Chapter 5 - Statistics

Probability Year 1

Chapter Overview

1. Basic probability
2. Venn diagrams
3. Mutually Exclusive / Independent Events
4. Tree diagrams

3	3.1	Understand and use mutually exclusive and independent events when calculating probabilities.	Venn diagrams or tree diagrams may be used. Set notation to describe events may be used.
Probability			Use of $P(B\|A) = P(B)$, $P(A\|B) = P(A)$, $P(A \cap B) = P(A)\,P(B)$ in connection with independent events.
		Link to discrete and continuous distributions.	No formal knowledge of probability density functions is required but students should understand that area under the curve represents probability in the case of a continuous distribution.

(Set notation **may** be used in Year 1 – will be seen more commonly in Year 2)

Probability concepts

✏ An **experiment** is a repeatable process that gives rise a number a number of **outcomes**.

✏ An **event** is a set of <u>one or more</u> of these outcomes.
(We often use capital letters to represent them)

$E =$ "rolling an even number"
$P =$ "rolling a prime number"

✏ A **sample space** is the set of all possible outcomes.

Because we are dealing with sets, we can use a **Venn diagram**, where
• the numbers are the individual outcomes,
• the sample space is a rectangle and
• the events are sets, each a subset of the sample space.
You do not need to use set notation like ∩ and ∪ in this module (but ordinarily you would!)

Example

Two fair spinners each have four sectors numbered 1 to 4. The two spinners are spun together and the sum of the numbers indicated on each spinner is recorded.
Find the probability of the spinners indicating a sum of
(a) exactly 5   (b) more than 5

Another Example

The table shows the times taken, in minutes, for a group of students to complete a number puzzle.

Time, t (min)	$5 \leq t < 7$	$7 \leq t < 9$	$9 \leq t < 11$	$11 \leq t < 13$	$13 \leq t < 15$
Frequency	6	13	12	5	4

A student is chosen at random. Find the probability for a group of students to complete a number puzzle
(a) In under 9 minutes   (b) in over 10.5 minutes.

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