Teaching guide: Simple probability

Mathematics for GCSE Science

This resource helps you to deliver the mathematical requirements that students are required to demonstrate in the new GCSE Science specifications. It consists of a teaching guide and PowerPoint presentation.

2. Handling data

Science GCSE subject criteria Maths skill: 2e. Understand simple probability (biology questions only)

1. Brief explanation	Probability is used to describe the chance of an outcome occurring. It is measured on a scale from 0 to 1 (or occasionally 0 to 100%, also used in GCSE Maths to describe probability but not for calculation purposes). 0 means the outcome is impossible and 1 means the outcome is certain.
2. Statement of coverage from: KS3 Mathematics programme of study (POS) KS4 Mathematics programme of study (POS)	• Record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale • Understand that the probabilities of all possible outcomes sum to 1 • Enumerate sets and unions/intersections of sets systematically, using tables, grids and Venn diagrams • Generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities. • Apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one • Use a probability model to predict the outcomes of future experiments; understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size • Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions
3. Maths introduction and development	By KS4, all students will be familiar with describing probability using words and the concept of the probability scale. Most will also have covered the content in the accompanying PowerPoint, although they may not have remembered it. After using words to describe probability, students are introduced to using fractions and decimals. Percentages, but not ratios, are used for expressing probabilities and neither are used in calculations at GCSE. Students need to be able to manipulate fractions and decimals for this topic.
4.Ref AQA All About Maths AQA All About Maths Basic probability	**Lesson 1** – starts with a review of fractions, decimals and percentages before progressing to consideration of basic probability skills. The idea of a probability scale from 0 to 1 and the estimation or calculation of the probability of events is the main focus. The idea of an expected number of outcomes is also considered.

	Lesson 2 – moves on to exhaustive events and identifying all the different outcomes in a probability experiment and noting they sum to 1. The terms 'mutually exclusive' and 'exhaustive' are introduced. The probability of an event 'not occurring' is also introduced.

Lesson 3 – focus on recording outcomes of events – this might be in a list, two way table or in a simple possibility space. The probability of event based on equally likely outcomes is included.

Lesson 4 – introduces frequency trees- this will be a new topic to all students as it is not included in the Key Stage 3 Programme of Study.

Lessons 5 and 6 build on the skills developed in lessons 1 – 4 and use a wide range of activities to consolidate and extend these skills. Frequency trees are a key feature of these two lessons as they are unlikely to be familiar from Key Stage 3. |
| 5. Misconceptions | Writing simple probability as a ratio, fraction or percentage (slide 3). That ratios and fractions can be interchanged. Eg 3:4 = ¾ or 3/7 depending on whether 4 is the 'whole' or the other 'part'. (If ratios aren't used then this is avoided of course.)

That all events are equally likely. |
| 6. Some examples of where it is applied in science | **Biology**   Genetic inheritance |