

The n to p terminal. if  
the current

Law



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The electrical circuit we use in day-to day practice consists of complex combination of resistors and other elements. The laws of combinations of resistors are not always enough to determine current in the circuit or potential difference between two points in the circuit, i. e., circuit analysis.

The two laws which are known as Kirchoff's law serves a useful tool here. For a given electrical circuit, we first do the labelling of different currents through different resistors in the circuit and assign a direction to it. If the total current, which is found at the end is positive, then the actual direction of current is the same as we have drawn and if it is found negative the actual direction is opposite to the drawn direction. Two terminals of the voltage source are also properly marked as P and N terminal (P for positive and N for negative) and the conventional direction of the current is thought to be from N terminal to P terminal such that the potential difference is  $V = E - ir$  Where,  $r$  is the internal resistance of the source and  $E$  is the emf. Here  $i$  is the current flowing from N to P terminal. If the current is thought to be from P to N terminal, then the above equation will become,  $V = E + ir$ . After doing the proper labelling, let us now discuss the two laws aka Kirchoff's laws. For any junction in the circuit, total amount which is entering the junction is equal to total current leaving the junction.

The above stated law is also known as JUNCTION LAW. The proof of this law is that there is no accumulatio of charge at any junction of the circuit. So, total current flowing into a junction is equal to total current flowing out of the junction. Also, the law is equally valid to any point in the circuit. b) The total change in potential in a closed circuit,

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containing resistors and voltage sources, is always zero. This law is also known as LOOP LAW. The potential of a point is dependent on its position.

So, this law is also obvious from the fact that starting from a point in the circuit, if we come back to the starting point by travelling the whole circuit path.