AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 6.2.4.1

Power

Past-paper questions

Tier	**Foundation**
Question groups	**13**
Available paper years	**2018–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

6.2.4.1 Power

Question 01

June 2018 | 8464/P/1F | Original Q2

0 2 **Figure 3** shows a mobile phone being recharged by a portable power source.

Figure 3



0 2 . 1 Why does the battery in the phone need recharging?

[1 mark]

Tick **one** box.

The store of chemical energy in the battery has reduced. ☐

The store of thermal energy in the battery has reduced. ☐

The store of kinetic energy in the battery has reduced. ☐

The store of gravitational energy in the battery has reduced. ☐

Question 2 continues on the next page

6.2.4.1 Power

Question 01 · continued

0 2 . 2 The power source provides a current of 1.86 A at a potential difference of 3.90 V

Calculate the power of the power source.

Use the equation:

power = potential difference × current

Choose the correct unit from the box.

[3 marks]

C	J	W

Power = _____

Unit _____

6.2.4.1 Power

Question 01 · continued

0 2 . 3 A student needs a new power source.

Figure 4 shows three different sized power sources.

Figure 4

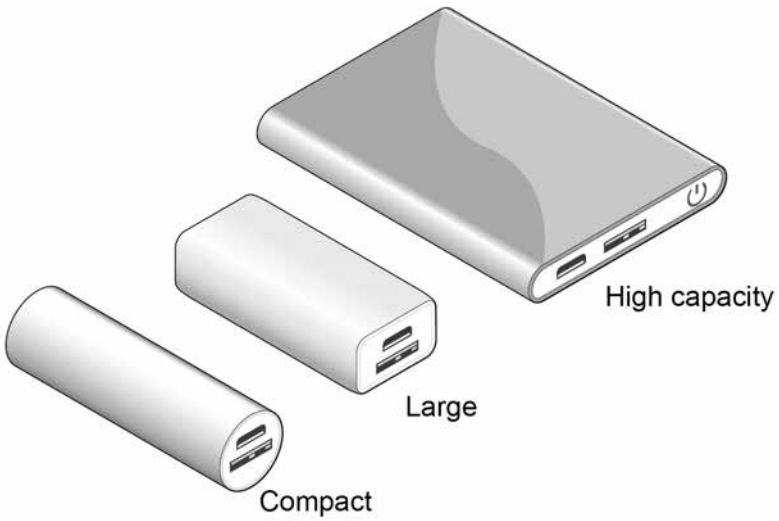


Table 1 gives data about the different power sources.

Table 1

Power source	Number of charges	Mass in grams
Compact	1	100
Large	5	200
High capacity	10	600

The student chose the large power source.

Suggest why the student chose the large power source.

[4 marks]

8

6.2.4.1 Power

Question 02

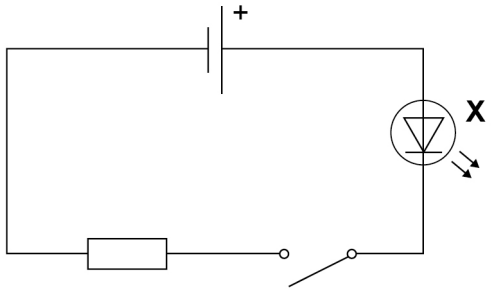
June 2019 | 8464/P/1F | Original Q1

0 1 A designer made some shoes that have lights in them.

Each shoe has a switch which closes when a person puts their foot on the floor.

Figure 1 shows the circuit.

Figure 1



0 1 . 1 What is component **X**?

[1 mark]

Tick (✓) **one** box.

Lamp ☐

LDR ☐

LED ☐

0 1 . 2 Complete the sentence.

Choose the answer from the box.

[1 mark]

greater than	**less than**	**the same as**

When the switch was closed, the current in component **X** was

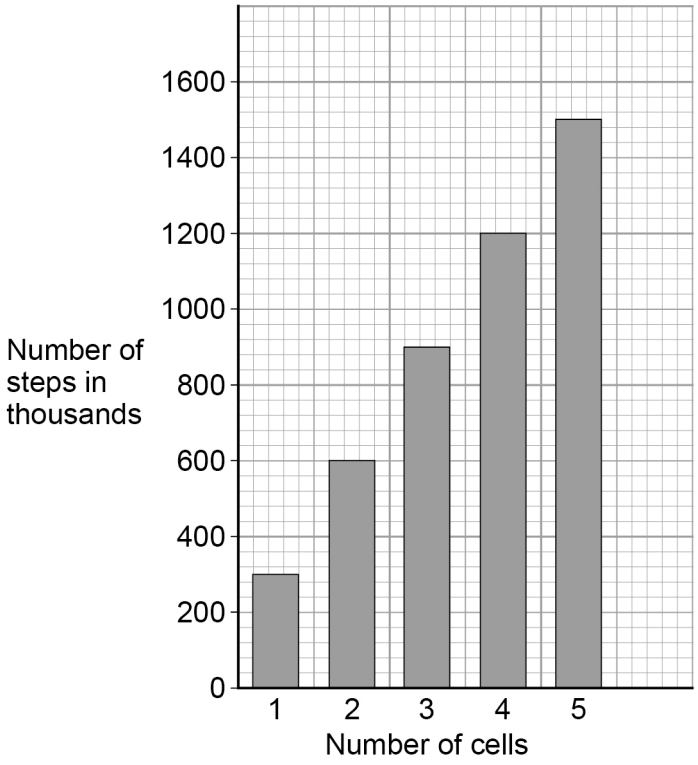
_____ the current in the resistor.

Question 02 · continued

The designer tested how the number of cells affected the number of steps that could be taken before the lights stopped working.

Figure 2 shows the results.

Figure 2



0 1 . 3 Determine how many more steps could be taken when the number of cells was increased from 3 to 5

[2 marks]

Number of steps = _____ thousand

Question 1 continues on the next page

6.2.4.1 Power

Question 02 · continued

0 1 . 4 How could the designer check the repeatability of the results?

[1 mark]

Tick (✓) **one** box.

Repeat the experiment with a different resistor in the circuit. ☐

Repeat the experiment using exactly the same method. ☐

Repeat the experiment with different types of shoe. ☐

0 1 . 5 When the potential difference across the resistor was 0.80 V, the current in the resistor was 0.020 A

Calculate the power dissipated by the resistor.

Use the equation:

power = potential difference × current

[2 marks]

Power = _____ W

0 1 . 6 Which other equation can be used to calculate the power dissipated by a resistor?

[1 mark]

Tick (✓) **one** box.

Power = $(\text{current})^2 \times \text{resistance}$ ☐

Power = $\frac{\text{current}}{(\text{resistance})^2}$ ☐

Power = $\text{current} \times (\text{resistance})^2$ ☐

6.2.4.1 Power

Question 02 · continued

0 1 . 7 What happens to the temperature of the resistor when there is a current in it?

[1 mark]

0 1 . 8 There was a current of 0.020 A in the resistor for 180 seconds.

Calculate the charge flow through the resistor.

Use the equation:

charge flow = current × time

[2 marks]

Charge flow = _____ C

11

6.2.4.1 Power

Question 03

0 2 A student investigated how the area of a solar panel affected the output potential difference of the solar panel.

The student placed different sized solar panels under a lamp.

Figure 3 shows a solar panel under a lamp.

Figure 3



0 2 . 1 Which variable should be controlled?

[1 mark]

Tick (✓) **one** box.

The area of the solar panels ☐

The brightness of the lamp ☐

The output potential difference of the solar panels ☐

6.2.4.1 Power

Question 03 · continued

0 2 . 2 The student measured the output potential difference using a voltmeter.

When the voltmeter was **not** connected, the reading on the voltmeter was 0.7 V

What name is given to this type of error?

[1 mark]

Tick (✓) **one** box.

Zero error ☐

Random error ☐

Measurement error ☐

Question 2 continues on the next page

Table 1 shows the results of the investigation.

Table 1

Solar panel	Area of solar panel in cm^2	Output potential difference in volts			
		Test 1	Test 2	Test 3	Mean
A	10	2.5	2.4	2.6	2.5
B	20	5.0	5.0	4.9	5.0
C	30	7.5	11.9	7.5	7.5
D	50	12.4	12.6	12.5	12.5

0 2 . 3 The readings for which solar panel show an anomalous result?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 2 . 4 The student did **not** have a solar panel with an area of 40 cm^2

Determine the most likely value for the mean output potential difference of a 40 cm^2 solar cell.

[1 mark]

Mean output potential difference = _____ V

6.2.4.1 Power

Question 03 · continued

0 2 . 5 The total input energy transfer to one of the solar panels was 8.0 joules.

The useful output energy transfer was 0.96 joules.

Calculate the efficiency of the solar panel.

Use the equation:

$$\text{efficiency} = \frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$$

[2 marks]

Efficiency = _____

0 2 . 6 Solar power is a renewable energy resource.

Complete the sentence.

Choose the answer from the box.

[1 mark]

burned	**replenished**	**consumed**

A renewable energy resource is one that is _____ as it is used.

Question 2 continues on the next page

6.2.4.1 Power

Question 03 · continued

0 2 . 7 Some homes have solar panels which generate electricity.

On a sunny day the potential difference across a solar panel is 31 volts.

A charge of 490 coulombs flows through the solar panel.

Calculate the energy transferred by the solar panel.

Use the equation:

energy transferred = charge flow × potential difference

Give your answer to 2 significant figures.

[3 marks]

Energy transferred = _____ J

0 2 . 8 Why do solar panels on homes help reduce the environmental impact of using electrical devices?

[1 mark]

Tick (✓) **one** box.

Less electricity is used in the home. ☐

Less fossil fuel is burned. ☐

The electricity from the solar panels is cheaper. ☐

11

6.2.4.1 Power

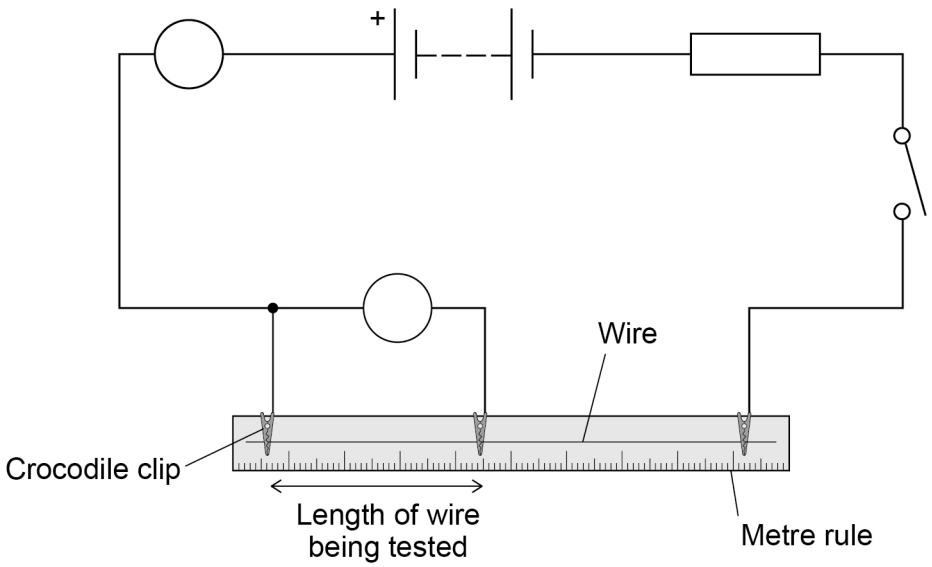
Question 04

November 2020 | 8464/P/1F | Original Q1

0 1 A student investigated how the resistance of a wire varies with the length of the wire.

Figure 1 shows the circuit used.

Figure 1



0 1 . 1 The symbols for the voltmeter and ammeter in **Figure 1** are **not** complete.

Complete the symbols for the voltmeter and ammeter in **Figure 1**.

[1 mark]

0 1 . 2 Which variable is the independent variable?

[1 mark]

Tick (✓) **one** box.

- The current in the wire ☐
- The length of the wire being tested ☐
- The resistance of the wire ☐
- The thickness of the wire ☐

6.2.4.1 Power

Question 04 · continued

0 1 . 3 Which variable is the dependent variable?

[1 mark]

Tick (✓) **one** box.

- The current in the wire ☐
- The length of the wire being tested ☐
- The resistance of the wire ☐
- The thickness of the wire ☐

0 1 . 4 The student took repeat readings of potential difference for a 30 cm length of the wire.

The readings were:

0.16 V 0.17 V 0.15 V

Calculate the mean potential difference.

[2 marks]

Mean potential difference = _____ V

Question 1 continues on the next page

Question 04 · continued

The length of the wire was increased to 60 cm

The current in the wire was 0.50 A

The mean potential difference across the wire was 0.32 V

0 1 . 5 Calculate the resistance of the 60 cm length of wire.

Use the equation:

$$\text{resistance} = \frac{\text{potential difference}}{\text{current}}$$

[2 marks]

Resistance = _____ Ω

0 1 . 6 Calculate the power dissipated in the 60 cm length of wire.

Use the equation:

$$\text{power} = \text{potential difference} \times \text{current}$$

[2 marks]

Power = _____ W

6.2.4.1 Power

Question 04 · continued

0 1 . 7 Calculate the charge flow when there is a current of 0.50 A in the wire for 17 s

Use the equation:

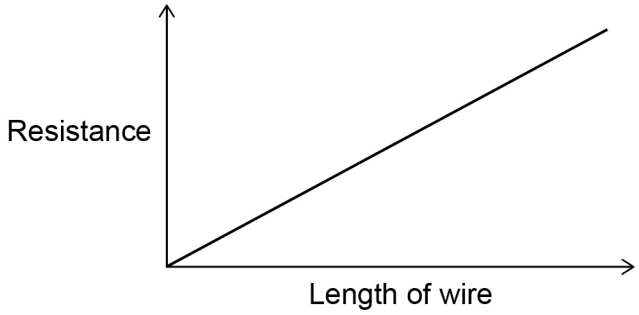
charge flow = current × time

[2 marks]

Charge flow = _____ C

0 1 . 8 **Figure 2** is a sketch graph of the results.

Figure 2



The student repeated the investigation using a thicker wire made from the same metal. For the same length, the thicker wire has a lower resistance.

Draw a line on **Figure 2** to show how the resistance of the thicker wire varies with length.

[1 mark]

12

6.2.4.1 Power

Question 05

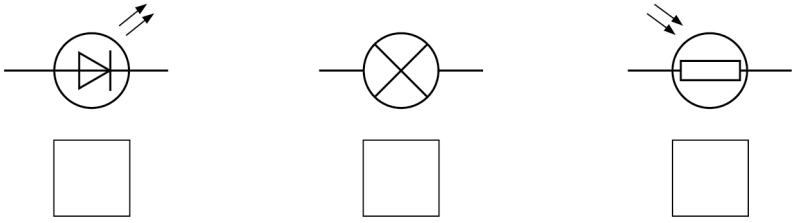
November 2021 | 8464/P/1F | Original Q3

0 3 A filament lamp breaks if the electric current in the filament becomes too big.

0 3 . 1 What is the correct symbol for a filament lamp?

[1 mark]

Tick (✓) **one** box.



0 3 . 2 What is meant by an electric current?

[1 mark]

Tick (✓) **one** box.

The energy carried by each unit of charge ☐

The flow of electrical charge ☐

The number of electrons in a circuit ☐

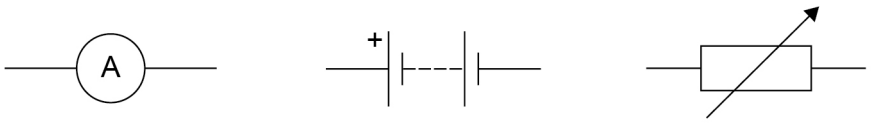
The speed at which charge moves ☐

Question 05 · continued

A manufacturer investigated the maximum current value of some filament lamps.

0 3 . 3 **Figure 6** shows the symbols for an ammeter, a battery and a variable resistor.

Figure 6



Ammeter Battery Variable resistor

The manufacturer connected an ammeter, battery, filament lamp and variable resistor in series.

Draw a circuit diagram to show the manufacturer's circuit.

Include the symbol for a filament lamp from Question **03.1**

[1 mark]

0 3 . 4 How could the manufacturer increase the current in the filament lamp?

[1 mark]

Tick (✓) **one** box.

Add an extra ammeter to the circuit. ☐

Decrease the resistance of the variable resistor. ☐

Use a battery with a smaller potential difference. ☐

6.2.4.1 Power

Question 05 · continued

0 3 . 5 When the potential difference across a filament lamp was 0.75 V, the current in the filament lamp was 0.16 A.

Calculate the power of the filament lamp.

Use the equation:

power = potential difference × current

[2 marks]

Power = _____ W

0 3 . 6 Write down the equation which links charge flow (Q), current (I) and time (t).

[1 mark]

0 3 . 7 The manufacturer increased the current in the filament lamp to 200 mA.

Calculate the charge flow through the filament lamp in 15 s.

[3 marks]

Charge flow = _____ C

6.2.4.1 Power

Question 05 · continued

0 3 . 8 The manufacturer increased the current in the filament lamp from 200 mA.

The filament in the lamp broke when the current reached 320 mA.

How many times greater than 200 mA was the current at which the filament broke?

[1 mark]

_____

_____

_____ times greater

0 3 . 9 The manufacturer tested lots of filament lamps.

The current at which the filament lamps broke was 320 ± 60 mA.

What is the range of currents at which the filament lamps broke?

[1 mark]

Tick (✓) **one** box.

60 mA to 320 mA ☐

260 mA to 320 mA ☐

320 mA to 380 mA ☐

260 mA to 380 mA ☐

12

6.2.4.1 Power

Question 06

0 5 **Figure 9** shows a mobile phone with its battery removed.

Figure 9



A student measured the potential difference across the battery and then put the battery into the phone.

0 5 . 1 What is the equation linking current (I), potential difference (V) and resistance (R)?

[1 mark]

Tick (✓) **one** box.

$I = V R$ ☐

$R = I V$ ☐

$V = I R$ ☐

$V = I^2 R$ ☐

Question 5 continues on the next page

6.2.4.1 Power

Question 06 · continued

0 5 . 2 The current in the electronic circuit in the mobile phone was 0.12 A.

The potential difference across the battery was 3.9 V.

Calculate the resistance of the electronic circuit in the mobile phone.

[3 marks]

Resistance = _____ Ω

6.2.4.1 Power

Question 06 · continued

0 5 . 3 Write down the equation which links energy (E), power (P) and time (t).

[1 mark]

0 5 . 4 The battery was fully charged when it was put into the mobile phone.

The battery discharged when the mobile phone was switched on.

The average power output of the battery as it discharged was 0.46 watts.

The time taken to fully discharge the battery was 2500 minutes.

Calculate the energy transferred by the battery.

[3 marks]

Energy transferred = _____ J

Question 5 continues on the next page

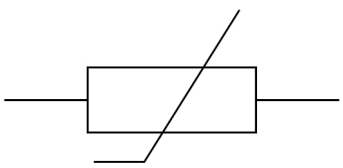
6.2.4.1 Power

Question 06 · continued

The mobile phone includes a sensor to monitor the temperature of the battery.

Figure 10 shows the circuit symbol for a component used in the sensor.

Figure 10



0 5 . 5 What component does the circuit symbol shown in **Figure 10** represent?

[1 mark]

0 5 . 6 The temperature of the component in **Figure 10** increases.

The potential difference across the component remains constant.

Explain what happens to the current in the component.

[2 marks]

11

6.2.4.1 Power

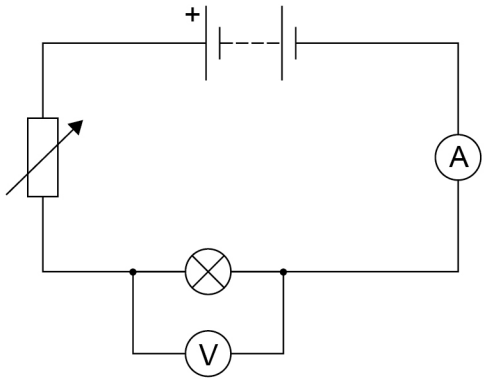
Question 07

June 2022 | 8464/P/1F | Original Q1

0 1 A student investigated how the potential difference across a filament lamp affects the current in the lamp.

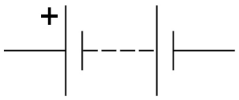
Figure 1 shows the circuit the student used.

Figure 1



0 1 . 1 **Figure 2** shows a circuit symbol.

Figure 2



What component does the symbol represent?

[1 mark]

Tick (✓) **one** box.

- Ammeter ☐
- Battery ☐
- Lamp ☐
- Variable resistor ☐

6.2.4.1 Power

Question 07 · continued

0 1 . 2 Which component from **Figure 1** did the student use to adjust the potential difference across the lamp?

[1 mark]

0 1 . 3 When the voltmeter was **not** connected to the circuit it gave a reading of 0.4 volts.

How can the student correct all the readings taken from the voltmeter?

[1 mark]

Tick (✓) **one** box.

- Add 0.4 volts to each reading ☐
- Divide each reading by 0.4 volts ☐
- Multiply each reading by 0.4 volts ☐
- Subtract 0.4 volts from each reading ☐

Question 1 continues on the next page

0 1 . 4 The student recorded three values of current for each potential difference.

Table 1 shows the results for 2.5 volts.

Table 1

Potential difference in volts	Current in amps		
	1	2	3
2.5	0.54	0.58	0.53

Calculate the mean current in the lamp.

[2 marks]

Mean current = _____ A

0 1 . 5 Calculate the power of the lamp when the potential difference across the lamp was 4.8 V

The current in the lamp was 0.75 A

Use the equation:

power = potential difference × current

[2 marks]

Power = _____ W

6.2.4.1 Power

Question 07 · continued

0 1 . 6 Calculate the resistance of the lamp when the potential difference across the lamp was 4.8 V

The current in the lamp was 0.75 A

Use the equation:

$$\text{resistance} = \frac{\text{potential difference}}{\text{current}}$$

[2 marks]

Resistance = _____ Ω

0 1 . 7 Complete the sentence.

Choose answers from the box.

Each answer may be used once, more than once or not at all.

[2 marks]

decrease	**increase**	**stay the same**

Increasing the current in a filament lamp makes the temperature

of the lamp _____ and the

resistance of the lamp _____ .

Question 1 continues on the next page

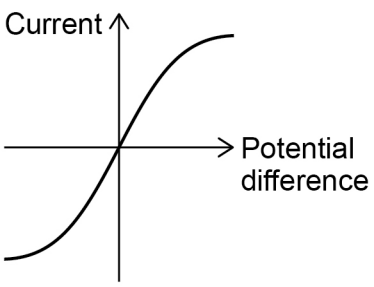
6.2.4.1 Power

Question 07 · continued

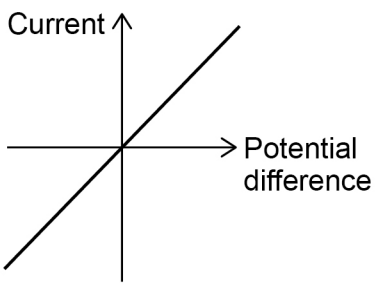
0 1 . 8 Which graph shows the relationship between potential difference and current for a filament lamp?

[1 mark]

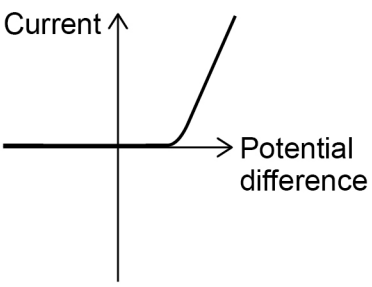
Tick (✓) **one** box.



☐



☐



☐

12

6.2.4.1 Power

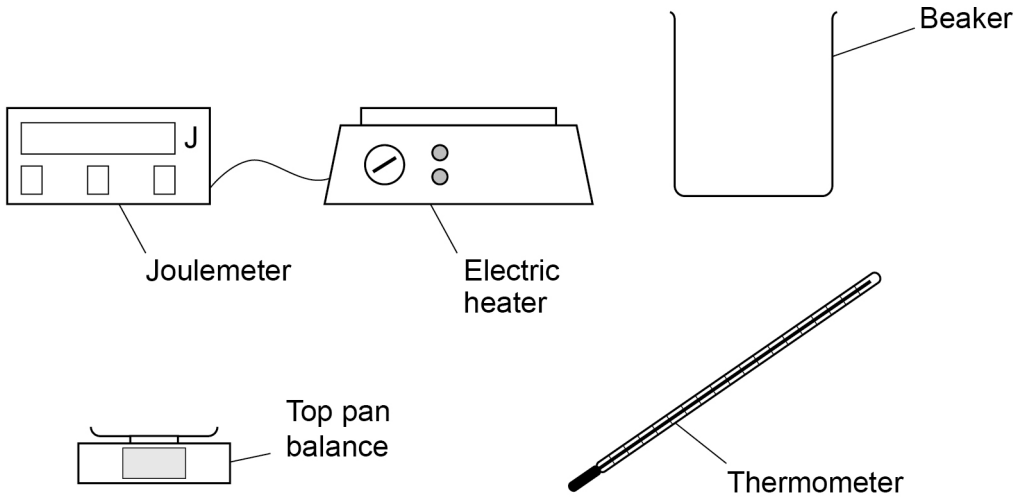
Question 08

June 2022 | 8464/P/1F | Original Q6

0 6 A student made measurements to determine the specific heat capacity of vegetable oil.

Figure 10 shows the equipment used.

Figure 10



0 6 . 1 Describe how the student could use the equipment shown in **Figure 10** to determine the specific heat capacity of vegetable oil.

[6 marks]

6.2.4.1 Power

Question 08 · continued

0 6 . 2 Give **one** risk when using the equipment in **Figure 10**.

[1 mark]

A different student did not have a joulemeter and calculated the energy transferred by the electric heater.

Use the Physics Equations Sheet to answer questions **06.3** and **06.4**.

0 6 . 3 Write down the equation linking energy transferred (*E*), power (*P*) and time (*t*).

[1 mark]

0 6 . 4 The electric heater had a power output of 50 watts.

Calculate the time taken for the electric element to transfer 4750 joules of energy to the vegetable oil.

[3 marks]

Time taken = _____ s

Question 6 continues on the next page

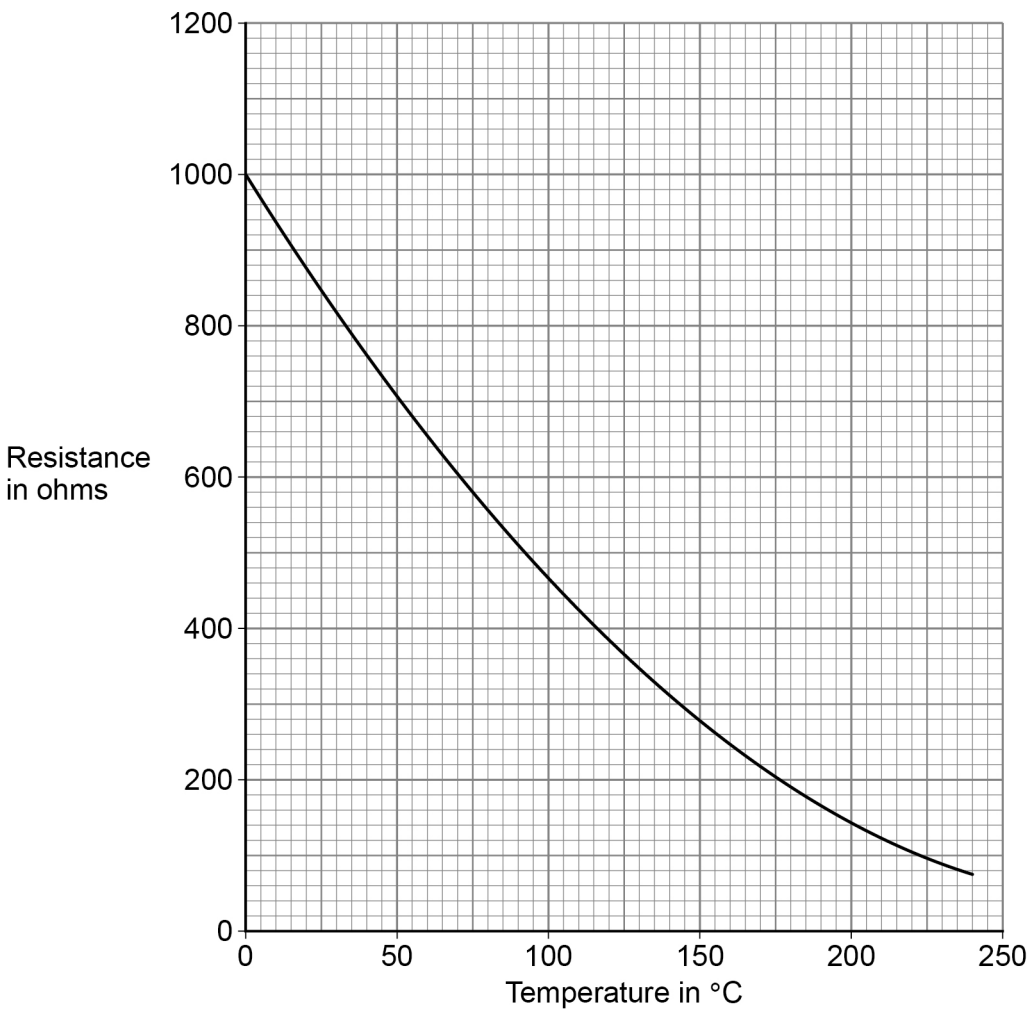
Question 08 · continued

In a deep fryer, vegetable oil is heated by an electric heating element. Food is then cooked in the hot vegetable oil.

The deep fryer contains an electrical component to monitor the temperature of the vegetable oil.

Figure 11 shows how the resistance of this electrical component changes with temperature.

Figure 11



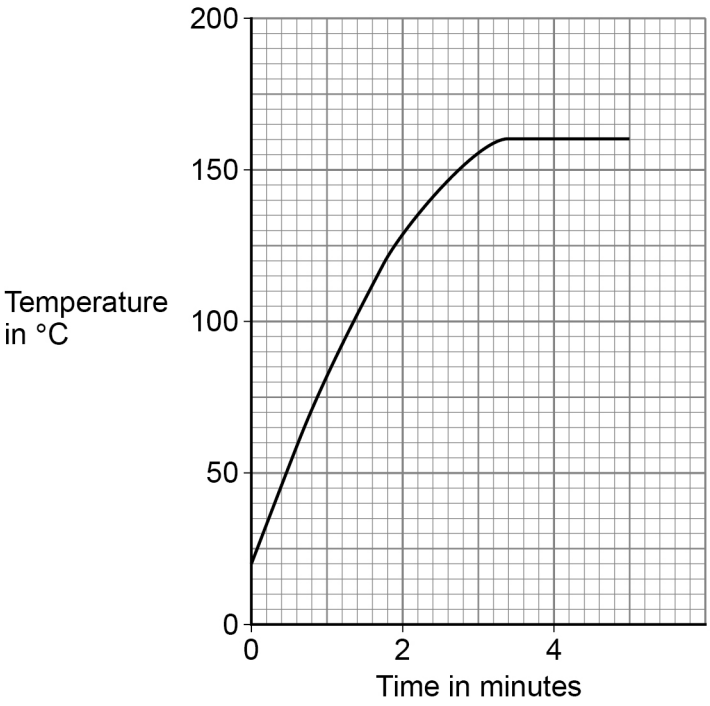
0 6 . 5 What electrical component is used to monitor the temperature of the vegetable oil?

[1 mark]

0 6 . 6 The electric heating element in the deep fryer automatically switches off when the vegetable oil reaches a certain temperature.

Figure 12 shows how the temperature of the vegetable oil changed after the deep fryer was switched on.

Figure 12



Determine the resistance of the electrical component when the electric heating element automatically switched off.

Use **Figure 11** and **Figure 12**.

[2 marks]

Resistance = _____ Ω

Question 6 continues on the next page

6.2.4.1 Power

Question 08 · continued

0 6 . 7 Some chips were put in the deep fryer.

In the deep fryer, water in the chips underwent a physical change and became steam.

Why is this a physical change?

[1 mark]

Tick (✓) **one** box.

- All water can change to steam. ☐
- No chemicals are involved when water changes to steam. ☐
- The change from water to steam can be detected visually. ☐
- The water will recover its original properties if the steam is cooled. ☐

15

6.2.4.1 Power

Question 09

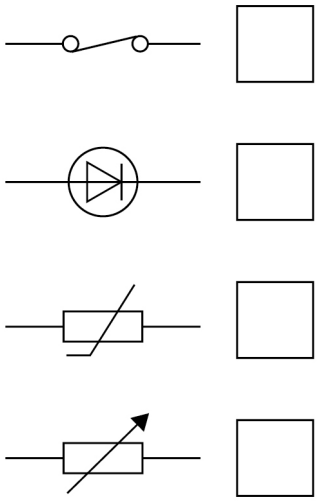
June 2023 | 8464/P/1F | Original Q4

0 4 A gardener wanted to build an electrical circuit to monitor the temperature in a greenhouse.

0 4 . 1 Which symbol represents an electrical component with a resistance that decreases as its temperature increases?

[1 mark]

Tick (✓) **one** box.



0 4 . 2 When the resistance of an electrical circuit decreases, the current in the circuit increases.

Complete the sentence.

Choose the answer from the box.

[1 mark]

charge	**energy**	**potential difference**	**power**

Electrical current is a flow of _____ .

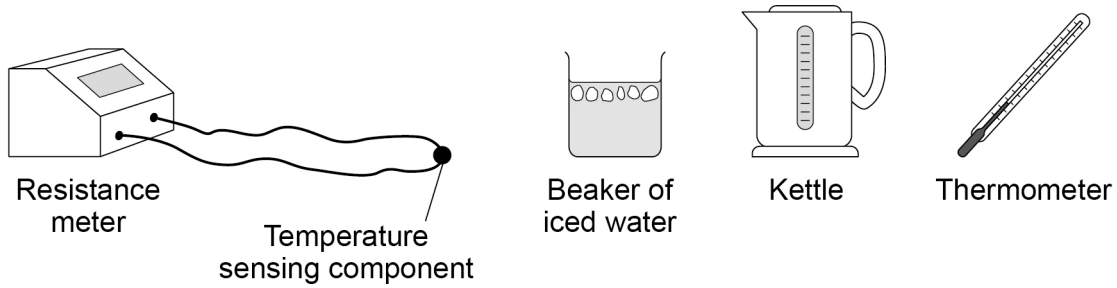
6.2.4.1 Power

Question 09 · continued

0 4 . 3 The gardener wanted to find how the resistance of the component varies with temperature.

Figure 4 shows the equipment used by the gardener.

Figure 4



The resistance meter displays the resistance of the component.

Plan a method the gardener could use to find how the resistance of the component varies with temperature.

[4 marks]

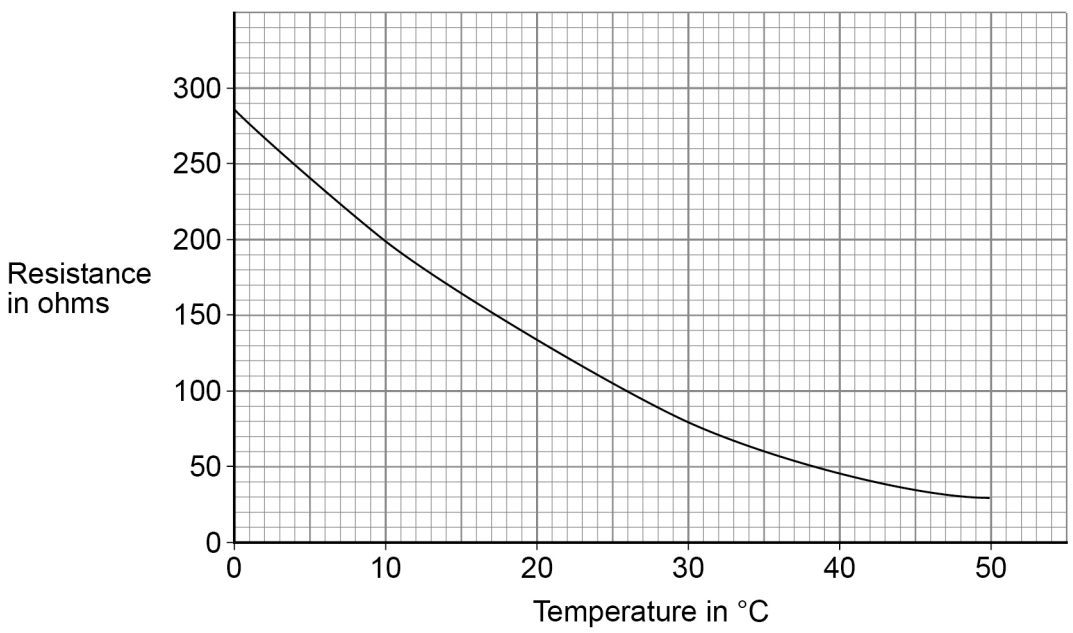
Question 4 continues on the next page

6.2.4.1 Power

Question 09 · continued

Figure 5 shows how the resistance of the component varies with temperature.

Figure 5



0 4 . 4 Complete the sentence.

Choose the answer from the box.

[1 mark]

linear	**non-linear**	**directly proportional**

The relationship between the temperature and the resistance of the component

is _____ .

Question 09 · continued

0 4 . 5 The temperature in the greenhouse changed from 10 °C to 30 °C.

Determine the change in resistance of the component between these temperatures.

Use **Figure 5**.

[2 marks]

Change in resistance = _____ Ω

Question 4 continues on the next page

6.2.4.1 Power

Question 09 · continued

The gardener builds a circuit that switches a heater on when the greenhouse gets too cold.

Use the Physics Equations Sheet to answer questions **04.6** and **04.7**.

0 4 . 6 Write down the equation that links current (I), potential difference (V) and power (P).

[1 mark]

0 4 . 7 The power of the heater is 2900 W.

The potential difference across the heater is 230 V.

Calculate the current in the heater.

[3 marks]

Current = _____ A

13

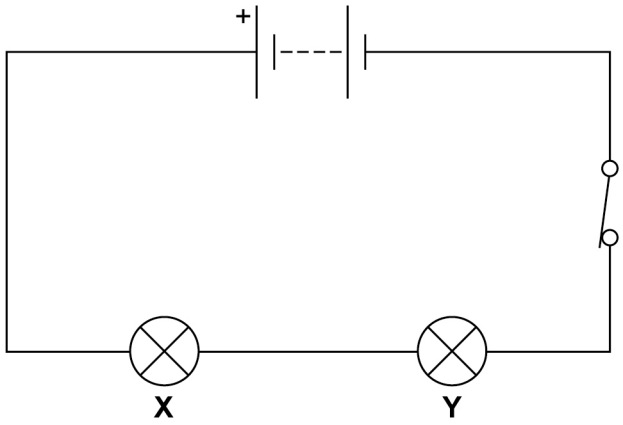
6.2.4.1 Power

Question 10

June 2024 | 8464/P/1F | Original Q1

0 1 **Figure 1** shows a circuit diagram. The circuit contains a battery and two lamps, **X** and **Y**.

Figure 1



0 1 . 1 How does the current in lamp **X** compare with the current in lamp **Y**?

[1 mark]

Tick (✓) **one** box.

The current in lamp **X** is smaller. ☐

The current in both lamps is the same. ☐

The current in lamp **X** is greater. ☐

0 1 . 2 Lamp **X** and lamp **Y** are **not** identical.

The potential difference across the battery is 4.5 V.

The potential difference across lamp **X** is 1.5 V.

Calculate the potential difference across lamp **Y**.

[1 mark]

Potential difference across lamp **Y** = _____ V

Question 10 · continued

The current in lamp **X** is 1.2 A.

The potential difference across lamp **X** is 1.5 V.

0 1 . 3 Calculate the power of lamp **X**.

Use the equation:

power = potential difference × current

[2 marks]

Power = _____ W

0 1 . 4 Calculate the resistance of lamp **X**.

Use the equation:

$$\text{resistance} = \frac{\text{potential difference}}{\text{current}}$$

[2 marks]

Resistance = _____ Ω

Question 1 continues on the next page

6.2.4.1 Power

Question 10 · continued

0 1 . 5 The current in lamp **X** is 1.2 A.

Calculate the charge flow through lamp **X** in 40 seconds.

Use the equation:

charge flow = current × time

[2 marks]

Charge flow = _____ C

0 1 . 6 The switch can be used to turn the lamps on and off.

Immediately after the lamps are switched on, the resistance of each lamp increases.

Why does the resistance of each lamp increase?

[1 mark]

Tick (✓) **one** box.

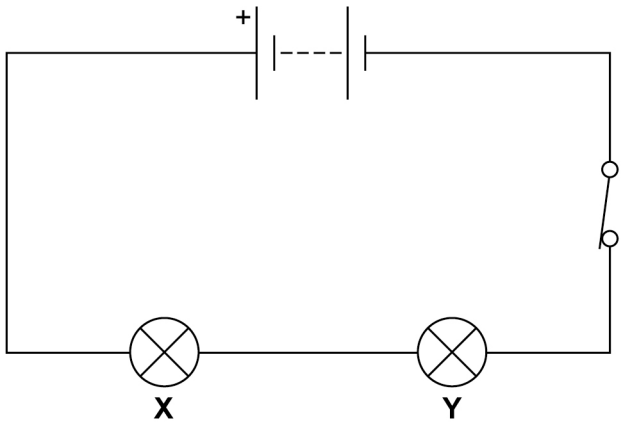
- The current in the battery decreases. ☐
- The potential difference across each lamp decreases. ☐
- The power of the battery increases. ☐
- The temperature of each lamp increases. ☐

6.2.4.1 Power

Question 10 · continued

Figure 1 is repeated below.

Figure 1



0 1 . 7 Lamp **Y** breaks.

What happens to lamp **X**?

Give a reason for your answer.

[2 marks]

Tick (✓) **one** box.

Lamp **X** gets brighter. ☐

Lamp **X** stays the same brightness. ☐

Lamp **X** no longer emits light. ☐

Reason _____

_____

11

6.2.4.1 Power

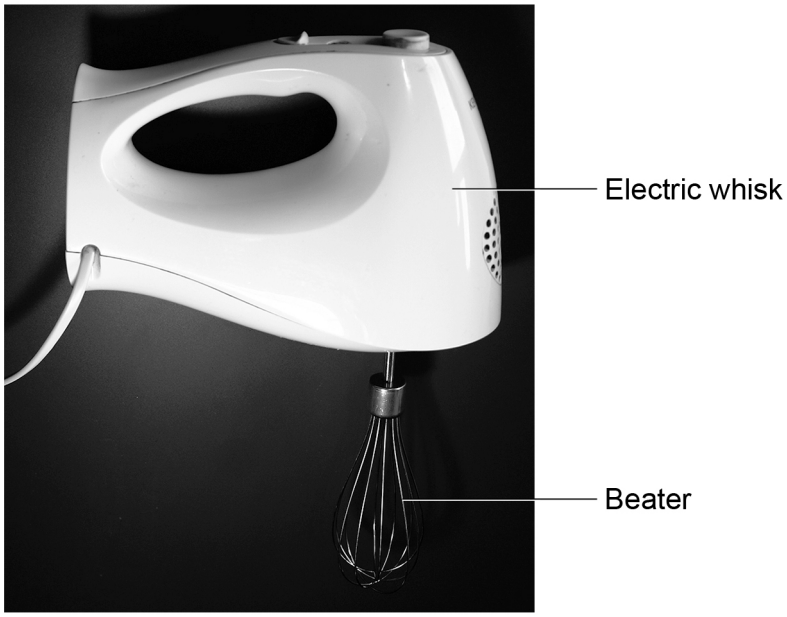
Question 11

June 2024 | 8464/P/1F | Original Q6

0 6 **Figure 10** shows an electric whisk that plugs into the mains electricity supply.

The whisk can mix food by spinning a beater.

Figure 10



0 6 . 1 Give **two** energy stores that increase when the whisk is switched on.

[2 marks]

1 _____

_____

2 _____

_____

6.2.4.1 Power

Question 11 · continued

Use the Physics Equations Sheet to answer questions **06.2** and **06.3**.

0 6 . 2 Work is done by the whisk when it is used to mix food.

Write down the equation that links power (*P*), time (*t*) and work done (*W*).

[1 mark]

0 6 . 3 The power output of the whisk is 92 W.

Calculate the time for the whisk to do 23 000 J of work.

[3 marks]

Time = _____ s

Question 6 continues on the next page

6.2.4.1 Power

Question 11 · continued

Use the Physics Equations Sheet to answer questions **06.4** and **06.5**.

0 6 . 4 Which equation links current (I), power (P) and resistance (R)?

[1 mark]

Tick (✓) **one** box.

$P = \frac{I}{R^2}$ ☐

$P = I R^2$ ☐

$P = \frac{I^2}{R}$ ☐

$P = I^2 R$ ☐

0 6 . 5 The current in the whisk is 500 mA.

The resistance of the whisk is 640 Ω.

Calculate the power of the whisk.

[3 marks]

Power = _____ W

6.2.4.1 Power

Question 11 · continued

The whisk has several settings that allow the beater to spin at different speeds.

A faster beater speed needs a greater power input from the mains electricity supply.

0 6 . 6 What is the potential difference between the live wire and neutral wire in the mains electricity supply?

[1 mark]

_____ V

0 6 . 7 Changing the beater speed does **not** change the potential difference between the live wire and neutral wire.

The power input to the whisk changes because the current in the whisk changes.

Complete the sentence.

[1 mark]

When the beater speed increases, the current in the whisk increases because the resistance of the whisk _____.

12

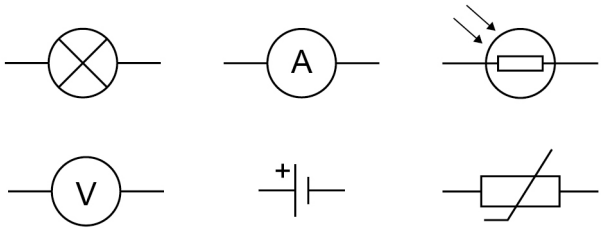
6.2.4.1 Power

Question 12

June 2025 | 8464/P/1F | Original Q2

0 2 **Figure 2** shows circuit symbols for some electrical components.

Figure 2



A student connects a circuit to measure the current in a filament lamp.

The student uses:

- an ammeter
- a cell
- a filament lamp.

0 2 . 1 Draw a circuit diagram for a circuit the student could use to measure the current in a filament lamp.

You should use **three** of the circuit symbols from **Figure 2**.

[3 marks]

6.2.4.1 Power

Question 12 · continued

0 2 . 2 Which component is the source of energy for the circuit?

[1 mark]

Tick (✓) **one** box.

Ammeter ☐

Cell ☐

Filament lamp ☐

0 2 . 3 There is a current of 1.5 A in the filament lamp for a time of 30 s.

Calculate the charge flow in the filament lamp.

Use the equation:

charge flow = current × time

[2 marks]

Charge flow = _____ C

6.2.4.1 Power

Question 12 · continued

0 2 . 4 The current in the filament lamp is 1.5 A when the potential difference across the filament lamp is 12 V.

Calculate the resistance of the filament lamp.

Use the equation:

$$\text{resistance} = \frac{\text{potential difference}}{\text{current}}$$

Choose the unit from the box.

[3 marks]

Ω	**°C**	**W**

Resistance = _____ Unit _____

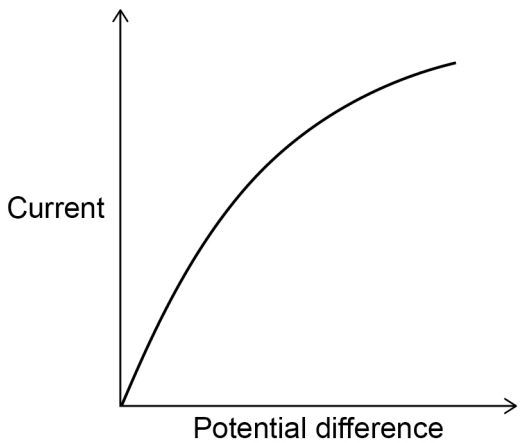
Question 2 continues on the next page

6.2.4.1 Power

Question 12 · continued

Figure 3 shows how the current varies with potential difference for the filament lamp.

Figure 3



0 2 . 5 Describe the relationship between potential difference and current for the filament lamp.

[2 marks]

0 2 . 6 As the current in the filament lamp increases, the temperature of the filament lamp increases.

What happens to the resistance of the filament lamp as the temperature increases?

[1 mark]

6.2.4.1 Power

Question 12 · continued

0 2 . 7 In most homes, filament lamps have been replaced with LED bulbs.

Table 1 shows information about a filament lamp and an LED bulb.

Table 1

	Input power in watts	Brightness in arbitrary units
Filament lamp	40	800
LED bulb	8	800

Explain the advantages of using LED bulbs instead of filament lamps.

You should include a calculation in your answer.

[4 marks]

Extra space

16

6.2.4.1 Power

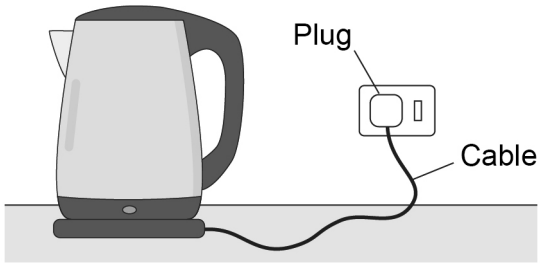
Question 13

June 2025 | 8464/P/1F | Original Q4

0 4 **Figure 5** shows a plastic kettle.

The kettle is connected to the mains electricity supply.

Figure 5



0 4 . 1 What is the frequency of the UK mains electricity supply?

[1 mark]

Tick (✓) **one** box.

25 Hz ☐

50 Hz ☐

75 Hz ☐

100 Hz ☐

Question 4 continues on the next page

6.2.4.1 Power

Question 13 · continued

0 4 . 2 The cable that connects the kettle to the plug contains two insulated wires.

Draw **one** line from each wire to the colour of the insulation on the wire.

[2 marks]

Wire	Colour of insulation
Live	Blue
Neutral	Brown
	Green and yellow stripes

Use the Physics Equations Sheet to answer questions **04.3** and **04.4**.

0 4 . 3 Write down the equation that links current (I), potential difference (V) and power (P).

[1 mark]

6.2.4.1 Power

Question 13 · continued

0 4 . 4 The power of the heating element in the kettle is 2100 W.

The potential difference across the heating element is 230 V.

Calculate the current in the heating element.

Give your answer to 2 significant figures.

[4 marks]

Current (2 significant figures) = _____ A

0 4 . 5 The kettle is designed to switch off when the water reaches boiling point.

Before the kettle switches off, 0.0080 kg of water changes state.

The energy transferred to change the state of the water is 18 000 J.

Calculate the specific latent heat of vaporisation of the water.

Use the Physics Equations Sheet.

[3 marks]

Specific latent heat of vaporisation = _____ J/kg

Question 13 · continued

0 4 . 6 A different kettle is used to heat some water.

The useful output energy transferred to the water is 75 600 J.

The total input energy transferred by the kettle is 84 000 J.

Calculate the efficiency of the kettle.

Use the equation:

$$\text{efficiency} = \frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$$

[2 marks]

Efficiency = _____

0 4 . 7 Explain **one** advantage of electrical appliances having a high efficiency.

[2 marks]

15