

Mains Electricity

Question Paper

Level	GCSE
Subject	Physics
Exam Board	Edexcel IGCSE
Module	Double Award (Paper 1P)
Topic	Electricity
Sub-Topic	Mains Electricity
Booklet	Question Paper

Time Allowed: 77 minutes

Score: /64

Percentage: /100

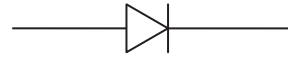
Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	70%	60%	55%	50%	<50%

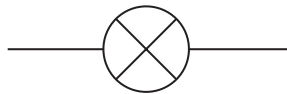
1 (a) The diagram shows some electrical circuit symbols.



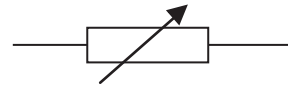
A



B



C



D

(i) Which symbol represents a switch?

(1)

- A**
- B**
- C**
- D**

(ii) Which symbol represents a diode?

(1)

- A**
- B**
- C**
- D**

(b) A hairdryer connected to the mains supply takes a current of 5.5 A.

(i) Which of these fuses should be used with the hairdryer?

(1)

A 3 A

B 5 A

C 7 A

D 13 A

(ii) Explain your answer.

(1)

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(iii) The hairdryer has a plastic case so there is no need for an earth wire connection in the plug.

Explain why the hairdryer is still safe to use.

(2)

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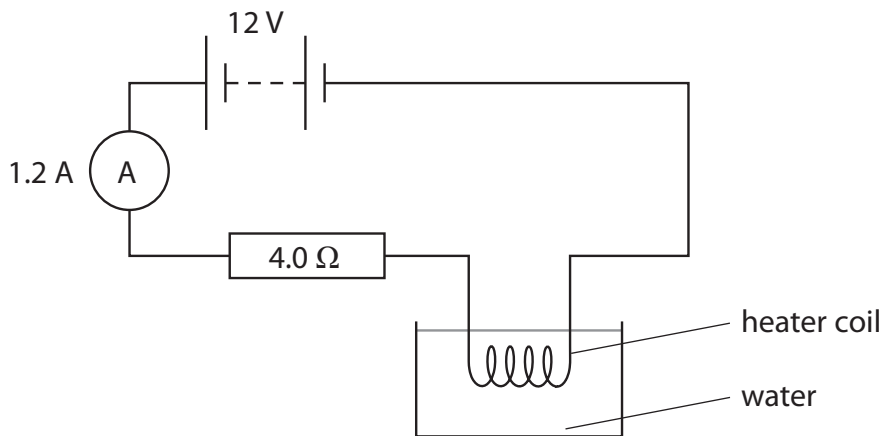
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(Total for Question = 6 marks)

2 The diagram shows a heater coil and a resistor connected to a 12 V battery and an ammeter. The ammeter reading is 1.2 A.



(a) (i) State the equation linking voltage, current and resistance. (1)

(ii) Calculate the voltage across the 4.0 Ω resistor. (2)

Voltage = V

(iii) Show that the voltage across the heater coil is about 7 V. (2)

(iv) Calculate the energy transferred to the heater coil in 5.0 minutes. (3)

Energy transferred = J

(v) At first, the temperature of the water increases.

After a while, the temperature reaches a steady value below the boiling point of water.

Explain why the temperature reaches a steady value.

(2)

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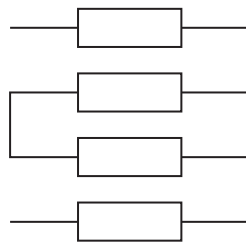
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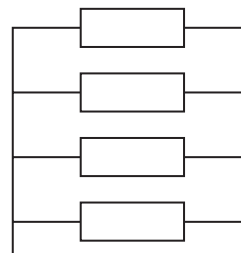
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(b) Resistors can be used as heating elements in the rear windows of cars.

The diagram shows two possible designs.



X



Y

(i) Complete the table by placing a tick (✓) in the correct boxes.

(1)

Design	Series	Parallel
X		
Y		

(ii) Describe the advantages and disadvantages of design **X** when used as a heater in a car window.

(3)

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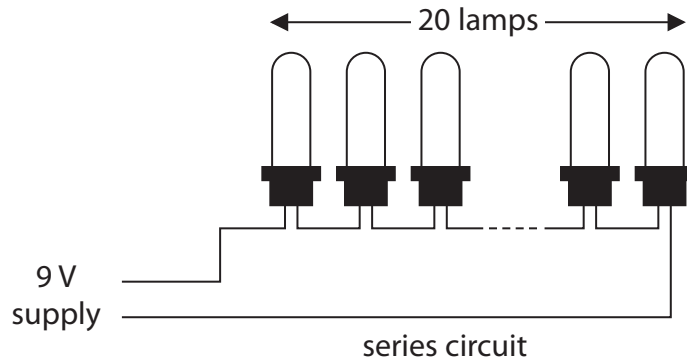
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(Total for Question = 14 marks)

3 The diagram shows some lamps connected together.

There are 20 small lamps connected in series with a 9 V supply.



(a) (i) What is the voltage across each lamp in the series circuit?

(1)

(ii) Each lamp has a power of 1.5 W.

State the equation linking power, current and voltage.

(1)

(iii) Show that the current in the circuit is about 3 A.

(2)

(b) (i) The lamps are on for 7 hours a day for 5 days.

Calculate the total energy transferred during this time.

(3)

energy transferred = J

(ii) Describe the energy changes that take place in the lamps when they are connected to the power supply.

(2)

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(Total for Question = 9 marks)

4 The photograph shows an extension cable on a reel.



There is a warning label on the reel.

<p style="text-align: center;">WARNING maximum allowable power when cable fully extended – 2400 W, 240 V when cable coiled up – 700 W, 240 V</p>

(a) (i) State the equation linking power, current and voltage.

(1)

(ii) Complete the table by inserting the missing value.

(1)

Power in W	Voltage in V	Current in A
700	240	
2400	240	10

(b) The extension cable is fitted with a 13 A fuse.

(i) Describe how the fuse protects the cable.

(3)

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(ii) Explain why a 5 A fuse is **not** suitable for this extension cable.

(2)

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(iii) Suggest why the maximum recommended current is lower when the cable is coiled up.

(1)

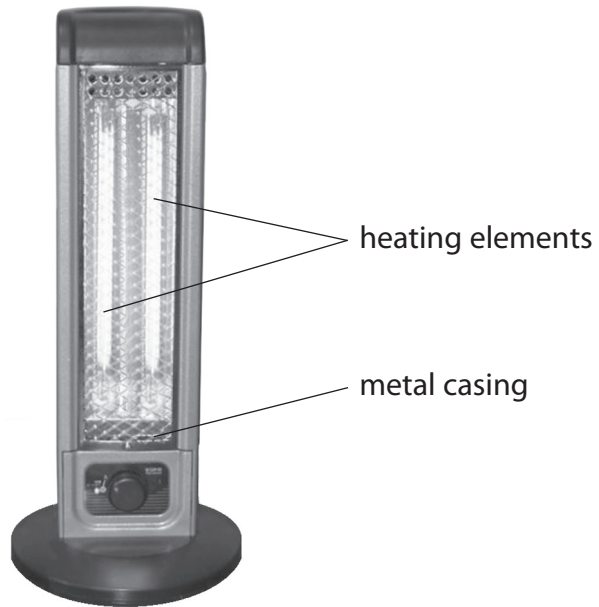
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(Total for Question = 8 marks)

5 The photograph shows an electric heater.



(a) The power of the heater is 2000 W.

The heater is connected to a 230 V mains supply.

(i) State the equation linking power, current and voltage.

(1)

(ii) Calculate the current in the heater.

(2)

current = A

(iii) Which of these fuses should be used with the heater?

(1)

- A** 1A
- B** 5A
- C** 7A
- D** 13A

(b) The two heating elements can be connected in series or in parallel.

Describe an advantage of each method.

(2)

series

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parallel

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(c) Some electrical appliances are fitted with an earth wire.

(i) Describe how an earth wire acts as a safety feature.

(4)

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(ii) Explain why this heater should be fitted with an earth wire.

(2)

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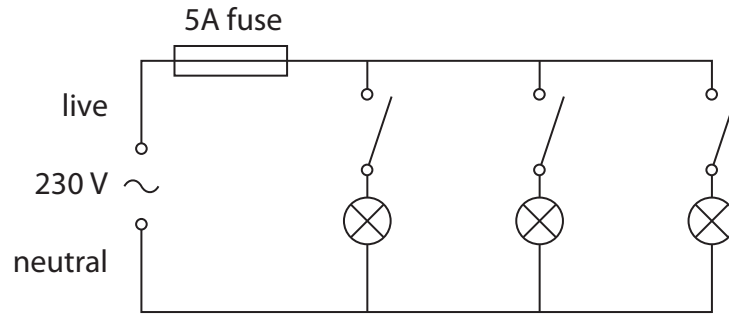
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(Total for Question = 12 marks)

6 The diagram shows the lighting circuit in an office.



(a) (i) State two advantages of connecting lamps in parallel rather than in series.

(2)

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(ii) What is the purpose of the 5 A fuse?

(1)

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(iii) Explain how a fuse works.

(3)

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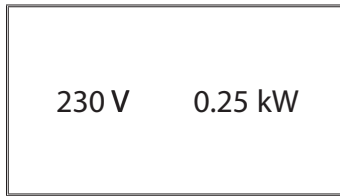
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(b) A label on one of the office computers includes this information.



(i) State the equation linking power, current and voltage. (1)

(ii) Use the information on the label to calculate the current in the computer. (3)

current = A

(iii) Fuses are available with values of 1 A, 3 A, 10 A and 13 A.

Suggest the most suitable fuse value for the computer.

Give a reason for your answer.

(2)

fuse value A

reason

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(iv) Some circuits use a circuit breaker instead of a fuse.

State two advantages of using a circuit breaker instead of a fuse.

(2)

1

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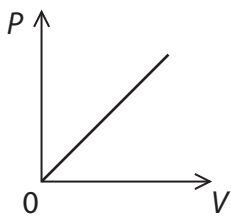
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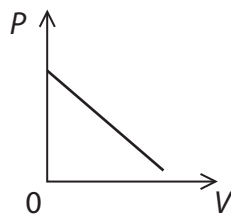
(c) The graphs show some ways that power (P) can vary with voltage (V).

Which is the correct graph for a fixed resistor?

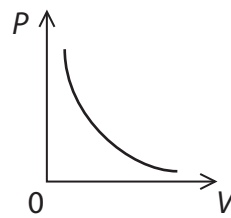
(1)



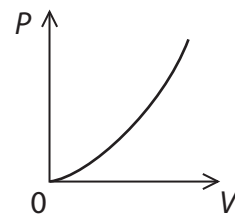
A



B



C



D

(Total for Question = 15 marks)