

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 21 January 2020 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
- Formulae Sheet.

### 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.

### 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.

For Examiner's Use	
Question	Mark
1	
2	
<b>TOTAL</b>	



**There are no questions printed on this page**

*Do not write  
outside the  
box*

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**



0 2

## Section C – Physics

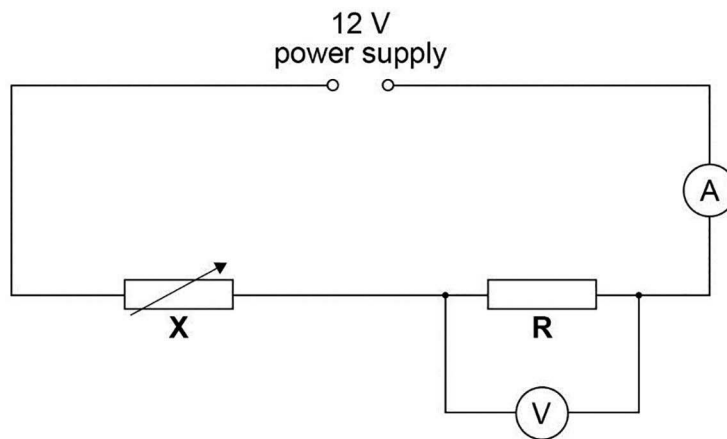
Answer **all** questions in this section.

0 1

A technician is investigating the properties of resistors.  
The technician set up a circuit to measure the voltage and current for a resistor, **R**.

**Figure 1** shows the circuit diagram.

**Figure 1**



0 1 . 1

What is component **X**?

Tick (✓) **one** box.

[1 mark]

Light-dependent resistor

Semi-conducting diode

Thermistor

Variable resistor

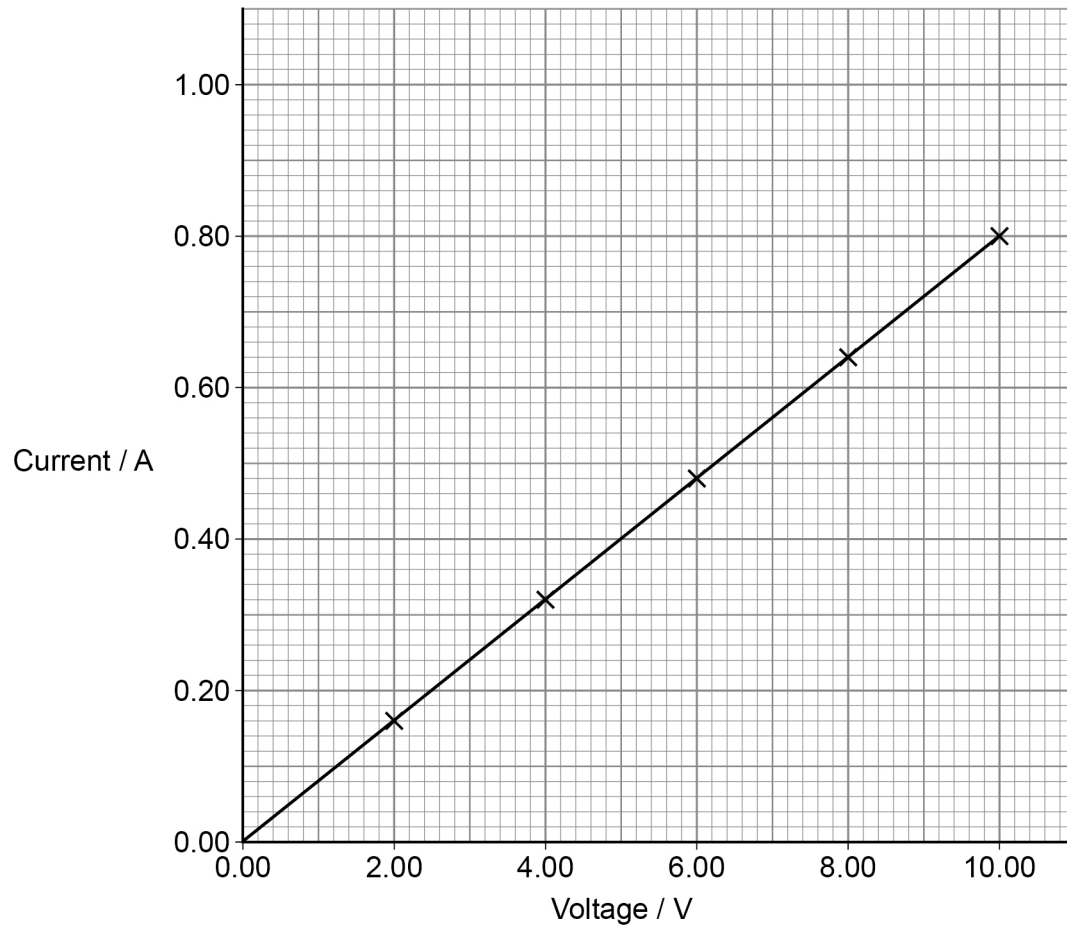
Question 1 continues on the next page

Turn over ►



Figure 2 shows the technician's results.

Figure 2



0 1 . 2

Describe the relationship between the voltage and current shown in **Figure 2**.

[1 mark]

---

---



**0 1 . 3** Calculate the resistance of the resistor, **R**.

Use data from **Figure 2**.

Give the correct unit in your answer.

**[3 marks]**

Resistance of resistor, **R** = \_\_\_\_\_ Unit = \_\_\_\_\_

**0 1 . 4** How does the energy transferred by **R** change as the voltage increases from 2.00 V to 10.00 V?

**[1 mark]**

---



---

**0 1 . 5** The technician sets the voltage across **R** to 10.00 V.  
Give the voltage across and the current in component **X**.

Use data from **Figure 2**.

**[2 marks]**

Voltage = \_\_\_\_\_ V

Current = \_\_\_\_\_ A

**0 1 . 6** The technician repeats the experiment with a different resistor.  
The new resistor has a larger resistance.

Draw a line on **Figure 2** to show what you would expect the technician's results to be.  
**[2 marks]**

**Question 1 continues on the next page**

**Turn over ►**



0 1 . 7

At voltages above 10.00 V, the new resistor gets hot.

What effect will this have on the resistance of the resistor?

Explain your answer.

**[3 marks]**

Effect \_\_\_\_\_

Explanation \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

13



0 2

The 'MeyGen' tidal energy project is the world's largest tidal power station. It is being constructed off the coast of Scotland.

0 2 . 1

One advantage of tidal power is that it is a renewable energy resource.

Give **one** other advantage of using tidal power to generate electricity.

[1 mark]

---

---

0 2 . 2

Describe how tidal power is used to generate electricity.

Refer to the useful energy transfer in your answer.

[2 marks]

---

---

---

---

---

---

---

---

---

---

**Question 2 continues on the next page**

**Turn over ►**



0 2 . 3

When the 'MeyGen' tidal energy project is completed, there will be 269 turbines. Each turbine will have a maximum power output of 1.5 MW.

Calculate the maximum electrical energy, in MJ, the project could generate in 2 hours.

[3 marks]

Maximum electrical energy generated in 2 hours = \_\_\_\_\_ MJ

0 2 . 4

Suggest **one** reason why the amount of electrical energy generated will be less than the amount calculated in Question 02.3.

[1 mark]

---

---

---

7

**END OF QUESTIONS**





**There are no questions printed on this page**

*Do not write  
outside the  
box*

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**







*Do not write  
outside the  
box*

Question number	<b>Additional page, if required. Write the question numbers in the left-hand margin.</b>
	<p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>
	<p><b>Copyright information</b></p> <p>For confidentiality purposes, all acknowledgements of third-party copyright material are published in a separate booklet. This booklet is published after each live examination series and is available for free download from <a href="http://www.aqa.org.uk">www.aqa.org.uk</a>.</p> <p>Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders may have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements. If you have any queries please contact the Copyright Team.</p> <p>Copyright © 2020 AQA and its licensors. All rights reserved</p>

