# ① Experiment

examples: ① Tossing a coin

② Tossing two coins

③ Rolling a dice

④ Picking two cards from a standard deck.

# ② Sample Space: A set of all possible outcomes of an experiment.

Examples: ① $S = \{H, T\}$ for the experiment of tossing a coin.

② For tossing two coins, the sample space would be:

$S = \{HH, HT, TH, TT\}$

③ Rolling a dice, $S = \{1, 2, 3, 4, 5, 6\}$

# ③ Event / Event Space: Any subset of sample space can be called Event.

Examples: ① Getting Heads is an event for the experiment of tossing a coin. $\therefore E = \{H\}$

② For tossing two coins experiment, getting at least one Tails can be one of the events.

$E = \{HT, TH, TT\}$

$P(E) \quad |E| \quad n(E)$

④ **Probability of an Event :** $P(E) = \dfrac{|E|}{|S|} = \dfrac{n(E)}{n(S)}$

where $|E|$ or $n(E)$ is called 'cardinality of E'
which simply means no. of elements in E.

**We are tossing a coin followed by a dice. How many elements will be there in the sample space?**

Click on an option to submit your answer

| | |
|---|---|
| A | 2 |
| B | 6 |
| C | 8 |
| D | 12 |
| E | 32 |
| F | 36 |

**We are tossing a dice, where the sample space is {1, 2, 3, 4, 5, 6}**
**Which of following is not an event?**
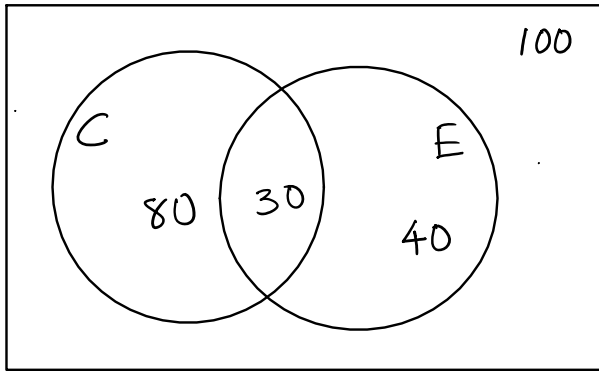
Click on an option to submit your answer

| | |
|---|---|
| A | {1} |
| B | {1, 3} |
| C | {1, 3, 5} |
| D | {1, 3, 5, 7} |

**It is known that 80% people like cappuccino, 40% people like espresso, and 30% like both. What percentage of the people like cappuccino, but do not like espresso?**

Click on an option to submit your answer

| | |
|---|---|
| A | 50% |
| B | 40% |
| C | 30% |
| D | 80% |

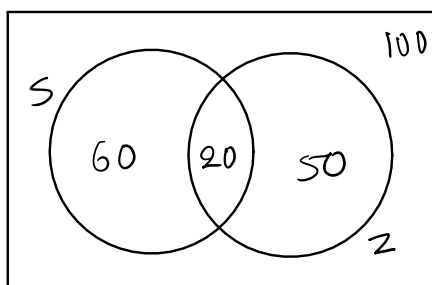**Venn Diagram:** sample space → ▢ & Event → ◯

people who like cappuccino
but don't like espresso

$$= 80 - 30$$
$$= 50$$

**It is known that 60% people use Swiggy, 50% use Zomato. 20% people use both.**
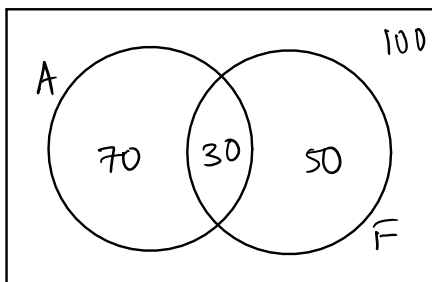**What percentage use Swiggy, but do not use Zomato?**

Click on an option to submit your answer

| | |
|---|---|
| A | 60% |
| B | 50% |
| C | 40% |
| D | 20% |

$$ans = 60 - 20$$
$$= 40$$

**It is known that 70% people use Amazon, 50% use Flipkart. 30% people use both.**
**What percentage of people use neither Amazon, nor Flipkart?**

Click on an option to submit your answer

| | |
|---|---|
| A | 10 |
| B | 20 |
| C | 30 |
| D | 40 |

People who do not
use any of them
$$= 100 - (\text{people who}$$
$$\text{use either of them})$$

$$= 100 - (A \cup F)$$

$$\boxed{|A \cup B| = |A| + |B| - |A \cap B|}$$

$$= 100 - (|A| + |F| - |A \cap F|)$$
$$= 100 - (70 + 50 - 30)$$
$$= 100 - 90 = 10$$

⭐ **Mutually Exclusive & Exhaustive Events**

→ Two events A & B are said to be **Mutually**

**Exclusive** if & only if their intersection is $\phi$.

$$A \cap B = \phi$$

→ Three events A, B & C are mutually exclusive if & only if $A \cap B = \phi$, $B \cap C = \phi$ and $A \cap C = \phi$

→ Events A & B (or A, B & C) are called **Exhustive** if & only if their union becomes 'S'

$$A \cup B = S \qquad (or \ A \cup B \cup C = S)$$

For M.E. events A & B,
$$\boxed{P(A \cup B) = P(A) + P(B)}$$

**Which of the following represent mutually exclusive sets?**

Click on an option to submit your answer

| | | |
|---|---|---|
| A | Youtube premium Vs Non-premium users | ✓ |
| B | People who like Cappuccino Vs Espresso | |
| C | Users of Swiggy Vs Zomato | |
| D | Users of Amazon Vs Flipkart | |

**There are 4 green balls, 6 yellow balls, and 2 blue balls in a bag. A random ball is chosen. Find the probability that a yellow or blue ball is chosen**

Click on an option to submit your answer

| | | |
|---|---|---|
| A | 4/12 | |
| B | 6/12 | |
| C | 8/12 | ✓ |
| D | 10/12 | |

**In an NPS survey, it is seen that 90% are either promoters or neutral. 30% percent are neutral or detractor. What percent of people are neutral?**

| A | 10% |
|---|-----|
| B | 20% |
| C | 30% |
| D | 70% |

$P \cup N = 90$

$N \cup D = 30$

$|P \cup N| + |N \cup D| = 120$

As $P, N$ & $D$ are M.E. & Exhaustive,

$|P| + |N| + |N| + |D| = 120 \Rightarrow |N| + 100 = 120 \Rightarrow \boxed{|N| = 20}$

Give one example for each type of the following events:
1. Mutually Exclusive but not Exhaustive
2. Exhaustive but not Mutually Exclusive
3. Mutually Exclusive as well as Exhaustive
4. Neither Mutually Exclusive not Exhaustive

s={1,2,3,4,5,6}
1. A = {1,2,3}, B = {4,5}  - mutually exclusive, not exhaustive
2. A[1,2,3], B[3,4,5,6] - exhaustive but not mutually exclusive
3. A[1,2,3], B[4,5,6] - mutually exclusive and exhaustive both
4. A[1,2], B[2,3] - neither of them