AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 6.2.3.1

Direct and alternating potential difference

Past-paper questions

Tier	**Higher**
Question groups	**3**
Available paper years	**2019–2025**

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.

6.2.3.1 Direct and alternating potential difference

Question 01

June 2019 | 8464/P/1H | Original Q3

0 3 A hybrid car has an electric motor and a petrol engine.

0 3 . 1 Petrol is a non-renewable energy resource.

What is meant by a non-renewable energy resource?

[1 mark]

0 3 . 2 The electric motor in the car is powered by a battery.

To charge the battery, the car is plugged into the mains supply at 230 V

The power used to charge the battery is 6.9 kW

Calculate the current used to charge the battery.

[4 marks]

Current = _____ A

0 3 . 3 Mains electricity is an ac supply.

Explain the difference between direct and alternating potential difference.

[2 marks]

6.2.3.1 Direct and alternating potential difference

Question 01 · continued

0 3 . 4 The cable used to connect the car to the mains electricity supply has a low resistance.

Explain why it is better to use a cable with a low resistance than to use a cable with a high resistance.

[2 marks]

9

6.2.3.1 Direct and alternating potential difference

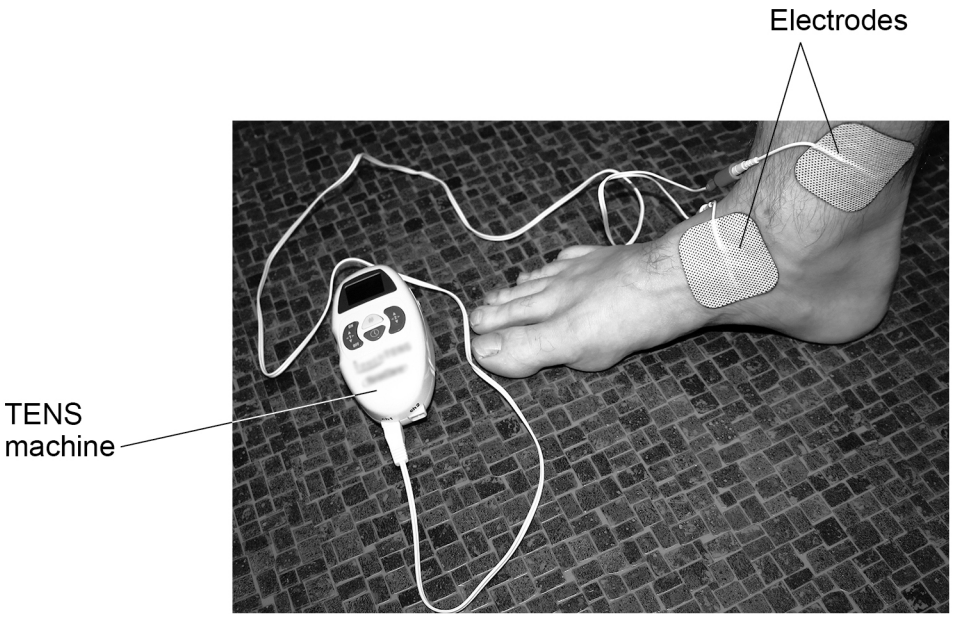
Question 02

November 2021 | 8464/P/1H | Original Q5

0 5 A TENS machine uses an electrical current to relieve pain.

Figure 8 shows the electrodes of a TENS machine connected across an ankle.

Figure 8



0 5 . 1 The maximum power of the TENS machine is 240 mW.

The potential difference across the battery in the TENS machine is 2.5 V.

Calculate the maximum current from the battery.

[4 marks]

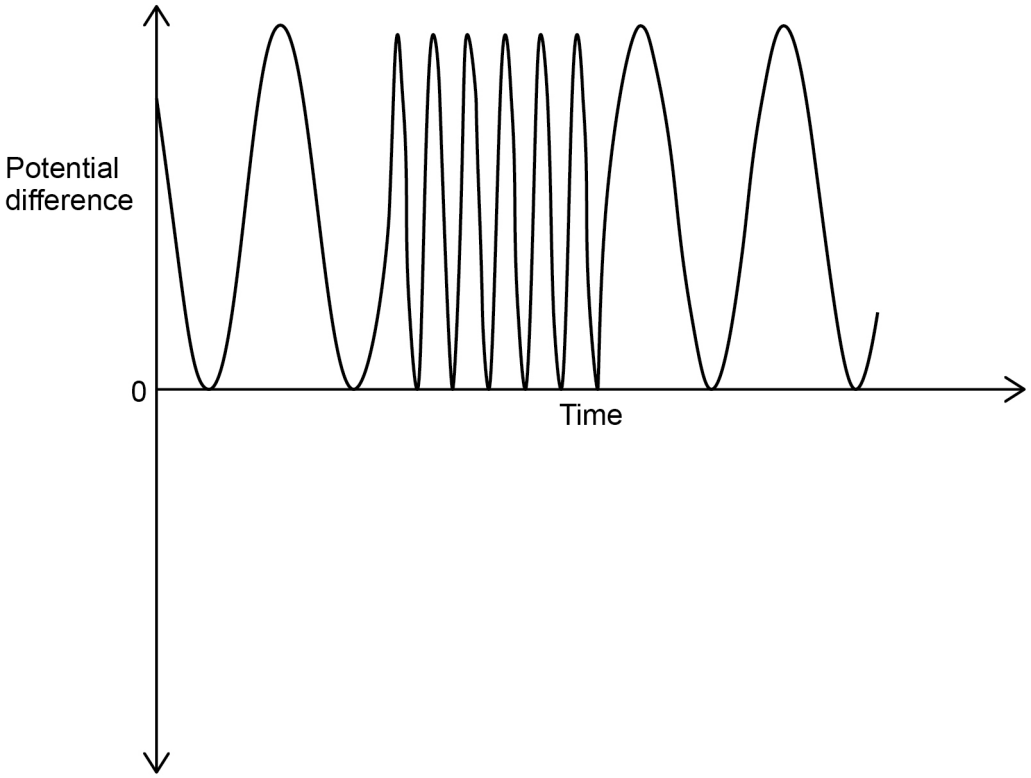
Maximum current = _____ A

6.2.3.1 Direct and alternating potential difference

Question 02 · continued

0 5 . 2 **Figure 9** is a sketch graph showing how the potential difference across the electrodes varies with time.

Figure 9



A student concluded that there was an alternating potential difference across the electrodes.

How does **Figure 9** show that the student was **not** correct?

[1 mark]

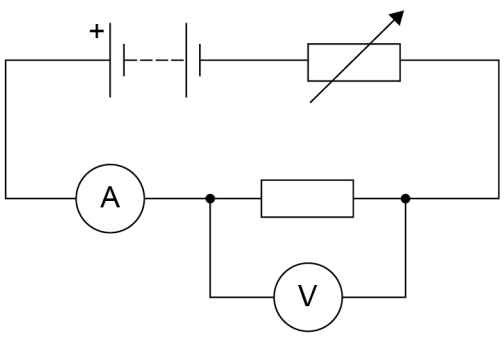
Question 5 continues on the next page

6.2.3.1 Direct and alternating potential difference

Question 02 · continued

Figure 10 shows a circuit the student built using the battery from the TENS machine.

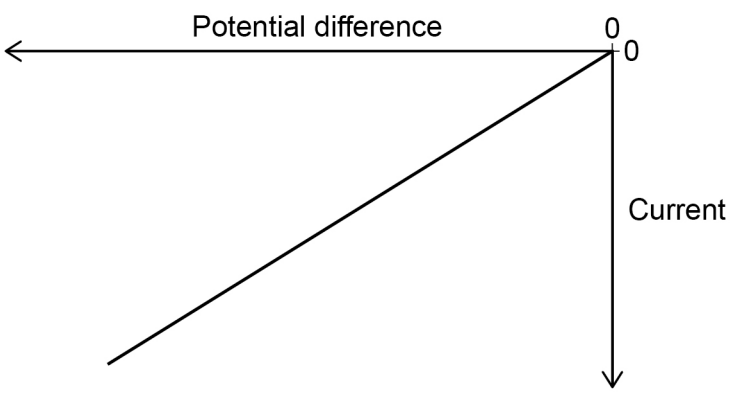
Figure 10



The student recorded how the current in the resistor varied with the potential difference across the resistor.

Figure 11 shows a sketch graph of the results.

Figure 11



0 5 . 3 What relationship does **Figure 11** show?

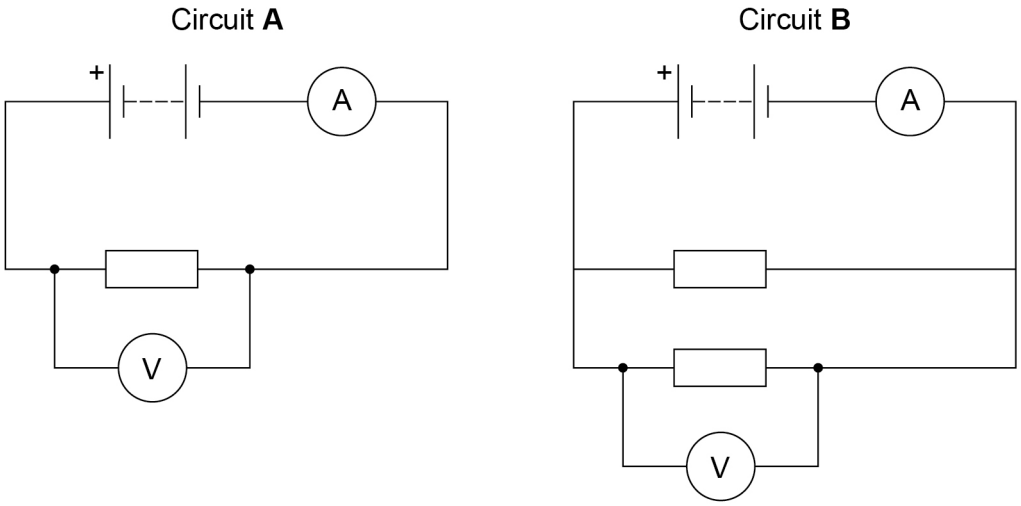
[1 mark]

6.2.3.1 Direct and alternating potential difference

Question 02 · continued

0 5 . 4 **Figure 12** shows two more circuits that the student built using the battery from the TENS machine.

Figure 12



The resistors all have the same resistance.

Compare the readings on the voltmeter and ammeter in circuit **A** and circuit **B**.

[3 marks]

Voltmeter _____

_____

_____

Ammeter _____

_____

_____

9

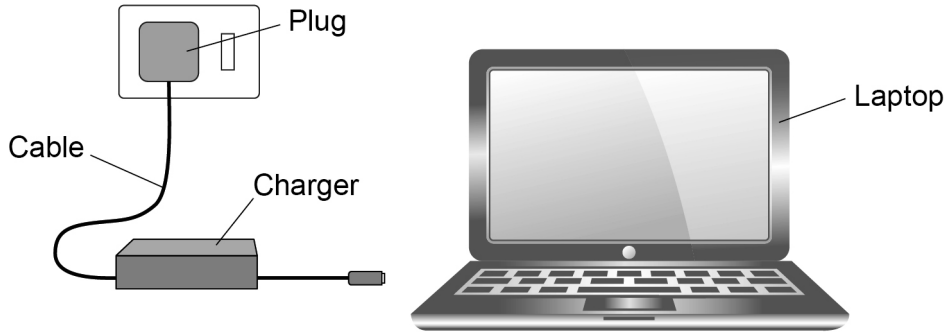
6.2.3.1 Direct and alternating potential difference

Question 03

June 2025 | 8464/P/1H | Original Q5

0 5 **Figure 5** shows a laptop computer, and a charger plugged into the mains supply.

Figure 5



0 5 . 1 Give the potential difference and frequency of the UK mains electricity supply.

[2 marks]

Potential difference _____ V

Frequency _____ Hz

0 5 . 2 The cable that connects the charger to the plug contains **two** wires that have coloured insulation.

The cable does **not** contain an earth wire.

Name each wire in the cable.

Give the colour of the insulation covering each wire.

[2 marks]

Name of wire _____ Colour of insulation _____

Name of wire _____ Colour of insulation _____

6.2.3.1 Direct and alternating potential difference

Question 03 · continued

0 5 . 3 The input to the charger is an alternating potential difference.

The output from the charger is a direct potential difference.

Describe the difference between an alternating potential difference and a direct potential difference.

[2 marks]

Question 5 continues on the next page

6.2.3.1 Direct and alternating potential difference

Question 03 · continued

A student is using the laptop computer.

The student notices that the battery has no stored energy.

The student quickly plugs the charger into the laptop and continues to use the laptop.

0 5 . 4 The laptop charger provides a constant power to the laptop.

The laptop takes longer to charge when the student uses the laptop than when the laptop is not used.

Explain why.

[2 marks]

6.2.3.1 Direct and alternating potential difference

Question 03 · continued

0 5 . 5 The potential difference across the laptop circuit is 15 V.

The average current in the laptop circuit when it is being used is 4.8 A.

The laptop charger provides a constant power of 97 W.

The maximum energy that the battery can store is 225 kJ.

Calculate the time taken to fully charge the battery from zero when the laptop is used continuously.

Use the Physics Equations Sheet.

Give your answer in hours.

[6 marks]

Time = _____ hours

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