

Probability

- The probability of an event happening is a number between 0 and 1.
- If an event is certain, the probability is 1, $P = 1$.
If an event is impossible, the probability is 0, $P = 0$
- Events are **mutually exclusive** when they cannot happen at the same time.
- Events are **exhaustive** if they include all possible outcomes. The probabilities of an exhaustive set of mutually exclusive events sum to 1.
- Equally likely outcomes have the same probability of happening.
- For equally likely outcomes, the probability that an event will happen is $P = \frac{\text{number of successful outcomes}}{\text{total number of possible outcomes}}$
- If the probability of an event happening is P , the probability of it not happening is $1 - P$
- A sample space diagram shows all the possible outcomes for one or more events. You can use it to find a theoretical probability.
- You can estimate the probability of an event from the results of an experiment or survey.
$$\text{relative frequency} = \frac{\text{number of successful trials}}{\text{total number of trials}}$$
$$\text{estimated probability} = \frac{\text{frequency of event}}{\text{total frequency}}$$
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- Estimated probability is also called **experimental probability**.
- A larger number of trials gives a more accurate estimate of probability.

- Predicted number of outcomes = probability \times number of trials
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- The elements of two (or more) sets can be shown together in a Venn diagram. Curly brackets $\{ \}$ show a set of values.
 \in means is an element of.
 ξ means the universal set – all the elements being considered.
 $A \cap B$ means A intersection B. This is all the elements that are in A and in B.
 $A \cup B$ means A union B. This is all the elements that are in A or B or both. A' means the elements not in A.
- A set is a list of things that share certain characteristics.
- You can calculate probabilities from a Venn diagram using
$$\frac{\text{number in the set}}{\text{total number in the Venn diagram}}$$
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- Two events are **independent** when the results of one do not affect the results of the other.
- When the outcome of one event changes the possible outcomes of the next event, the two events are not independent.
- When there are 3 ways of making the first choice and 3 ways of making the next, there are $3 \times 3 = 9$ ways of choosing 2 objects.
- A frequency tree shows the number of options for different choices.
- A probability tree diagram shows all possible outcomes of an experiment.