

Introduction of Probability

Definitions:

- * **Random experiment** : An experiment whose result is not predicted (unknown) is called a Random experiment.
- * **Event** : Each outcome of a random experiment is called an event.
- * **Probability** : Probability of an event is defined as the ratio of favourable number of events to the total number of events.

If 'E' denotes an event, then its probability is denoted by $P(E)$ and is given by the formula

$$P(E) = \frac{\text{favourable number of events}}{\text{total number of events}}$$

* **Note:**

- (i) $0 \leq P(E) \leq 1$, i.e., probability of any event always lies between zero and one except for sure and impossible events.
- (ii) Probability of a sure event (certain event) is always 1.
- (iii) Probability of an impossible event is always zero
- (iv) If $P(E)$ denotes the occurrence (happening) of an event and $\bar{P}(E)$ denotes the non occurrence (not happening) of an event, then

$$P(E) + \bar{P}(E) = 1$$

$$\bar{P}(E) = 1 - P(E) \text{ (or) } P(\bar{E}) = 1 - P(E)$$

Types of Random Experiments

1. **Tossing a coin**: Total number of possible outcomes are 2, i.e. H or T
2. **Tossing two coins** : Total number of possible outcomes are 4, i.e.
HH, TH, HT, TT
3. **Tossing three coins** : Total number of possible outcomes are 8, i.e.
HHH, THH, HTH, TTH, HHT, THT, HTT, TTT
4. **Throwing a die** : Total number of possible outcome are 6, i.e.
1 or 2 or 3 or 4 or 5 or 6
5. **Throwing two dice** : Total number of possible outcome are 36, i.e.
(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6)
(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6)
(3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6)
(4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6)
(5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6)
(6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)

6. Drawing a card from a well shuffled pack of 52 cards : Total number of possible outcome are 52, i.e.

Total number of Red cards = 26 (diamonds and hearts)

Total number of black cards = 26 (spades and clubs)

Total number of diamond = 13

Total number of hearts = 13

Total number of spades = 13

Total number of clubs = 13

Total number of face card = $4 \times 3 = 12$

Total number of non face cards = 40

Total number of Aces = 4

Total number of queen = 4

Total number of king = 4

Total number of jacks = 4

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