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Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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I declare this is my own work.

# Level 3 Certificate/Extended Certificate

## APPLIED SCIENCE

Unit 1 Key Concepts in Science  
Section A – Biology

Monday 12 June 2023

Afternoon

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	
3	
<b>TOTAL</b>	

### 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.



J U N 2 3 A S C 1 B 0 1

IB/M/Jun23/E9

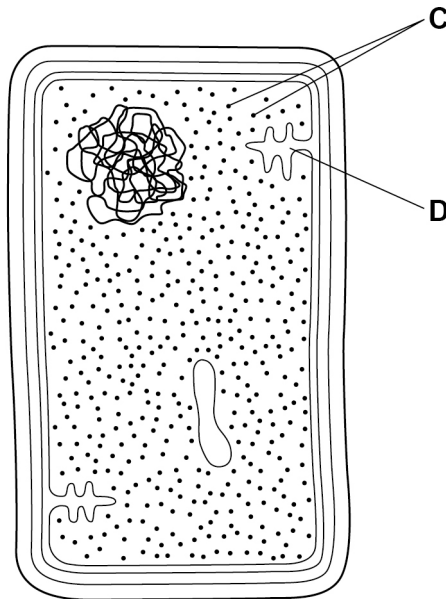
**ASC1/B**

## Section A – Biology

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

0 1

All living organisms are made of cells.

**Figure 1** shows a bacterial cell.**Figure 1**

0 1 . 1

What is the function of **C** in **Figure 1**?Tick (✓) **one** box.**[1 mark]**

To attach to other cells

To digest food particles

To synthesise lipids

To synthesise protein



**0 1 . 2** What is the function of **D** in **Figure 1**?

Tick (✓) **one** box.

[1 mark]

Contains genes used to make toxins

Increases surface area to carry out respiration

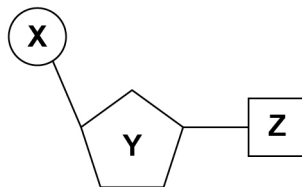
To enclose substances and transport them

To protect the cell from antibiotics

Bacterial cells have plasmids made of DNA. DNA is made of a long chain of nucleotides.

**Figure 2** shows a DNA nucleotide.

**Figure 2**



**0 1 . 3** Name the different parts of the DNA nucleotide shown in **Figure 2**.

[3 marks]

X \_\_\_\_\_

Y \_\_\_\_\_

Z \_\_\_\_\_

Question 1 continues on the next page

Turn over ►



0 1 . 4 All living organisms respire.

Draw one line from each stage of respiration to its description.

[3 marks]

Stage of respiration	Description
Electron transfer chain	Energy is released to phosphorylate ADP to ATP
Glycolysis	Series of oxidation-reduction reactions which generate ATP and carbon dioxide is lost
Krebs cycle	Phosphorylation of ATP
	Produces glucose which is converted to lipids
	Produces pyruvate and reduced NAD

8



**Turn over for the next question**

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ANSWER IN THE SPACES PROVIDED**

**Turn over ►**



0 2

Basal metabolic rate (BMR) is the minimum energy needed to maintain essential body processes.

BMR is measured in  $\text{kJ m}^{-2} \text{h}^{-1}$  (kilojoules per square metre per hour).

**Figure 3** shows how BMR changes with age for males.

**Figure 4** shows how BMR changes with age for females.

**Figure 3**

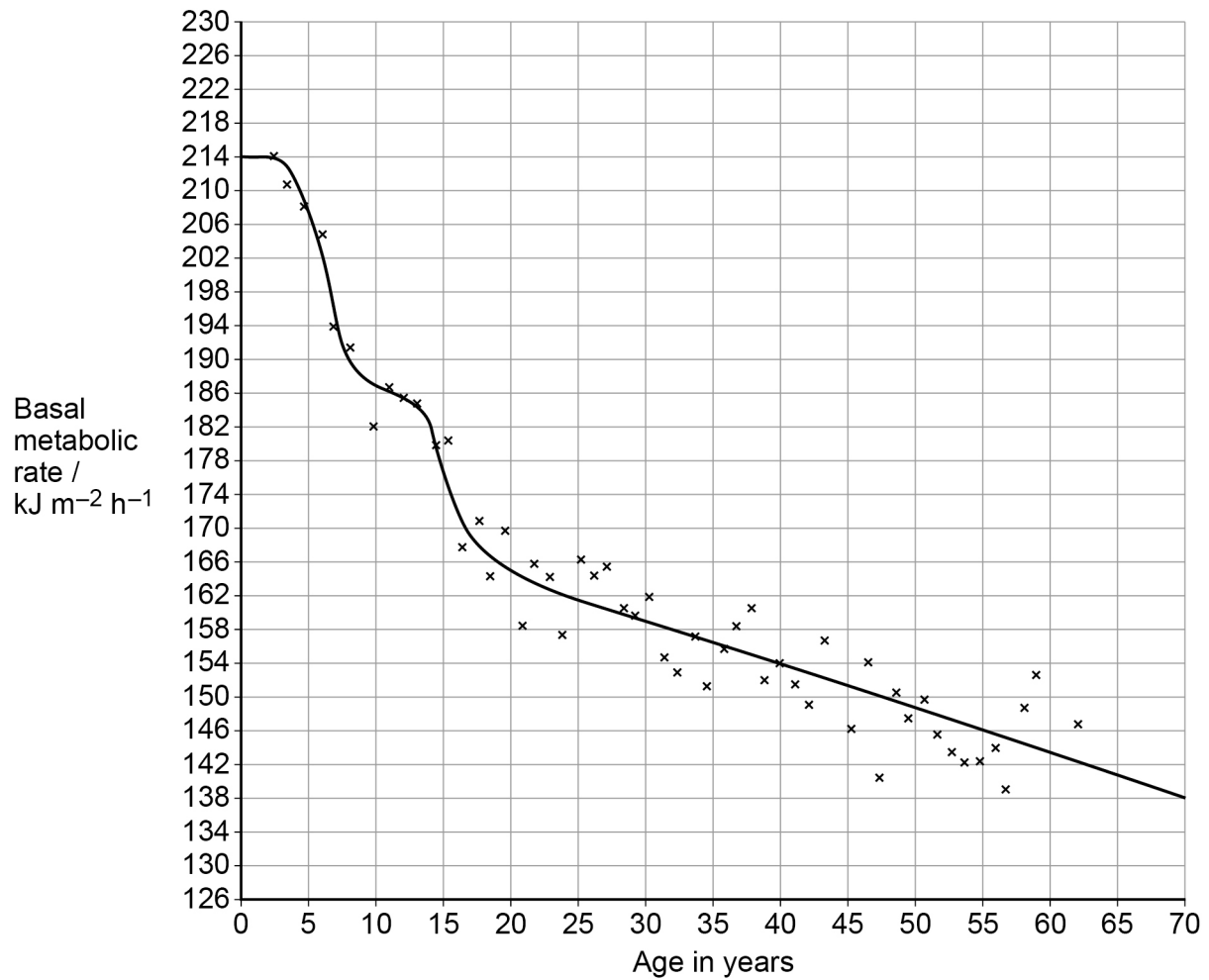
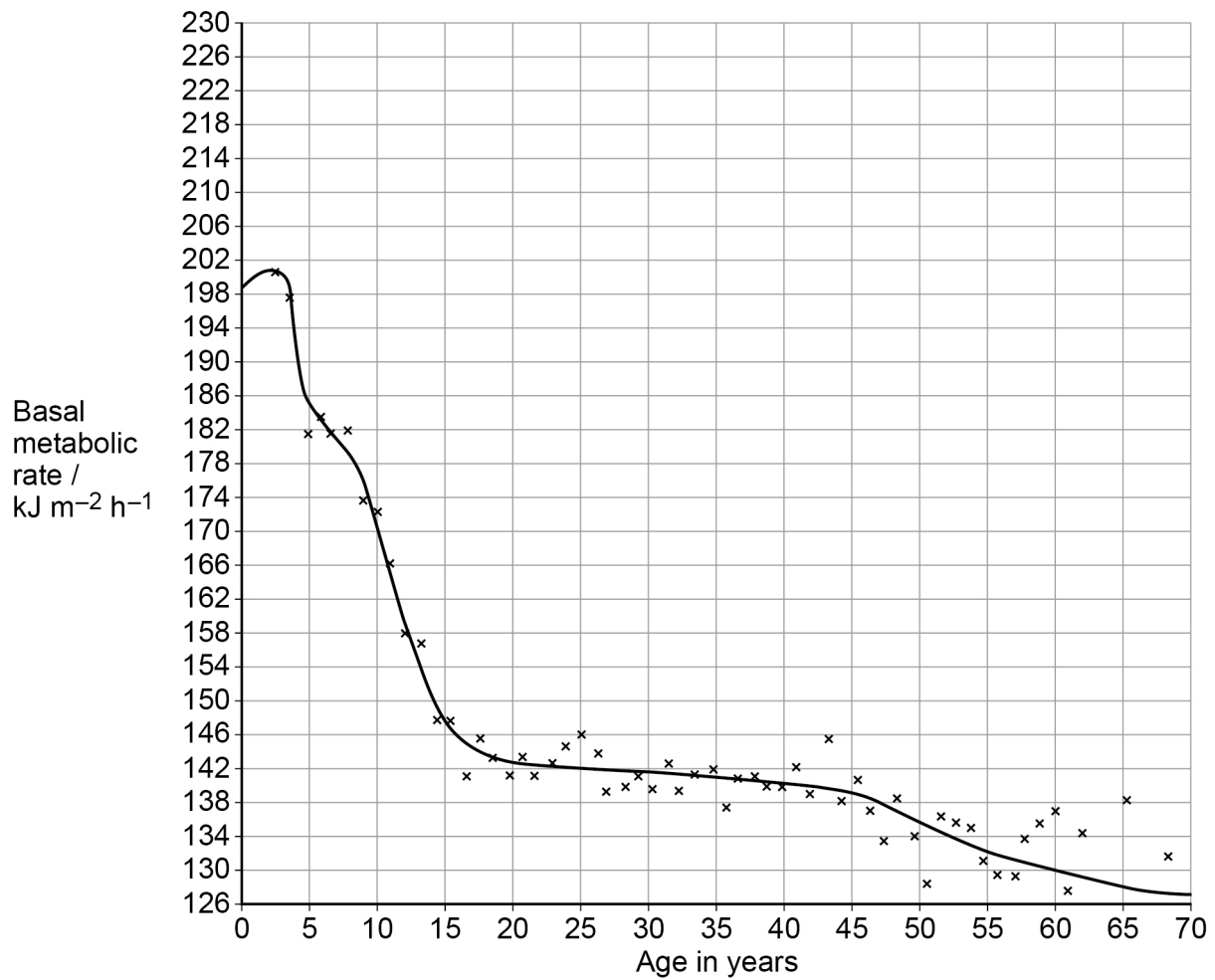


Figure 4



0 2 . 1

Basal metabolic rate can help determine how much a person should eat per day.

Calculate how many more  $\text{kJ m}^{-2} \text{h}^{-1}$  a 40-year-old male should eat **per day** compared to a 40-year-old female.

[2 marks]

Answer = \_\_\_\_\_  $\text{kJ m}^{-2} \text{day}^{-1}$

Question 2 continues on the next page

Turn over ►



0 2 . 2

**Figure 3** and **Figure 4** show differences in BMR for males and females and for different ages.

Suggest **two** other factors that affect BMR.

[2 marks]

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

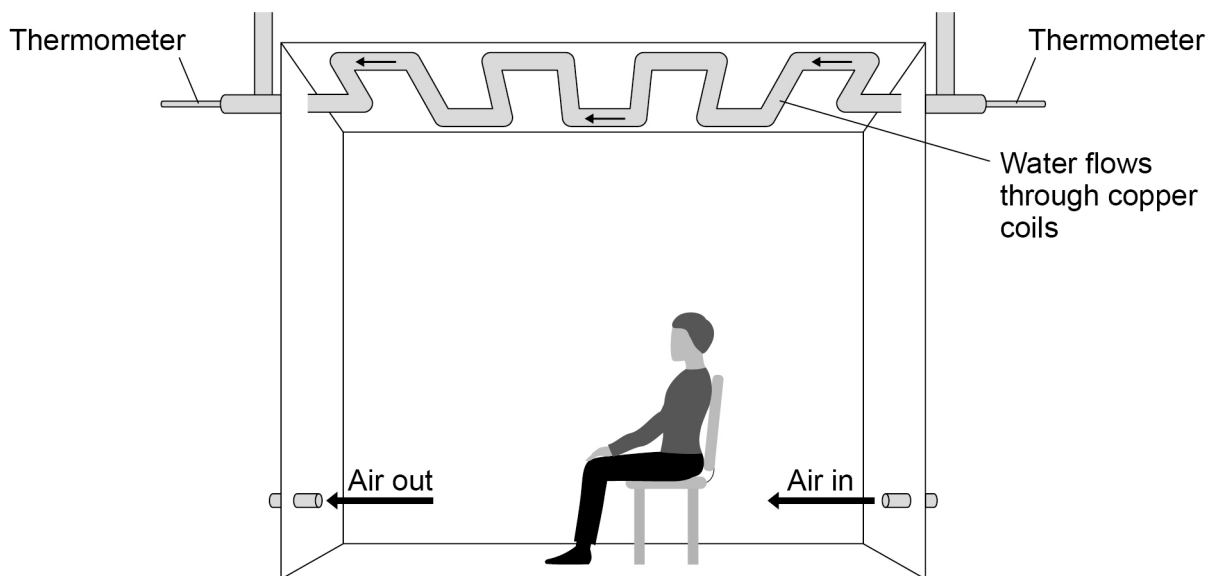
\_\_\_\_\_

0 2 . 3

BMR can be measured using direct calorimetry.

**Figure 5** shows some of the equipment used in direct calorimetry.

**Figure 5**



Describe how BMR is measured using direct calorimetry.

[3 marks]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

7





0 3

Arrhythmia is an abnormal heart rate.

Artificial pacemakers are fitted to patients who have arrhythmia.

0 3 . 1

Describe how an artificial pacemaker works to re-establish a normal heart rate.

[3 marks]

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Approximately 50 000 artificial pacemakers are fitted to patients in the UK each year.

One of the disadvantages of an artificial pacemaker is that the battery only lasts for approximately 10 years.

In 2019 scientists trialed a new type of artificial pacemaker in animals which could last longer. The new artificial pacemaker is powered by the contractions of the heart.

0 3 . 2

Suggest **two** other advantages of using a battery-free artificial pacemaker in the future.

[2 marks]

1 \_\_\_\_\_

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2 \_\_\_\_\_

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5

**END OF QUESTIONS**



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ANSWER IN THE SPACES PROVIDED**





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