



Surname \_\_\_\_\_

Other Names \_\_\_\_\_

Centre Number \_\_\_\_\_

For Examiner's Use

Candidate Number \_\_\_\_\_

Candidate Signature \_\_\_\_\_

Level 3 Certificate and Extended Certificate in  
Applied Science

## THE HUMAN BODY

### ASC4

Thursday 18 January 2018    Afternoon

Time allowed: 1 hour 30 minutes

**For this paper you must have:**

- a calculator.

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]



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## **INSTRUCTIONS**

- **Use black ink or black ball-point pen.**
- **Answer ALL questions.**
- **You must answer the questions in the spaces provided. Do not write on blank pages.**
- **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**

- **Please read each question carefully before starting.**

**DO NOT TURN OVER UNTIL TOLD TO DO SO**



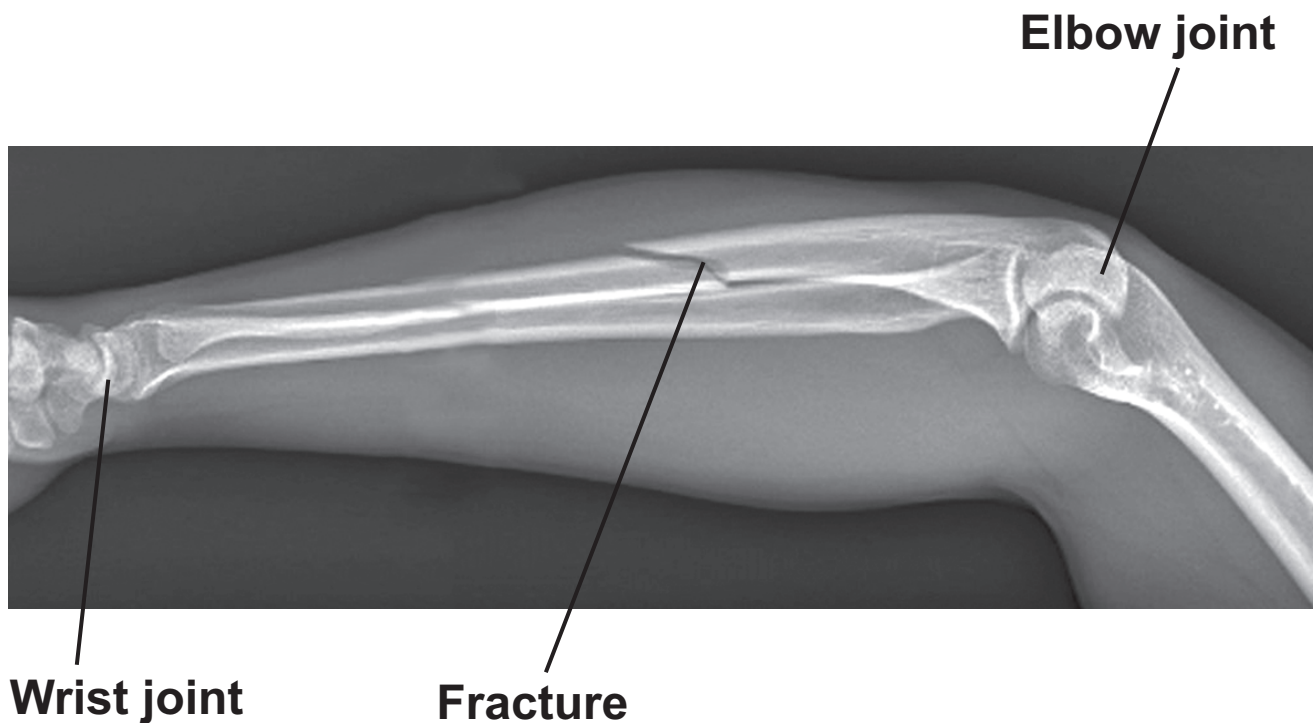
Answer ALL questions.

0 1

A man attends hospital with an injured arm and the arm is X-rayed.

The X-ray in FIGURE 1 shows a fracture in the bone of the arm.

FIGURE 1



0 1 . 1

The arm is placed in a cast for 6 weeks to allow the bone to heal.

Name the TWO processes that take place in the bone to heal the fracture. [2 marks]

1 \_\_\_\_\_

2 \_\_\_\_\_



**0 1 . 2** **FIGURE 1 also shows the elbow joint.**

**What type of joint is the elbow?**

**Tick (✓) ONE box. [1 mark]**

**ball and socket**

**gliding**

**hinge**

**pivot**

**0 1 . 3** **Describe the range of movement the elbow joint should have. [2 marks]**

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**[Turn over]**



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0 1 . 4

The ends of the bones in FIGURE 1 are covered with a layer of cartilage.

Describe the function of cartilage in a joint.  
[2 marks]

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0 1 . 5

The skeleton consists of the appendicular and the axial skeleton.

The arm shown in FIGURE 1 is part of the appendicular skeleton.

State what the AXIAL skeleton consists of.  
[1 mark]

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8

[Turn over]



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Several hospitals in the UK reported that increasing numbers of children needed treatment for malnutrition between 2012 and 2014.

In many cases the intake of calcium and iron in the children's diet was too low.

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Describe TWO symptoms you would see in a child with calcium deficiency. [2 marks]

1

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0 2 . 2

Anaemia may be seen in a child with iron deficiency.

Describe TWO symptoms you would see in a child with anaemia. [2 marks]

1 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

0 2 . 3

Give TWO ways in which iron deficiency can be treated. [2 marks]

1 \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2 \_\_\_\_\_  
\_\_\_\_\_  
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[Turn over]



0 2 . 4

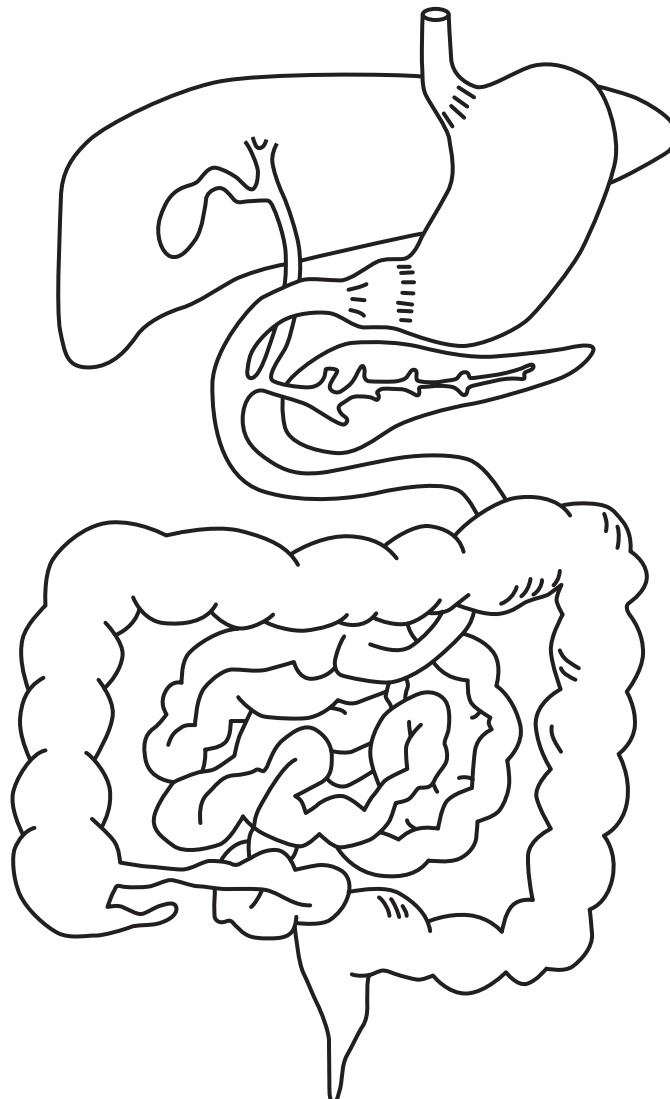
A dietician suggests that one way to increase calcium intake in children is for them to eat more dairy products such as milk and cheese.

Dairy products are high in lipids.

Digestion of lipids involves bile which is produced in the liver and released from the gall bladder.

Label the liver AND the gall bladder on FIGURE 2. [1 mark]

FIGURE 2



0 2 . 5

**Explain the role of bile and lipase in the digestion of dairy food. [3 marks]**

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**[Turn over]**



0 2 . 6

A lipid molecule consists of one glycerol molecule bonded to three fatty acids.

When water reacts with a lipid molecule during digestion a hydrolysis reaction takes place.

Describe the effect of hydrolysis on a lipid molecule. [2 marks]

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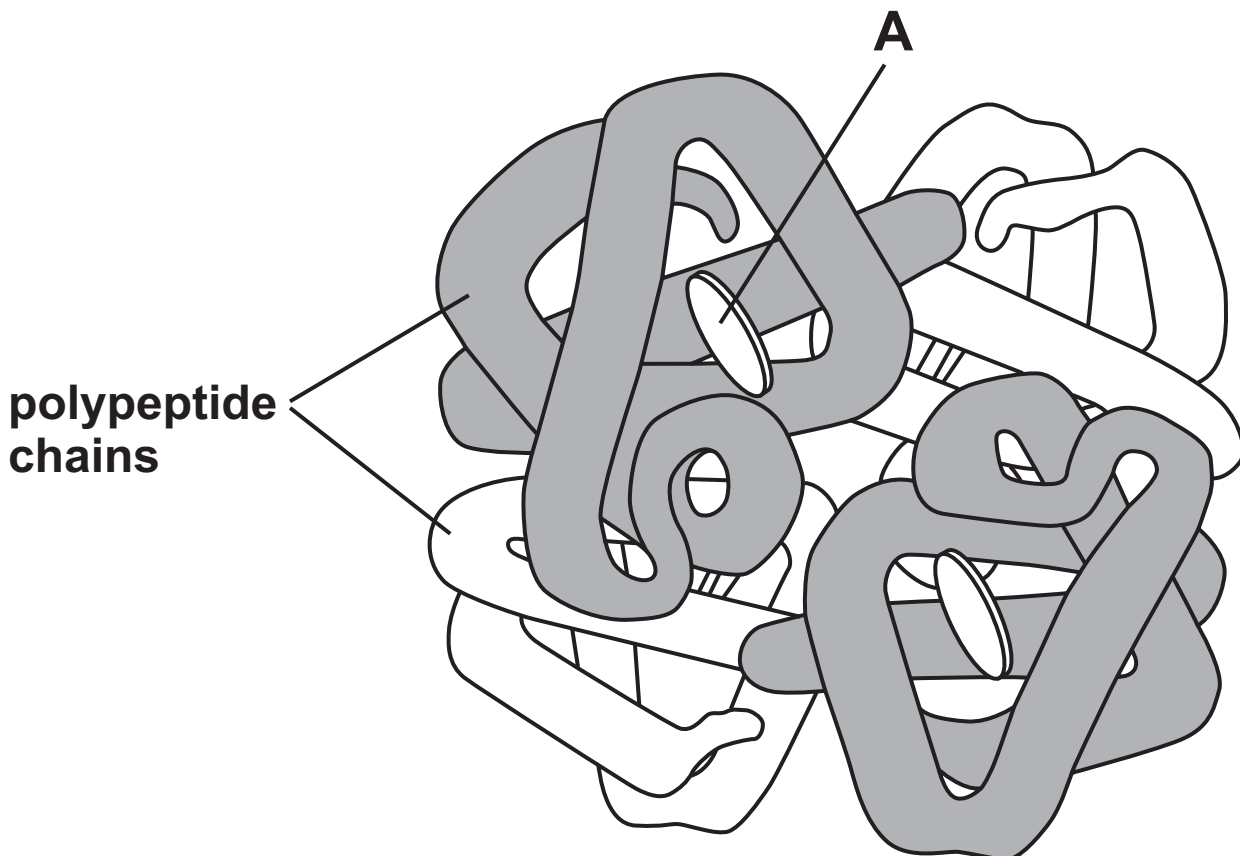


0 3

Oxygen is carried by haemoglobin in red blood cells.

FIGURE 3 shows one molecule of haemoglobin.

FIGURE 3



0 3 . 1

Part A in FIGURE 3 is where oxygen binds to haemoglobin.

What is part A? [1 mark]

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[Turn over]



**0 3 . 2** Oxygen saturation is often measured by healthcare professionals.

**What equipment is used to measure the oxygen saturation level of blood? [1 mark]**

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**0 3 . 3** What is the normal range for oxygen saturation in a healthy person? [1 mark]

**Oxygen saturation =**

\_\_\_\_\_ % to \_\_\_\_\_ %

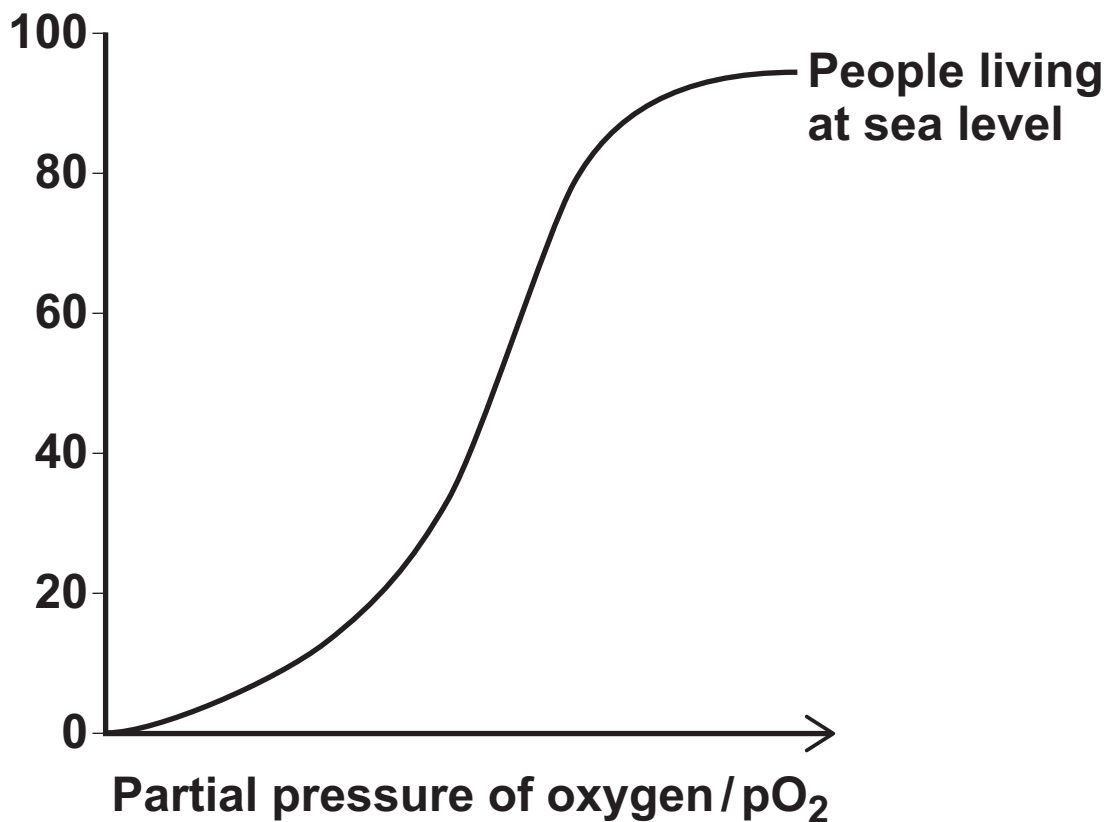


03 . 4

FIGURE 4 shows the oxygen dissociation curve for the haemoglobin of people living at sea level.

**FIGURE 4**

Percentage saturation of haemoglobin with oxygen



On FIGURE 4 sketch the dissociation curve you would expect to see for haemoglobin in people adapted to living at high altitude.  
[2 marks]

[Turn over]



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People who live at high altitude have more red blood cells per unit volume of blood compared with people who live at sea level.

Many runners train at high altitudes so when they compete in races at sea level their performance is better.

Explain why training at high altitude might increase a runner's race performance at sea level. [5 marks]

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**[Turn over]**



0 4

The human nervous system is organised into the central nervous system and the peripheral nervous system.

The peripheral nervous system is then divided into the somatic nervous system and the autonomic nervous system.

0 4 . 1

Describe the role of the somatic nervous system and the role of the autonomic nervous system. [4 marks]

**Somatic nervous system**

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**Autonomic nervous system**

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**0 4 . 2**

**The autonomic nervous system is further divided into the sympathetic nervous system and the parasympathetic nervous system.**

**Give TWO effects of stimulating the PARASYMPATHETIC nervous system. [2 marks]**

**1** \_\_\_\_\_

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**2** \_\_\_\_\_

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**[Turn over]**



0 4 . 3

A woman has a stroke causing damage to her brain.

After the stroke she cannot maintain her balance and she finds it difficult to write and hold small objects.

Which part of the brain is likely to have been damaged by the stroke? [1 mark]

\_\_\_\_\_

0 4 . 4

Some injuries to the brain damage the brain stem.

Give TWO symptoms you might see if the brain stem is damaged. [2 marks]

1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

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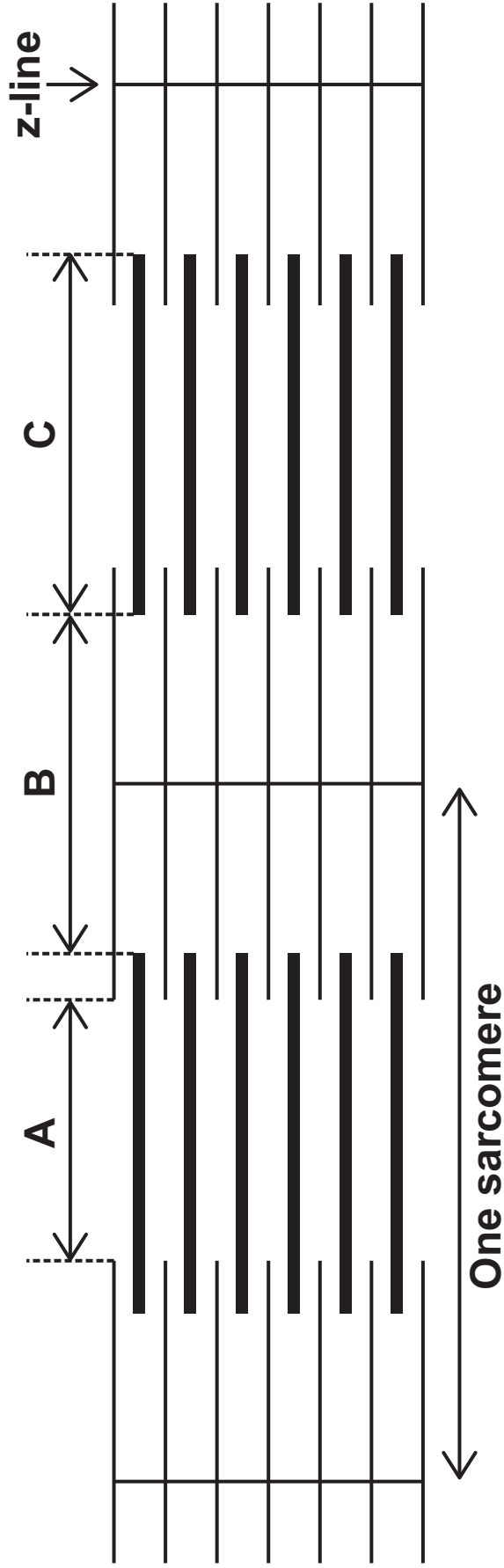


0 5

Multiple Sclerosis is a disease that affects the muscles of the body.

FIGURE 5 shows part of a myofibril from a muscle.

FIGURE 5





2 3

0 5 . 1

Name sections A, B and C in FIGURE 5. [3 marks]

A \_\_\_\_\_

B \_\_\_\_\_

C \_\_\_\_\_

0 5 . 2

Describe what happens to the length of section B, and the length of section C, when the myofibril in FIGURE 5 contracts. [2 marks]

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[Turn over]

0 5 . 3

**People with multiple sclerosis often suffer from symptoms caused by muscle spasms. A muscle spasm is a painful contraction of the muscle that can make movements and walking difficult.**

**Describe how actin and myosin filaments in a myofibril work together to cause muscle contraction. [3 marks]**

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0 5 . 4

Dantrolene is a drug used to treat the symptoms of multiple sclerosis.

Dantrolene prevents the release of calcium ions (Ca<sup>2+</sup>) from muscle stores.

Explain how Dantrolene prevents muscle spasms. [3 marks]

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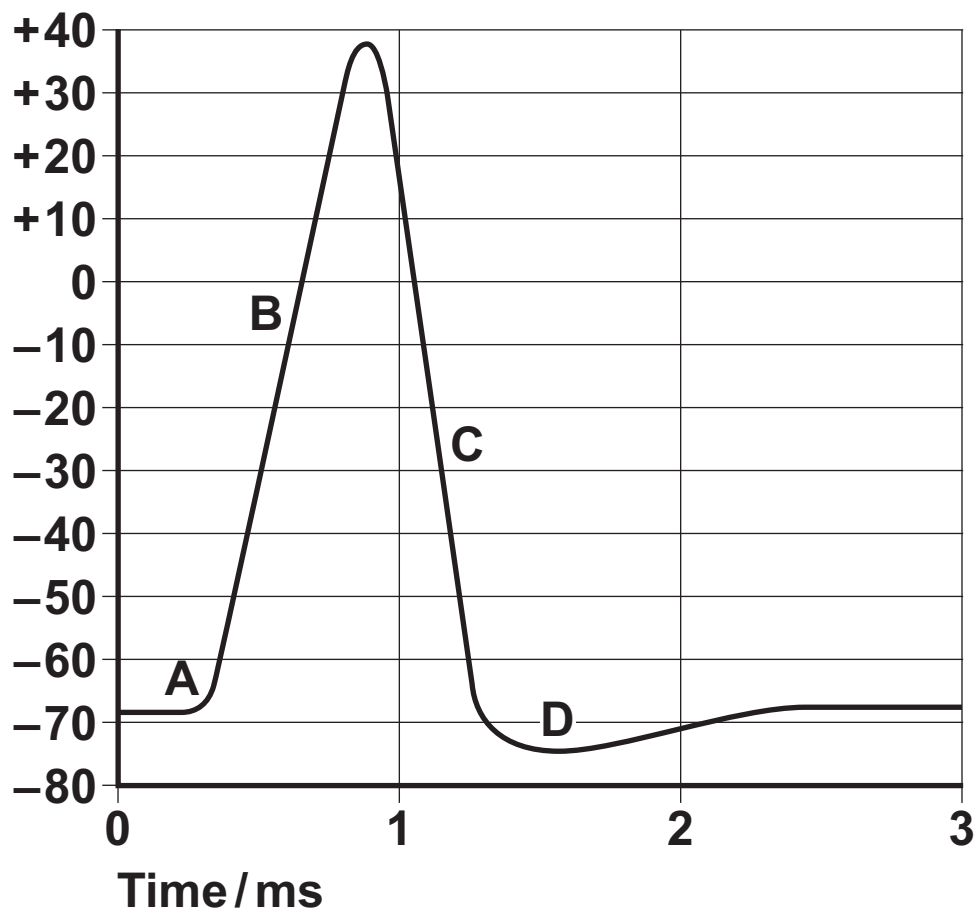
0 6

The concentration of ions inside and outside the neurone is unequal at rest which causes a difference in potential across the membrane.

FIGURE 6 shows how the potential across the membrane of a neurone changes during an action potential.

FIGURE 6

Potential across the membrane / mV



0 6 . 1

What is the resting potential of the neurone in FIGURE 6? [1 mark]

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0 6 . 2

Where on FIGURE 6, A, B, C or D, are the potassium channels open to allow potassium ions to move out of the neurone? [1 mark]

Tick (✓) ONE box.

A

B

C

D

[Turn over]



06 . 3

Where on FIGURE 6, A, B, C or D, are the sodium channels open to allow sodium ions to move rapidly into the neurone? [1 mark]

Tick (✓) ONE box.

A

B

C

D

06 . 4

A research scientist investigated four different neurones to find the relationship between:

- the presence of myelin
- axon diameter
- speed of conduction of impulses.

TABLE 1, on page 29, shows the results.



TABLE 1

Neurone	Is the neurone myelinated or non-myelinated?	Axon diameter/ $\mu\text{m}$	Speed of conduction of nerve impulses along the neurone in m/s
A	myelinated	11.0	71.0
B	non-myelinated	1.2	1.8
C	myelinated	18.0	105.0
D	myelinated	1.0	5.5

Give TWO possible conclusions the student could make about the relationship between axon diameter, presence of myelin and speed conduction. [2 marks]

1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

[Turn over]



06 . 5

**When an action potential reaches the presynaptic membrane of a synapse a neurotransmitter is released.**

**Explain the role of calcium channels and calcium ions ( $\text{Ca}^{2+}$ ) in causing the neurotransmitter to be released into the synapse. [3 marks]**

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0 6 . 6

A common drug used to treat depression blocks serotonin uptake by channels on the presynaptic membrane.

Explain how the drug reduces the symptoms of depression. [2 marks]

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END OF QUESTIONS



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Examiner's Initials	
Question	Mark
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<b>TOTAL</b>	

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