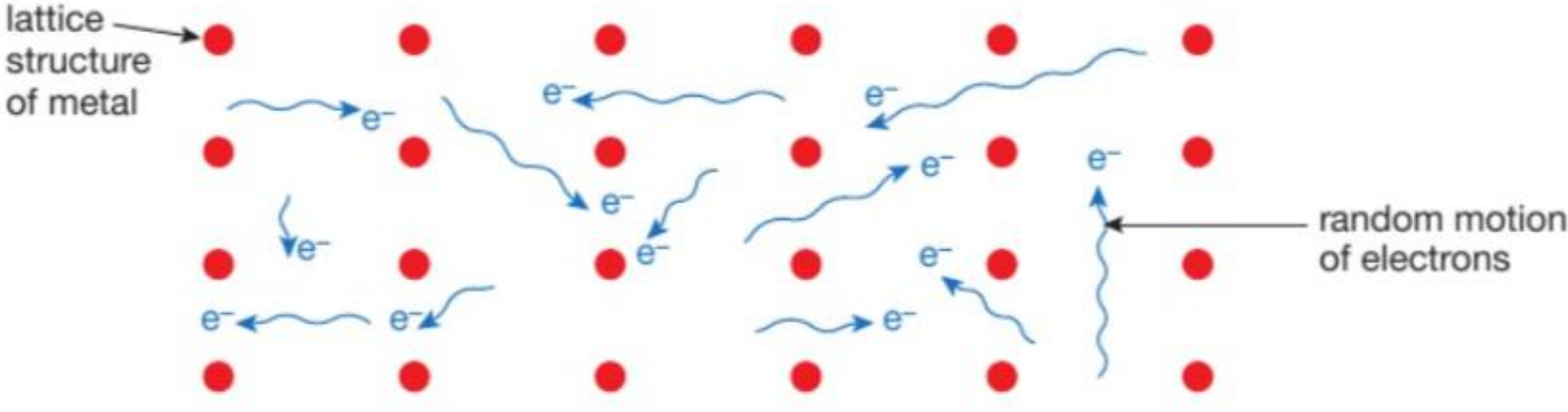


Electricity- Part-2

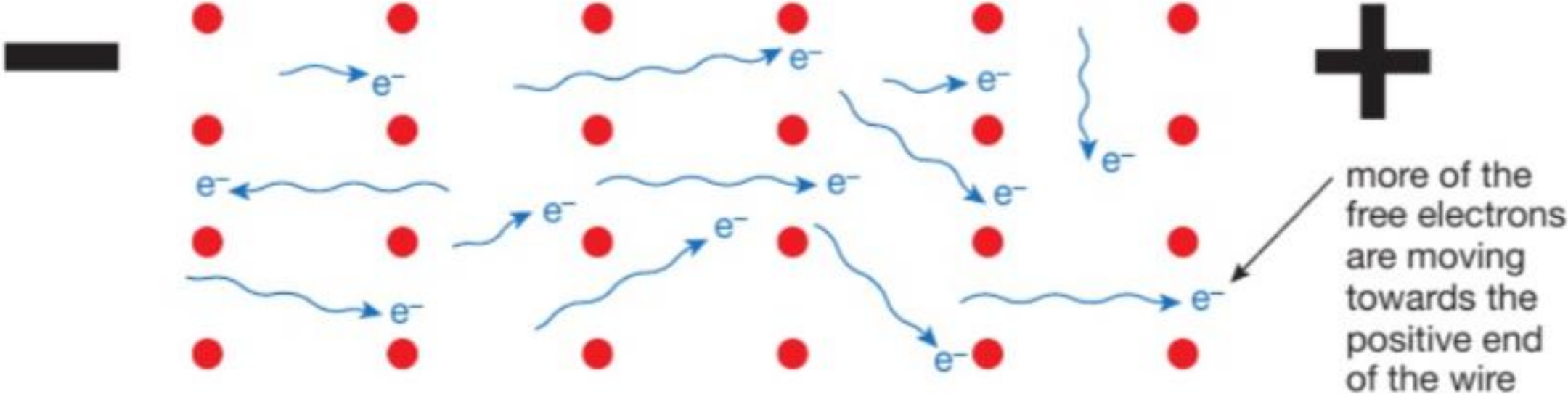
# Current & Voltage



# Free electrons



# Flow of electrons



# Electric Charge(Q)

Electric charge(Q) is measured by the unit called Coulomb(C).

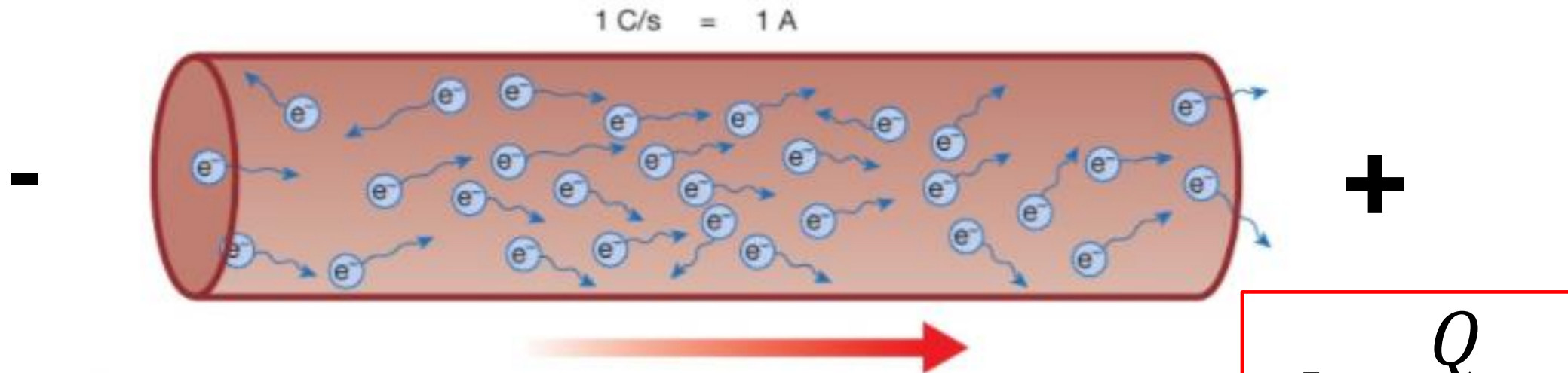
Charge of  $6.25 \times 10^{18}$  electrons is equal to 1 Coulomb(C).

Charge of an electron is  $-1.6 \times 10^{-19}$  C



Charles-Augustin de Coulomb

# Current(I)



- Rate of flow of charge is called the current.
- SI unit is ampere(A).
- 1 A = 1 C/s

$$I = \frac{Q}{t}$$

$$Q = It$$

## Concept learning questions

01) A charge of 20 C flows through a point of a circuit in 5 second. Find the current in the circuit.

$$I = \frac{Q}{t}$$

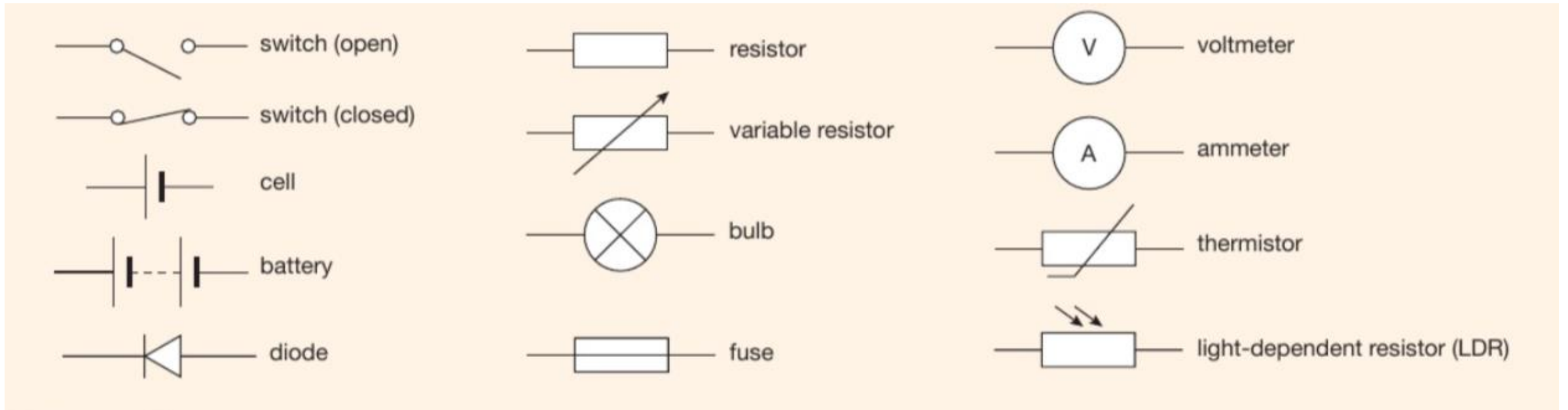
$$I = \frac{20 \text{ C}}{5 \text{ s}}$$

$$= 4 \text{ C/s} = 4 \text{ A}$$

## Concept learning questions

02) A current of 2 A flows through a point in a circuit in 3 second. Find the charge flow through the point.

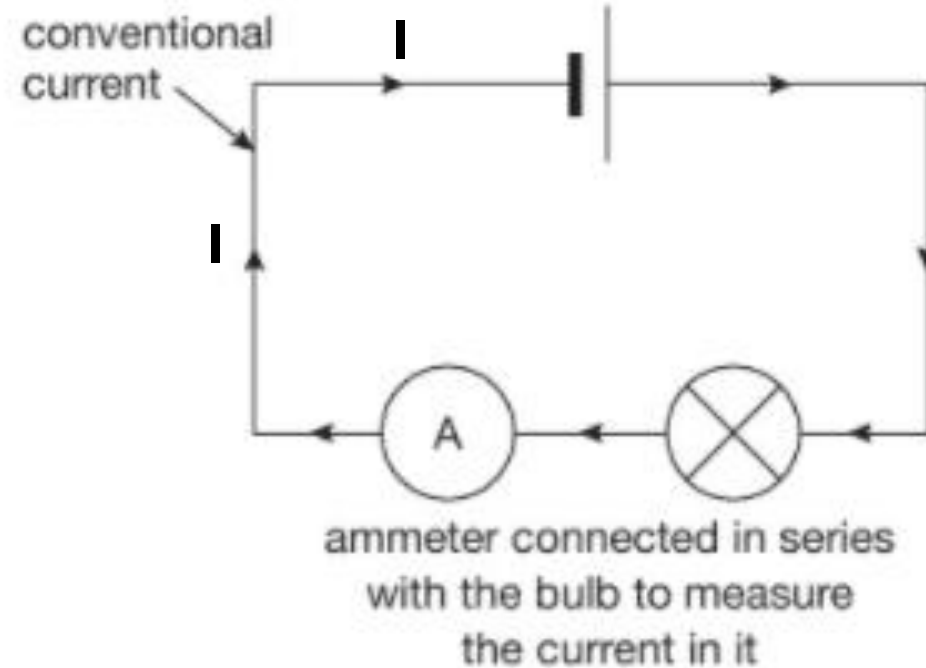
$$\begin{aligned} Q &= It \\ &= 2 \text{ A} \times 3 \text{ s} \\ &= 6 \text{ C} \end{aligned}$$



# CIRCUIT SYMBOLS



# Measuring Current(I)



**Ammeter**

**Circuit symbol**



An ammeter has negligible resistance.

# Voltage(V)



**1.5 V means 1.5 J of energy is transferred per each coulomb of charge**

**The amount of energy transferred per unit charge is called the voltage.**

$$V = \frac{E}{Q}$$

$$1V = 1J/C$$

$$E = V \times Q$$

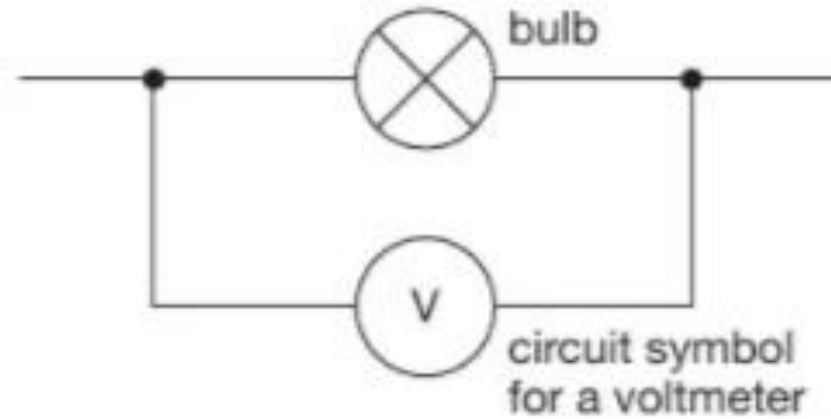
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# Voltage(V)

- ❑ **The voltage is also known as potential difference.**
- ❑ **The SI unit of voltage is volt(V).**
- ❑ **The voltage across an equipment shows the amount of electrical energy transferred to the equipment from each coulomb of charge passing through the equipment.**

Ex: Voltage across a bulb is 3 V = The bulb receive 3J of energy from each coulomb.

# Voltmeter



MEASURING VOLTAGE(V)

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# Concept learning questions

1) The voltage across a light bulb is 3 V. Calculate the electrical energy transferred to the bulb when 20 C of charge passing through it.

2) When 50 C of charge passing through a motor the electrical energy transferred to the motor is 200 J. Find the voltage across the motor.

## SERIES CIRCUITS

- If the components are connected (as a single loop) without branches or junctions, it is called a series circuit.

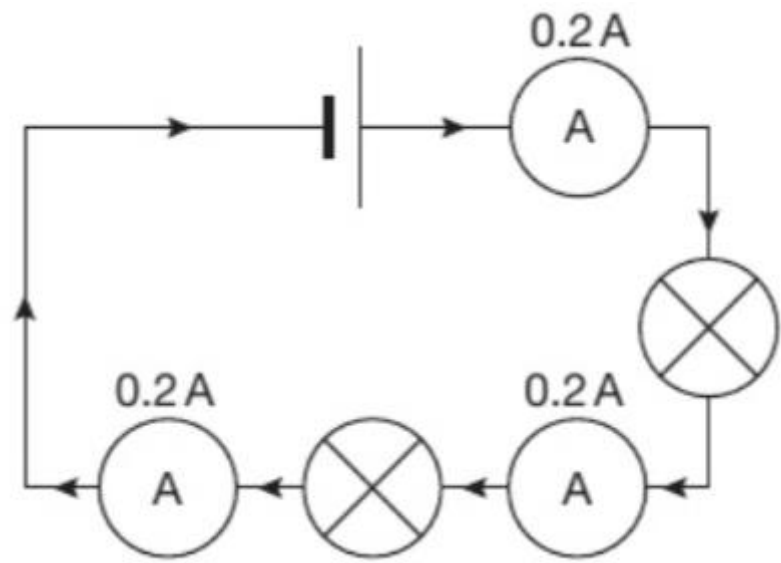


Draw the circuit diagram using circuit symbols.

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# Properties of series connection

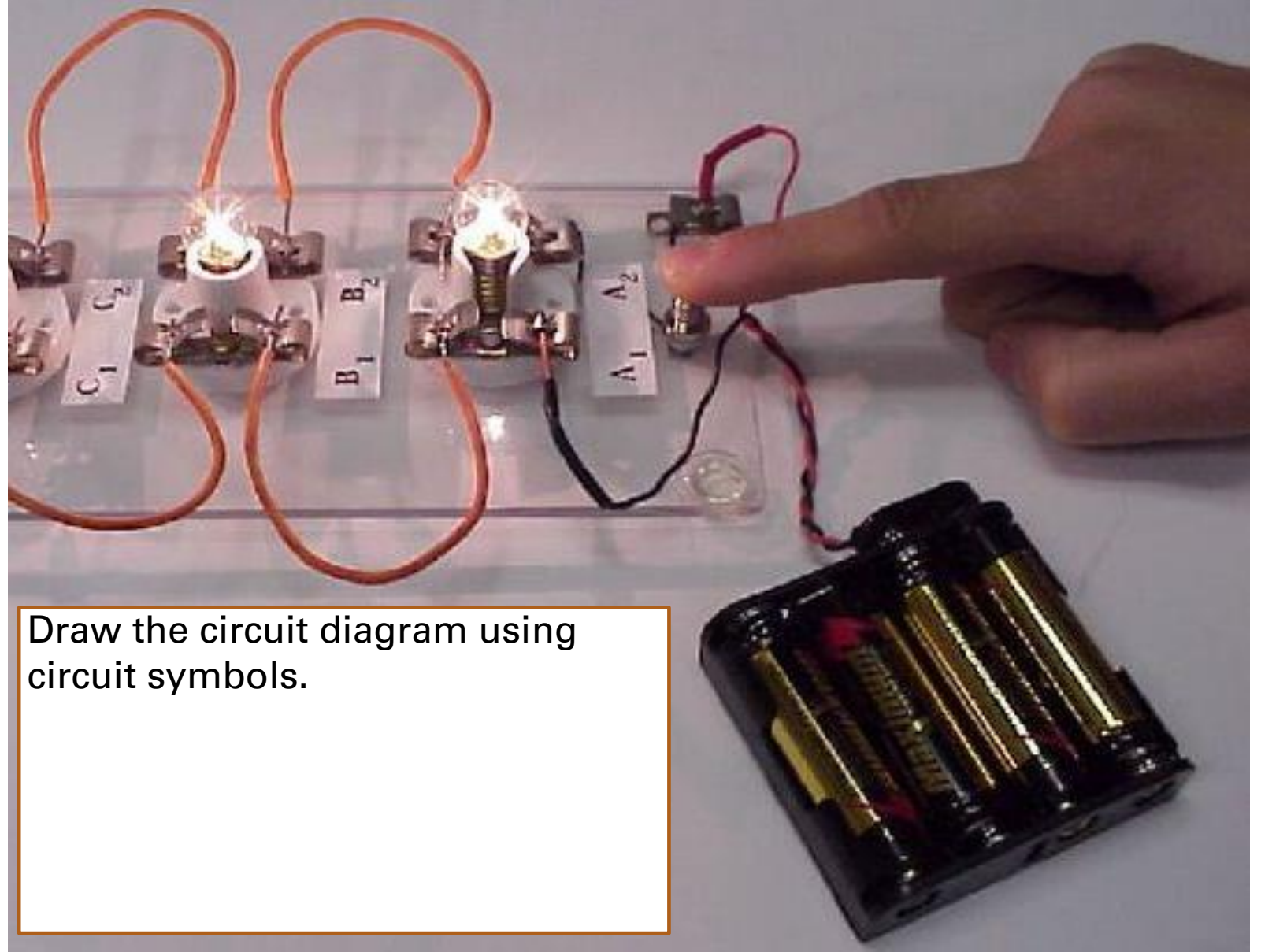
- ❑ Single switch can control all the components.
- ❑ If a component breaks, it opens the circuit and stop the flow of current.
- ❑ The voltage of the battery is shared between the components.  
    Ex: adding more bulbs in series reduce the brightness of the bulbs.
- ❑ Same current flows through all the components.





## ■ PARALLEL CIRCUITS

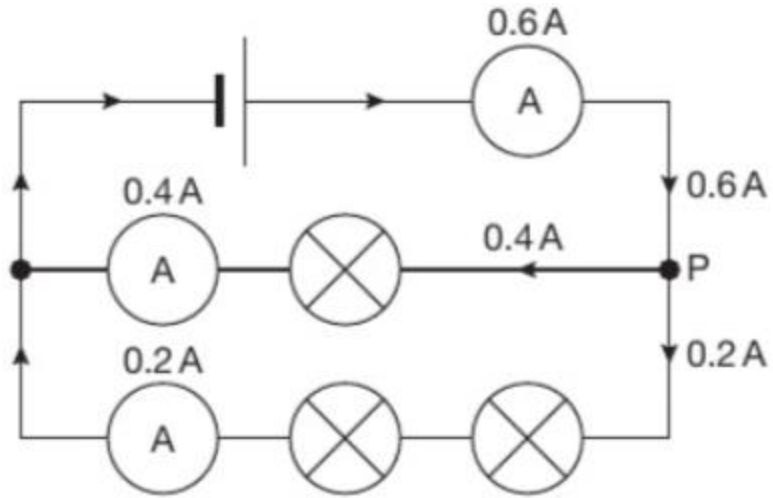
■ Circuit that have junctions or branches and more than one path that the current can flow are called parallel circuits.



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# Properties of parallel connection

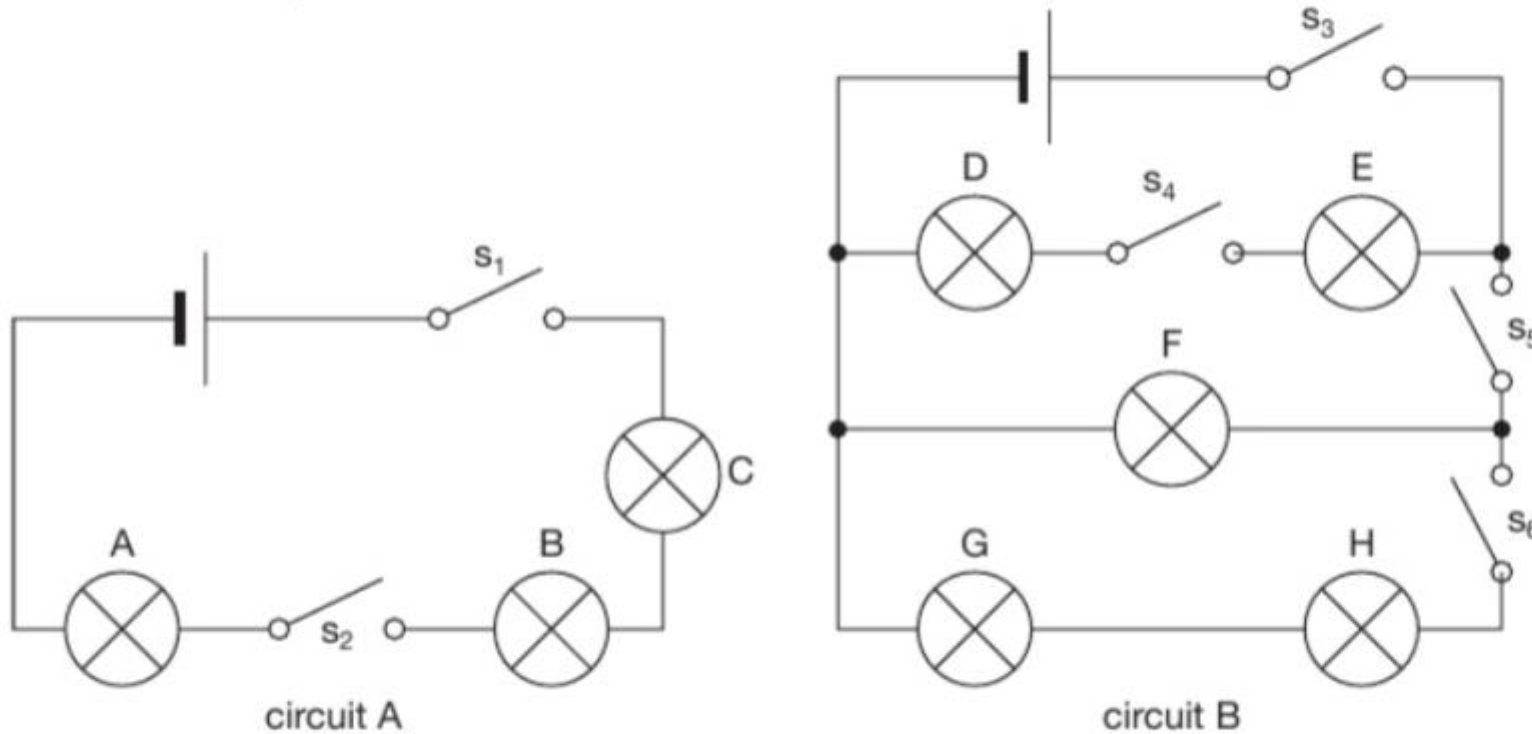
- ❑ Single switch can control all the components and separate switches can be placed to control the components in the branches.
- ❑ If a component breaks, it won't affect the components in other branches.
- ❑ The voltage is the same for all the components in parallel.
- ❑ The current is shared between the branches.





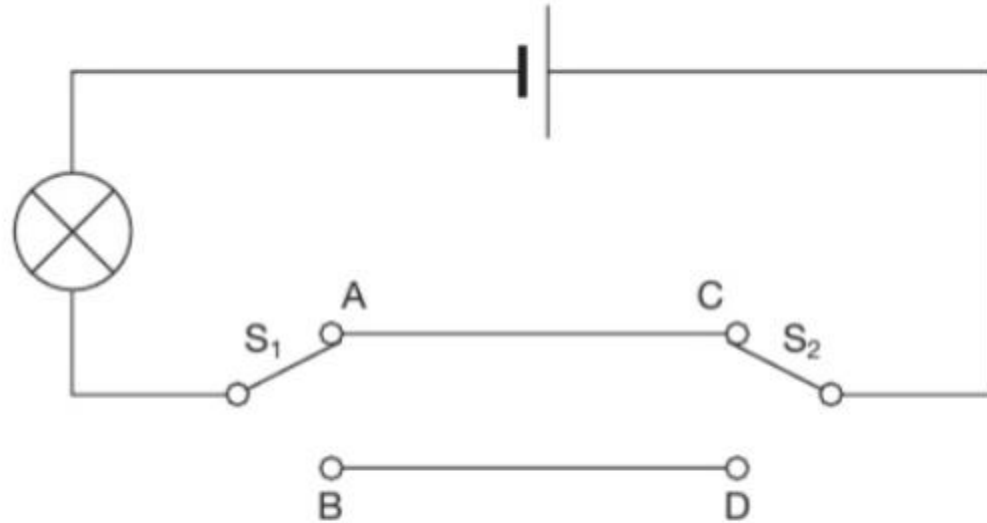
# End Chapter questions

- b** Look carefully at the circuits shown below. Assuming that all switches are initially closed, decide which of the bulbs go out when each of the switches is opened in turn.



- c** In circuit A, which bulb(s) glow the brightest when all the switches in the circuit are closed?
- d** Explain your answer to part **c**.

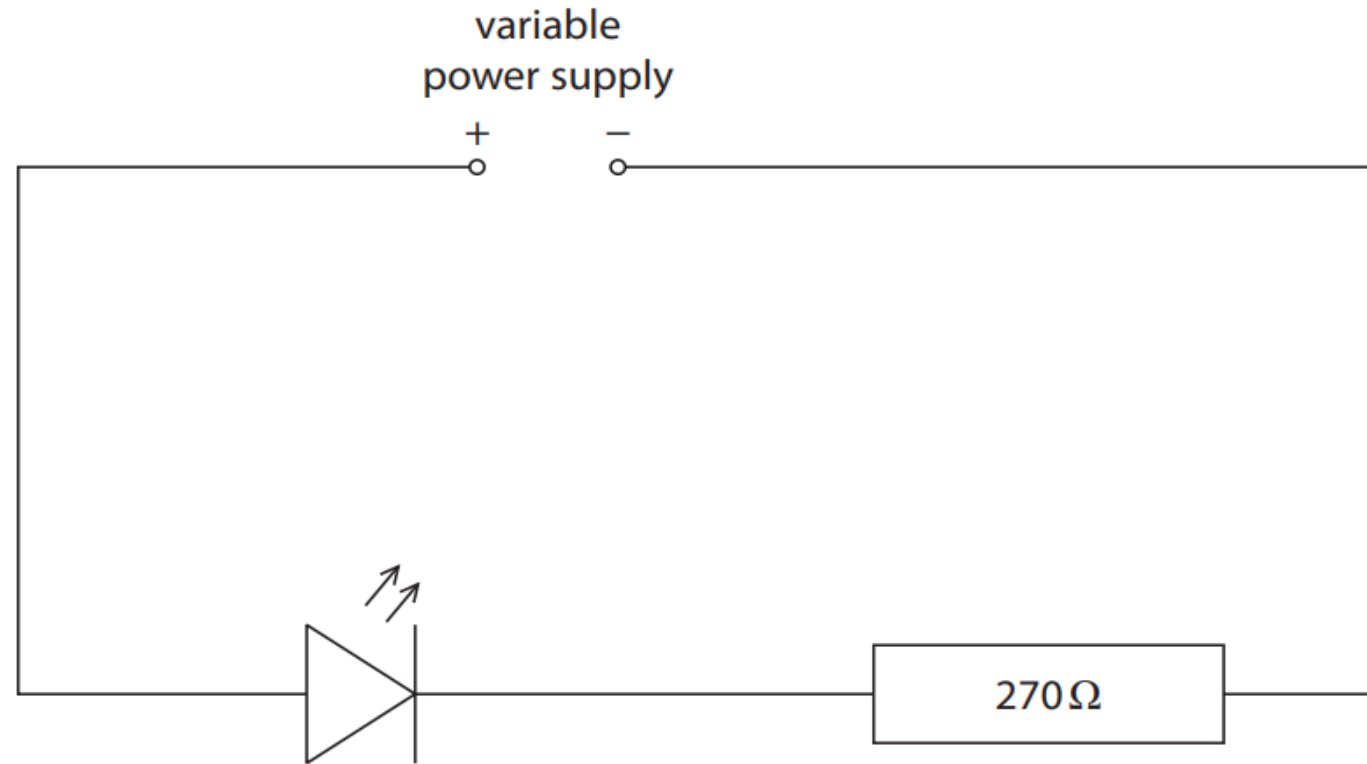
- 4 The diagram below shows a circuit containing two 2-way switches.



- a Explain in your own words what happens when each of the switches is moved to a new position.
- b Suggest one important application of this circuit in the home.

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- 5 The diagram shows a circuit used to investigate the relationship between current and voltage for a light-emitting diode (LED).



- (a) Draw meters on the diagram to measure the voltage of the LED and the current in the LED.

(3)

## ■ Marking scheme

Question number	Answer	Notes	Marks
5 (a)	both ammeter and voltmeter symbols correct; ammeter drawn in series with LED; voltmeter drawn in parallel with LED;		3