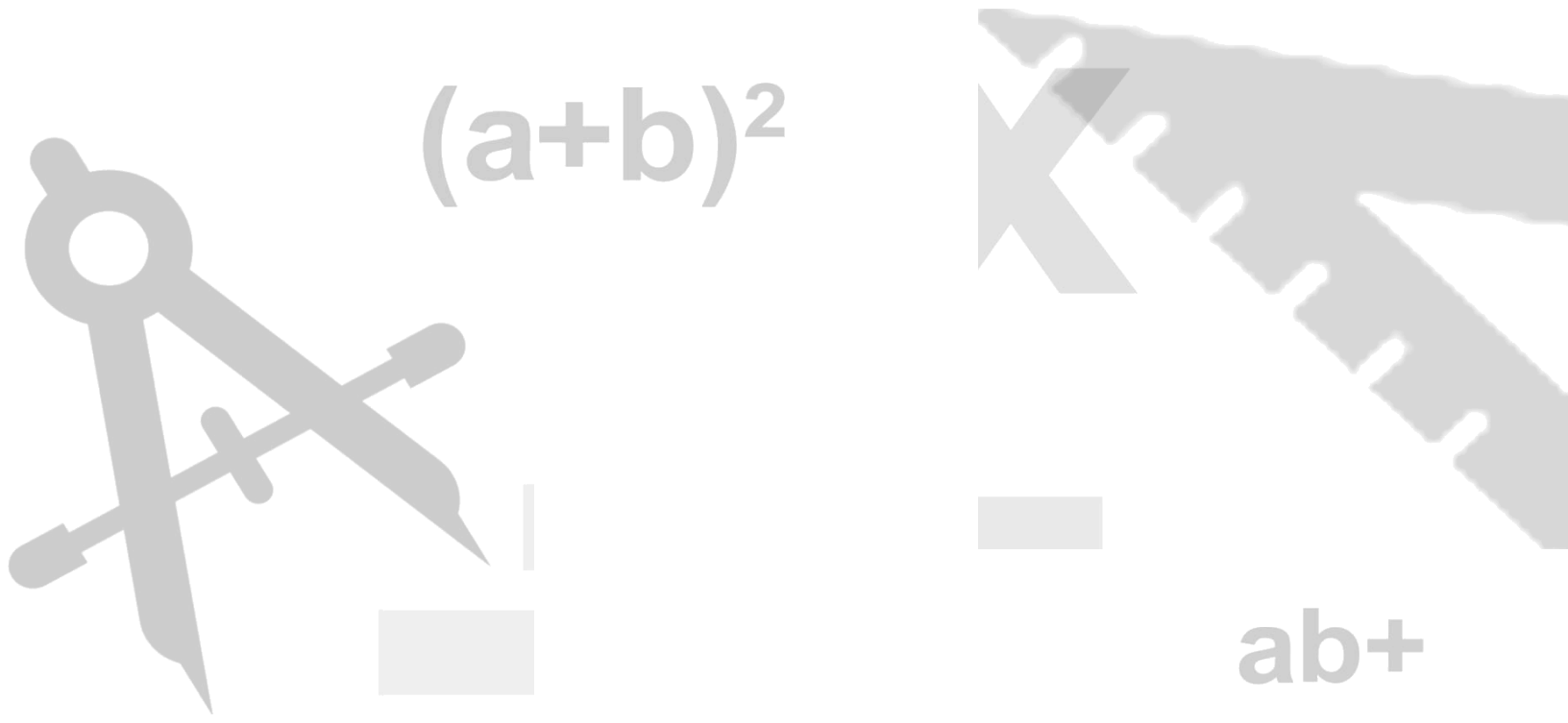
MATHS



Probability

1. **Probability** is a quantitative measure of uncertainty.
2. In the **experimental approach** to probability, we find the probability of the occurrence of an event by actually performing the experiment a number of times and adequate recording of the happening of event.
3. In the **theoretical approach** to probability, we try to predict what will happen without actually performing the experiment.
4. The experimental probability of an event approaches to its theoretical probability if the number of trials of an experiment is very large.
5. An **outcome** is a result of a single trial of an experiment.
6. The word **'experiment'** means an operation which can produce some well defined outcome(s).

   There are two types of experiments:

   i. **Deterministic experiments:** Experiments which are repeated under identical conditions produce the same results or outcomes are called deterministic experiments.

   ii. **Random or Probabilistic experiment**: If an experiment, when repeated under identical conditions, do not produce the same outcome every time but the outcome in a trial is one of the several possible outcomes, then it is known as a random or probabilistic experiment.

   In this chapter, the term experiment will stand for random experiment.

7. The collection of all possible outcomes is called the **sample space**.
8. An outcome of a random experiment is called an **elementary event**.
9. An event associated to a random experiment is a **compound event** if it is obtained by combining two or more elementary events associated to the random experiment.
10. An event A associated to a random experiment is said to occur if any one of the elementary events associated to the event A is an outcome.
11. An elementary event is said to be **favorable** to a compound event A, if it satisfies the definition of the compound event A. In other words, an elementary event E is favorable to a compound event A, if we say that the event A occurs when E is an outcome of a trial.
12. In an experiment, if two or more events have equal chances to occur or have equal probabilities, then they are called **equally likely events**.
13. The **theoretical probability (also called classical probability) of an event *E***, written as $P(E)$, is defined as

$$\frac{\text{Number of outcomes favourable to E}}{\text{Number of all possible outcomes of the experiment}}$$

14. For two events A and B of an experiment:

   If $P(A) > P(B)$ then event A is more likely to occur than event B.

   If $P(A) = P(B)$ then events A and B are equally likely to occur.

15. An event is said to be **sure event** if it always occur whenever the experiment is performed. The probability of sure event is always one. In case of sure event elements are same as the sample space.

16. An event is said to be **impossible event** if it never occur whenever the experiment is performed. The probability of an impossible event is always zero. Also, the number of favorable outcome is zero for an impossible event.

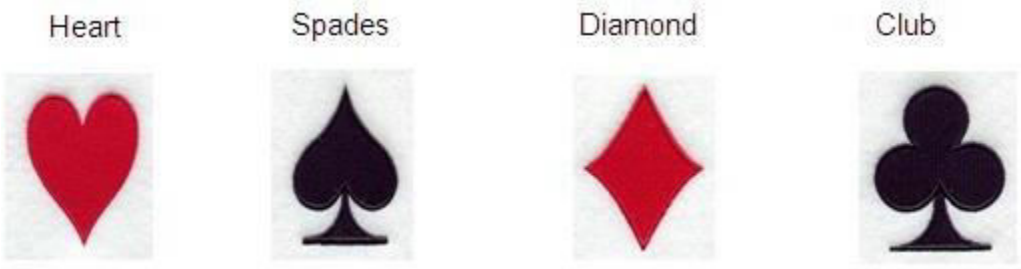
17. Probability of an event lies between 0 and 1, both inclusive, i.e., $\mathbf{0} \leq \boldsymbol{P}(\boldsymbol{A}) \leq \mathbf{1}$

18. If E is an event in a random experiment then the event 'not *E*' (denoted by $\bar{E}$) is called the **complementary event** corresponding to *E*.

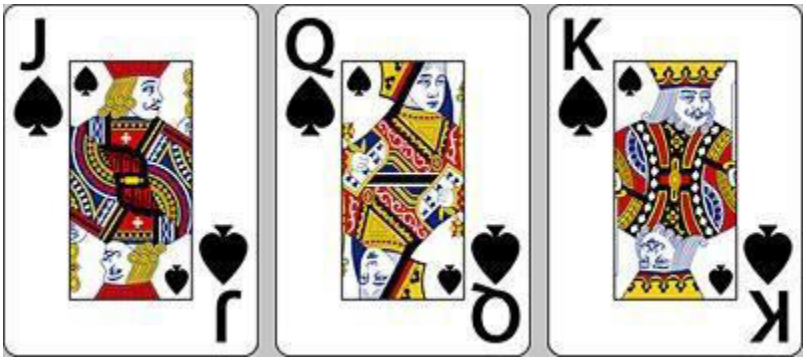
19. The **sum of the probabilities** of all elementary events of an experiment is 1.

20. For an event *E,* $\boldsymbol{P}(\bar{\boldsymbol{E}}) = \mathbf{1} - \boldsymbol{P}(\boldsymbol{E})$, where the event $\bar{E}$ representing 'not *E*" is the complement of event E.

21. Suits of Playing Card
A pack of playing cards consist of 52 cards which are divided into 4 suits of 13 cards each. Each suit consists of one ace, one king, one queen, one jack and 9 other cards numbered from 2 to 10. Four suits are named as spades, hearts, diamonds and clubs.



22. Face Cards
King, queen and jack are face cards.



23. The formula for finding the **geometric probability** of an event is given by:

$$P(E) = \frac{\text{Measure of the specified part of the region}}{\text{Measure of the whole region}}$$

Here, 'measure' may denote length, area or volume of the region or space.