Fundamental Principle of Counting

Data Science and A.I. Lecture Series

Bindeshwar Singh Kushwaha

PostNetwork Academy

Fundamental Principle of Counting

- **Statement:** If one event can occur in m ways and another event can occur in n ways, then the two events together can occur in $m \times n$ ways.

Fundamental Principle of Counting

- **Statement:** If one event can occur in m ways and another event can occur in n ways, then the two events together can occur in $m \times n$ ways.
- This principle can be extended to multiple events. For example:

$$\text{Total ways for 3 events} = m \times n \times p$$

Fundamental Principle of Counting

- **Statement:** If one event can occur in m ways and another event can occur in n ways, then the two events together can occur in $m \times n$ ways.
- This principle can be extended to multiple events. For example:

$$\text{Total ways for 3 events} = m \times n \times p$$

- The principle is widely used in problems involving arrangements and selections.

Example 1: Mohan's Pants and Shirts

- Mohan has 3 pants (P_1, P_2, P_3) and 2 shirts (S_1, S_2).

Example 1: Mohan's Pants and Shirts

- Mohan has 3 pants (P_1, P_2, P_3) and 2 shirts (S_1, S_2).
- For each pant, there are 2 choices of shirts.

Example 1: Mohan's Pants and Shirts

- Mohan has 3 pants (P_1, P_2, P_3) and 2 shirts (S_1, S_2).
- For each pant, there are 2 choices of shirts.
- Total combinations:

$$3 \times 2 = 6$$

Example 1: Mohan's Pants and Shirts

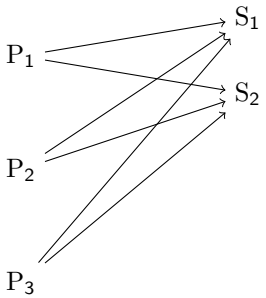
- Mohan has 3 pants (P_1, P_2, P_3) and 2 shirts (S_1, S_2).
- For each pant, there are 2 choices of shirts.
- Total combinations:

$$3 \times 2 = 6$$

- The combinations are:

$$P_1S_1, P_1S_2, P_2S_1, P_2S_2, P_3S_1, P_3S_2$$

Diagram for Pants and Shirts



- Each pant (P_1, P_2, P_3) is connected to both shirts (S_1, S_2).
- The arrows represent the possible pairings between pants and shirts.
- Total combinations:

$$3 \times 2 = 6$$

Example 2: Sabnam's School Supplies

- Sabnam has:

Example 2: Sabnam's School Supplies

- Sabnam has:
  - 2 school bags (B_1, B_2),

Example 2: Sabnam's School Supplies

- Sabnam has:
  - 2 school bags (B_1, B_2),
  - 3 tiffin boxes (T_1, T_2, T_3),

Example 2: Sabnam's School Supplies

- Sabnam has:
  - 2 school bags (B_1, B_2),
  - 3 tiffin boxes (T_1, T_2, T_3),
  - 2 water bottles (W_1, W_2).

Example 2: Sabnam's School Supplies

- Sabnam has:
  - 2 school bags (B_1, B_2),
  - 3 tiffin boxes (T_1, T_2, T_3),
  - 2 water bottles (W_1, W_2).
- For each school bag, there are 3 choices of tiffin boxes.

Example 2: Sabnam's School Supplies

- Sabnam has:
  - 2 school bags (B_1, B_2),
  - 3 tiffin boxes (T_1, T_2, T_3),
  - 2 water bottles (W_1, W_2).
- For each school bag, there are 3 choices of tiffin boxes.
- For each pair of school bag and tiffin box, there are 2 choices of water bottles.

Example 2: Sabnam's School Supplies

- Sabnam has:
  - 2 school bags (B_1, B_2),
  - 3 tiffin boxes (T_1, T_2, T_3),
  - 2 water bottles (W_1, W_2).
- For each school bag, there are 3 choices of tiffin boxes.
- For each pair of school bag and tiffin box, there are 2 choices of water bottles.
- Total combinations:

$$2 \times 3 \times 2 = 12$$

Example 3: 4-Letter Words from "ROSE"

- To form 4-letter words with "ROSE" (no repetition):

Example 3: 4-Letter Words from "ROSE"

- To form 4-letter words with "ROSE" (no repetition):
  - First letter: 4 choices,

Example 3: 4-Letter Words from "ROSE"

- To form 4-letter words with "ROSE" (no repetition):
  - First letter: 4 choices,
  - Second letter: 3 choices,

Example 3: 4-Letter Words from "ROSE"

- To form 4-letter words with "ROSE" (no repetition):
  - First letter: 4 choices,
  - Second letter: 3 choices,
  - Third letter: 2 choices,

Example 3: 4-Letter Words from "ROSE"

- To form 4-letter words with "ROSE" (no repetition):
  - First letter: 4 choices,
  - Second letter: 3 choices,
  - Third letter: 2 choices,
  - Fourth letter: 1 choice.

Example 3: 4-Letter Words from "ROSE"

- To form 4-letter words with "ROSE" (no repetition):
  - First letter: 4 choices,
  - Second letter: 3 choices,
  - Third letter: 2 choices,
  - Fourth letter: 1 choice.
- Total words:

$$4 \times 3 \times 2 \times 1 = 24$$

Example 4: Signals with Flags

- If 4 flags of different colors are available:

Example 4: Signals with Flags

- If 4 flags of different colors are available:
  - First flag: 4 choices,

Example 4: Signals with Flags

- If 4 flags of different colors are available:
  - First flag: 4 choices,
  - Second flag: 3 choices (no repetition).

Example 4: Signals with Flags

- If 4 flags of different colors are available:
  - First flag: 4 choices,
  - Second flag: 3 choices (no repetition).
- Total signals:

$$4 \times 3 = 12$$

Reach PostNetwork Academy

Website

www.postnetwork.co

Reach PostNetwork Academy

Website

www.postnetwork.co

YouTube Channel

www.youtube.com/@postnetworkacademy

Reach PostNetwork Academy

Website

www.postnetwork.co

YouTube Channel

www.youtube.com/@postnetworkacademy

Facebook Page

www.facebook.com/postnetworkacademy

Reach PostNetwork Academy

Website

www.postnetwork.co

YouTube Channel

www.youtube.com/@postnetworkacademy

Facebook Page

www.facebook.com/postnetworkacademy

LinkedIn Page

www.linkedin.com/company/postnetworkacademy

Thank You!