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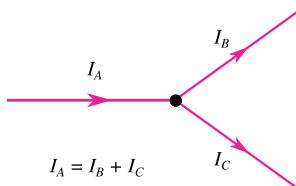
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23 Current and Voltage - Circuit Rules

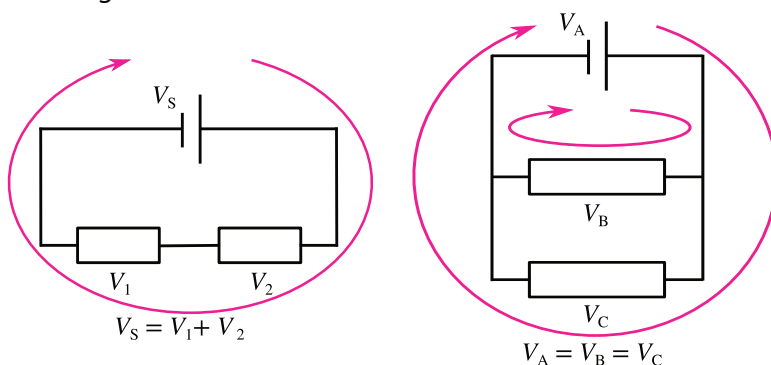
Current is the **rate of flow of electric charge**. Current is not used up in a circuit; at all points in a series circuit, current has **the same value**.

If a circuit has a branch, the current flowing into the junction must **equal** the current flowing out of it.



In the diagram above, the value of Current A is equal to **the sum** of the values of Current B and Current C.

Voltage is also known as potential difference. The voltage across a component is the **work done per unit charge** in driving the charge through the component. In a circuit loop, the sum of the voltages across the power supplies is always equal to **the sum** of the voltages across the rest of the components; see the left figure below.



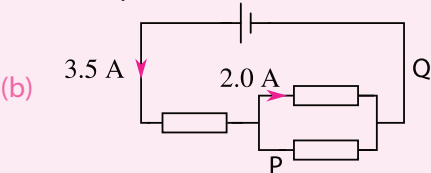
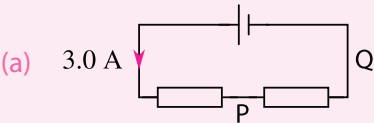
In the right diagram above, the value of the voltage across the cell is **equal** to the value of the voltage across the top resistor (the top loop of the circuit) and also to the value of the voltage across the bottom resistor (the bottom loop of the circuit).

This means components in **parallel** have equal voltage, and components in **series** divide the available voltage between them.

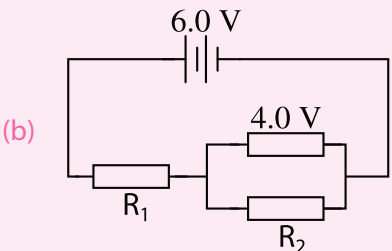
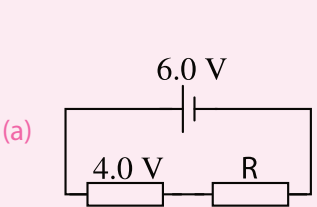
	Components in series . . .	Components in parallel . . .
Cur- rent	have the same current as each other	divide the current between them
Voltage	divide the voltage between them	have the same voltage as each other

Assume below perfect voltmeters and ammeters. Perfect voltmeters carry no current. Perfect ammeters have zero potential difference across them.

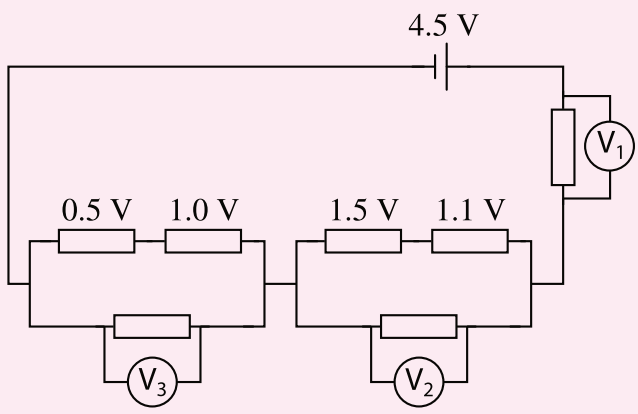
23.1 In the circuits below, state the current at positions P and Q.



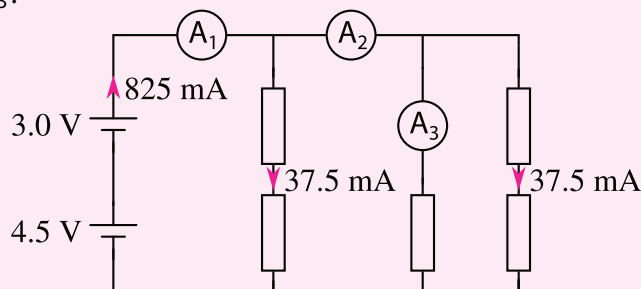
23.2 In the circuits below, state the potential difference across (a) resistor R, and (b) R_1 and R_2 .



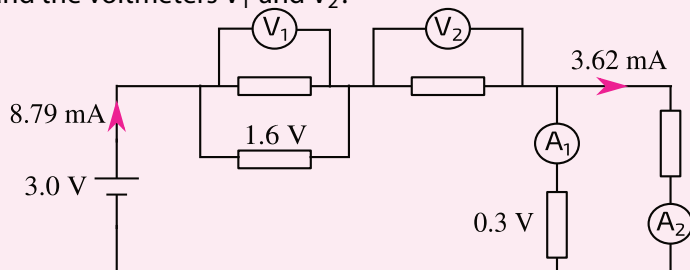
23.3 What are the readings on the voltmeters V_1 , V_2 and V_3 below?



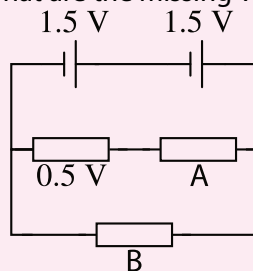
23.4 In the circuit below, what are the readings on the ammeters A_1 , A_2 and A_3 ?



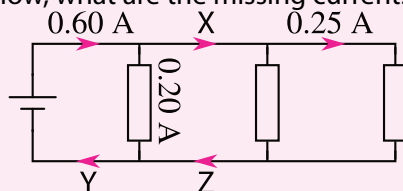
23.5 In the circuit below, what are the readings on the ammeters A_1 and A_2 and the voltmeters V_1 and V_2 ?



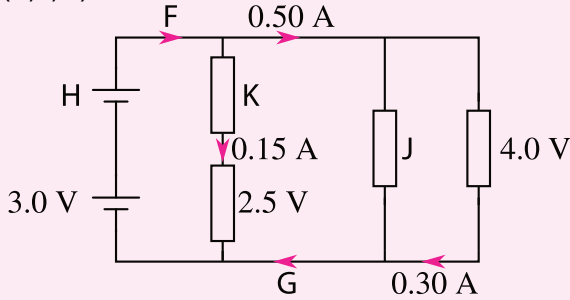
23.6 In the circuit below, what are the missing voltages; A and B?



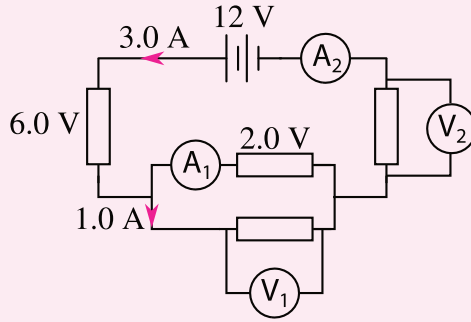
23.7 In the circuit below, what are the missing currents; X, Y and Z?



23.8 In the circuit below, what are the missing currents (F and G) and voltages (H, J, K)?



23.9 What are the readings on A_1 and A_2 , and on V_1 and V_2 below?



23.10 What are the readings on A_1 , A_2 and A_3 , and on V_1 , V_2 and V_3 below?

