Current Voltage and Power 1

Q:1 (a) Describe the difference between an alternating current (a.c.) and a direct current (d.c.).

_____

_____

(2 marks)

(b) The diagram shows the information plate on the bottom of an electric wallpaper steamer.

230 V a.c. 50 Hz 2.3 kW

b)(i)Use the equation in the box to calculate the current used by the steamer.

power = current × potential difference

Show clearly how you work out your answer.

_____

_____

_____

Current = _____ A

(2 marks)

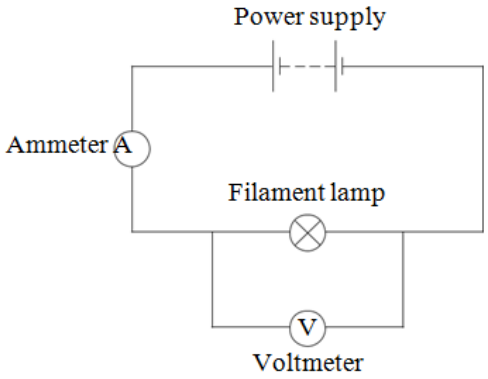
(b)(ii)Which one of the following fuses should be used inside the plug of the steamer?

Draw a ring around your answer.

1A 3A 5A 10A 13A

(1 mark)

Q:2 The diagram shows the circuit used by a student to measure the power of a filament lamp.



a) Name a component connected in parallel with the filament lamp.

_____

(1 mark)

(b) By adding another component to the circuit, the student is able to obtain a range of ammeter and voltmeter readings.

Ammeter reading in amps	Voltmeter reading in volts
0.10	1.0
0.15	2.0
0.20	4.0
0.25	7.0
0.30	11.0

(b)(i)Which one of the following components did the student add to the circuit?

Draw a ring around your answer.

fuse switch variable resistor

(1 mark)

(b)(ii)What is the range of ammeter readings taken by the student?

from _____ amps to _____ amps

(1 mark)

(b) (iii) Use the data in the table and the equation in the box to calculate the maximum power of the filament lamp.

power =	current	×	potential difference
(watt, W)	(ampere, A)		(volt, V)

Show clearly how you work out your answer.

_____

_____

Power = _____ W

(3 marks)

(c) Complete the following sentence by drawing a ring around the correct line in the box.

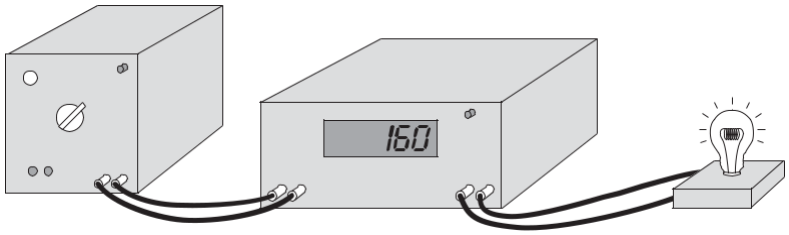
As the temperature of a filament lamp increases, its resistance

increases
remains constant
Decreases

.

(1 mark)

Q:3 A student used a joulemeter to measure the energy transformed by a lamp.



Power supply Joulemeter Lamp

The student set the joulemeter to zero, and then switched on the power supply.

After 120 seconds (2 minutes), the reading on the joulemeter had increased to 2880.

(a) In the space below, draw the circuit symbol used to represent a lamp.

(1 mark)

(b) (i) Use the equation in the box to calculate the power of the lamp.

$$\text{power} = \frac{\text{energy transformed}}{\text{time}}$$

Show clearly how you work out your answer.

Power = _____

(2 marks)

(b) (ii) Which one of the following is the unit of power?

Draw a ring around your answer.

Joule newton watt

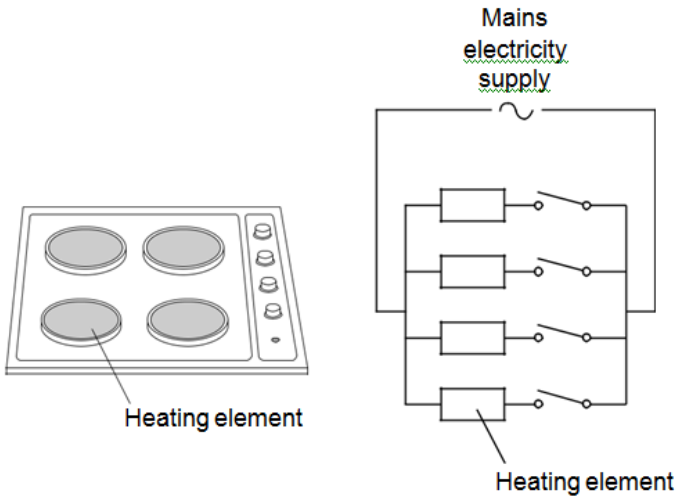
(1 mark)

(c)Complete the following sentence using one of the phrases from the box.

larger than	the same as	smaller than

If the lamp was left switched on for 10 minutes, the amount of energy transformed would be _____ the amount of energy transformed in 2 minutes. (1 mark)

Q:4 The picture shows an electric cooker hob. The simplified circuit diagram shows how the four heating elements connect to the mains electricity supply. The heating elements are identical.



When all four heating elements are switched on at full power the hob draws a current of 26 A from the 230 V mains electricity supply.

(a) Calculate the resistance of one heating element when the hob is switched on at full power.

Use the correct equation from the Physics Equations Sheet.

Give your answer to 2 significant figures.

_____

_____

.Resistance = _____ Ω

(3 marks)

(b) The table gives the maximum current that can safely pass through copper wires of different cross-sectional area.

Cross-sectional area in mm^2	Maximum safe current in amps
1.0	11.5
2.5	20.0
4.0	27.0
6.0	34.0

(b) (i) The power sockets in a home are wired to the mains electricity supply using cables containing 2.5 mm2 copper wires. Most electrical appliances are connected to the mains electricity supply by plugging them into a standard power socket.

It would not be safe to connect the electric cooker hob to the mains electricity supply by plugging it into a standard power socket.

Why?

_____

_____

_____

(2 marks)

(b) (ii) Describe the structure of the cable that should be used to connect the electric cooker hob to the mains electricity supply.

_____

_____

_____

_____

(3 marks)

(c)Mains electricity is an alternating current supply. Batteries supply a direct current.

What is the difference between an alternating current and a direct current?

_____

_____

_____

(2 marks)

Q:5 (a)The diagram shows the information plate on an electric kettle. The kettle is plugged into the a.c. mains electricity supply.

230 V 2760 W
50 Hz

Use the information from the plate to answer the following questions.

(a) (i) What is the frequency of the a.c. mains electricity supply?

_____

(1 mark)

(a) (ii) What is the power of the electric kettle?

_____

(1 mark)

(b)To boil the water in the kettle, 2400 coulombs of charge pass through the heating element in 200 seconds.

Calculate the current flowing through the heating element and give the unit.

Use the correct equation from the Physics Equations Sheet.

Choose the unit from the list below.

amps volts watts

_____

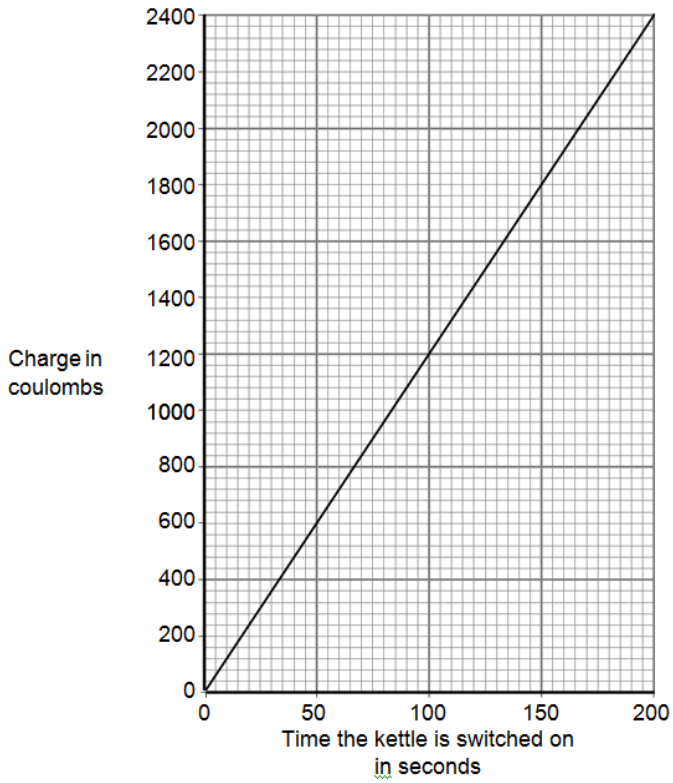
_____

_____

Current =_____

(3 marks)

(c) The amount of charge passing through the heating element of an electric kettle depends on the time the kettle is switched on.



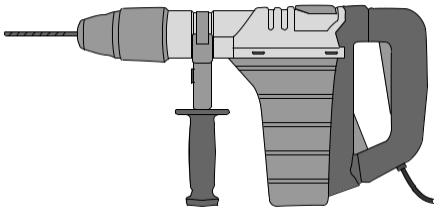
What pattern links the amount of charge passing through the heating element and the time the kettle is switched on?

_____

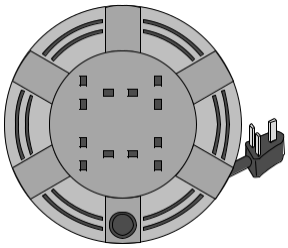
_____

(2 marks)

Q:6 Figure 11 shows an electric drill and an extension lead. The drill is used with the extension lead.



Electric drill



Extension lead

(a) The drill is used for 50 seconds. In this time, 30 000 joules of energy are transferred from the mains electricity supply to the drill. Calculate the power of the drill.

Use the correct equation from the Physics Equations Sheet.

_____

_____

Power = _____ W

(2 marks)

b)A second drill is used with the extension lead. The power of this drill is 1200 W.

The instructions for using the extension lead include the following information.

When in use the lead may get hot:

DO NOT go over the maximum power

- **lead wound inside the case: 820 watts**

- **lead fully unwound outside the case: 3100 watts**

It would not be safe to use this drill with the extension lead if the lead was left wound inside the plastic case.

Explain why.

_____

_____

_____

(3 marks)

(c)Table 2 gives information about three different electric drills.

Table 2

Drill	Power input in watts	Power output in watts
X	640	500
Y	710	500
Z	800	500

A person is going to buy one of the drills, X, Y or Z. The drills cost the same to buy.

Use only the information in the table to decide which one of the drills, X, Y or Z, the person should buy.

Give a reason for your answer.

_____

_____

_____

(1 mark)

TOTAL MARKS=40