Relationships Between Events A and B	New Events from Old Events A, B	Events and Occurances
A implies B: $\boxed{A \subseteq B}$	A or B: $\boxed{A \cup B}$	Sample Space $\boxed{(\mathcal{S})}$
A, B are mutually exclusive events: $\boxed{A \cap B = \emptyset}$	A and B: $\boxed{A \cap B}$	an impossible event: $\boxed{(\emptyset)}$
	not A: $\boxed{A^c}$	$\Rightarrow$ an event is a set
$A_1, \dots, A_n$ is a partitioning of $\mathcal{S}$: $\boxed{A_1 \cup A_2 \cup \dots \cup A_n = \mathcal{S},\ A_i \cap A_j = \emptyset, \text{ for } i \neq j}$	A or B but not both: $\boxed{(A \cup B) - (A \cap B) = (A \cup B) \cap (A \cap B)^c =}$	ζ is a possible outcome: $\boxed{\zeta \in \mathcal{S}}$
		A is an event $\boxed{A \subseteq \mathcal{S}}$
		A occured: $\boxed{\zeta_{actual} \in A}$
		Something must happen an outcome must occure $\boxed{\zeta_{actual} \in \mathcal{S}}$

Note:
this document is prepared to explain basic and regularly used statistical terminology through the use of simple set theory notions.

The following sample space is defined as an **example** of events and occurrences:

Sample space $\mathscr{S}$: the set of all pebbles in the garden with surface area $\leq$n cm^2

A possible outcome, Outcome $\mathscr{s}$: a pebble with surface area 2 cm^2

$\Rightarrow \mathscr{s} \in \mathscr{S}$

Event A : the set of all pebbles (outcomes) with surface area $\geq$ 2 cm^2

$\Rightarrow$ A $\subseteq \mathscr{S}$ (A implies $\mathscr{S}$)

Event A occurred:

there actually exists an outcome y ,

a pebble with surface area 3 cm^2

in Event A (set of all pebbles (outcomes) with surface area $\geq$ 2 cm^2)
since there exists Outcome y $\in$ Event A
we say Event A has occurred.

An impossible outcome (outcome $\varnothing$): a pebbles with surface area -2 cm^2
An impossible event (event $\varnothing$):

- the set of pebbles with negative surface area
- The set of outcomes $\{z_1, ..., z_n\}$ such that $\{z_1, ..., z_n\} \subseteq (A \cap A^c)$

Partitions of sample space $\mathscr{S}$:

Let A_1 the set of pebbles (outcomes) with surface area in (0, 1]
Let A_2 the set of pebbles (outcomes) with surface area in (1, 2]
…
Let A_n the set of pebbles (outcomes) with surface area in (n-1, n]

Then A_1, ... , A_n are the partitions of $\mathscr{S}$
Where $A_1 \cup ... \cup A_n = \mathscr{S}$
And $(A_i \cap A_j) = \varnothing$ for i $\neq$ j

Example
{{1}, {2,3}, {4,5}} is a partition of {1,2,3,4,5}