Probability

Probability := Total number of ways devided by total outcomes.

: Sample Space: It is a Collection or a set of possible outcomes of a random experiment.

1) Coin Dice

Ex: $J = \{1, 2, 3, 4, 5, 6\}$

2) flip Coin

$C = \{H, T\}$

* Mutually Exclusive event:

Two events are mutually exclusive or disjoint if they cannot both occur at the same time.

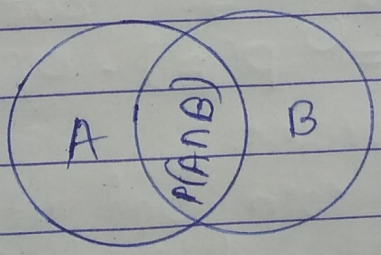
Ex: $P(A \text{ or } B) = P(A) + P(B)$

$P(H \text{ or } T) = P(H) + P(T)$

* Non Mutually Exclusive event:

Non-mutually exclusive events are events that can happen at the same time.

$P(A \text{ or } B) = P(A) + P(B) - P(A \cap B)$



B - H

4 - Q

1 - H∩Q

$P(H \text{ or } Q) = P(H) + P(Q) - P(H \cap Q)$

Ex: 1) What is the probability of a dice showing a number 3 or number 5 ?

→ $P(A \text{ or } B) = P(A) + P(B)$

$S = \{1, 2, 3, 4, 5, 6\}$

$P(3 \text{ or } 5) = 1/6 + 1/6$

let;

$P(3)$ is getting number 3

$P(5)$ is getting number 5

$P(3) = 1/6$ & $P(5) = 1/6$

So,

$P(3 \text{ or } 5) = P(3) + P(5)$

$P(3 \text{ or } 5) = (1/6) + (1/6) = 2/6$

$P(3 \text{ or } 5) = 1/3$

∴ The probability of a die showing 3 or 5 is $1/3$.

* Independent Event :

Two events are independent if the outcome or occurance of the first does not affects the outcomes or occurance of the second.

* When two events A & B, are independent, the probability of both occurring is,

$P(A \& B) = P(A) \cdot P(B)$

Ex: flip a coin and get a head and you flip a second coin and get a tail. The two coins don't influence each other.

Dependent Event:

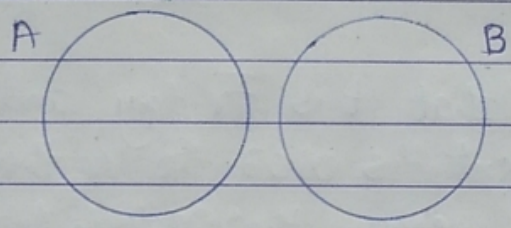
Two events are dependent if the outcome or occurrance of the first affects the outcome or occurence of the second so that the probability is changed.

* When two events, A & B, are dependent the probability of both occuring is:

$$P(A \text{ \& } B) = P(A) \cdot P(B/A)$$

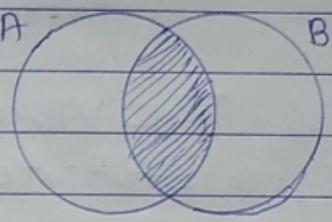
Additive Rule

Non-Mutually Exclusive



$$P(A \text{ or } B) = P(A) + P(B)$$

Non-Mutually Exclusive



$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ \& } B)$$

Ex 1: A jar contains 3 red, 5 green, 2 blue & 6 yellow marbles. A marble is chosen at random from the jar. After replacing it, a second marble is chosen. What is the probability of choosing a green & then a yellow marble.

Probabilities:

$$P(\text{green}) = 5/16 \qquad P(\text{yellow}) = 6/16$$

$$P(G \text{ \& } Y) = = P(G) \cdot P(Y)$$

$$= 5/16 \cdot 6/16$$

$$= 30/256$$

$$= 15/128$$

Ex: 2) Riya has to select two students from a class of 23 girls and 25 boys. What is the probability that both students chosen are boys?

-> Total number of students = 23+25 = 48

Probability of choosing the first Boy, say boy 1

= 25/48

Probability of choosing the 2nd boy = 24/47

$$P(B1 \text{ \& } B2) = P(B1) + P(B2/B1)$$

$$= 25/48 \cdot 24/47$$

$$= \frac{600}{2256}$$

3) The probability that it is Friday and that a students is absent is 0.03. Since there are 5 school days in a week, the probability that it is Friday is 0.2. What is the probability that a student is absent given that today is Friday?

-> $P(\text{Absent}/\text{Friday}) = \frac{P(\text{Friday \& Absent})}{P(\text{Friday})}$

$= \frac{0.03}{0.2} = 0.15 = 15\%$

Baye's theorem:

$$P(A/B) = \frac{P(B/A)\,P(A)}{P(B)}$$

Histogram

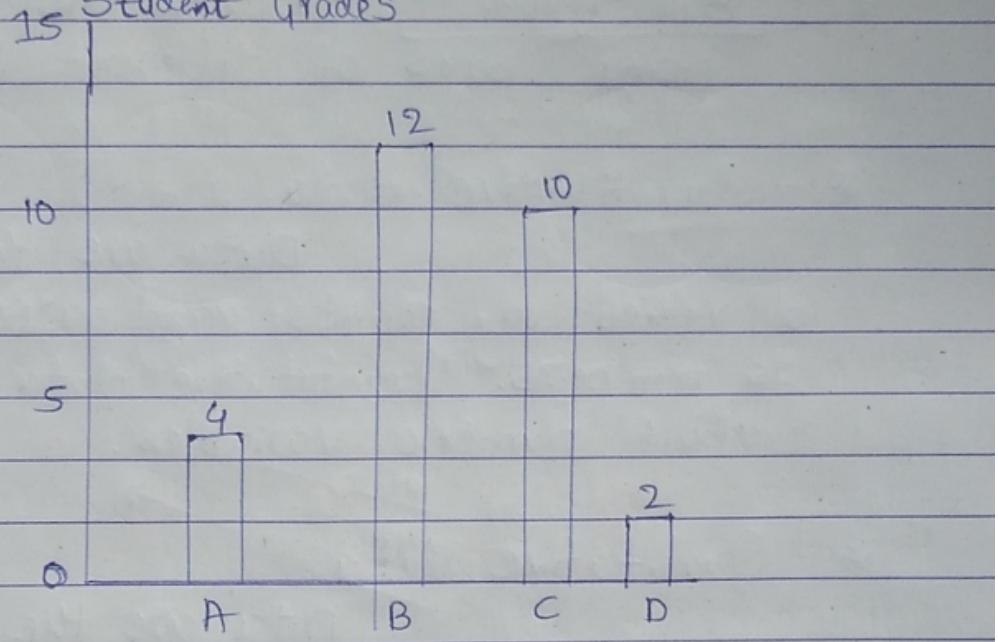
It shows the frequency of values in the data. Usually in intervals of values. Frequency is the amount of times that value appeared in the data.

* A histogram visually presents quantitative data.

Ex: Student Grades.

In a recent test, this many students got these grades:

Grade:	A	B	C	D
Students:	4	12	10	2



Pie Charts

* Pie graphs are used to show the distribution of qualitative data.
* Each catagory is represented with a slice in the 'pie'. The size of each slice represents the frequency of values from that catagory in the data.

* Quantitative data: Data can represent in decimal format

* Quantitative data: Data don't represent in decimal format.

* Frequency Histogram: It is a graph with vertical columns that represent the frequency of a data point or range of data points occuring in a set of data.

* Bar Graph: Graphical display of data using bars of different hight.

* Quantitative data:

Data are the measures of values or counts and are expressed as numbers. Quantitative data are data about numeric variables.

* Qualitative data:

Data are the measures of 'types' and may be represented by a name, symbol or number code.