

## 1. Addition Rule:

There are 2 types of events.

\* Mutual Exclusive

\* Non-Mutual Exclusive

October-31:

### Mutual Exclusive Events:

Two events are mutually exclusive when they can't occur at the same time.

Ex: If you toss the coin, what is the probability of the coin landing on heads (or) tails.

$$P(A \cup B) = P(A) + P(B)$$

$$P(H \cup T) = \frac{1}{2} + \frac{1}{2}$$

$$= 1$$

### Non-Mutual Exclusive Event:

Multiple events can be occurring at the same time

Ex: - picking a king of hearts from deck of cards.  
- picking a card randomly from a deck of cards, what is the probability of choosing a card the queen (or) heart?

$$P(Q \cup H) = (P(Q) + P(H)) - 1$$

$$= \left( \frac{4}{52} + \frac{13}{52} \right) - 1$$

$$= \frac{17}{52}$$

=

$$P(Q \cup H) = P(Q) + P(H) - P(Q \cap H)$$

$$= \frac{4}{52} + \frac{13}{52} - \frac{1}{52}$$

$$= \frac{16}{52}$$

$$= \frac{4}{13}$$

$$P(Q \cup H) = 0.3$$

## 2. Multiplication Rule:

### 1. Independent Event:

All the values have the same priority after n

number of trials also.

Ex: If you roll the dice and time & 5th time what is the probability of getting 4?

2nd time  $P(4) = \frac{1}{6}$

5th time  $P(4) = \frac{1}{6}$

What is the probability of rolling & getting a 5 then 4 in a dice?

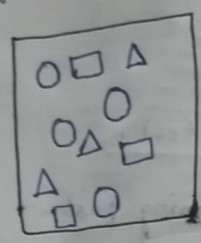
$$P(5 \text{ AND } 4) = P(A \text{ AND } B) = P(A) * P(B)$$

$$P(5 \text{ and } 4) = \frac{1}{6} * \frac{1}{6} = \frac{1}{36} = 0.0277$$

2. Dependent Event:

One event depends on another event.

present event outcome depends on previous event's outcome.



$$P(\Delta) = \frac{3}{10} = 0.3$$

$$P(O) = \frac{4}{10} = 0.4$$

$$P(\square) = \frac{3}{8} = 0.375$$

Ex: What is the probability of drawing a king & then 3 from deck of cards?

$$P(A \text{ AND } B) = P(A) * P(B/A)$$

$$P(K \text{ AND } 3) = \frac{4}{52} * \frac{4}{51}$$

$$= 0.0769 * 0.0784 = \frac{16}{2652}$$

$$= 0.00603 \rightarrow 0.6\%$$

Permutation & Combinations:

A B C D

permutation: irrespective of

"Permutation" refers to the different ways in which a set of items can be arranged in order & in permutation the order of the item matters but not items.

$${}_n P_r = \frac{n!}{(n-r)!}$$

n: no. of items

r: no. of ways.

$${}_4 P_2 = \frac{4!}{2!} = \frac{24}{2} = 12$$

A B C D

permutation: AB, BA, AC, CA, AD, DA, BC, BD, CB, CD, DB, DC

"Combination" refers to the different way of selecting item from a set where the order of selection does not matters but items should not repeat.

$${}_n C_r = \frac{n!}{r!(n-r)!}$$

ABCD  
Combination: AB, BC, AC, AD, BD, CD

$${}_4 C_2 = \frac{4!}{2!2!} = \frac{24}{4} = 6$$