Basics of Probability

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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.

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

$n(E) \rightarrow |E|$

④ Probability of an Event :

$$P(E) = \frac{|E|}{|S|} = \frac{n(E)}{n(S)}$$

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?

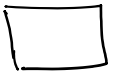
Click on an option to submit your answer

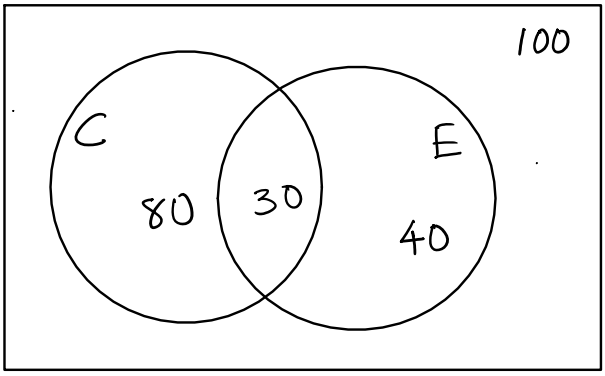
A	{1}
B	{1, 3}
C	{1, 3, 5}
D	{1, 3, 5, 7}

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 → 

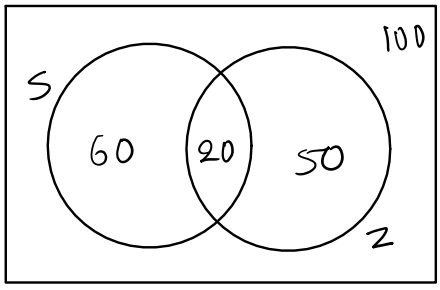


people who like cappuccino but don't like espresso

$= 80 - 30$

$= 50$

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



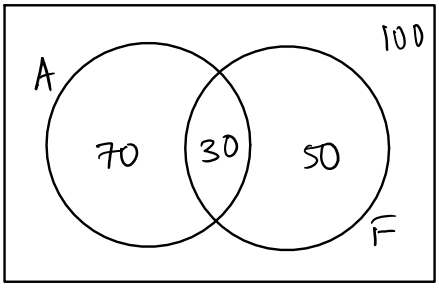
Click on an option to submit your answer

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

$= 100 - (\text{people who use either of them})$

$= 100 - (A \cup F)$

$|A \cup B| = |A| + |B| - |A \cap B|$

$= 100 - (|A| + |F| - |A \cap F|)$

$= 100 - (70 + 50 - 30)$

$= 100 - 90 = 10$

☆ Mutually Exclusive & Exhaustive Events

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

Exclusive if & only if their intersection is ϕ.

$$A \cap B = \phi$$

→ 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'

$$A \cup B = S \quad (\text{or } A \cup B \cup C = S)$$

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?

Click on an option to submit your answer

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