B\right)=P(A)×P\left(B\right)$for non-independent events
* Using $P\left(A∪B\right)=P\left(A\right)+P\left(B\right)$for non-mutually exclusive events
* Ensuring that the overall probability adds up to 1, particularly when completing Venn diagrams.
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