



**Surname** \_\_\_\_\_

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

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

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

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

**I declare this is my own work.**

# **Level 3 Certificate/Extended Certificate**

## **APPLIED SCIENCE**

### **Unit 4 The Human Body**

#### **ASC4**

**Time allowed: 1 hour 30 minutes**

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

**[Turn over]**



**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 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.**

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



**Answer ALL questions.**

**0 1**

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

**0 1 . 1**

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

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|   |   |   |   |
|---|---|---|---|
| 0 | 1 | . | 2 |
|---|---|---|---|

**Give TWO symptoms of iron deficiency in humans. [2 marks]**

1 \_\_\_\_\_

\_\_\_\_\_

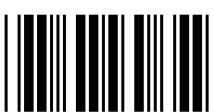
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2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**[Turn over]**



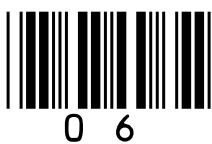
01.3

Give TWO different sources of dietary iron for humans. [2 marks]

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

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

5



|   |   |
|---|---|
| 0 | 2 |
|---|---|

**The human skeleton has over 200 bones.**

|   |   |   |   |
|---|---|---|---|
| 0 | 2 | . | 1 |
|---|---|---|---|

**Give TWO functions of the skeleton.**  
**[2 marks]**

1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**[Turn over]**



**02.2**

**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** \_\_\_\_\_

\_\_\_\_\_





**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**

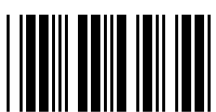
☐

**Synovial membrane**

☐

**Tendon**

**[Turn over]**



|   |   |   |   |
|---|---|---|---|
| 0 | 2 | . | 4 |
|---|---|---|---|

**Different types of joint have different ranges of movement.**

**On the opposite page, 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**

**[Turn over]**



|   |   |   |   |
|---|---|---|---|
| 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.**



**BLANK PAGE**

**[Turn over]**





**FIGURE 1, on the opposite page, shows the structure inside the bone of two different people.**

**0 2 . 6**

**Compare the structure of bone B with the structure of bone A. [2 marks]**

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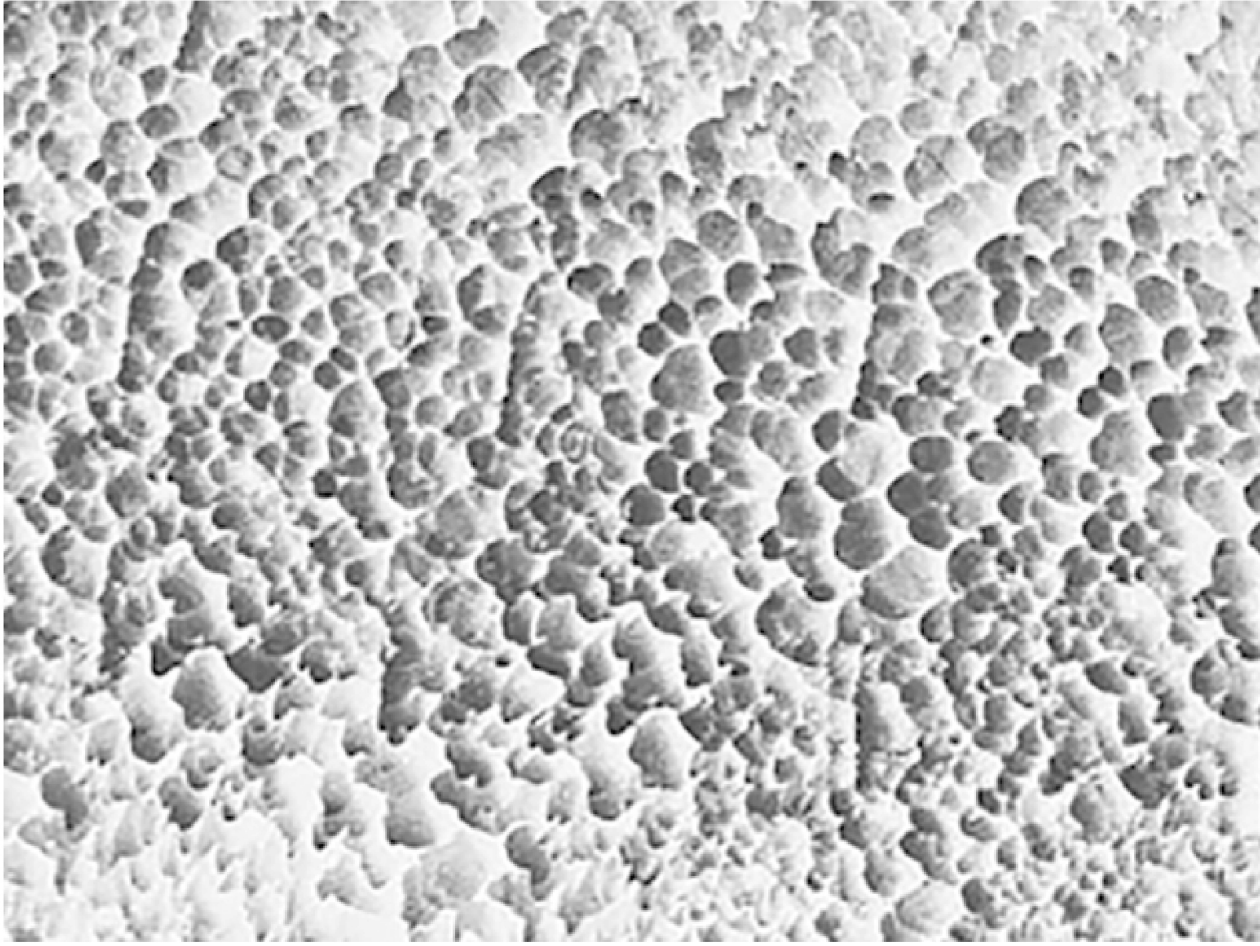
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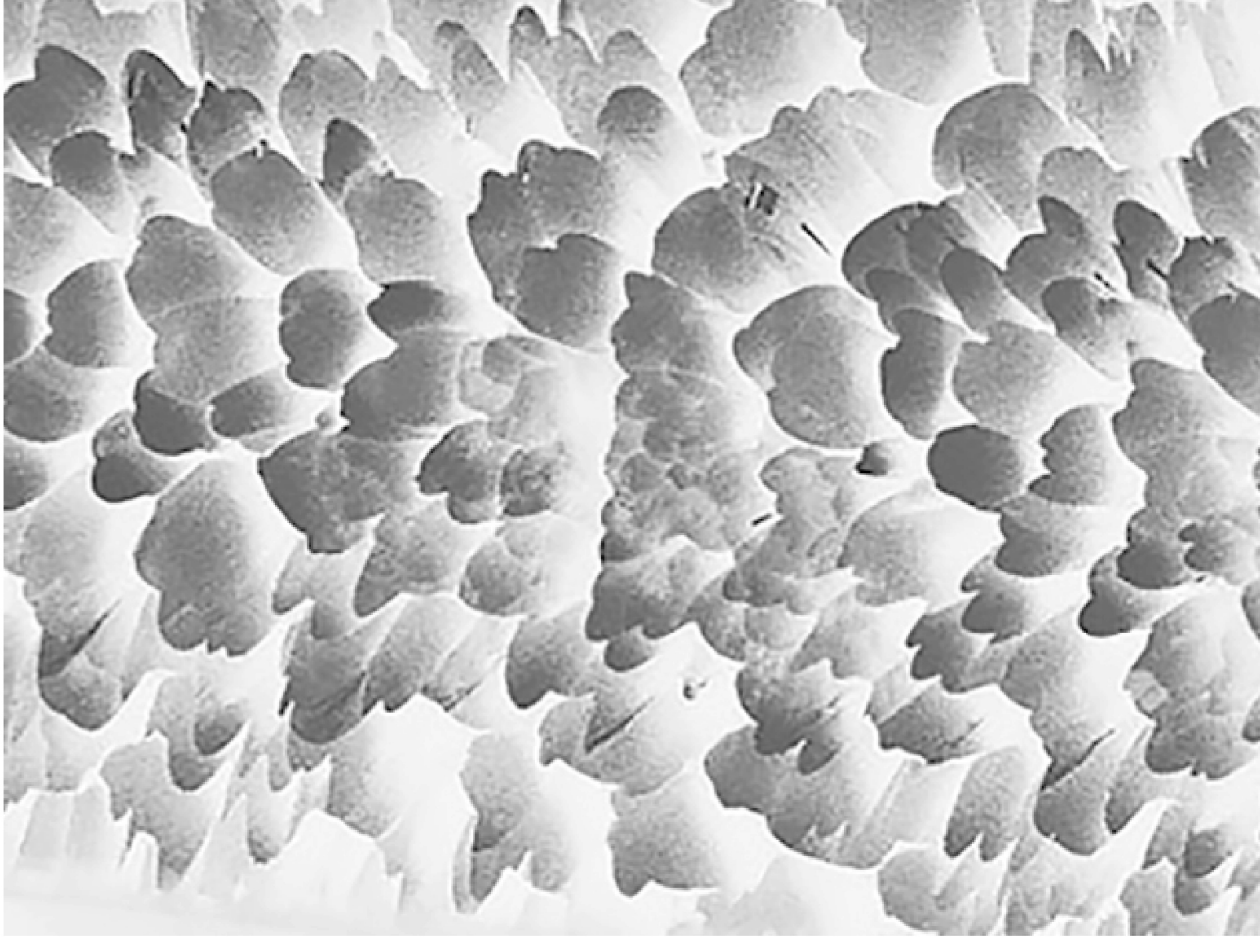


**FIGURE 1**



**Bone A is a healthy bone**

**[Turn over]**



**Bone B is a bone affected  
by osteoporosis**

**02.7**

**Suggest ONE risk for a person whose bones are affected by osteoporosis.**  
**[1 mark]**

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**02.8**

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

**1** 

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**2** 

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**[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.**

**On the opposite page, match each term to the description of the term. [2 marks]**



**TERM****DESCRIPTION**

**Chemical  
digestion**

**Breaking large food  
particles into smaller  
particles**

**Mechanical  
digestion**

**Condensation  
reactions take place  
during this type of  
digestion**

**Hydrolysis of the  
bonds within a food  
molecule**

**Joining small  
molecules together to  
form insoluble  
molecules**

**[Turn over]**



|   |   |   |   |
|---|---|---|---|
| 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 \_\_\_\_\_.**

**03.3**

**The stomach secretes hydrochloric acid.**

**Describe the role of hydrochloric acid in DIGESTION. [2 marks]**

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**[Turn over]**



|   |   |   |   |
|---|---|---|---|
| 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 |
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**Bile increases the rate of digestion of one food group.**

**Which food group? [1 mark]**

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**[Turn over]**

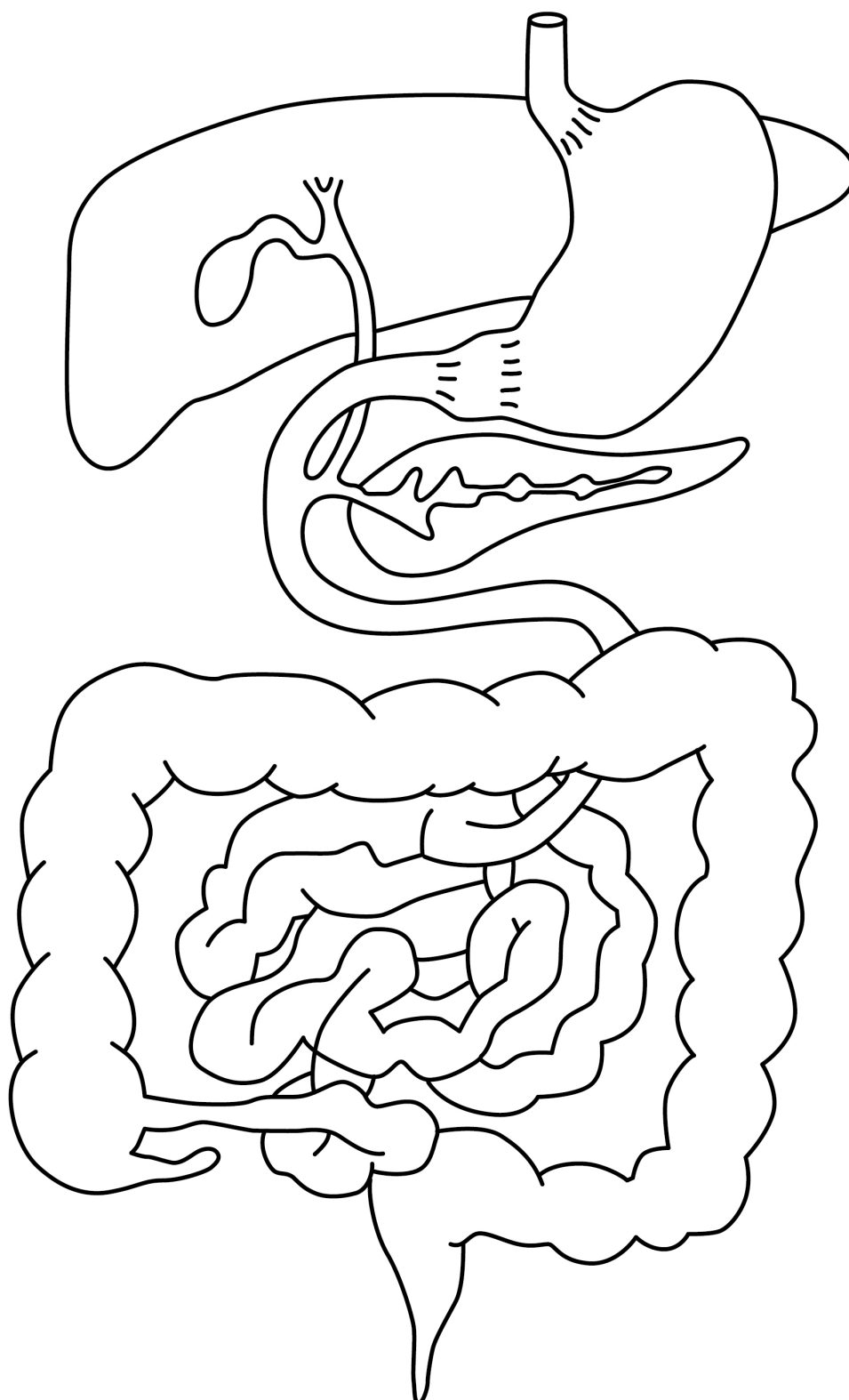


**Diarrhoea happens when absorption of water from food is significantly reduced.**

**Severe diarrhoea can cause dehydration.**

**FIGURE 2 shows the digestive system.**

**FIGURE 2**





**03.6**

**Name the part of the digestive system that absorbs water from food to prevent diarrhoea. [1 mark]**

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**03.7**

**Label your answer to Question 03.6 on FIGURE 2. [1 mark]**

**[Turn over]**



|   |   |   |   |
|---|---|---|---|
| 0 | 3 | . | 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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[Turn over]

15



|   |   |
|---|---|
| 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**



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**[Turn over]**



|   |   |   |   |
|---|---|---|---|
| 0 | 4 | . | 2 |
|---|---|---|---|

**Complete TABLE 1 on the opposite page.**

**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     |          |

[Turn over]



|   |   |   |   |
|---|---|---|---|
| 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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**[Turn over]**



|   |   |   |   |
|---|---|---|---|
| 0 | 4 | . | 5 |
|---|---|---|---|

**Describe the effect of the parasympathetic nervous system on the digestive system. [1 mark]**

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|   |   |   |   |
|---|---|---|---|
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|---|---|---|---|

**Describe the effect of the sympathetic nervous system on the pupils of the eyes. [1 mark]**

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**[Turn over]**

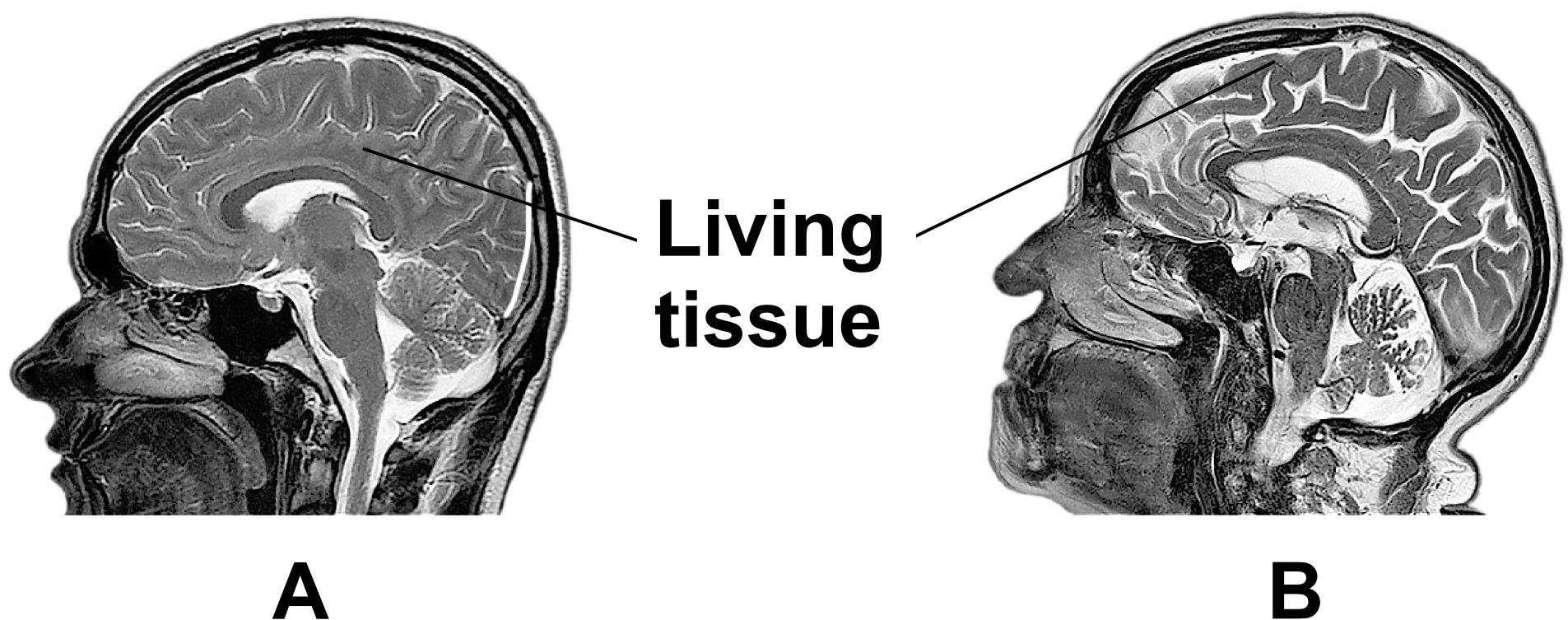


**Some people develop dementia as they get older.**

**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** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

|           |
|-----------|
|           |
| <b>12</b> |

**[Turn over]**



|   |   |
|---|---|
| 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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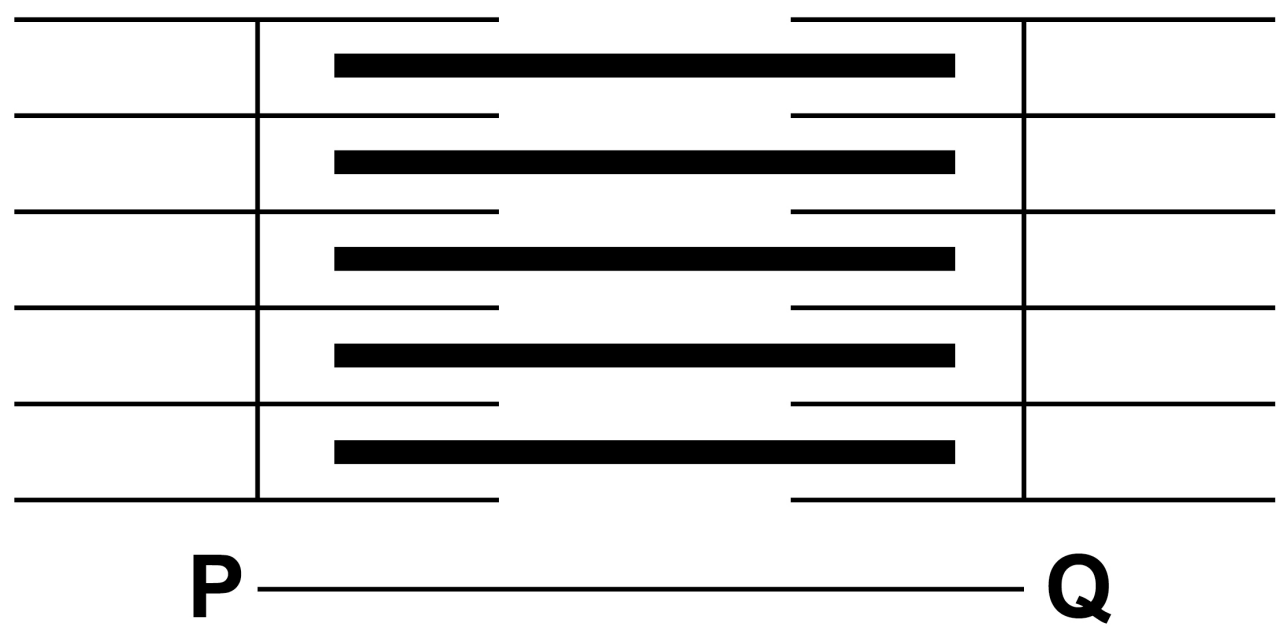
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[Turn over]

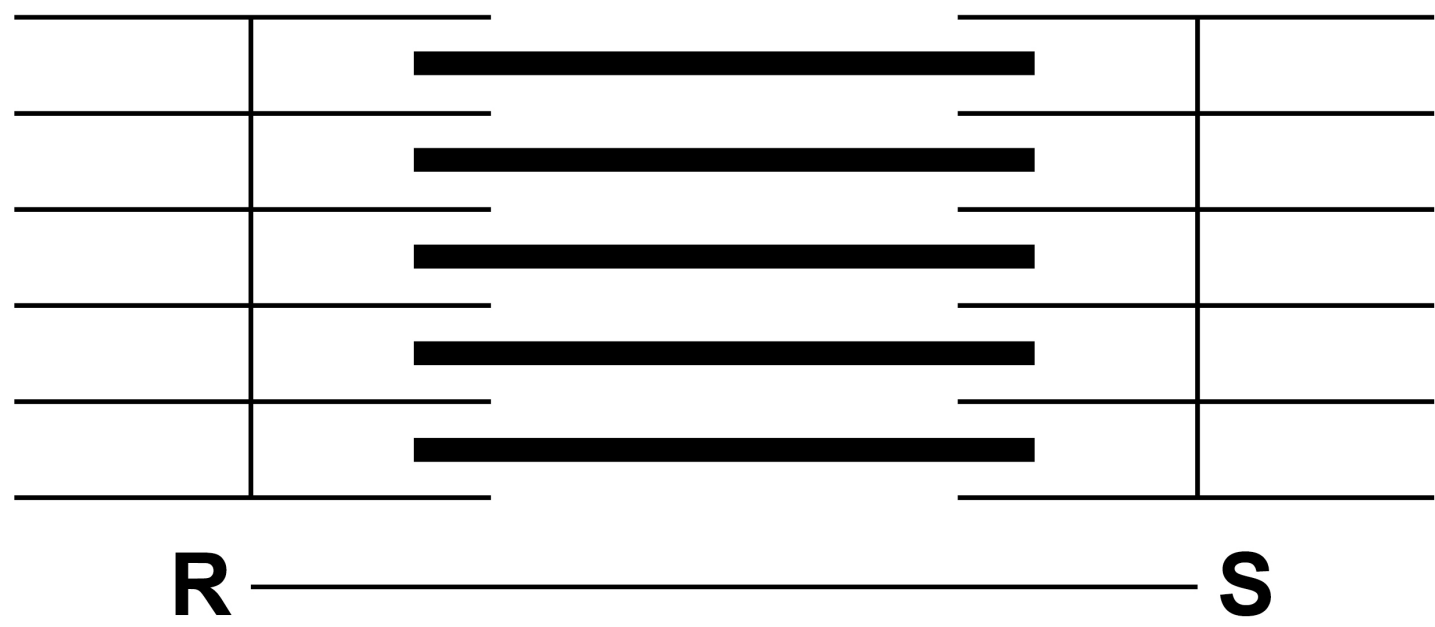
**FIGURE 4** shows a myofibril when it is contracted and when it is relaxed.

**FIGURE 4**

**Contracted myofibril**



**Relaxed myofibril**





**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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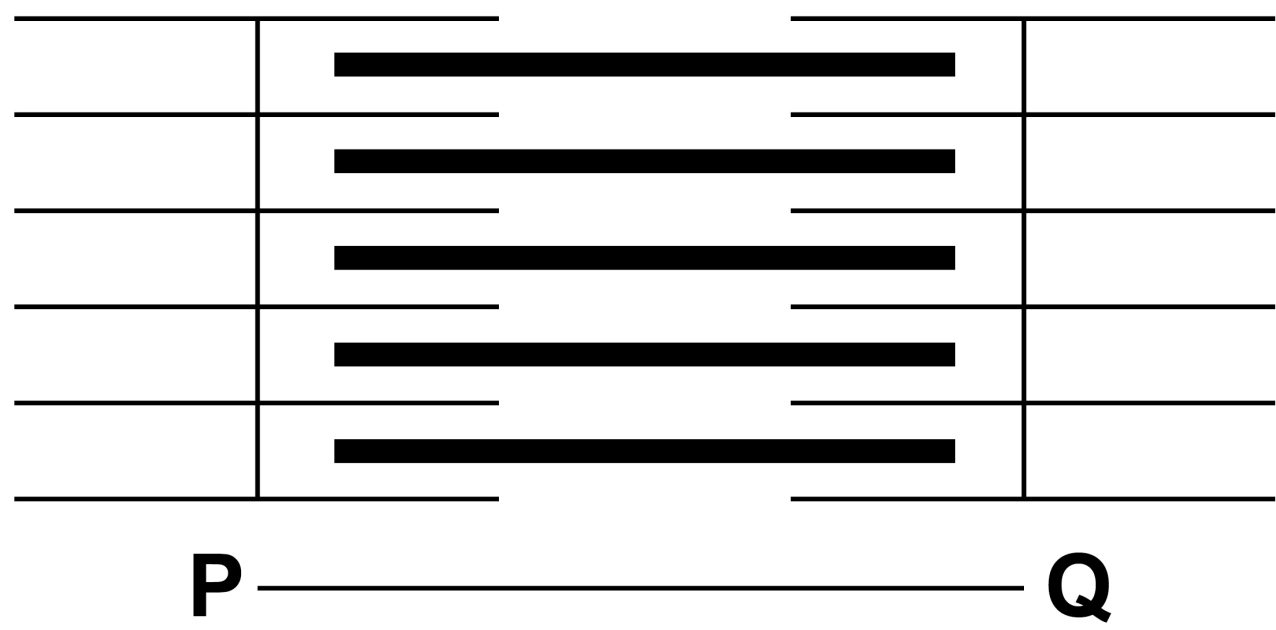
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**[Turn over]**

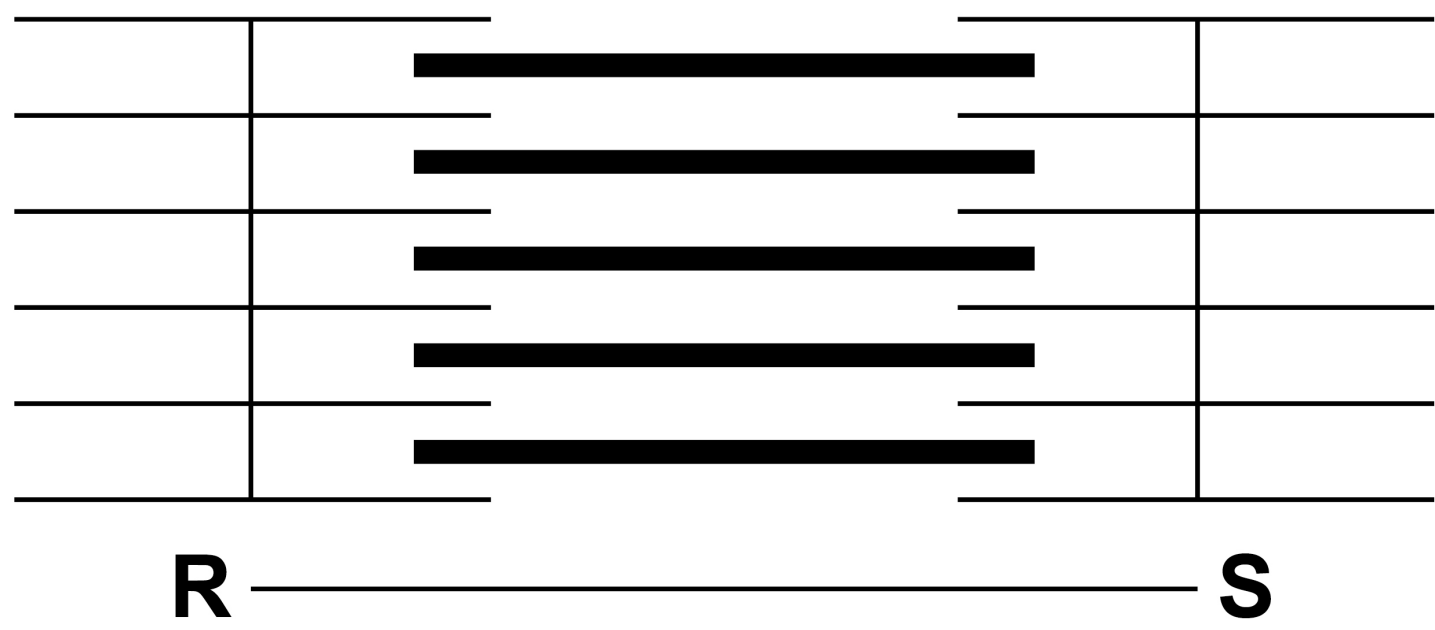


REPEAT OF FIGURE 4

Contracted myofibril



Relaxed myofibril



|   |   |   |   |
|---|---|---|---|
| 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 = \_\_\_\_\_ %

[Turn over]



|   |   |   |   |
|---|---|---|---|
| 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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05.6

**Describe what happens to the calcium ions when the muscle stops contracting. [2 marks]**

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**END OF QUESTIONS**

14



**Additional page, if required.  
Write the question numbers in the  
left-hand margin.**

[illegible]

**Additional page, if required.  
Write the question numbers in the  
left-hand margin.**

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| For Examiner's Use |      |
|--------------------|------|
| Question           | Mark |
| 1                  |      |
| 2                  |      |
| 3                  |      |
| 4                  |      |
| 5                  |      |
| TOTAL              |      |

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2 2 1 A A S C 4