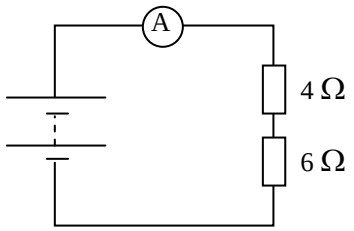
High Demand Questions QUESTIONSHEET 1

(a) Teresa set up the circuit shown in the diagram. The ammeter reading was 0.4 A.



(i) What is the value of the current through the 4Ω resistor?

..... [1]

(ii) What is the value of the current through the 6Ω resistor?

.....

.....

..... [1]

(b) Calculate:

(i) the potential difference across the 6Ω resistor.

.....

..... [2]

(ii) the potential difference across the 4Ω resistor.

.....

..... [1]

(c) A third resistor is placed in series with the 4Ω and 6Ω resistors. The total resistance of 3 resistors in series is given by: $R_{total} = R_1 + R_2 + R_3$. The current now falls to 0.25 A.
Calculate the value of the third resistor.

.....

.....

..... [3]

TOTAL / 8

High Demand Questions QUESTIONSHEET 2

(a) An electric kettle has a power rating of 2.4 kW.

(i) Using the equation: Power (W) = $\frac{\text{energy transferred}}{\text{time}}$

calculate the electrical energy used by the kettle in 1 minute.

.....

..... [1]

(ii) Not all the energy supplied by the mains goes into heating the water. What happens to it?

..... [1]

(b) (i) Power is also given by the equation: Power (W) = potential difference × current
Calculate the current flowing the the electric kettle element. (mains voltage is 240 V)

.....

..... [1]

(ii) Name 2 other appliances in the home that convert electrical energy to mainly heat energy.

..... [2]

(c) (i) The cost of electricity is given by:

cost = power (kW) × time (h) × cost of 1 kWh

If electricity costs 10p per unit and the kettle is on for a total of 20 h per quarter, calculate the cost of running the kettle.

.....

..... [1]

(ii) Calculate the cost of running a 100W light bulb for the same length of time.

.....

..... [1]

(iii) Express the cost of running the light bulb as a percentage of the cost of running the kettle for the same length of time.

.....

..... [1]

TOTAL / 8

An electric kettle has a power rating of 2.4 kW when it is connected to a 240 V power supply. To make a cup of tea the kettle is switched on for three minutes. During a morning it is used five times to make cups of tea.

(a) If one unit of electricity costs 8p. Use the following equations to calculate the total cost of using the kettle in the morning.

units = power × time (hours)
cost of electricity = energy transferred × price per unit

.....

.....

.....

..... [3]

(b) The kettle is connected to the mains using a standard plug.

(i) Write down the equation which relates current, power and voltage.

..... [1]

(ii) Calculate the current used by the electric kettle when it is operating. Show clearly how you obtain your answer.

.....

.....

..... [2]

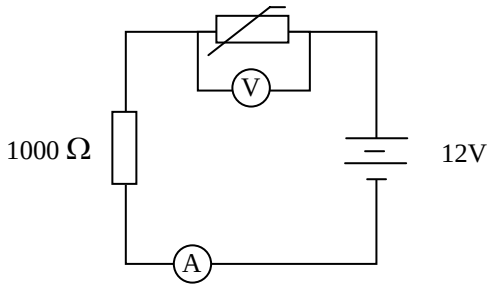
(iii) Should a 3 A fuse or a 13 A fuse be fitted?

..... [1]

(c) The kettle is made out of plastic and there are no exposed metal parts. Why is it still necessary to have a fuse in the plug?

..... [1]

A pupil sets up the circuit diagram shown below.



(a) When the thermistor is left in the air, the voltmeter reads 10 V.

(i) What is the voltage across the 1000 Ω fixed resistor?

..... [1]

(ii) Write down the equation relating current, resistance and voltage.

..... [1]

(iii) Calculate the reading on the ammeter.

.....

.....

..... [2]

(b) The thermistor is now placed in a beaker containing hot water. The ammeter now reads 8 mA.

(i) Calculate the voltmeter reading.

.....

.....

..... [3]

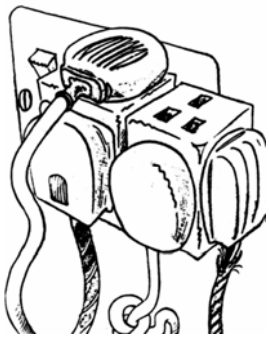
(ii) What is the resistance of the thermistor now?

.....

..... [2]

TOTAL / 9

(a) The diagram below shows how several appliances have been connected to one wall socket.



Why is this not advisable?

.....

.....

.....

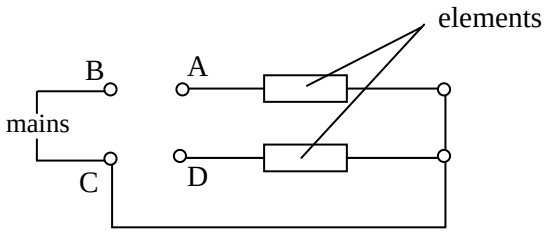
..... [3]

(b) When a lawnmower is plugged in, it is often advised that a circuit breaker should also be used. Why?

.....

..... [2]

An electrical device with three heat settings may use two identical elements.



If the elements are connected in parallel, a high heat is produced.
On medium heat only one element is used.
On low heat, the elements are connected in series.

(a) (i) Draw the three circuits described above.

[6]

(ii) Explain why each circuit produces a different level of heat.

.....

.....

.....

.....

.....

..... [6]

TOTAL / 12

High Demand Questions QUESTIONSHEET 7

An electric fire is designed to run on a 240 V supply.
It has a power rating of 3 kW.

(a) (i) What current will the fire draw from the electricity supply?

.....

.....

..... [2]

(ii) What would be the correct fuse rating for the fire?

..... [1]

(b) What is the resistance of the element of the fire?

.....

.....

..... [2]

(c) In addition to the use of a fuse, what other safety precaution would be built into the design of the fire?

..... [1]

TOTAL / 6

High Demand Questions QUESTIONSHEET 8

Melissa has a number of coloured light bulbs, which she wishes to use for Christmas decorations.
Each bulb runs on a 240 V supply and is rated as 60 W.

(a) How many bulbs can Melissa use with a 5 amp fuse?

.....

.....

..... [3]

(b) Draw a diagram of the circuit she would use.

[3]

(c) Assume that electrical energy costs 12 kWh
How much would it cost Melissa to run her lights for 6 hours a night for 15 nights?

.....

.....

.....

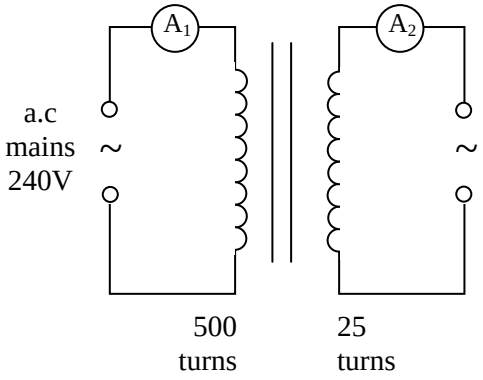
.....

..... [3]

TOTAL / 10

Medium Demand Questions QUESTIONSHEET 9

Michael has a train set which he plugs into a transformer powered by the mains.



(a) If the mains voltage is 240 V and the number of turns in the transformer coils are as stated above, calculate the voltage output of the transformer.

.....

.....

..... [3]

(b) 2 ammeters are placed as shown.

(i) What does an ammeter measure?

..... [1]

(ii) Which ammeter will show a higher reading?

..... [1]

(c) Transformers are also used in the transmission of electricity through the National Grid.

(i) Is this electricity transmitted at low voltage or low current?

..... [1]

(ii) Why is this?

.....

.....

..... [2]

TOTAL / 8

Medium Demand Questions QUESTIONSHEET 10

(a) John wants to design a circuit using a thermistor to switch on a heater in a greenhouse. He obtained resistance and temperature data for thermistors from a catalogue, as shown in the table.

Resistance (kΩ)	350	200	100	50	20	5
temperature (^{o}C)	0	10	25	50	75	100

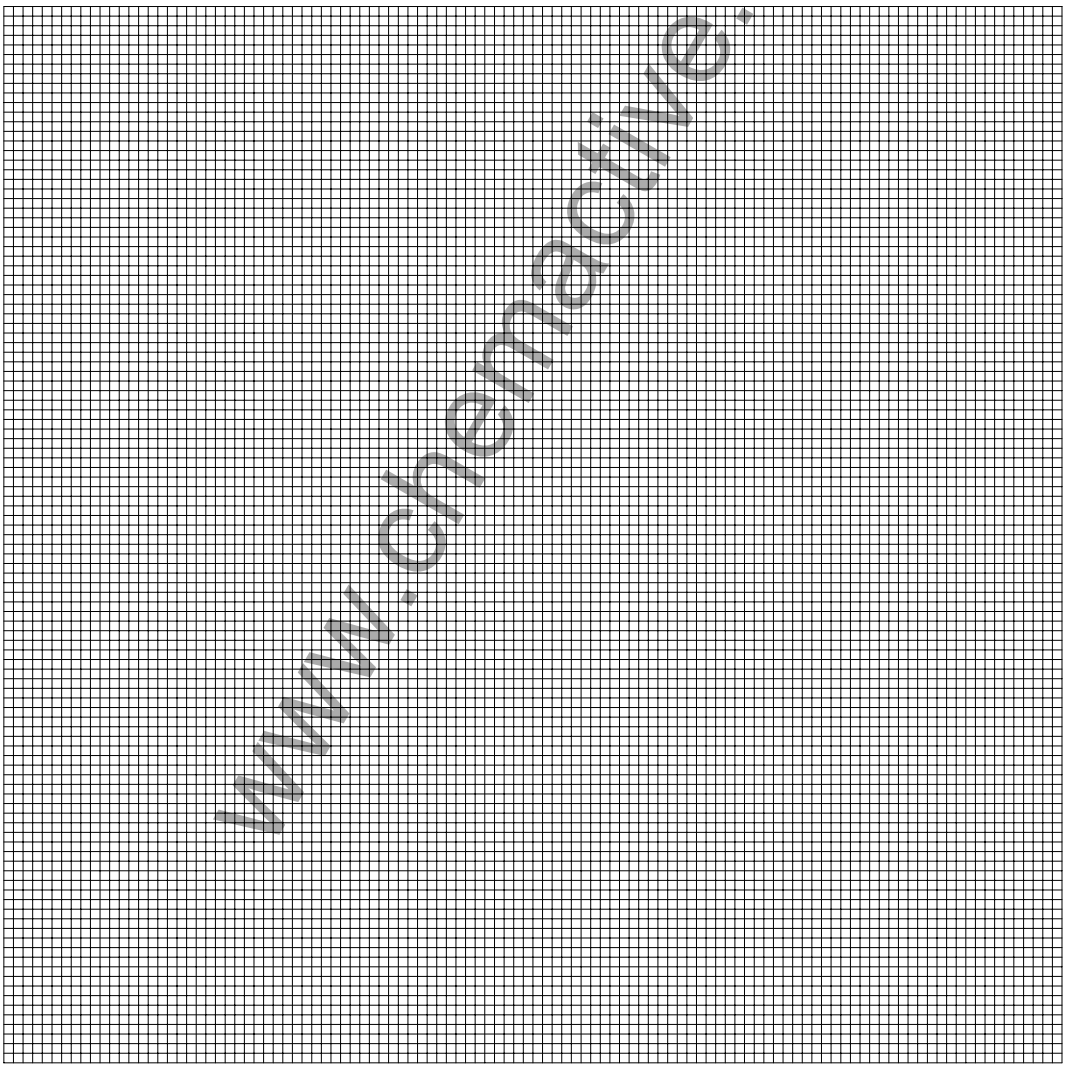
(i) What is a thermistor?

..... [1]

(ii) Plot a graph of resistance against temperature. [2]

(iii) What is happening to the resistance as the temperature increases?

..... [1]



(Continued...)

(b) (i) In the circuit described, what would happen to the reading on the ammeter as the temperature decreased?

..... [1]

(ii) Calculate the current flowing in the circuit if the potential difference across the battery at 25^{o}C is 4V.

.....

..... [2]

(c) Name a component which could be used in a circuit designed to detect if it was day or night.

..... [1]

TOTAL / 8

Medium Demand Questions QUESTIONSHEET 11

(a) Jade decides to conduct an experiment on the filament bulb from her torch to see how the current varies with the potential difference across it.

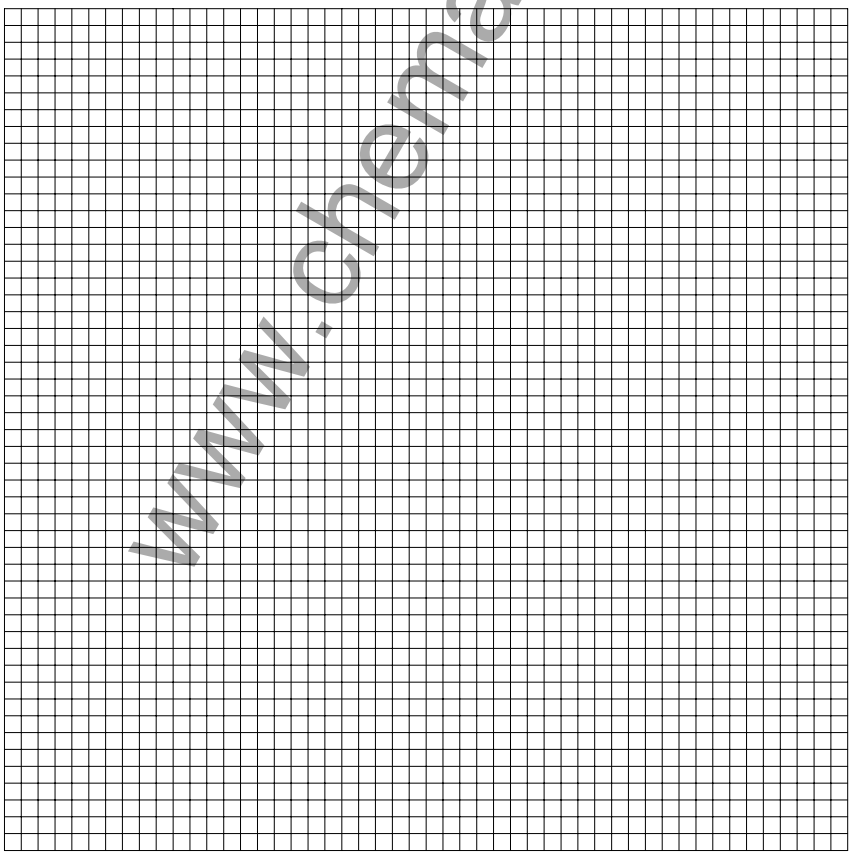
Draw a circuit diagram of Jade's circuit.

[2]

(b) The data she obtained is shown in the table.

Potential difference (V)	0	0.05	0.15	0.5	0.9	1.7	2.6	3.8
current (A)	0	0.05	0.1	0.15	0.19	0.25	0.3	0.36

(i) Plot a graph of potential difference against current. [2]



(Continued...)

(ii) Use the graph to find the potential difference across the bulb when the current measures 0.2 A.

..... [1]

(iii) Calculate the resistance of the bulb when the current is 0.2 A.

.....

..... [2]

(iv) How does the resistance of the bulb change as the current increases?

..... [1]

GCSE PHYSICS **ELECTRICITY IN THE HOME**

Medium Demand Questions QUESTIONSHEET 12

(a) The table shows the electricity meter readings for the Allen household for one year.

Date	present reading (kWh)	previous reading (kWh)	units used (kWh)
December 1998	29349	28562	
March 1999	30097	29349	
June 1999	30701	30097	
September 1999	31228	30701	

(i) Complete the table to show the units used in each quarter. [2]

(ii) When was the reading highest?

..... [1]

(iii) Suggest a reason for this.

..... [1]

(b) Angela comes home from work and makes a cup of tea, using the kettle for 5 minutes. She uses the kettle twice more for 5 minutes a time during the evening. She washes her hair, then uses the hair drier for 15 minutes. She then spends 30 minutes ironing, then watches television for 2 hours. She puts the light on in the living room for 4 hours during the evening.

The following table shows the power ratings for the equipment she used. If electricity costs 10 per unit, and cost is calculated using: cost = units used in kWh x cost per unit,

(i) complete the table with the times used and units in kWh for each appliance. [3]

(ii) calculate the cost of the electricity used that evening.

.....

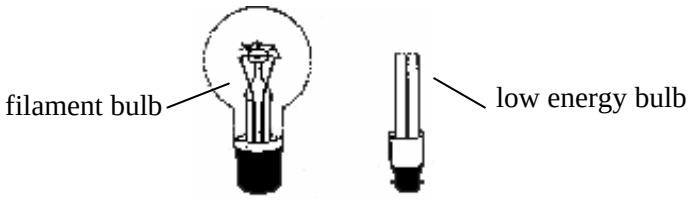
..... [1]

Appliance	power rating (W)	time used (h)	kWh
kettle	2000		
hair drier	700		
television	200		
iron	800		
light bulb	100		

TOTAL / 8

Medium Demand Questions QUESTIONSHEET 13

The figure shows two types of light bulb - an filament bulb (150 W) and a low energy bulb (30 W).



Both lamps produce the same amount of light energy.

(a) Which bulb is more efficient?

..... [1]

(b) One kilowatt-hour of electricity costs 8p. Use the following equations to calculate the total cost of using the filament bulb for its lifetime. (1000 hours)

units = power × time

cost of electricity = energy transferred × price per unit

.....

.....

.....

..... [3]

(c) The low energy bulb uses one fifth of the electrical energy. How much does it cost to use the low energy bulb for 1000 hours?

..... [1]

TOTAL / 5

Medium Demand Questions QUESTIONSHEET 14

The figure shows the plate that appears on the bottom of a toaster.

model no.: 765/432
1000 W
230 V
50 Hz

(a) What is the power rating of the toaster?

..... [1]

(b) (i) Write down the equation which relates current, power and voltage.

..... [1]

(ii) Calculate the current used by the toaster when it is operating. Show clearly how you obtain your answer.

.....

.....

..... [2]

(c) (i) The plug contains a fuse. What is the purpose of the fuse?

.....

.....

..... [2]

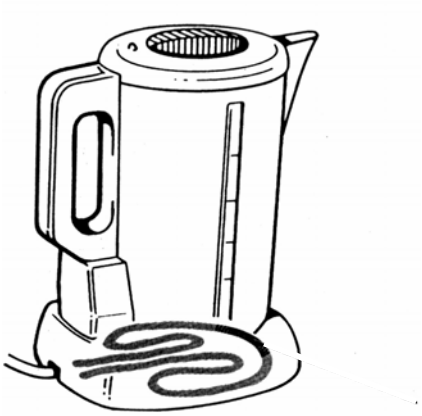
(ii) If 3A, 5A, 10A and 13 A fuses are available, which one should be fitted to the plug?

..... [1]

TOTAL / 7

Medium Demand Questions QUESTIONSHEET 15

The diagram shows a small electric kettle. When it is connected to a 220 V power supply 1100 J of energy are transferred each second.



(a) What is the power of the kettle?

..... [1]

(b) (i) Write down the equation which relates current, power and voltage.

..... [1]

(ii) Calculate the current used by the electric kettle when it is operating. Show clearly how you obtain your answer.

.....

.....

..... [2]

(c) (i) Write down the equation which relates current, resistance and voltage.

..... [1]

(ii) Calculate the resistance of the heating element in the kettle. Show clearly how you obtain your answer.

.....

.....

..... [2]

(d) The kettle is now connected to a 110 V power supply. By what factor does the energy transferred each second change? Show clearly how you arrive at your answer.

.....

.....

..... [3]

TOTAL / 10

Medium Demand Questions QUESTIONSHEET 16

A piece of electrical equipment is designed to run on mains voltage.
It has a metal case.
Two safety measures are built into its design.
For each of the safety measures listed below explain why it is necessary and outline how it works.

(a) the case of the piece of equipment is earthed

.....

.....

.....

.....

.....

.....

.....

..... [3]

(b) a fuse is put into the circuit

.....

.....

.....

.....

.....

.....

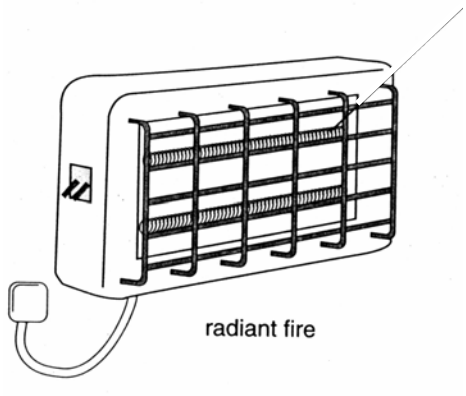
.....

..... [3]

TOTAL / 6

Low Demand Questions QUESTIONSHEET 17

The diagram shows an electric fire rated at 3 kW. It is connected to a 240 V mains supply using a standard three pin plug.



(a) Calculate the current used by the electric fire when it is operating. Show clearly how you obtain your answer.

.....

.....

..... [2]

(b) The plug has three wires - earth, live and neutral. Complete the table below to indicate what current flows in each wire when the fire is operating normally. [3]

wire	current /A
earth	
live	
neutral	

(c) Explain what happens to the currents in each of the wires if the live wire touches the metal case of the electric heater.

.....

.....

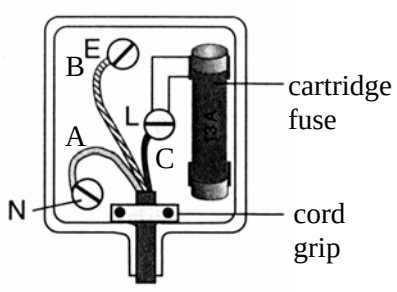
..... [3]

TOTAL / 8

GCSE PHYSICS **ELECTRICITY IN THE HOME**

Low Demand Questions QUESTIONSHEET 18

The diagram below shows a mains electricity plug.



(a) Complete the table below:

Wire	Name	Colour
A		
B		
C		

[3]

(b) A plastic 200 W hairdryer often only has two wires

(i) Which wire is not used?

..... [1]

(ii) Why is this wire not needed?

.....

..... [2]

(c) The plug also has a fuse. What is a fuse and how does it work?

.....

.....

.....

..... [3]

TOTAL / 9

Low Demand Questions QUESTIONSHEET 19

Complete the following sentences.

(a) A kilowatt-hour is the electrical energy used by a one _____ appliance in _____.

Electricity companies refer to a kilowatt-hour as a _____ of electricity.

[3]

(b) Electricity meters are joule meters.

1 kw hr = 1000 J/s × 3600 s

Complete the calculation to work out what 1 Kilowatt hour is in Joules

.....

.....

..... [2]

(c) The main fuses available are 3 amp. 5 amp and 13 amp.

(i) Complete the table below to show the correct fuse to use for each appliance.

appliance	**power**	**correct fuse**
lamp	100 W	
immersion heater	3 kW	
iron	750 W	

[3]

(ii) Which of the following uses the most units of electricity:

A an immersion heater being used for 2 hours?
B a lamp being left on for 12 hours?
You must show your working.

.....

.....

.....

..... [3]

TOTAL / 11

GCSE PHYSICS **ELECTRICITY IN THE HOME**

Low Demand Questions QUESTIONSHEET 20

Complete the following sentences.

A fuse prevents circuit from carrying too large a _____. This helps to cut down the risk of _____.

It also prevents an electrical appliance from being _____.

Fuse wires are made of _____ which have a very low _____ point.

A 5 amp fuse can carry a current of _____, but will _____ if a larger current flows.

The fuse must be in the _____ wire of the circuit.

TOTAL / 8