

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

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	
5	
<b>TOTAL</b>	



Answer **all** questions.

0	1
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Mineral ions and vitamins are essential for a healthy body to function.

0	1	.	1
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Describe the role of iron ions ( $\text{Fe}^{2+}$ ) in the human body.**[1 mark]**

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0	1	.	2
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Give **two** symptoms of iron deficiency in humans.**[2 marks]**

1 

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2 

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0	1	.	3
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Give **two** different sources of dietary iron for humans.**[2 marks]**

1 

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2 

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<hr/> <b>5</b>
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0 2

The human skeleton has over 200 bones.

0 2 . 1

Give **two** functions of the skeleton.

**[2 marks]**

1 \_\_\_\_\_

2 \_\_\_\_\_

0 2 . 2

The human skeleton is divided into the axial skeleton and the appendicular skeleton.

Name **one** part of each of:

- the axial skeleton
- the appendicular skeleton.

**[2 marks]**

Axial skeleton \_\_\_\_\_

Appendicular skeleton \_\_\_\_\_

**Question 2 continues on the next page**

**Turn over ►**

Joints form where different bones meet.

**0 2 . 3** Which of the following holds the bones together in a joint?

**[1 mark]**

Tick (✓) **one** box.

Cartilage

Ligament

Synovial membrane

Tendon

**0 2 . 4** Different types of joint have different ranges of movement.

Draw **one** line from each joint to the description of the joint's range of movement.

**[3 marks]**

**Joint**

**Range of movement**

	Can move in all three planes
Ball and socket	Can only move up to 90° in one plane
Hinge	Can only move up to 180° in one plane
Pivot	Rotation around a fixed point
	Sliding motion in three planes



**0 2 . 5** Synovial joints contain synovial fluid inside the joint.

What is the function of the synovial fluid?

**[1 mark]**

Tick (✓) **one** box.

To create new bone cells.

To lubricate the joint.

To protect the ligaments.

To reduce swelling in the joint.

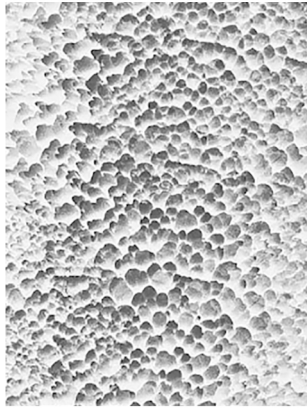
**Question 2 continues on the next page**

**Turn over ►**



Figure 1 shows the structure inside the bone of two different people.

Figure 1



Bone A is a healthy bone



Bone B is a bone affected  
by osteoporosis

0 2 . 6

Compare the structure of bone B with the structure of bone A.

[2 marks]

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0 2 . 7

Suggest **one** risk for a person whose bones are affected by osteoporosis.

[1 mark]

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0 2 . 8

Suggest **two** ways to help prevent osteoporosis developing.**[2 marks]**

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

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14**Turn over for the next question****Turn over ►**

0 3

The digestive system makes sure that we can access the nutrients in our food that are needed for the body to function correctly.

0 3 . 1

Digestion includes chemical digestion and mechanical digestion.

Match each term to the description of the term.

**[2 marks]****Term****Description**

	Breaking large food particles into smaller particles
Chemical digestion	Condensation reactions take place during this type of digestion
Mechanical digestion	Hydrolysis of the bonds within a food molecule
	Joining small molecules together to form insoluble molecules

0 3 . 2

Carbohydrates should form approximately one third of our food intake each day.

Complete the sentences about the digestion of carbohydrates.

**[4 marks]**

The group of enzymes that convert carbohydrates to glucose are called

\_\_\_\_\_.

The enzymes for carbohydrate digestion are made in the \_\_\_\_\_

and the \_\_\_\_\_.

The end product of carbohydrate digestion is \_\_\_\_\_.

Most of the digested food is absorbed into the bloodstream in the

\_\_\_\_\_.





**0 3 . 3** The stomach secretes hydrochloric acid.

Describe the role of hydrochloric acid in **digestion**.

**[2 marks]**

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**0 3 . 4** Bile is used in digestion.

Where is bile stored?

**[1 mark]**

Tick (✓) **one** box.

- Gall bladder
- Liver
- Pancreas
- Small intestine

**0 3 . 5** Bile increases the rate of digestion of one food group.

Which food group?

**[1 mark]**

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**Question 3 continues on the next page**

**Turn over ►**

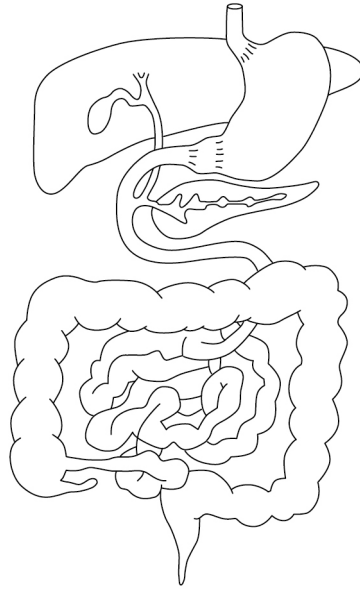


Diarrhoea happens when absorption of water from food is significantly reduced.

Severe diarrhoea can cause dehydration.

**Figure 2** shows the digestive system.

**Figure 2**



0 3 . 6

Name the part of the digestive system that absorbs water from food to prevent diarrhoea.

[1 mark]

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0 3 . 7

Label your answer to Question 03.6 on **Figure 2**.

[1 mark]



03.8

When a person has diarrhoea, it is important to prevent dehydration and maintain the correct concentration of sodium ions in the blood.

Giving the person a drink containing sodium ions and glucose is better at preventing dehydration than a drink containing only sodium ions.

Explain why.

[3 marks]

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15

**Turn over for the next question**

**Turn over ►**



0 4

A person is walking in a forest and suddenly sees a snake that scares them.

The person's heart rate and breathing rate increase rapidly. The person runs away from the snake.

0 4 . 1

Which part of the brain controls the increase in heart rate and breathing rate?

**[1 mark]**

Tick (✓) **one** box.

Brain stem

Cerebral cortex

Temporal lobe

0 4 . 2

Complete **Table 1**.

Describe the function of each part of the brain when the person sees and runs away from the snake.

**[3 marks]****Table 1**

Part of the brain	Function
Cerebellum	_____
Occipital lobe	_____
Parietal lobe	_____



**0 4 . 3** The response to the snake is controlled by the autonomic nervous system.

Describe the difference between the somatic nervous system and the autonomic nervous system.

**[2 marks]**

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**0 4 . 4** Describe the role of the sympathetic nervous system and the role of the parasympathetic nervous system.

**[2 marks]**

Sympathetic nervous system \_\_\_\_\_

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Parasympathetic nervous system \_\_\_\_\_

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**0 4 . 5** Describe the effect of the parasympathetic nervous system on the digestive system.

**[1 mark]**

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**0 4 . 6** Describe the effect of the sympathetic nervous system on the pupils of the eyes.

**[1 mark]**

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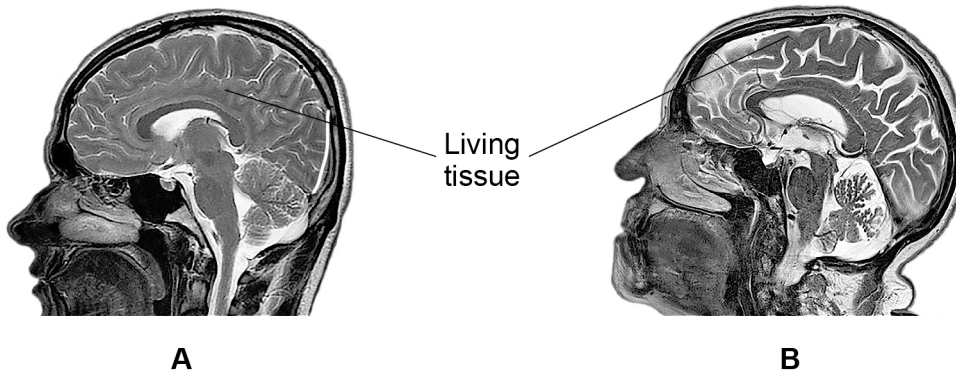


Some people develop dementia as they get older.

One of the symptoms of dementia is short-term memory loss.

**Figure 3** shows MRI scans of two brains.

**Figure 3**



The grey areas in each brain show living tissue.

0 4 . 7

One of the MRI scans is of a 22-year-old person and the other is of a 96-year-old person.

A student suggested that the MRI scan in **B** was from a 96-year-old person with dementia.

Give **two** reasons to support the student's suggestion.

[2 marks]

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

12



**0 5**

At all times, some of our muscles are contracting to carry out vital functions.

**0 5 . 1**

The proportion of fast-twitch fibres in muscles varies between people.

A student suggested that athletes competing in the high jump would have a higher proportion of fast-twitch fibres compared to long-distance runners.

Describe **three** features of fast-twitch fibres that would support the student's suggestion.

**[3 marks]**

1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

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3 \_\_\_\_\_

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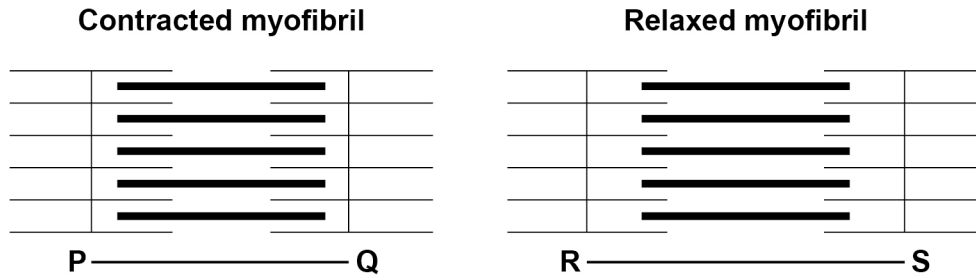
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**Question 5 continues on the next page**

**Turn over ►**

Figure 4 shows a myofibril when it is contracted and when it is relaxed.

Figure 4



P-Q and R-S show the distance between Z lines of the myofibril.

0 5 . 2 What is the area between two Z lines called?

[1 mark]

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0 5 . 3 Name the filaments attached at the Z line.

[1 mark]

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**0 5 . 4** The distance **P-Q** is 1.7  $\mu\text{m}$ .

The distance **R-S** is 2.1  $\mu\text{m}$ .

Calculate the percentage change in the distance between Z lines when the muscle relaxes.

**[3 marks]**

Percentage change = \_\_\_\_\_ %

**0 5 . 5** Calcium is needed for a muscle to contract.

Describe what happens in the myofibril to cause a muscle to contract when a nerve impulse arrives at the muscle.

**[4 marks]**

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**Question 5 continues on the next page**

**Turn over ►**



0 5 . 6

Describe what happens to the calcium ions when the muscle stops contracting.

**[2 marks]**

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**14****END OF QUESTIONS**

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