

# Probability

## Examples

**Dice**  
Two dice are rolled, what is probability of getting 8 as a sum?

**Sol.** Number of possible outcome =  $6^2 = 36$   
Number of favorable outcomes = 5 i.e., (2, 6), (3, 5), (4, 4), (5, 3), (6, 2)

$$P(E) = \frac{5}{36}$$

### Coin

When a coin is tossed, what would be the probability of appearing head?

**Sol.** Total outcomes = 2, Favorable outcomes = 1

$$P(E) = \frac{1}{2}$$

### Card

What is the probability of getting a queen from a pack of 52 cards?

**Sol.** Number of Favorable outcomes = 4

Number of possible outcomes = 52  
∴ there are four queens

$$P(E) = \frac{4}{52} = \frac{1}{13}$$

## Theoretical Probability

$$0 \leq P(E) \leq 1$$

What we expect to happen in an experiment

Number of trials in

$$P(E) = \frac{\text{Number of trials in which the event happened}}{\text{Total number of trials}}$$

## Experimental Probability

What actually happens in an experiment

$$P(E) = \frac{\text{Number of outcomes favorable to E}}{\text{Number of all possible outcomes of the experiment}}$$

## Value

Sum of probabilities of all elementary events is 1.  
For events A, B, C:  
 $P(A) + P(B) + P(C) = 1$

## Definitions

### Impossible Event

For impossible event, probability is 0.

### Sure or Certain Event

For sure or certain event, probability is 1.

### Complementary Event

For event E, complement event,  $P(\bar{E}) = 1 - P(E)$

### Elementary Event

Event having only one outcome of the experiment