

Conditional Probability

Definition

The probability of occurrence of any event A when another event B in relation to A has already occurred is known as conditional probability. It is depicted by $P(A|B)$.

$$P(A) = P(A|B) \cdot P(B) + P(A|\text{not } B) \cdot P(\text{not } B)$$

OR

$$P(A|B) = P(A \cap B) / P(B)$$

Example : In a group of 100 computer buyers, 40 bought CPU, 30 purchased monitor, and 20 purchased CPU and monitors. If a computer buyer chose at random and bought a CPU, what is the probability they also bought a Monitor?

Solution: As per the first event, 40 out of 100 bought CPU,

So, $P(A) = 40\%$ or 0.4

Now, according to the question, 20 buyers purchased both CPU and monitors. So, this is the intersection of the happening of two events. Hence,

$$P(A \cap B) = 20\% \text{ or } 0.2$$

By the formula of conditional probability we know;

$$P(B|A) = P(A \cap B) / P(A)$$

$$P(B|A) = 0.2 / 0.4 = 2/4 = 1/2 = 0.5$$

The probability that a buyer bought a monitor, given that they purchased a CPU, is 50%.

REF : [Conditional Probability | Definition, Formula, Properties & Examples \(byjus.com\)](https://byjus.com/conditional-probability/).