Electric current, p.d., and resistance

Q-1) What is current?

Electric current is the rate of flow of electrons electric charges past a point. A Coulomb (C) charge is: 

\[ I = \frac{\Delta Q}{t} \]  

unit = Amps (A)

Conventional current: \[ \text{e}^- \]

Q-2) What is electric charge?

\[ Q = I \times t \]

The unit of charge is Coulomb (C). One Coulomb is the charge which flows at a time of 1 second when the current is 1 A.

Charge on 1 electron = \(1.6 \times 10^{-19}\)

Q-3) Difference between e.m.f. and p.d.

<table>
<thead>
<tr>
<th>e.m.f.</th>
<th>p.d.</th>
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<tbody>
<tr>
<td>emf is the amount of chemical energy converted to electrical energy per unit charge.</td>
<td>p.d. is the electrical energy converted to other forms of energy (e.g., heat) per unit charge.</td>
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<tr>
<td>It's an input to the circuit.</td>
<td>It's an output to the circuit.</td>
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<tr>
<td>Sum of all p.d.</td>
<td>[ V = \frac{\text{work done (energy)}}{\text{charge}} ]</td>
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Q-4) What is the Ohm's law?

\[ V = IR \]  
voltage is proportional to current.
0.5) What is power? 

Power is the rate at which energy is transferred.

\[ P = I \times V \]
\[ P = V^2 / R \]
\[ P = I^2 R. \]

Energy transferred = \[ P \times t = I \times V \times t. \]

* Power = \text{energy transferred} / \text{time taken}.

\[ P = \frac{V \times Q}{t} \quad \Rightarrow \quad Q = I \times t. \]
\[ P = \frac{V \times I \times t}{t} \]
\[ P = IV. \]