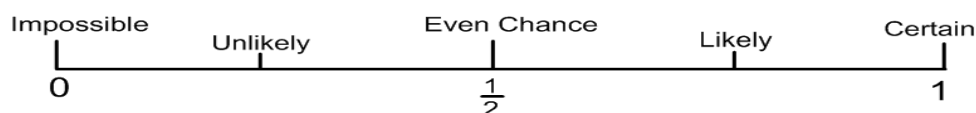# Leaving Cert Probability Revision Notes

Probability Scale

The probability scale never goes less than 0 or more than 1

Probability

Probability is the numerical measure of the chance of an event occurring

Probability is usually written an a fraction or a decimal

$$P(E) = \frac{\text{number of successful outcomes}}{\text{number of possible outcomes}}$$

Relative Frequency (Experimental Frequency)

Relative frequency is an estimate of the probability of an event

$$\text{Relative Frequency} = \frac{\text{frequency or number of times the ever happens in a trial}}{\text{total number of trials}}$$

Note – the more times you repeat an experiment the better the probability estimate

Expected Frequency

Expected frequency = number of trials x relative frequency

Equally Likely

Events are said to be equally likely if all events have the same chance of occurring. For example a fair coin has the same probability of landing on heads as tails.

If all outcomes are equally likely to occur, then the trial or experiment is considered to be fair or unbiased

Fundamental Principle of Counting (FPC)

The fundamental Principle of Counting is used to find the correct number of outcomes of 2 or more events.

FPC - If one event has m possible outcomes and a second event has n possible outcomes, then the total number of possible outcomes is m x n.

Combined Events

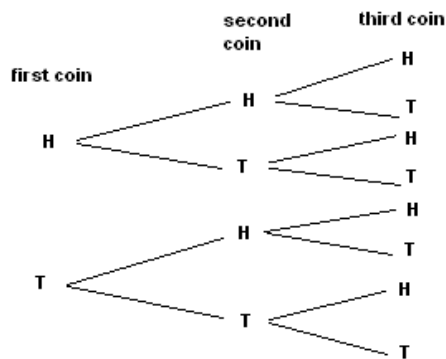A combined event is where two or more events occur and their outcomes are combined together

Representing Outcomes

Systematic Listing

Have a logical system to how all events are listed

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Tree Diagrams

A coin is flipped 3 times & recorded on a tree diagram

Two Way Tables

Sharon has decided that she will buy a top and a pair of trousers. She has a choice of a pink, green or yellow top and white or blue trousers. List all the possible colours of clothes that she could wear.

		Trousers	
		White (W)	Blue (B)
Top	Pink (P)	P, W	P, B
	Green (G)	G, W	G, B
	Yellow (Y)	Y, W	Y, B

And/Or

A and B are 2 events, for example, A is rolling a regular 6 sided die and B is flipping a fair coin

AND – Probability of A happening and B happening: $P(A \text{ and } B) = P(A) \times P(B)$

OR – Probability of A happening or B happening: $P(A \text{ or } B) = P(A) + P(B)$

Independent Events

Events in which the outcome of the 1st event doesn't affect the outcome of the 2nd event e.g. rolling a die twice, the die doesn't hold a memory so if it landed on heads the first time there is still a 50:50 chance of it landing on heads or tails the second time

Dependent Events

Events where the 2nd event is affected by the 1st event e.g. if marbles are removed from a bag and not replaced

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Bernoulli Trials

A Bernoulli Trial is an experiment whose outcomes are random and have only 2 possible outcomes – pass or fail

Properties:

- There must be a fixed number of trials

- Two possible outcomes – success or failure (hit or miss) (true or false)

- The trials must be independent of each other

Examples:

- Tossing a coin

- Shooting free throws in a basketball game

Expected Value

The expected value E(X) is the average or mean outcome of an experiment

$$E(X) = \sum x \cdot P(x)$$

Expected Value

Total number of outcomes

Probability of an outcome
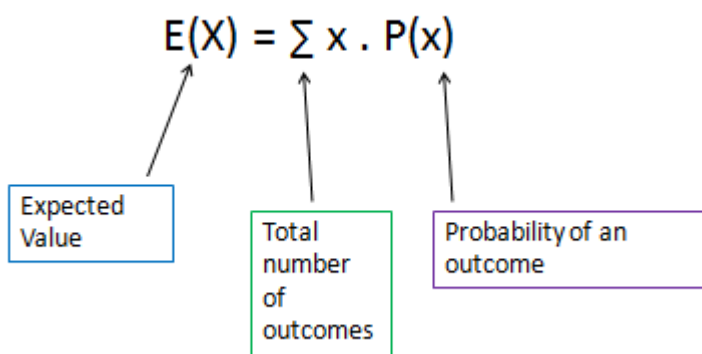
Permutations

- Permutations are the number of ways we can arrange something

- Order matters

- $n!$

Combinations

- If we are asked to select or choose a number of objects from a group of objects this is called a combination for example choosing a committee.

- Order does not matter!

- With a permutation order does matter!

- $^{n}C_{r}$

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