AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 6.2.1.4

Resistors

Past-paper questions

Tier	**Higher**
Question groups	**6**
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.

6.2.1.4 Resistors

Question 01

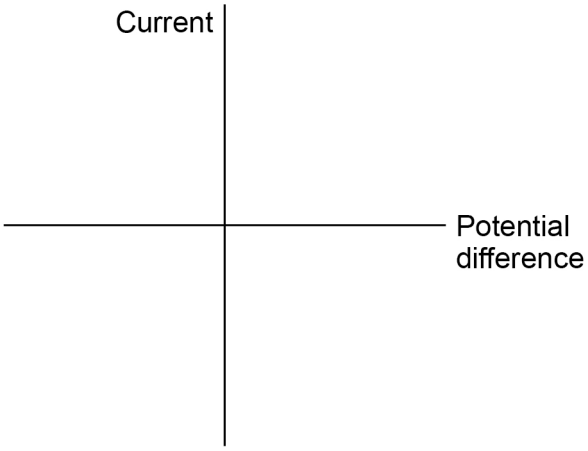
June 2018 | 8464/P/1H | Original Q6

0 6 A student built a circuit using filament lamps.

0 6 . 1 Sketch a current potential difference graph for a filament lamp on **Figure 9**

[2 marks]

Figure 9

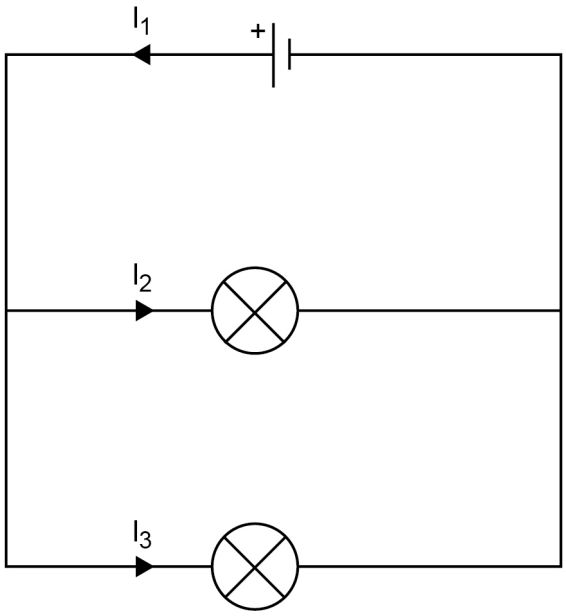


6.2.1.4 Resistors

Question 01 · continued

Figure 10 shows the circuit with two identical filament lamps.

Figure 10



0 6 . 2 Compare the currents I_1, I_2 and I_3

[2 marks]

Question 6 continues on the next page

6.2.1.4 Resistors

Question 01 · continued

0 6 . 3 Calculate the charge that flows through the cell in 1 minute.

Each filament lamp has a power of 3 W and a resistance of 12 Ω

Write any equations that you use.

Give the unit.

[6 marks]

Charge = _____

Unit = _____

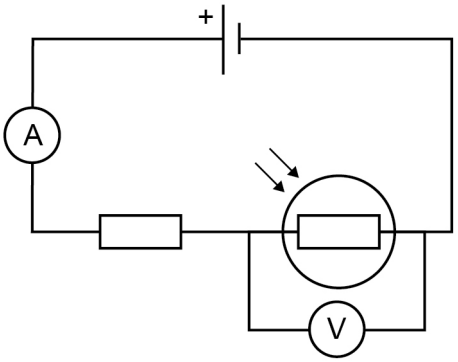
6.2.1.4 Resistors

Question 01 · continued

0 6 . 4 The student builds a different circuit.

Figure 11 shows the circuit.

Figure 11



Explain how the readings on both meters change when the environmental conditions change.

[6 marks]

6.2.1.4 Resistors

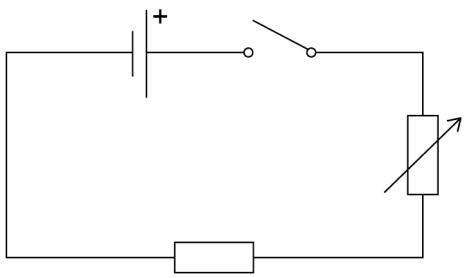
Question 02

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

0 1 A student investigated how the current in a resistor varies with the potential difference across the resistor.

Figure 1 shows part of the circuit used.

Figure 1



0 1 . 1 The student connected an ammeter and a voltmeter into the circuit.

What is the correct way to connect the ammeter and the voltmeter into the circuit?

[1 mark]

Tick (✓) **one** box.

Ammeter	Voltmeter	
In parallel with the resistor	In series with the resistor	☐
In parallel with the cell	In series with the resistor	☐
In series with the resistor	In parallel with the resistor	☐
In series with the resistor	In parallel with the cell	☐

0 1 . 2 The student increased the resistance of the variable resistor.

How did increasing the resistance affect the current in the circuit?

[1 mark]

6.2.1.4 Resistors

Question 02 · continued

0 1 . 3 How should the student change the circuit to give negative values for current and potential difference?

[1 mark]

0 1 . 4 Name the type of relationship between current and potential difference for a resistor at constant temperature.

[1 mark]

0 1 . 5 Write the equation which links current, potential difference and resistance.

[1 mark]

0 1 . 6 The current in the resistor was 0.12 A when the potential difference across the resistor was 3.0 V

Calculate the resistance of the resistor.

[3 marks]

Resistance = _____ Ω

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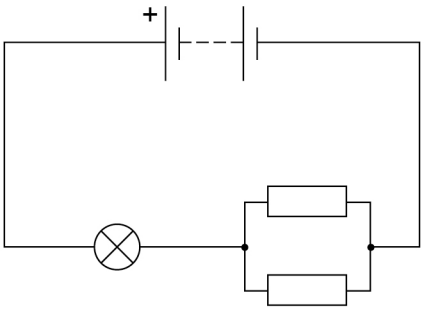
6.2.1.4 Resistors

Question 03

June 2019 | 8464/P/1H | Original Q4

0 4 **Figure 2** shows a circuit that a student built.

Figure 2



0 4 . 1 The lamp has a resistance of 10 Ω

Each resistor has a resistance of 10 Ω

What is the total resistance of the circuit?

[1 mark]

Tick (✓) **one** box.

Between 20 and 30 Ω ☐

Exactly 20 Ω ☐

Exactly 30 Ω ☐

Less than 20 Ω ☐

0 4 . 2 Explain your answer to Question **04.1**

[2 marks]

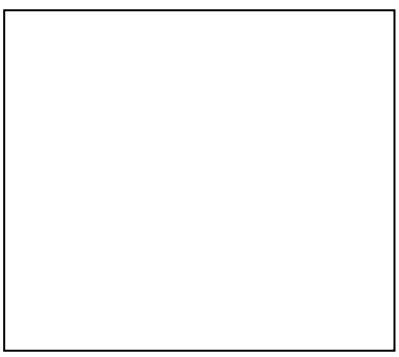
6.2.1.4 Resistors

Question 03 · continued

The student replaced one of the resistors with a thermistor.

0 4 . 3 Draw the circuit symbol for a thermistor in the box below.

[1 mark]



0 4 . 4 The student increased the temperature of the thermistor.

Explain how the current in the thermistor changed.

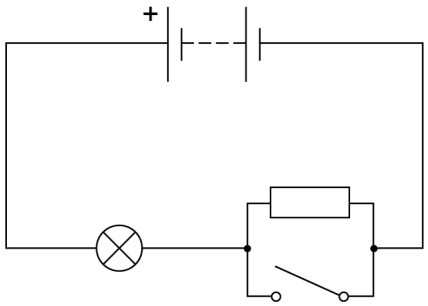
[2 marks]

6.2.1.4 Resistors

Question 03 · continued

0 4 . 5 **Figure 3** shows another circuit the student built.

Figure 3



Explain how the potential difference across the resistor and the lamp will change when the switch is closed.

[4 marks]

The resistor _____

_____

_____

_____

The lamp _____

_____

_____

_____

10

6.2.1.4 Resistors

Question 04

0 1 **Figure 1** shows a mobile phone with its battery removed.

Figure 1



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

0 1 . 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 1 continues on the next page

6.2.1.4 Resistors

Question 04 · continued

0 1 . 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

6.2.1.4 Resistors

Question 04 · continued

0 1 . 3 Write down the equation which links energy (E), power (P) and time (t).

[1 mark]

0 1 . 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 1 continues on the next page

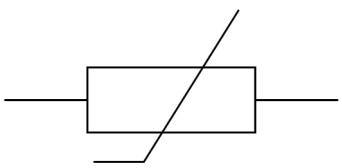
6.2.1.4 Resistors

Question 04 · continued

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

Figure 2 shows the circuit symbol for a component used in the sensor.

Figure 2



0 1 . 5 What component does the circuit symbol shown in **Figure 2** represent?

[1 mark]

0 1 . 6 The temperature of the component in **Figure 2** increases.

The potential difference across the component remains constant.

Explain what happens to the current in the component.

[2 marks]

11

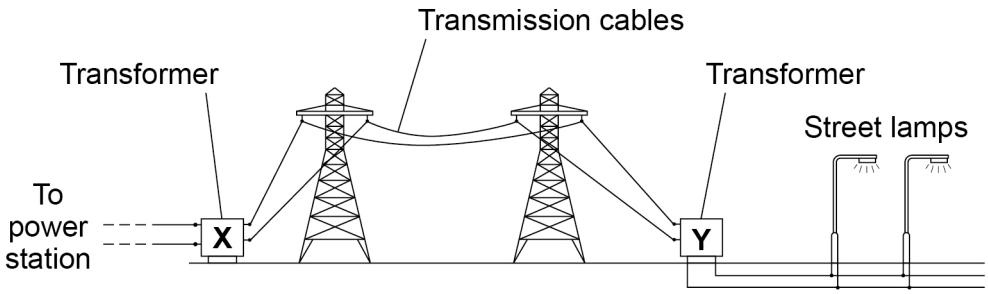
6.2.1.4 Resistors

Question 05

June 2023 | 8464/P/1H | Original Q3

0 3 **Figure 7** shows how the National Grid transfers energy from a power station to some street lamps.

Figure 7



0 3 . 1 Explain how transformer **X** increases the efficiency of the National Grid.

[3 marks]

6.2.1.4 Resistors

Question 05 · continued

0 3 . 2 The potential difference across the primary coil in transformer **Y** is 400 000 V.

The potential difference across the secondary coil is 11 000 V.

The current in the primary coil is 660 A.

Calculate the current in the secondary coil of transformer **Y**.

Use the Physics Equations Sheet.

[3 marks]

Current in the secondary coil = _____ A

0 3 . 3 Why is the current in each street lamp less than the current in the secondary coil in transformer **Y**?

[1 mark]

Tick (✓) **one** box.

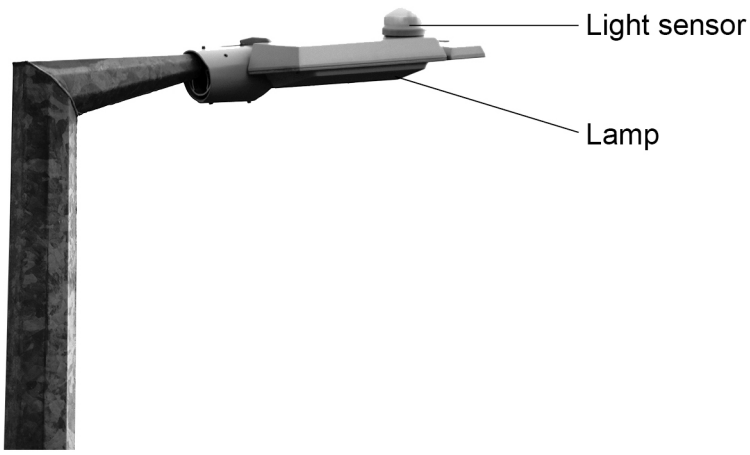
- Current is used up in the cables between **Y** and each street lamp. ☐
- Some of the current is dissipated to the surroundings. ☐
- The cables between **Y** and the street lamps have electrical resistance. ☐
- The street lamps are connected in parallel. ☐

6.2.1.4 Resistors

Question 05 · continued

0 3 . 4 **Figure 8** shows the top of a street lamp.

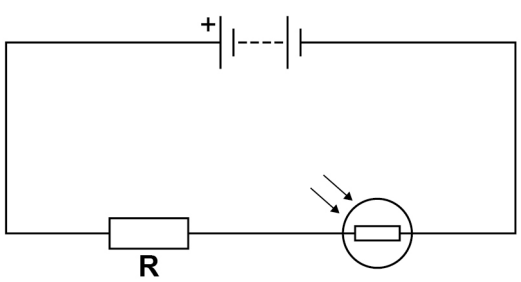
Figure 8



The light sensor detects if it is day or night.

Figure 9 shows part of the circuit in the light sensor.

Figure 9



Explain what happens to the potential difference across resistor **R** as the light intensity decreases.

[3 marks]

6.2.1.4 Resistors

Question 05 · continued

0 3 . 5 When the current in resistor **R** is 20 mA, the power transferred by resistor **R** is 6.0 W.

Calculate the resistance of resistor **R**.

Use the Physics Equations Sheet.

[4 marks]

Resistance = _____ Ω

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6.2.1.4 Resistors

Question 06

June 2025 | 8464/P/1H | Original Q3

0 3 A student investigated the resistance of a resistor.

0 3 . 1 The student used:

- the resistor
- a cell
- a switch
- an ammeter
- a voltmeter.

Draw a circuit diagram for a circuit the student could use to measure the resistance of the resistor.

[3 marks]

Question 3 continues on the next page

6.2.1.4 Resistors

The student:

- added a variable resistor to the circuit
- used the variable resistor to change the readings on the ammeter and the voltmeter
- recorded several different pairs of readings from the ammeter and the voltmeter.

0 3 . 2 When the reading on the ammeter was 450 mA, the reading on the voltmeter was 2.7 V.

Calculate the resistance of the resistor.

Use the Physics Equations Sheet.

[4 marks]

Resistance = _____ Ω

6.2.1.4 Resistors

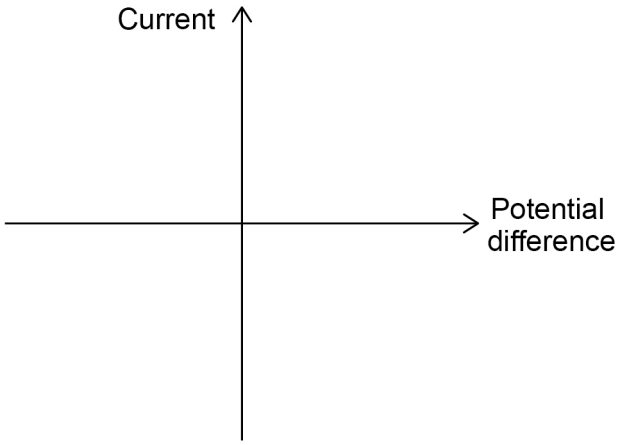
Question 06 · continued

0 3 . 3 The student plotted a graph of current against potential difference for the fixed resistor.

Complete **Figure 2** to show a sketch graph for a fixed resistor at a constant temperature.

[1 mark]

Figure 2

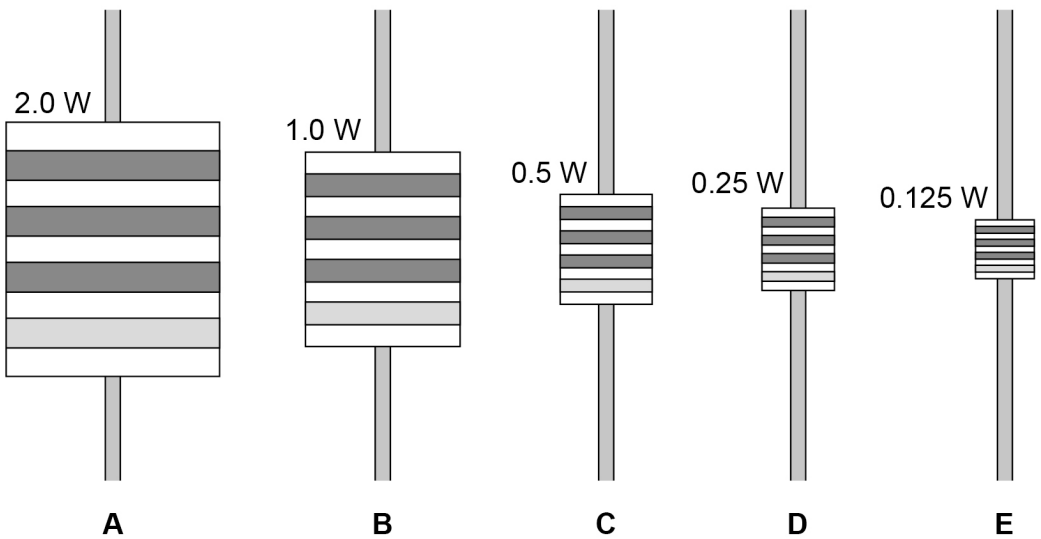


Question 3 continues on the next page

6.2.1.4 Resistors

0 3 . 4 **Figure 3** shows five resistors with the same resistance but different power ratings.

Figure 3



The power rating of a resistor is the maximum energy the resistor can transfer each second without overheating.

Each resistor has a resistance of 2.2 kΩ.

Determine which resistors in **Figure 3** are suitable to be used in a circuit that has a maximum current of 0.012 A.

Use the Physics Equations Sheet.

[4 marks]

Suitable resistors _____

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