

Chapter 18 : Probability

INTRODUCTION TO PROBABILITY USING DATA :

➤ **Probability :**

Probability means the chance of occurrence of an event. It is measure of uncertainty.

Consider the experiment of rolling a dice marked on the faces with numbers 1, 2, 3, 4, 5, 6 (only one number on each face). The outcomes of getting a number are equally likely. The likelihood of getting 4 is one out of six outcomes *i.e.*, $\frac{1}{6}$. In other words, we say the probability of getting 4 = $\frac{1}{6}$

Similarly the probability of any other number (*i.e.*, 1, 2, 3, 5, 6) is also $\frac{1}{6}$.

Probability of something happening = $\frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$

- ♣ Here, favourable outcome is an outcome that matches the event. For example, in throwing of a dice, the number of favourable outcomes corresponding to the appearance of a prime number is 3, *i.e* 2, 3 and 5.
- ♣ The set of the total number of outcomes is also described by the word **sample space**. Hence the sample space for throwing a dice is $S = \{1, 2, 3, 4, 5, 6\}$

Probability of an event not occurring = 1 – Probability of an event occurring.

Illustration :

A dices is rolled once. What is the probability of getting :

(a) a 3? (b) an even number

Sol. : (a) Number of 3's on a dice = 1

Total number of possible outcomes = 6

(∴ Sample space = {1, 2, 3, 4, 5, 6}) ∴ Probability of getting 3 = $\frac{1}{6}$.

(b) Number of even numbers on a dice = 3(2, 4, 6)

Total number of possible outcomes = 6

∴ probability of getting an even number = $\frac{3}{6} = \frac{1}{2}$

➤ **Trials :**

A trial is a random experiment repeated under same conditions. For example, tossing a coin, throwing a dice are trials.

➤ **Event :**

An event is a possible outcome of the trial. For example, getting a head or tail on tossing a coin, getting a '6' on the upper face of a dice etc., are events.

Example :

- ◆ When we toss a coin and get a head it is an event.
- ◆ When a dice is rolled and we get an even number it is an event.
- ◆ From a pack of 52 cards, picking up a red card is an event.

➤ **Equally Likely :**

When two events have an even chance of happening the two events are **equally likely**. For example, while throwing a coin chance of occurring of Head or Tail are equally likely events.

TABULATING AND COUNTING OCCURRENCE OF 1 THROUGH 6 IN A NUMBER OF THROWS :

When we throw a dice, then Sample space(S) = {1, 2, 3, 4, 5, 6}

∴ Total number of outcomes = 6.

Number	Event	Probability
1.	Probability of getting 1	Number of 1's on a dice = 1 ∴ $\frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{6}$
2.	Probability of getting 2	Number of 2's on a dice = 1 ∴ $\frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{6}$
3.	Probability of getting 3	Number of 3's on a dice = 1 ∴ $\frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{6}$

4.	Probability of getting 4	Number of 4's on a dice = 1 $\therefore \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{6}$
5.	Probability of getting 5	Number of 5's on a dice = 1 $\therefore \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{6}$
6.	Probability of getting 6	Number of 6's on a dice = 1 $\therefore \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{1}{6}$
7.	Probability of getting even number	The favourable outcome are 2, 4, 6 \therefore Number of even numbers on a dice = 3 $\therefore \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{3}{6} = \frac{1}{2}$
8.	Probability of getting odd number	The favourable outcome are 1, 3, 5 \therefore Number of odd numbers on a dice = 3 $\therefore \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}} = \frac{3}{6} = \frac{1}{2}$


Important Notes

- ✓ An impossible outcome has no chance of happening. The probability of an impossible outcome is 0.
- ✓ A certain outcome must happen. The probability of a certain outcome is 1

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