AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

Level 3 Certificate/Extended Certificate
APPLIED SCIENCE

Unit 1 Key Concepts in Science
Section C – Physics

Tuesday 17 January 2023 Morning

Time allowed: 1 hour 30 minutes.
You are advised to spend approximately 30 minutes on this section.

Materials
For this paper you must have:
- a calculator
- the Formulae Sheet (enclosed).

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in each section.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

For Examiner's Use	
Question	Mark
1	
2	
TOTAL	

Information
- You will be provided with a copy of the Formulae Sheet.
- There are three sections in this paper:
  Section A – Biology **Section B** – Chemistry **Section C** – Physics.
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60 and the maximum mark for this section is 20.

Advice
Read each question carefully.

Do not write outside the box

Section C – Physics

Answer **all** the questions in this section.

0 1 A student investigated the voltage and current for a lamp.

Figure 1 shows a circuit diagram for the student's circuit.

Figure 1

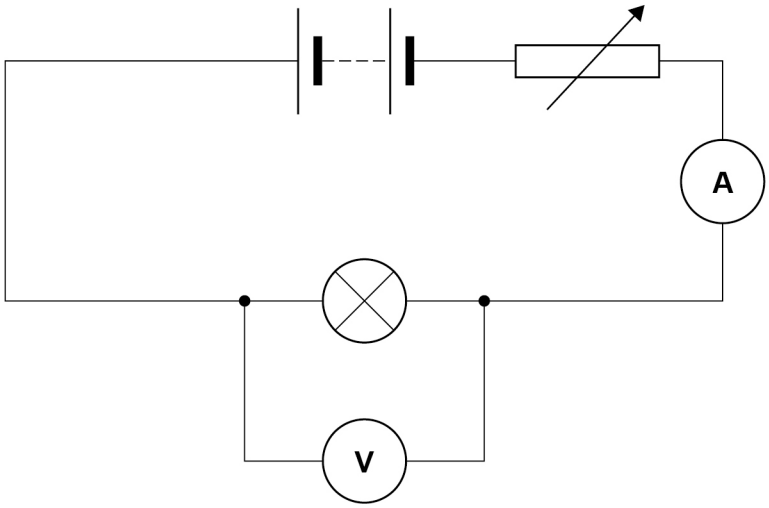

Table 1 shows the results.

Table 1

Voltage / V	0.00	2.00	4.00	6.00	8.00	10.00	12.00
Current / A	0.00	0.80	1.20	1.52	1.72	1.88	2.00

0 1 . 1 Name the component in **Figure 1** that is used to change the voltage across the lamp.

[1 mark]

0 1 . 2 Plot a graph of the results shown in **Table 1** on **Figure 2**.

The first three points have been plotted for you.

Draw a line of best fit.

[2 marks]

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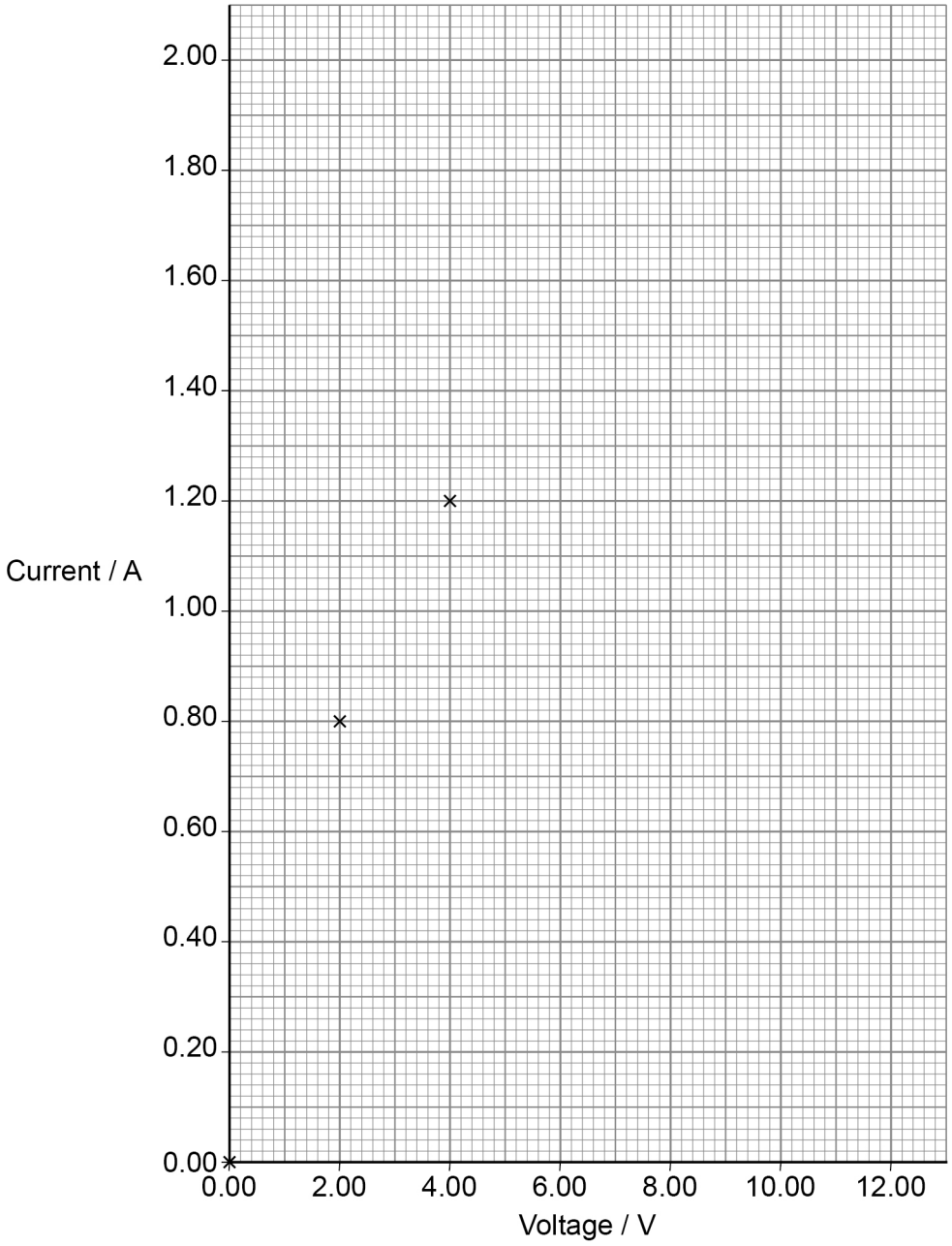
Figure 2



0 1 . 3 Calculate the resistance of the lamp when the voltage is 1.00 V.

Give the unit.

Use the Formulae Sheet and data from **Figure 2**.

[3 marks]

Resistance of the lamp = _____ Unit _____

Question 1 continues on the next page

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0 1 . 4 The resistance of the lamp increases as the voltage increases.

How does your line of best fit on **Figure 2** show this?

[1 mark]

0 1 . 5 Explain why the resistance of the lamp increases as the voltage increases.

You should refer to electrons in your answer.

[3 marks]

Table 1 is repeated below.

Table 1

Voltage / V	0.00	2.00	4.00	6.00	8.00	10.00	12.00
Current / A	0.00	0.80	1.20	1.52	1.72	1.88	2.00

0 1 . 6 Calculate the maximum power of the lamp in this investigation.

Use the Formulae Sheet and data from **Table 1**.

[1 mark]

Maximum power of the lamp = _____ W

11

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0 2 A car is driven in a race.

The car accelerates from rest with a **constant** acceleration of 10.2 m s^{-2} for 1.7 seconds.

0 2 . 1 Calculate the speed of the car at 1.7 seconds.

Use the Formulae Sheet.

[1 mark]

Speed of car at 1.7 seconds = _____ m s^{-1}

0 2 . 2 The mass of the car is 1500 kg.

Calculate the driving force of the car's engine.

Give the unit.

Use the Formulae Sheet.

[2 marks]

Driving force of the engine = _____ Unit _____

Question 2 continues on the next page

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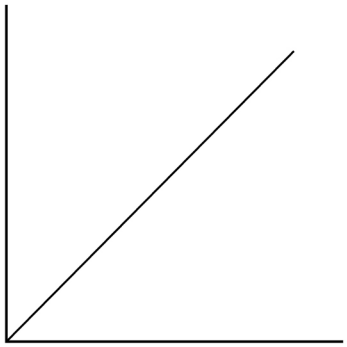
0 2 . 3 Which of the following graphs **A**, **B**, **C** or **D** shows how the displacement of the car changes as it accelerates during the first 1.7 seconds of the race?

[1 mark]

Tick (✓) **one** box.

A Displacement



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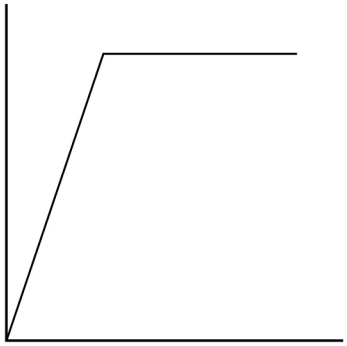
B Displacement



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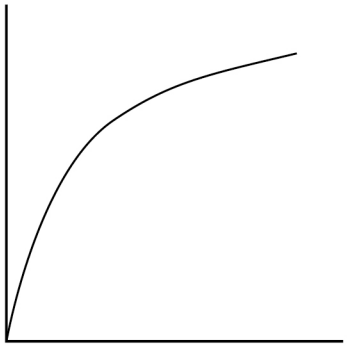
C Displacement



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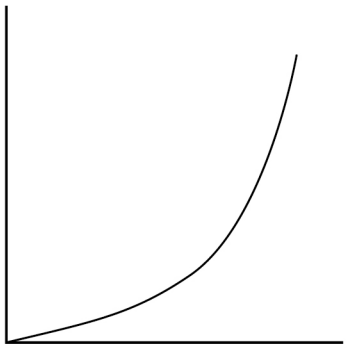
D Displacement



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0 2 . 4 The driving force of the car's engine is the same throughout the race.

However, after 1.7 seconds the acceleration of the car is **not** constant.

Explain why the acceleration of the racing car is **not** constant after 1.7 seconds.

In your answer, you should refer to the forces involved.

[3 marks]

0 2 . 5 At the end of the race the driver applies the brakes to stop the car.

Describe the energy transfers when the brakes are applied

[2 marks]

9

END OF QUESTIONS

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