AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 6.2.2

Series and parallel circuits

Past-paper questions

Tier	**Foundation**
Question groups	**2**
Available paper years	**2019–2023**

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.

6.2.2 Series and parallel circuits

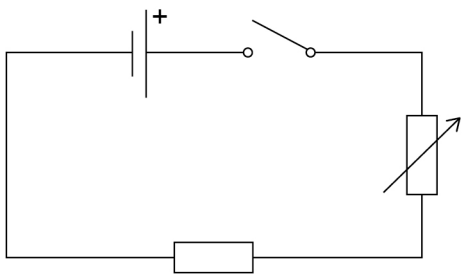
Question 01

June 2019 | 8464/P/1F | Original Q6

0 6 A student investigated how the current in a resistor varies with the potential difference across the resistor.

Figure 8 shows part of the circuit used.

Figure 8



0 6 . 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 6 . 2 The student increased the resistance of the variable resistor.

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

[1 mark]

6.2.2 Series and parallel circuits

Question 01 · continued

0 6 . 3 How should the student change the circuit to give negative values for current and potential difference?

[1 mark]

0 6 . 4 Name the type of relationship between current and potential difference for a resistor at constant temperature.

[1 mark]

0 6 . 5 Write the equation which links current, potential difference and resistance.

[1 mark]

0 6 . 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

8

6.2.2 Series and parallel circuits

Question 02

June 2023 | 8464/P/1F | Original Q6

0 6 Body analysis scales use the electrical resistance of a person's legs to estimate the percentage of water in the person's body.

Figure 8 shows body analysis scales.

Figure 8



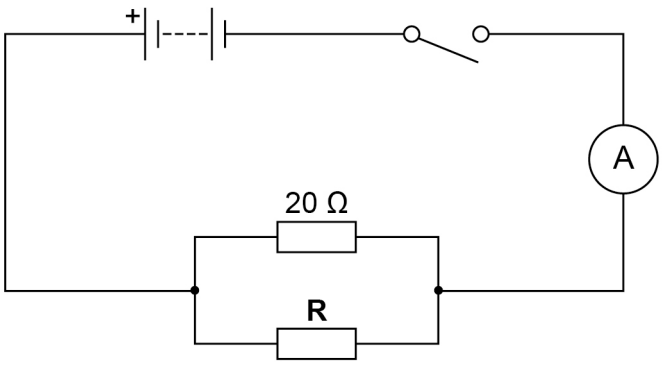
The person's legs contain both solid tissue and water.

A student used resistors to model the solid tissue and water.

The student connected a 20 Ω resistor in parallel with a resistor, **R**.

Figure 9 shows the circuit diagram.

Figure 9



0 6 . 1 To determine the total resistance of both resistors, a voltmeter must be connected into the circuit.

Complete **Figure 9** to show where the voltmeter should be connected.

[1 mark]

Question 02 · continued

0 6 . 2 The student calculated the total resistance of the two resistors.

The student's answer was 26 Ω.

Explain why the student's answer **cannot** be correct.

[2 marks]

0 6 . 3 Write down the equation that links current (*I*), resistance (*R*) and potential difference (*V*).

[1 mark]

0 6 . 4 When the total resistance of the resistors was 7.5 Ω the current in the circuit was 480 mA.

Calculate the potential difference across the two resistors.

[3 marks]

Potential difference = _____ V

Question 02 · continued

The student investigated how the resistance of **R** affected the total resistance of the circuit.

Table 2 shows the results.

Table 2

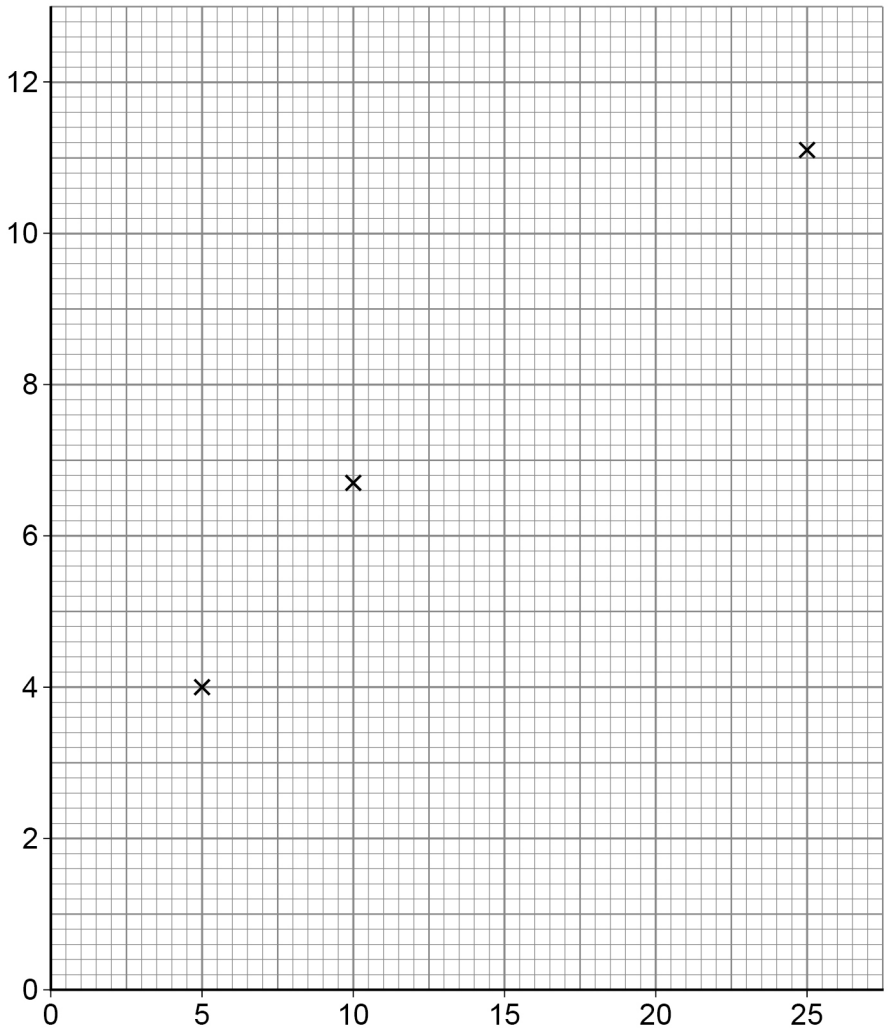
Resistance of R in ohms	Total resistance of the circuit in ohms
5.0	4.0
10.0	6.7
15.0	8.6
20.0	10.0
25.0	11.1

Some of the results are plotted in **Figure 10**.

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Question 02 · continued

Figure 10



0 6 . 5 Complete **Figure 10**.

You should:

- label both axes
- plot the two remaining values from **Table 2**
- draw the line of best fit.

[3 marks]

0 6 . 6 What resistance of **R** would give a total resistance of 4.4 Ω?

Use **Figure 10**.

[1 mark]

Resistance of **R** = _____ Ω

Question 02 · continued

The body analysis scales initially show a reading of 0.0 kg.

When the student steps onto the scales the reading is 64.8 kg.

The student steps off the scales and then immediately steps back on.

The scales now show a reading of 64.1 kg.

0 6 . 7 Complete the sentence.

[1 mark]

The difference between the two values given by the scales is due

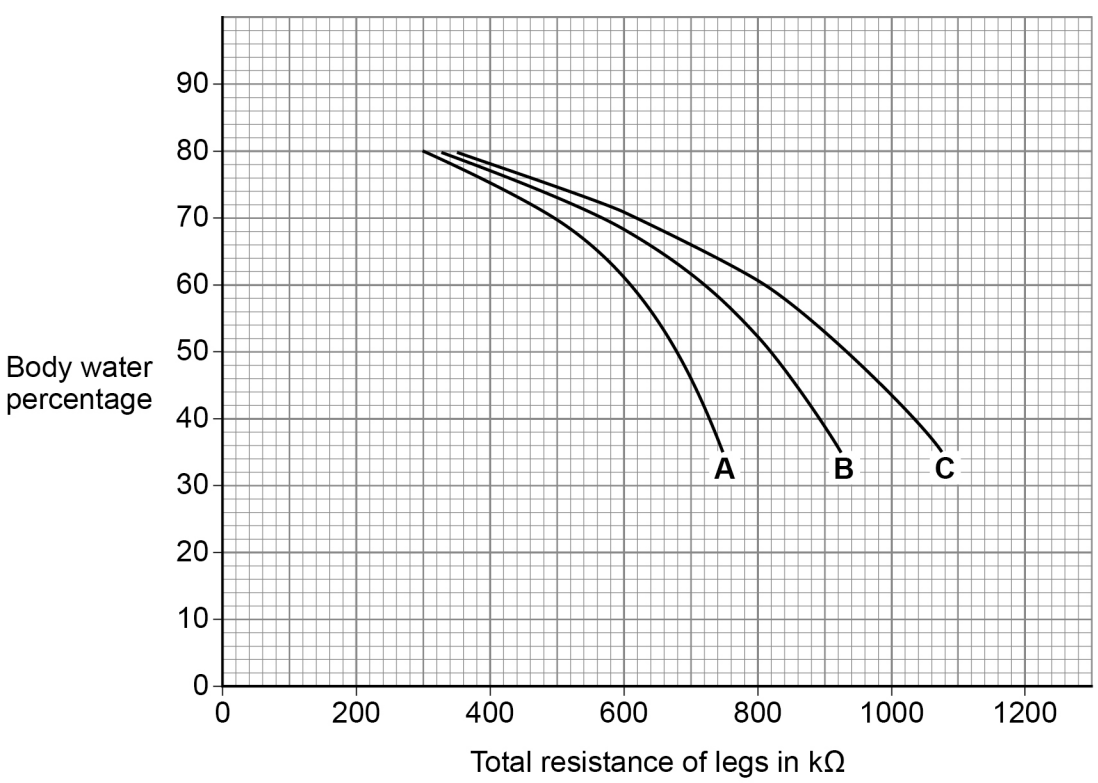
to a _____ error.

0 6 . 8 The height of the student is programmed into the scales.

The scales place the student into a category, **A**, **B** or **C**, based on height and mass.

Figure 11 shows how the scales use the category and the total resistance of the legs to determine the body water percentage.

Figure 11



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Question 02 · continued

The total resistance of the student's legs is 600 kΩ. A healthy body water percentage is between 45% and 65%.

The different measurements of the mass of the student mean that the student could be in either category **A** or category **B**.

Evaluate if the student has a healthy body water percentage.

[3 marks]

15