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 4 The Human Body

Thursday 12 January 2023 Afternoon Time allowed: 1 hour 30 minutes

Materials
For this paper you must have:
- a calculator.

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- 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
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.

Advice
Read each question carefully.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
TOTAL	

Do not write outside the box

Answer **all** questions.

0 1 The human nervous system coordinates and controls our voluntary and involuntary actions.

Communication between cells in the body and the brain is along neurones.

0 1 . 1 In what form do nerve impulses travel along neurones?

[1 mark]

Tick (✓) **one** box.

Chemical signal ☐

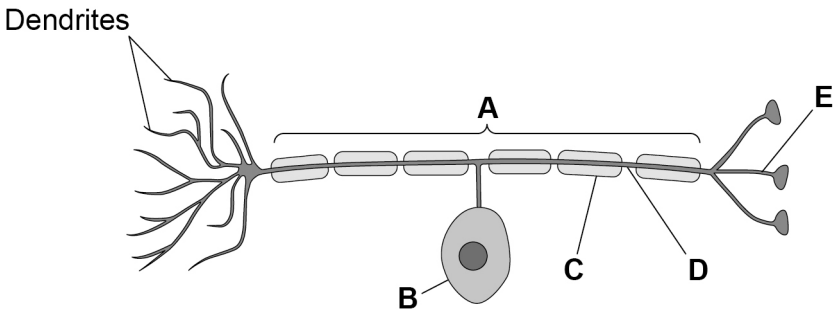
Electrical signal ☐

Light signal ☐

Sound signal ☐

Figure 1 shows a neurone.

Figure 1



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0 1 . 2 Draw **one** line from each part of the neurone shown in **Figure 1** to the correct label for that part.

[3 marks]

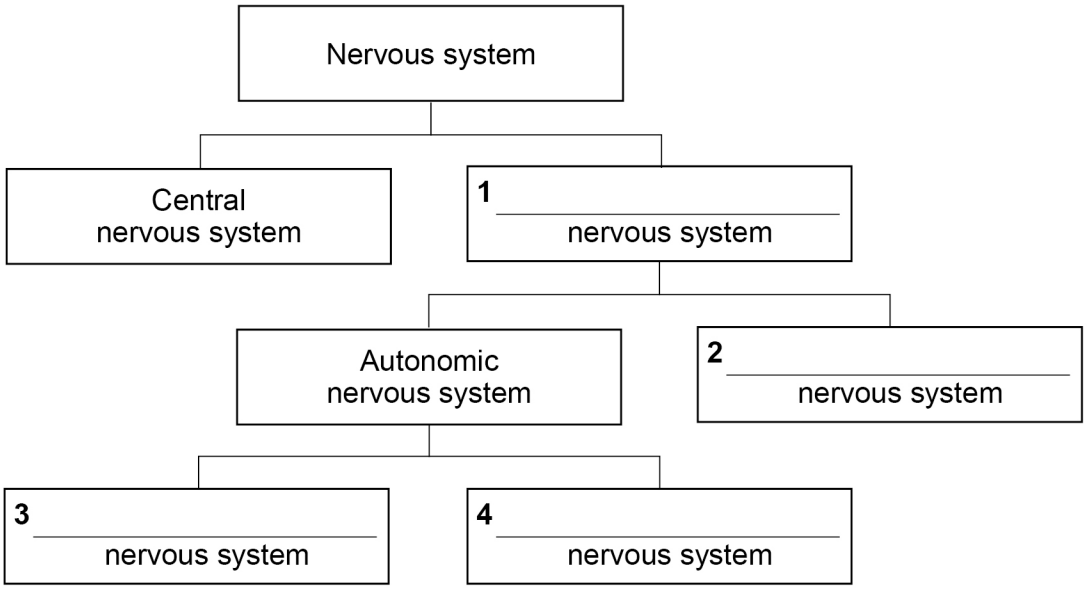
Part of the neurone	Label
Axon	**A**
Cell body	**B**
Node of Ranvier	**C**
	D
	E

0 1 . 3 Complete **Figure 2** to show how the human nervous system is organised.

Write your answers on lines **1**, **2**, **3** and **4**.

[4 marks]

Figure 2



Question 1 continues on the next page

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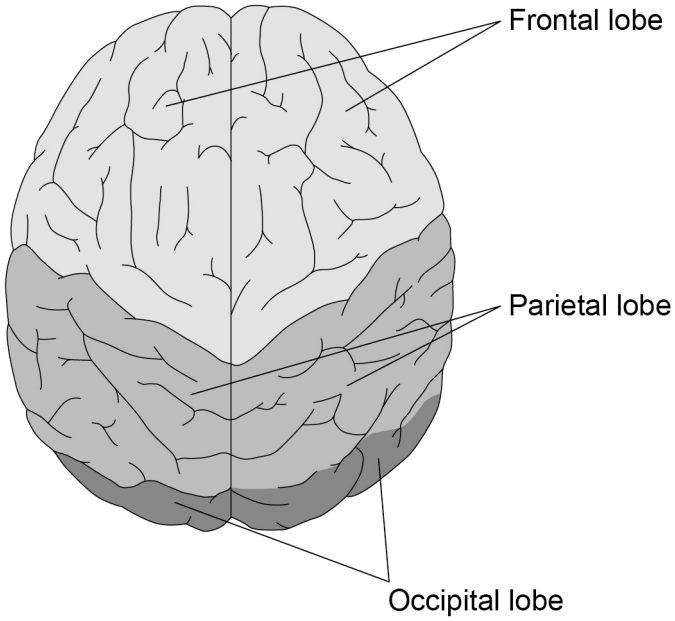
The brain is part of the central nervous system.

Doctors can scan a person's brain to look for damage.

Figure 3 shows some different parts of the brain.

Figure 3



0 1 . 4 Three of the four lobes in the brain are shown and labelled in **Figure 3**.

What is the name of the fourth lobe?

[1 mark]

0 1 . 5 Give the function of the occipital lobe.

[1 mark]

0 1 . 6 Name the part of the brain that controls breathing rate and heart rate.

[1 mark]

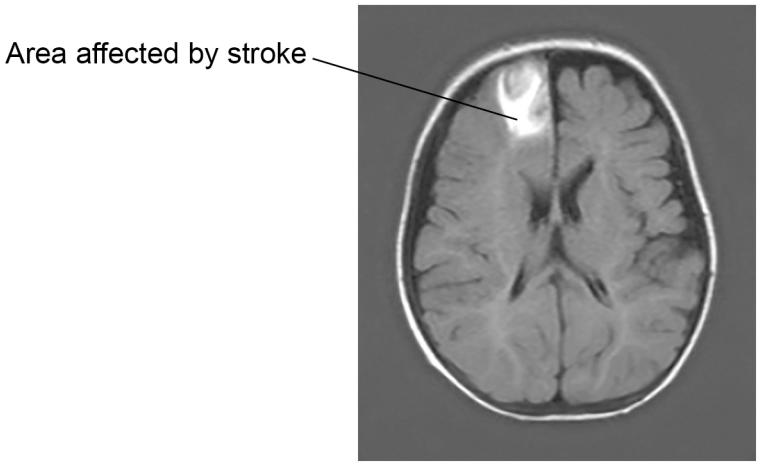
Do not write outside the box

Sometimes a blood vessel in the brain is blocked, causing the blood supply to be cut off. This is known as a stroke.

Doctors use brain scans to view the affected areas.

Figure 4 shows a brain scan of a person who has had a stroke.

Figure 4



0 1 . 7 Describe **two** symptoms that a doctor would observe in the person.

Give a reason for your answer.

Use **Figure 3** and **Figure 4**.

[3 marks]

1 _____

_____

2 _____

_____

Reason _____

_____

Question 1 continues on the next page

Do not write outside the box

0 1 . 8 Alzheimer's is a disorder affecting the brain.

One cause of Alzheimer's is a lack of acetylcholine in the brain.

What is the function of acetylcholine in the nervous system?

[1 mark]

Tick (✓) **one** box.

As a chemical to increase the speed of nerve impulses along neurones. ☐

As a neurotransmitter to transfer impulses from neurone to neurone. ☐

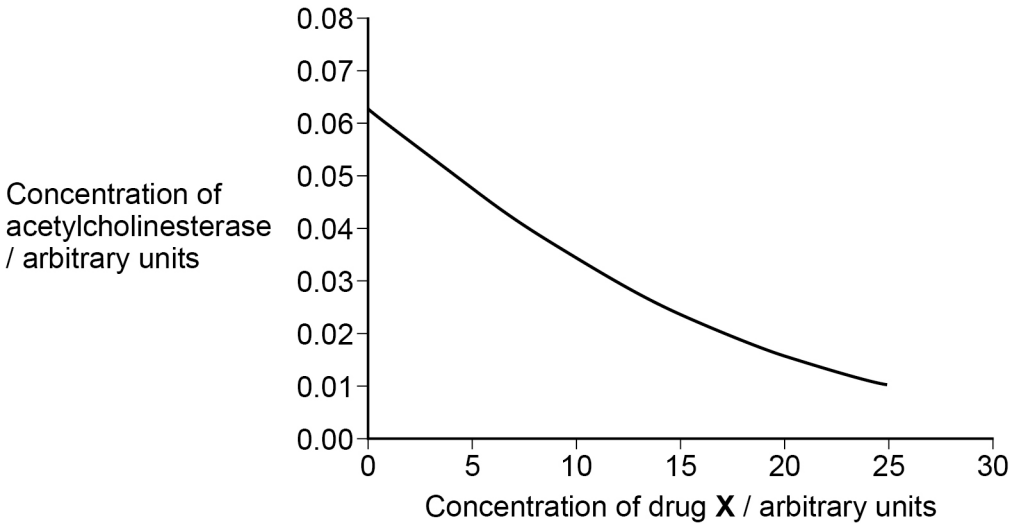
To break down other chemicals in the synapses between neurones. ☐

Do not write outside the box

0 1 . 9 Acetylcholinesterase is an enzyme that breaks down acetylcholine.

Figure 5 shows how drug **X** affects the concentration of acetylcholinesterase in the brain.

Figure 5



Explain how increasing the concentration of drug **X** reduces the symptoms of Alzheimer's.

[2 marks]

17

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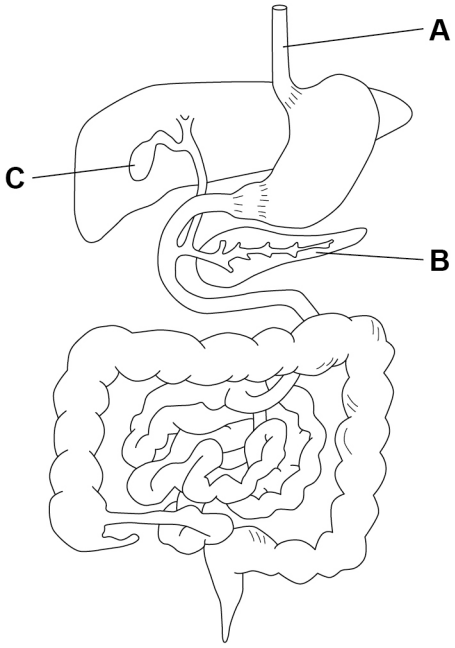
0 2 **Figure 6** shows the human digestive system.

Figure 6



0 2 . 1 Name parts **A**, **B** and **C** in **Figure 6**.

[3 marks]

A _____

B _____

C _____

Do not write outside the box

Lipids are an important part of a healthy diet.

0 2 . 2 Explain how lipase and bile are used to digest lipids.

[3 marks]

0 2 . 3 A healthy diet also includes a range of micronutrients.

Complete **Table 1**.

[3 marks]

Table 1

Micronutrient	**Example of a food rich in the micronutrient**
Calcium	
Vitamin C	
Vitamin D	

0 2 . 4 A diet too high in sodium chloride (salt) can cause high blood pressure.

Give **two** consequences of high blood pressure.

[2 marks]

1

2

Question 2 continues on the next page

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0 2 . 5 A person has high blood pressure. The doctor tells them to reduce their salt intake.

Which food should be reduced in their diet?

[1 mark]

Tick (✓) **one** box.

Cow's milk ☐

Eggs ☐

Fresh vegetables ☐

Processed meat ☐

0 2 . 6 Which piece of equipment can be used to measure blood pressure?

[1 mark]

Tick (✓) **one** box.

Dipstick ☐

Pulse oximeter ☐

Sphygmomanometer ☐

Thermometer ☐

13

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0 3 The human skeleton has several functions.

One function is movement.

0 3 . 1 Give **two other** functions of the human skeleton.

[2 marks]

1 _____

_____

2 _____

_____

0 3 . 2 Synovial joints between bones of the skeleton are needed for movement.

Describe **two** features of synovial joints that allow movement.

[2 marks]

1 _____

_____

2 _____

_____

0 3 . 3 Describe the range of motion in a gliding joint.

[1 mark]

_____

_____

Question 3 continues on the next page

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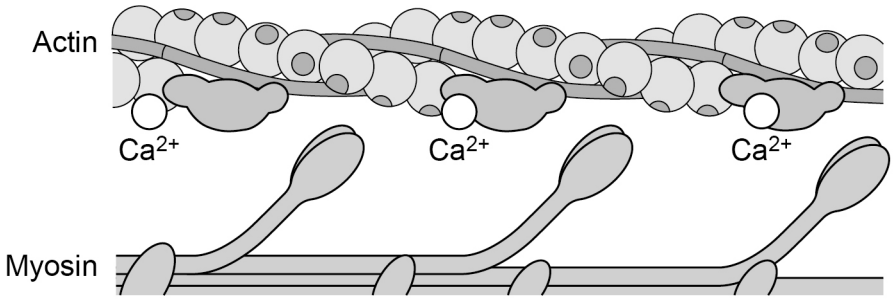
Figure 7 shows part of an actin filament and a myosin filament in a muscle fibre when calcium ions have been released in response to a nerve impulse.

Figure 7



0 3 . 4 Explain what happens when calcium ions are released in response to a nerve impulse stimulating the muscle fibre.

[3 marks]

0 3 . 5 Explain how actin filaments and myosin filaments cause contraction of a muscle fibre.

Use **Figure 7**.

[3 marks]

Do not write outside the box

0 3 . 6 Long-distance runners have a higher proportion of slow-twitch muscle fibres compared with fast-twitch muscle fibres.

Give **two** reasons why a long-distance runner has a higher proportion of slow-twitch muscle fibres.

[2 marks]

1 _____

_____

2 _____

_____

Fast-twitch muscle fibres store creatine phosphate.

0 3 . 7 Describe how creatine phosphate is used to transfer energy to the muscle fibres.

[2 marks]

_____

_____

_____

_____

0 3 . 8 Describe how creatine phosphate is regenerated after a period of exercise.

[2 marks]

_____

_____

_____

_____

17

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0 4 Some babies are born early and are called premature babies.

Oxygen saturation levels in premature babies can be too low due to a low breathing rate.

0 4 . 1 Which oxygen saturation level is in the normal range?

[1 mark]

Tick (✓) **one** box.

91% ☐

93% ☐

94% ☐

95% ☐

Question 4 continues on the next page

Premature babies can be helped with their breathing using two different methods.

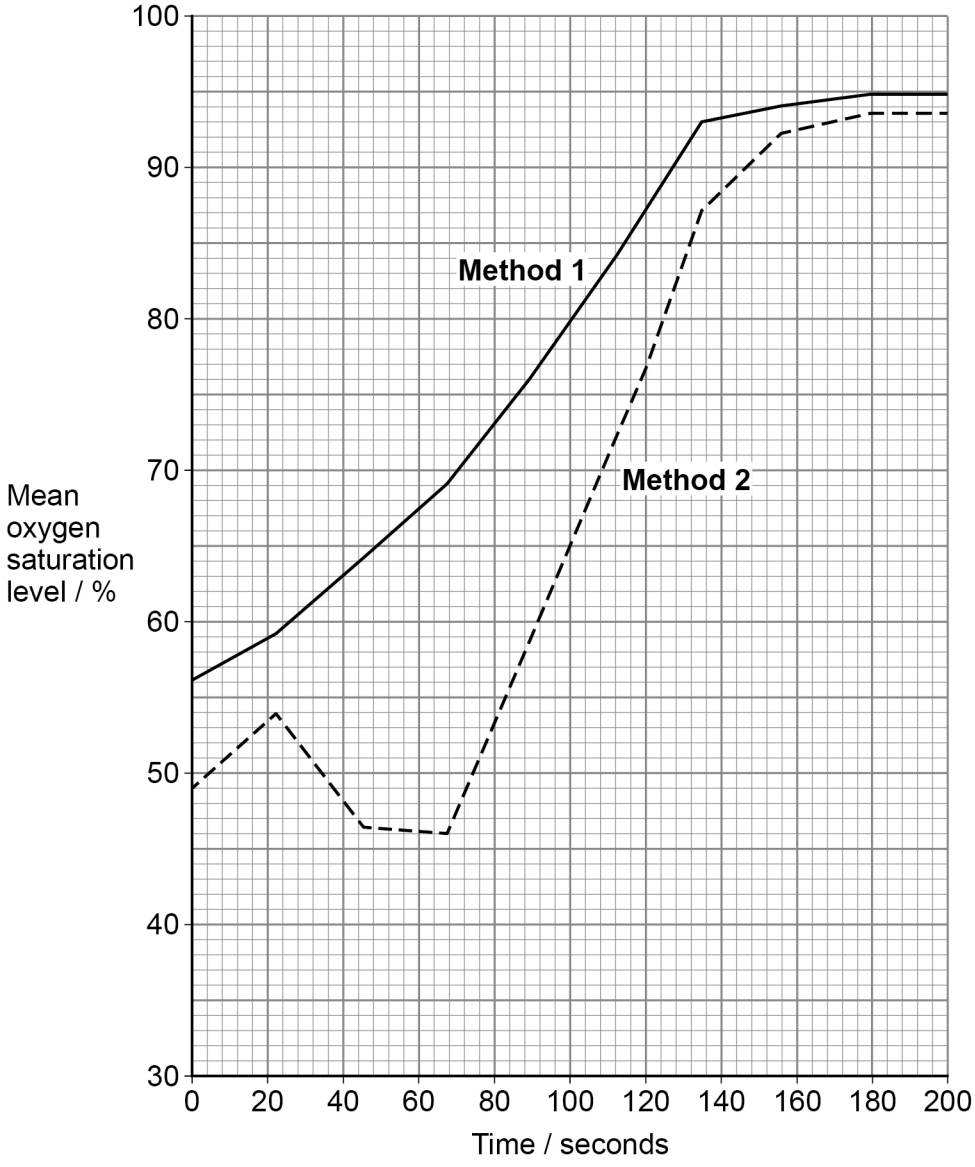
Method 1: provides a continuous flow of oxygen in the nose.

Method 2: uses a ventilator to force air into the lungs.

Scientists investigated the effectiveness of the two methods to improve oxygen saturation in premature babies.

Figure 8 shows the scientists' results.

Figure 8



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0 4 . 2 Determine the time it took for the mean oxygen saturation level to reach 90% in **method 1** and **method 2**.

Use **Figure 8**.

[2 marks]

Method 1 = _____ seconds

Method 2 = _____ seconds

0 4 . 3 The mean oxygen saturation in babies who received **method 1** increased from 56% at the start to 95% after 180 seconds.

Calculate the percentage increase in the mean oxygen saturation for **method 1** from 0 seconds to 180 seconds.

Give your answer to **2** significant figures.

[3 marks]

Percentage increase = _____ %

0 4 . 4 A student stated that **method 1** was better than **method 2** at helping breathing in premature babies.

Give **three** reasons to support the student's statement.

Use information from **Figure 8**.

[3 marks]

1 _____

_____

2 _____

_____

3 _____

_____

Question 4 continues on the next page

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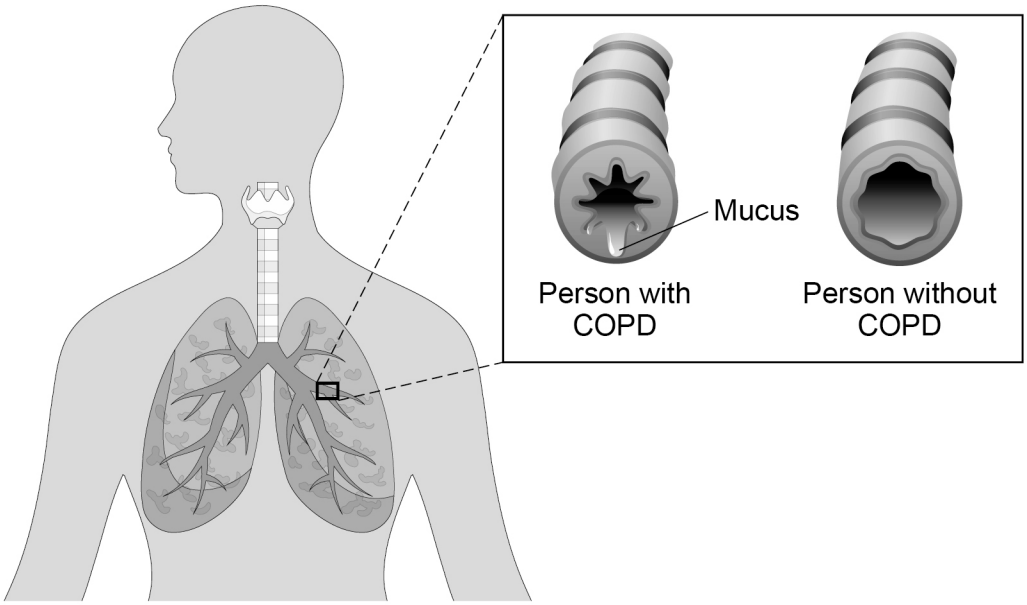
Some people develop a lung disorder called COPD (chronic obstructive pulmonary disorder). **Method 1** can be used for people with COPD to help them breathe when they are asleep.

Figure 9 compares the bronchioles of a person with COPD with the bronchioles of a person without COPD.

Figure 9



0 4 . 5 Explain why a person with COPD has a lower oxygen saturation level than a person without COPD.

[4 marks]

13

END OF QUESTIONS

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