11.1 Current & Potential Difference

Question Paper

Course	CIE A Level Physics (9702) 2019-2021
Section	11. Current of Electricity
Topic	11.1 Current & Potential Difference
Difficulty	Medium

Time allowed: **10**

Score: **/10**

Percentage: **/100**

Question 1

The charge that an electric battery can deliver is specified in ampere-hours.

For example, a battery of capacity 40 ampere-hours could supply, when fully charged, 0.2 A for 200 hours.

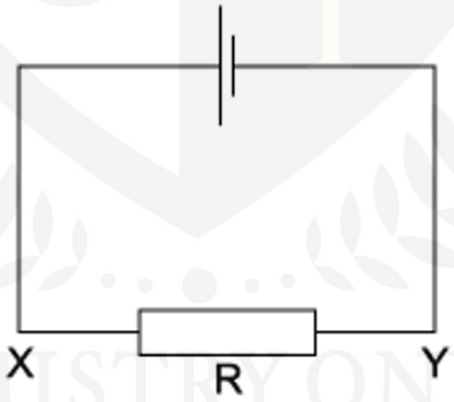
What is the maximum energy that a fully charged 12 V, 40 ampere-hour battery could supply?

A 1.7 kJ **B** 29 kJ **C** 1.7 MJ **D** 29 MJ

[1 mark]

Question 2

The current in the circuit shown is 4.8 A



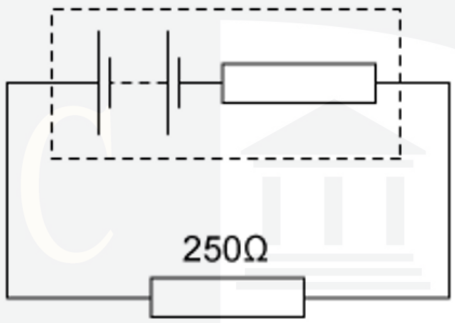
What is the direction of flow and the rate of flow of electrons through the resistor *R*?

	direction of flow	rate of flow
A	X to Y	3.0×10^{19} s^{-1}
B	X to Y	6.0×10^{18} s^{-1}
C	Y to X	3.0×10^{19} s^{-1}
D	Y to X	6.0×10^{18} s^{-1}

[1 mark]

Question 3

A battery, with a constant internal resistance, is connected to a resistor of resistance 250 Ω, as shown.



The current in the resistor is 40 mA for a time of 60 s. During this time 6.0 J of energy is lost in the internal resistance.

What is the energy supplied to the external resistor during the 60 s and the e.m.f. of the battery?

	energy / J	e.m.f / V
A	2.4	2.4
B	2.4	7.5
C	24	10.0
D	24	12.5

[1 mark]

Question 4

In a simple electrical circuit, the current in a resistor is measured as (2.50 ± 0.05) mA. The resistor is marked as having a value of 4.7Ω ± 2%.

If these values were used to calculate the power dissipated in the resistor, what would be the percentage uncertainty in the value obtained?

A 2 % **B** 4 % **C** 6 % **D** 8 %

[1 mark]

Question 5

A milliammeter shows a reading of 20 mA.

How many electrons flow through the milliammeter in 10 seconds?

A 0.20 **B** 3.2×10^{20} **C** 200 **D** 1.3×10^{18}

[1 mark]

Question 6

A power cable X has resistance *R* and carries current I.

A second cable Y has resistance 2*R* and carries current $\frac{I}{2}$

What is the ratio $\frac{power\ dissipated\ in\ Y}{power\ dissipated\ in\ X}$?

A $\frac{1}{4}$ **B** $\frac{1}{2}$ **C** 2 **D** 4

[1 mark]

Question 7

Two copper wires of the same length but different diameters carry the same current.

Which statement about the flow of charged particles through the wires is correct?

A charged particles are provided by the power supply, therefore, the speed at which they travel depends only on the voltage of the supply

B the charged particles in both wires move with the same average speed because the current in both wires is the same

C the charged particles move faster through the wire with the larger diameter because there is a greater volume through which to flow

D the charged particles move faster through the wire with the smaller diameter because it has a larger potential difference applied to it

[1 mark]

Question 8

Two lamps are connected in series to a 250V power supply. One lamp is rated 240V, 60W and the other is rated 10V, 2.5W.

Which statement most accurately describes what happens?

A both lamps light at less than their normal brightness

B both lamps light normally

C only the 60W lamp lights

D the 10V lamp blows

[1 mark]

Question 9

The potential difference across a component in a circuit is 2.0 V.

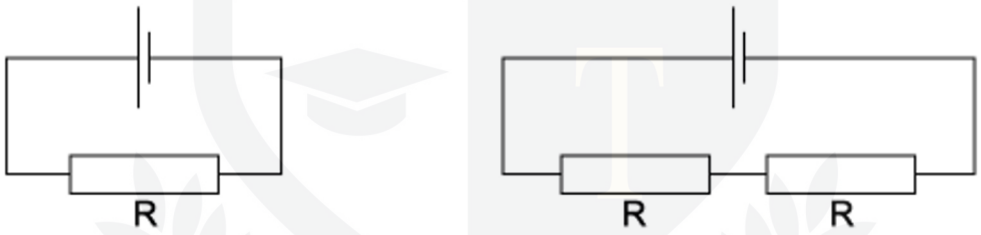
How many electrons must flow through this component in order for it to be supplied with 4.8 J of energy?

A 2.6×10^{18} **B** 1.5×10^{19} **C** 3.0×10^{19} **D** 6.0×10^{19}

[1 mark]

Question 10

The diagrams show two different circuits.



The cells in each circuit have the same electromotive force and zero internal resistance. The three resistors each have the same resistance *R*.

In the circuit on the left, the power dissipated in the resistor is *P*.

What is the total power dissipated in the circuit on the right?

A $\frac{P}{4}$ **B** $\frac{P}{2}$ **C** P **D** $2P$

[1 mark]