Probability

Mutually exclusive – two events are mutually exclusive if they cannot happen at the same time
Exhaustive – events are exhaustive if they include all outcomes
Experimental probability – the frequency of an event/total frequency
Independent – two events are independent if the results of one does not affect the other
Sample space diagram – this shows all the possible outcomes of two events
Venn diagram – a set of overlapping circles that can be used to show probabilities
Tree diagram – this shows two or more events and their probabilities

Statistics – Probability

EZY MATHS

Introduction

The likelihood of an event happening

	1/4	1/2	3/4	
0%	25%	50%	75%	100%
0	0.25	0.5	0.75	1

Impossible | Even Chance | Certain

Counting outcomes

Working out how many combinations there are

Rolling a die and flipping a coin

	1	2	3	4	5	6
Heads	H, 1	H, 2	H, 3	H, 4	H, 5	H, 6
Tails	T, 1	T, 2	T, 3	T, 4	T, 5	T, 6

This is a sample space diagram

There are 12 possible outcomes from this event

Calculating probability

$$P(\text{Event}) = \frac{number\ of\ successful\ outcomes}{total\ number\ of\ outcomes}$$

$$P(3) = \frac{2}{8} \Rightarrow \frac{1}{4}$$

Simplify answers where possible

The 'OR' rule (mutually exclusive)

$$P(a\ or\ b) = P(a) + P(b)$$

$$P(2\ or\ 4) = \frac{2}{8} + \frac{1}{8} \Rightarrow \frac{3}{8}$$

Add each probability

The 'AND' rule (independent)

$$P(a\ and\ b) = P(a) \times P(b)$$

Flip a coin twice

$$P(2\ tails) = \frac{1}{2} \times \frac{1}{2} \Rightarrow \frac{1}{4}$$

Multiply each probability

Types of events

Mutually exclusive

Events that cannot happen at the same time

Rolling a die → $P(1\ and\ 6)$

All probabilities from the event will **sum** to make **1**

Independent events

Events where the outcome of one **doesn't** affect the outcomes of the others

Picking a counter out of a bag, replacing it and repeating.

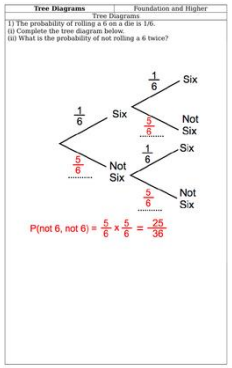
Dependent events

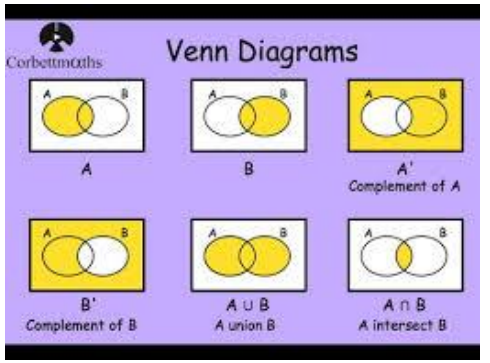
Events where the outcome of one **does** affect the outcomes of the others

Picking a counter out of a bag, **not** replacing it and repeating.

Calculating expected outcomes

$$P(event) \times number\ of\ trials$$





Higher GCSE only – set notation and conditional probability