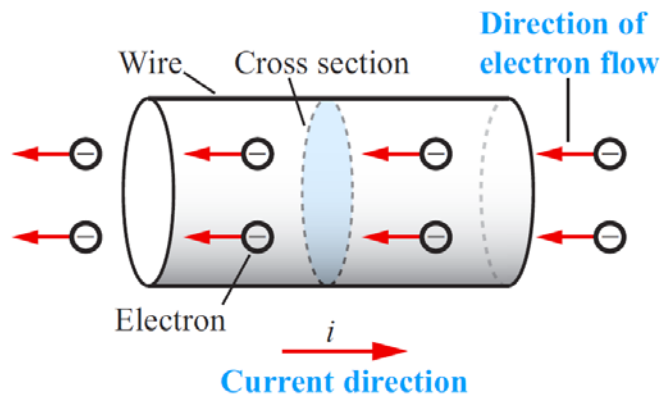


Current

Moving charge gives rise to current. Even though in the overwhelming majority of cases the current flowing through a material is dominated by the movement of electrons (as opposed to positively charged ions), it is advisable to start thinking of the current in terms of *positive charge*, primarily to avoid having to keep track of the fact that current direction is defined to be in opposition to the direction of flow of negative charges.

Electric current is defined as the time rate of transfer of electric charge across a specified boundary.

Consider the segment of wire below.



The current i flowing through it is equal to the amount of charge dq that crosses the wire's cross section over an infinitesimal time duration dt , given as

$$i = \frac{dq}{dt} \text{ (A)}$$

The unit for current is the ampere (A).

In general, both positive and negative charges may flow across the hypothetical interface, and the flow may occur in both directions.

By convention, the direction of i is defined to be the direction of the net flow of (net) charge (positive minus negative).



Consider the circuit on the left, above; a current of 5A is flowing through that wire segment in the direction of the arrow. The same information about the current magnitude and direction may be displayed as shown by the circuit on the right where the arrow points in the opposite direction and the current is expressed as -5A. The current flowing through the labeled wire is *the same for both circuits*.

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