

## 2: Electricity 1 – Topic questions

## Paper 4

The questions in this document have been compiled from a number of past papers, as indicated in the table below.

Use these questions to formatively assess your learners' understanding of this topic.

Question	Year	Series	Paper number
9	2016	June	41
8	2016	March	42
8	2016	November	41

The mark scheme for each question is provided at the end of the document.

You can find the complete question papers and the complete mark schemes (with additional notes where available) on the School Support Hub at [www.cambridgeinternational.org/support](http://www.cambridgeinternational.org/support)

- 9 Fig. 9.1 shows a 12 V battery connected in a circuit containing resistors A, B, C and D. Each resistor has a resistance of  $6.0\ \Omega$ .

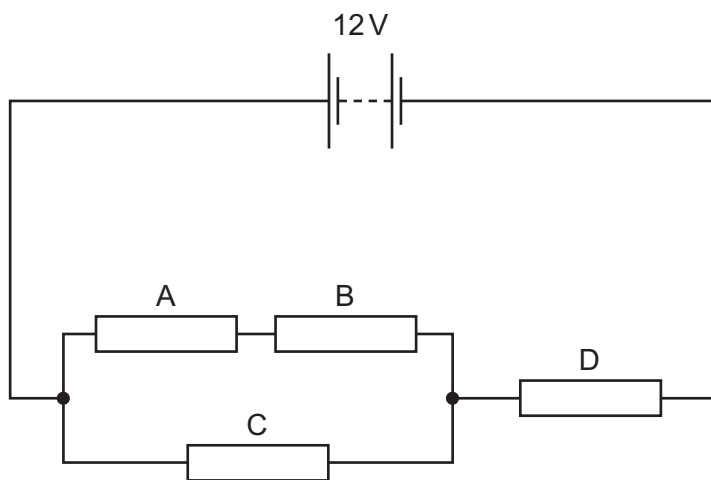


Fig. 9.1

- (a) Calculate the combined resistance of

- (i) resistors A and B,

resistance = ..... [1]

- (ii) resistors A, B and C,

resistance = ..... [2]

- (iii) resistors A, B, C and D.

resistance = ..... [1]

**(b)** Calculate

**(i)** the current in the battery,

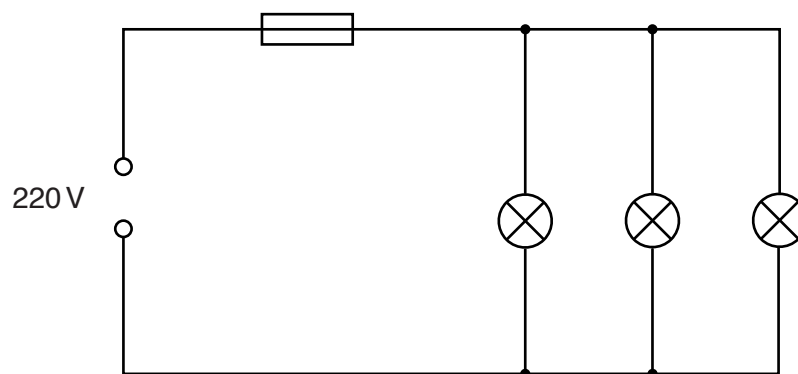
current = ..... [1]

**(ii)** the energy transferred from the battery to the circuit in 50 s.

energy transferred = ..... [2]

[Total: 7]

- 8 (a)** Fig. 8.1 shows 3 lamps and a fuse connected to a power supply.



**Fig. 8.1**

The e.m.f. of the supply is 220V. Each lamp is labelled 220V, 40W. The rating of the fuse is 2.0 A.

Calculate

- (i)** the current in each lamp,

current = .....[2]

- (ii)** the current in the fuse,

current = .....[1]

- (iii)** the total number of lamps, all in parallel, that could be connected without blowing the fuse.

number = .....[2]

**(b)** After a very long period of use, the wire filament of one of the lamps becomes thinner.

**(i)** Underline the effect of this change on the resistance of the filament.

resistance increases      resistance remains the same      resistance decreases      [1]

**(ii)** State and explain the effect of this change on the power of the lamp.

.....  
.....  
.....[2]

[Total: 8]

**8** A battery is made up of 8 cells in series. Each cell has an e.m.f. of 1.5 V.

The battery is connected to one  $8.0\ \Omega$  resistor for 40 minutes.

**(a)** Calculate the e.m.f. of the battery.

e.m.f. = .....[1]

**(b)** Calculate the energy transferred from the battery in 40 minutes.

energy = .....[4]

**(c)** Describe the energy changes that take place during the 40 minutes.

.....  
.....[2]

[Total: 7]

Question	Answer	Mark
9 (a) (i)	12 $\Omega$	B1
9 (a) (ii)	1 / R = 1 / R <sub>1</sub> + 1 / R <sub>2</sub> <b>OR</b> 1 / R = 1 / 12 + 1 / 6 OR (R = ) R <sub>1</sub> R <sub>2</sub> / (R <sub>1</sub> + R <sub>2</sub> ) <b>OR</b> (12 $\times$ 6) / (12 + 6) 4 $\Omega$	C1 A1
9 (a) (iii)	4 + 6 = 10 $\Omega$	B1
9 (b) (i)	(I = 12 / 10 = ) 1.2 A	B1
9 (b) (ii)	(E = ) IVt OR 1.2 $\times$ 12 $\times$ 50 <b>OR</b> I <sup>2</sup> Rt <b>OR</b> 1.2 <sup>2</sup> $\times$ 10 $\times$ 50 OR V <sup>2</sup> t / R OR 12 <sup>2</sup> $\times$ 50 / 10 720 J	C1 A1
		Total: 7
8 (a) (i)	P = IV OR 40 = 220 $\times$ I <b>OR</b> (I = ) P / V OR 40 / 220 0.18 A	C1 A1
8 (a) (ii)	[3 $\times$ 0.18(2)] = 0.54 A <b>OR</b> 0.55 A	B1
8 (a) (iii)	2 / 0.182 = 10.99 <b>OR</b> 2 / 0.18 = 11.1 C1 10 lamps OR 11 lamps	C1 A1
8 (b) (i)	resistance <u>increases</u>	B1
8 (b) (ii)	power (of lamp) decreases P = IV and current in lamp decreases. OR P = V <sup>2</sup> / R	B1 B1
		Total: 8
8 (a)	12 V	B1
8 (b)	(I = ) V/R 12 / 8 <b>OR</b> 1.5 (A) (W = ) IVt OR 1.5 $\times$ 12 $\times$ 40 ( $\times$ 60) <b>OR</b> (W = ) I <sup>2</sup> Rt OR 1.52 $\times$ 8 $\times$ 40 ( $\times$ 60) <b>OR</b> W = V <sup>2</sup> t / R OR 122 $\times$ 40 ( $\times$ 60) / 8 43 000 J	C1 C1  C1 A1
8 (c)	Chemical (energy) to electrical (energy) (in battery) Electrical (energy) to thermal / heat (energy) (in resistor)	B1 B1
		Total: 7

Notes about the mark scheme are available separately.