



Please write clearly in block capitals.

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

Surname

---

Forename(s)

---

Candidate signature

---

# Level 3 Certificate / Extended Certificate APPLIED SCIENCE

## Unit 4 The Human Body

Tuesday 22 May 2018

Morning

Time allowed: 1 hour 30 minutes

### Materials

For this paper you must have:

- a calculator.

### Instructions

- Use black ink or black ball-point pen.
- 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.
- 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	
5	
<b>TOTAL</b>	



J U N 1 8 A S C 4 0 1

IB/M/Jun18/E10

**ASC4**

Answer **all** questions.

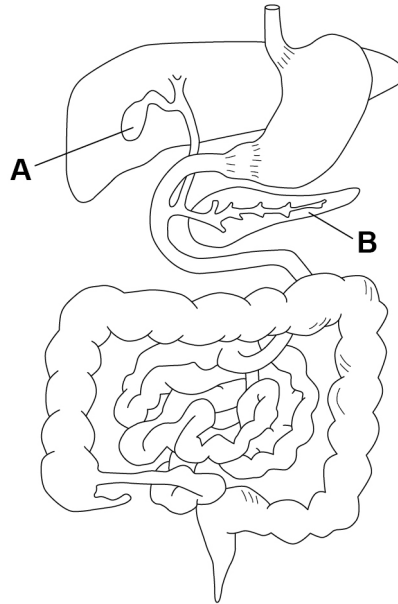
Do not write  
outside the  
box

0 1

A man has diarrhoea and goes to see the doctor. The doctor diagnoses irritable bowel syndrome (IBS). IBS can reduce absorption of some nutrients into the blood.

**Figure 1** shows the digestive system.

**Figure 1**



0 1 . 1

Name the part of the digestive system which is affected by IBS.

Label this part **X** on **Figure 1**.

[2 marks]

Name of part \_\_\_\_\_

0 1 . 2

The man's symptoms are worse after eating fatty foods.

Parts **A** and **B** in **Figure 1** are involved in the digestion of fats.

Name parts **A** and **B**.

[2 marks]

**A** \_\_\_\_\_

**B** \_\_\_\_\_



**0 1 . 3** Explain how part **A** helps speed up the digestion of fats.

**[3 marks]**

---



---



---



---



---



---

**0 1 . 4** Lipase is a type of enzyme that digests fats.

Complete **Table 1** for carbohydrase and protease.

**[3 marks]**

**Table 1**

	<b>Carbohydrase</b>	<b>Lipase</b>	<b>Protease</b>
Enzyme substrate		fats	
<b>One</b> place in the body where the enzyme is made		small intestine	
<b>One</b> place in the body where the enzyme acts		small intestine	

**Question 1 continues on the next page**

**Turn over ►**



**0 1 . 5** Vitamins are an essential part of a healthy diet.

What is the name of the deficiency disease caused by vitamin C deficiency?

**[1 mark]**

---

**0 1 . 6** Give **two** symptoms of vitamin C deficiency.

**[2 marks]**

1 \_\_\_\_\_

2 \_\_\_\_\_

**0 1 . 7** Suggest **two** ways in which vitamin C deficiency can be treated.

**[2 marks]**

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_



**Table 2** shows data from hospital admissions in the UK.

**Table 2**

Year	Total number of adults and children admitted to hospital with vitamin C deficiency	Number of children admitted to hospital with vitamin C deficiency
2010	26	0
2012	10	2
2014	137	10
2016	237	48

**0 1 . 8** Calculate the percentage increase in cases of vitamin C deficiency from 2010 to 2016.

Use information from **Table 2**.

**[2 marks]**

Percentage increase = \_\_\_\_\_

**0 1 . 9** A newspaper makes the following statement:

Malnutrition in children is on the rise in the UK.

Give **one** reason that supports the newspaper's statement and **one** reason that does not support the newspaper's statement.

**[2 marks]**

---



---



---



---

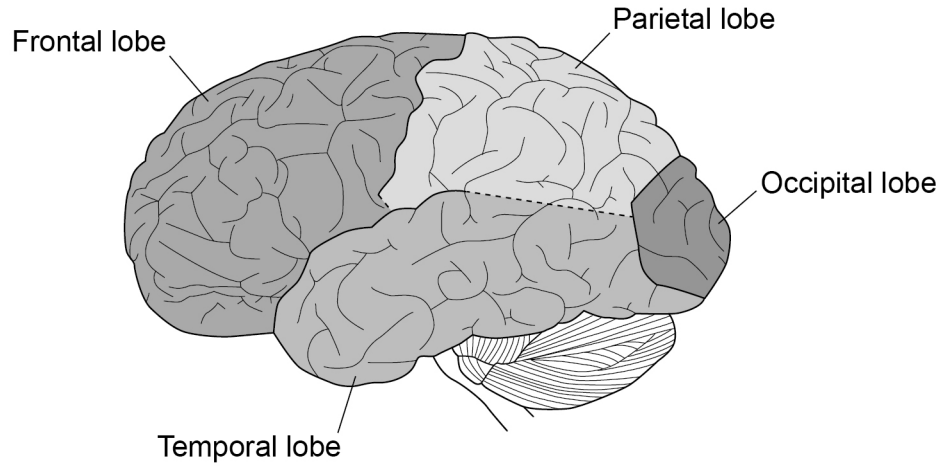


0 2

Neurologists study the brain and its functions to diagnose disorders.

Figure 2 shows the lobes of the brain.

Figure 2



0 2 . 1

Draw **one** line from each lobe of the brain to the function of the lobe.

[4 marks]

Lobe of the brain

Function of the lobe

	Controlling heart rate
Frontal	Emotions and reasoning
Occipital	Memory and speech
Parietal	Movement and recognition
Temporal	Posture and balance
	Visual processing



**0 2 . 2** Where in the brain are the lobes in Question **02.1** found?

Tick (✓) **one** box.

**[1 mark]**

Brain stem

Cerebellum

Cerebral cortex

**0 2 . 3** When a person is frightened their heart rate increases and their pupils dilate.

Which part of the nervous system causes these symptoms?

Tick (✓) **one** box.

**[1 mark]**

Parasympathetic

Peripheral

Somatic

Sympathetic

**Question 2 continues on the next page**

**Turn over ►**



Do not write  
outside the  
box

0 2 . 4

Alzheimer's disease affects different parts of the brain.

Give **three** symptoms of Alzheimer's disease.

[3 marks]

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

0 2 . 5

People with Alzheimer's disease do **not** produce enough acetylcholine in their brain.

Acetylcholine is a neurotransmitter used in synapses.

Describe the sequence of events that allows an impulse to pass from one neurone to the next neurone at the synapse.

[3 marks]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

12



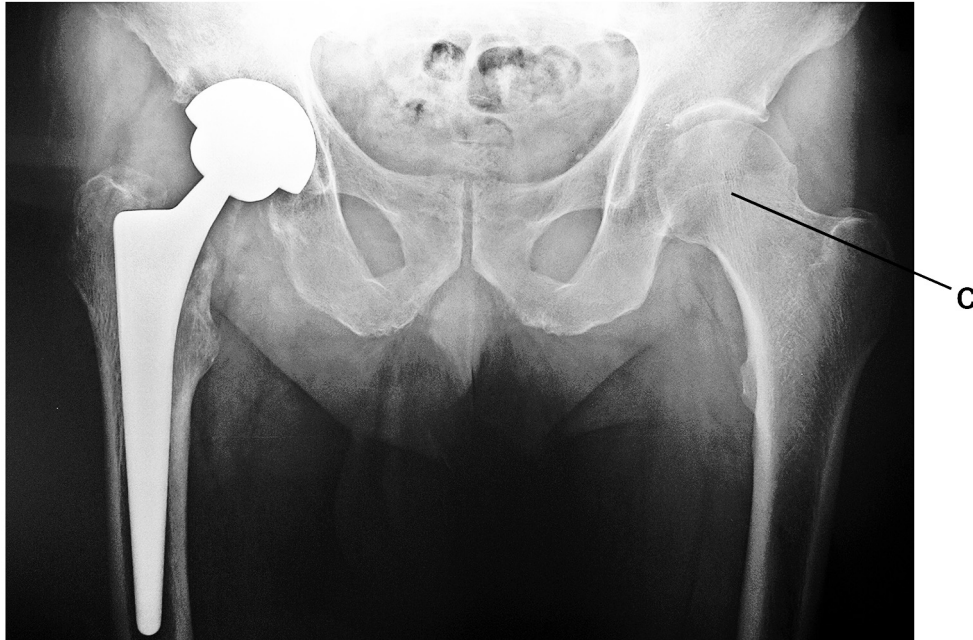


0 3

An elderly woman falls and injures herself. She is taken to hospital to have an X-ray.

**Figure 3** shows the X-ray.

**Figure 3**



0 3 . 1

The X-ray shows that the woman has had a joint replaced.

What type of joint has been replaced?

Tick (✓) **one** box.

[1 mark]

Ball and socket

Gliding

Hinge

Pivot

0 3 . 2

What range of movement does joint **C** in **Figure 3** have?

[1 mark]

---



---

Question 3 continues on the next page

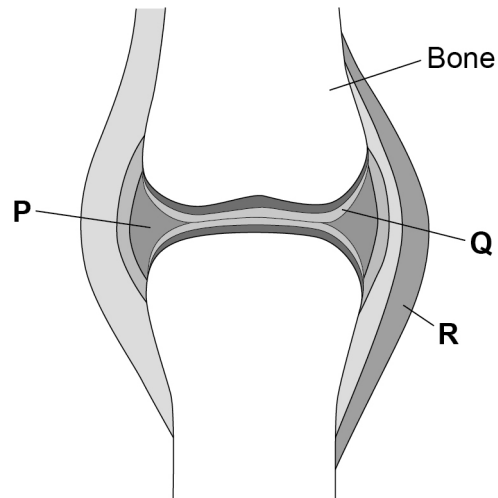
Turn over ►



Figure 4 shows some parts of the synovial joint in a knee.

Do not write  
outside the  
box

Figure 4



0 3 . 3 Name parts **P** and **Q** in **Figure 4**.

[2 marks]

**P** \_\_\_\_\_

**Q** \_\_\_\_\_

0 3 . 4 What is the role of part **R** in **Figure 4**?

[1 mark]

---

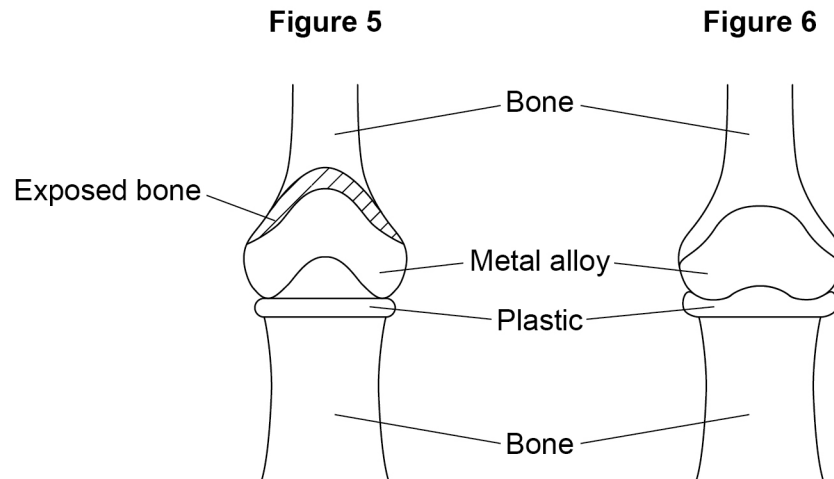
---



Some people need to have knee replacement surgery.

**Figure 5** shows a traditional artificial knee joint.

**Figure 6** shows an artificial knee joint made using 3D printing technology.



**0 3 . 5** What is the function of the plastic between the metal alloy and the bone? [1 mark]

---



---

**0 3 . 6** The knee in **Figure 6** has been made for a specific patient using a 3D printer.

Suggest **one** advantage of the knee joint in **Figure 6** compared with the knee joint in **Figure 5**. [1 mark]

---



---

7
---

Turn over ►



0 4

Sports science students were investigating the effect of fatigue on fast-twitch muscle fibres and slow-twitch muscle fibres.

0 4 . 1

Give **two** adaptations of slow-twitch muscle fibres.

[2 marks]

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

In the investigation, the students used muscle fibres from rats. Using data loggers the students measured the force produced by each muscle contraction until the force declined to 50% of the original.

**Table 3** shows some of their results.

**Table 3**

Time / ms	Force of muscle contraction as a percentage of the original force	
	Slow-twitch leg muscle fibre	Fast-twitch leg muscle fibre
0	100	100
6	92	94
12	91	86
18	87	77
24	88	70
30	84	61
36	78	57
42	77	50



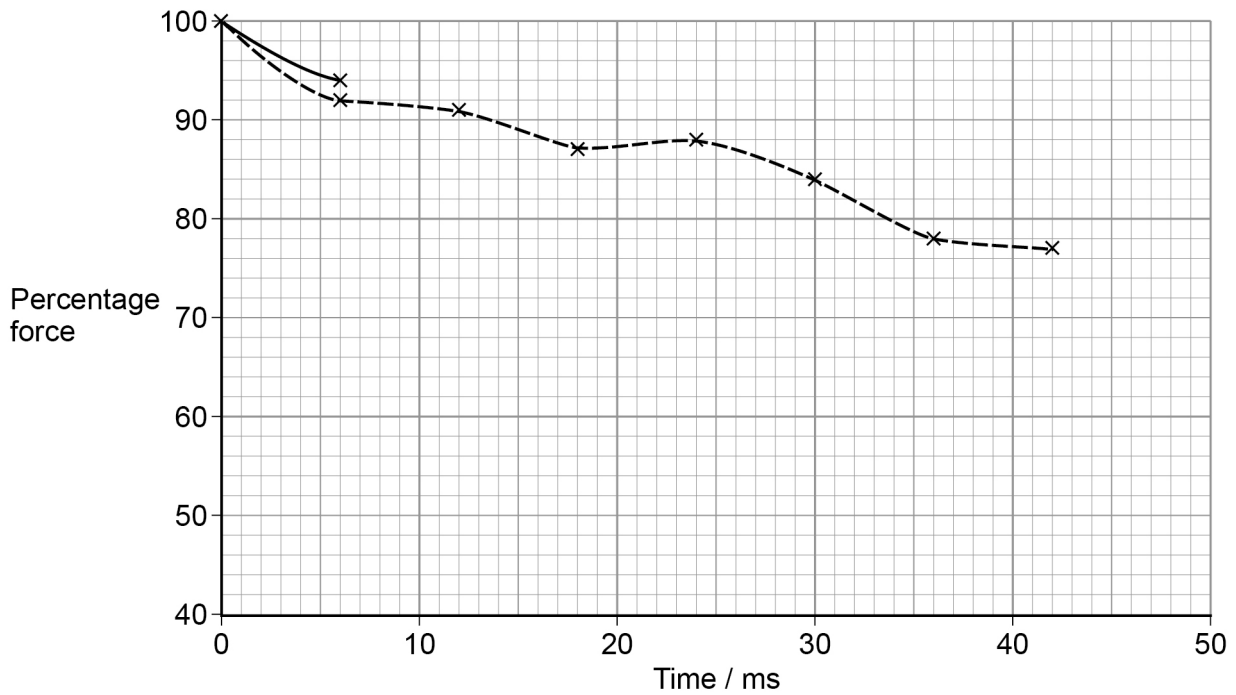
Do not write outside the box

0 4 . 2

Complete the graph for the fast-twitch leg muscle fibre on **Figure 7**.

[2 marks]

**Figure 7**



**Key**

- Fast-twitch leg muscle fibre
- - - Slow-twitch leg muscle fibre

0 4 . 3

Give **two** conclusions the sports science students could make from the data shown in **Table 3** and **Figure 7**.

[2 marks]

1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Question 4 continues on the next page

Turn over ►



Do not write  
outside the  
box

0 4 . 4

Explain why muscles become fatigued.

Use knowledge of the sliding filament theory of muscle contraction in your answer.

[2 marks]

---

---

---

---

---

---

---

0 4 . 5

Some athletes take creatine supplements.

Explain why the force of a muscle contraction may be greater in someone taking creatine supplements.

[3 marks]

---

---

---

---

---

---

---

11



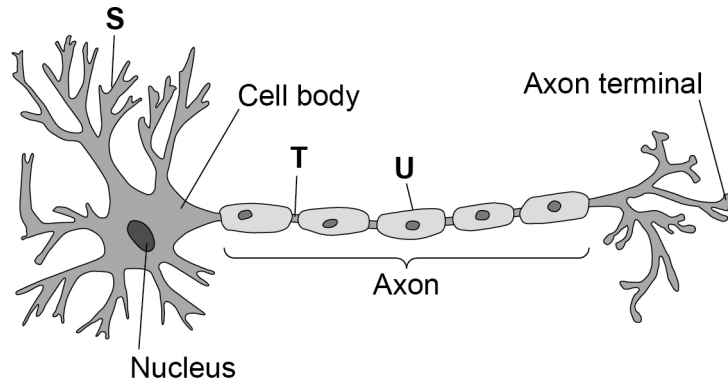
Do not write outside the box

0 5

Devic disease is a disorder that affects motor neurones.

Figure 8 shows a motor neurone from a healthy person.

Figure 8



0 5 . 1

Name **S**, **T** and **U** in **Figure 8**.

[3 marks]

**S** \_\_\_\_\_

**T** \_\_\_\_\_

**U** \_\_\_\_\_

0 5 . 2

Explain how part **U** enables nerve impulses to travel at high speed along the motor neurone in **Figure 8**.

[3 marks]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

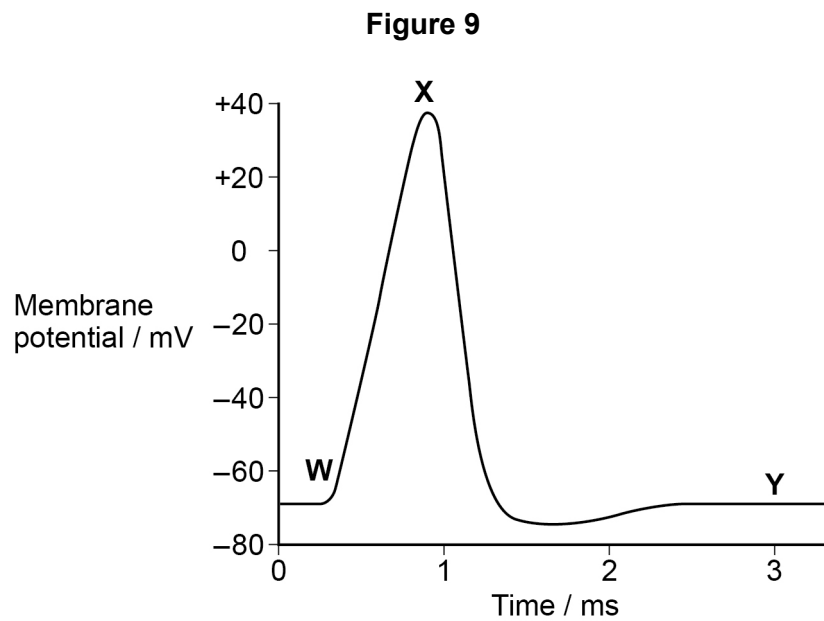
Question 5 continues on the next page

Turn over ►



**Figure 9** shows changes in membrane potential of a neurone during one action potential.

Do not write  
outside the  
box



0 5 . 3

Describe what happens to cause the change in membrane potential between point **W** and point **X** on **Figure 9**.

[2 marks]

---

---

---

---

---

---

---





Do not write  
outside the  
box

0 5 . 4

At point **Y** the neurone is maintaining its resting potential.

Explain how the resting potential is maintained.

**[3 marks]**

---

---

---

---

---

---

---

---

---

---

11

**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**



**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**



**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**

**Copyright information**

For confidentiality purposes, from the November 2015 examination series, acknowledgements of third party copyright material will be published in a separate booklet rather than including them on the examination paper or support materials. This booklet is published after each examination series and is available for free download from [www.aqa.org.uk](http://www.aqa.org.uk) after the live examination series.

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, AQA, Stag Hill House, Guildford, GU2 7XJ.

Copyright © 2018 AQA and its licensors. All rights reserved.

