



Surname _____

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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]



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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 (Fe^{2+}) in the human body.
[1 mark]**

0 1 . 2

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

1



2

0	1	.	3
---	---	---	---

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

1

2

[Turn over]

5



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 _____

[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



02.4

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

[Turn over]



02.5

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.



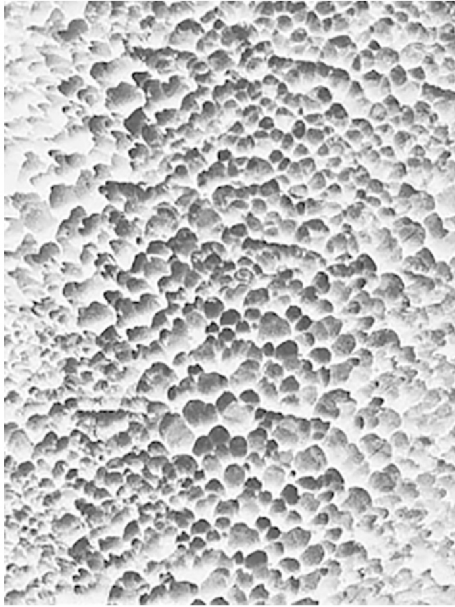
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FIGURE 1 shows the structure inside the bone of two different people.

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]

0	2	.	7
---	---	---	---

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

[Turn over]



0	2	.	8
---	---	---	---

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

1 _____

2 _____

14



03

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

03.1

Digestion includes chemical digestion and mechanical digestion.

Match each term to the description of the term.
[2 marks]

TERM

DESCRIPTION

Chemical
digestionBreaking large food particles
into smaller particlesCondensation reactions take
place during this type of
digestionMechanical
digestionHydrolysis of the bonds within
a food moleculeJoining 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 _____ .



0	3	.	3
---	---	---	---

The stomach secretes hydrochloric acid.

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

[Turn over]



03.4

Bile is used in digestion.

Where is bile stored? [1 mark]

Tick (✓) ONE box.

☐

Gall bladder

☐

Liver

☐

Pancreas

☐

Small intestine

03.5

Bile increases the rate of digestion of one food group.

Which food group? [1 mark]



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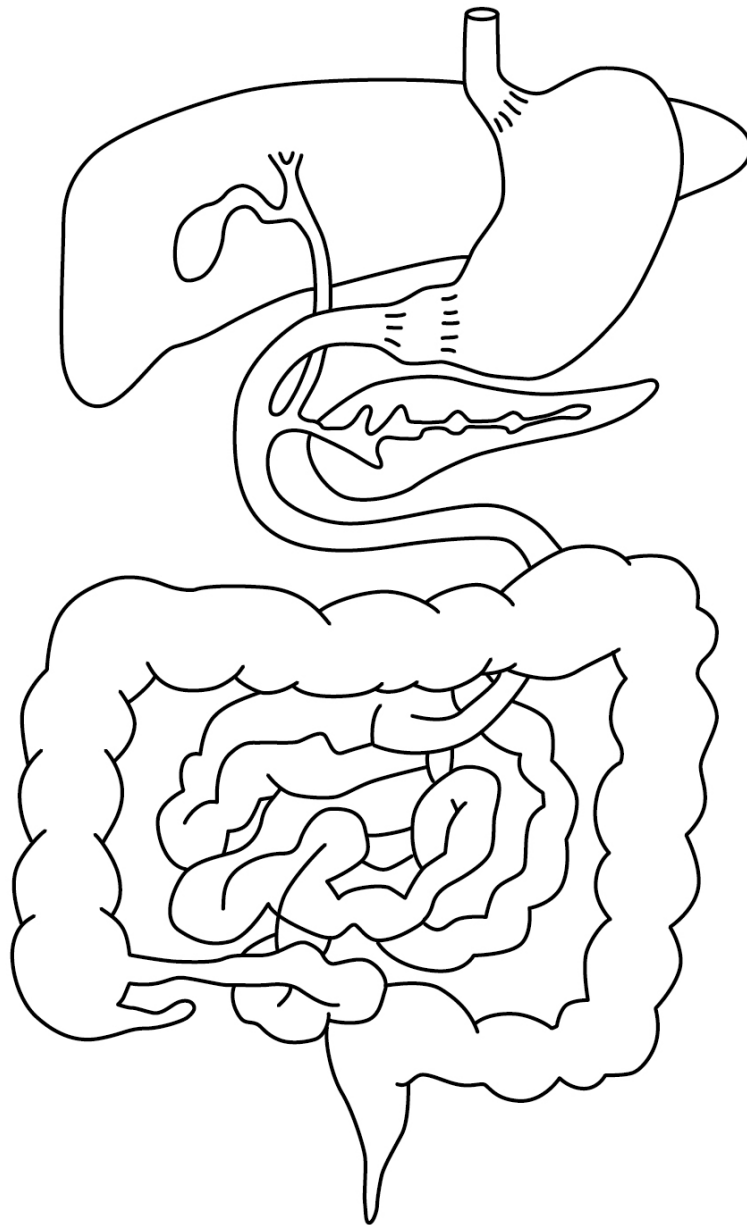


Diarrhoea happens when absorption of water from food is significantly reduced.

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]

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]

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

[Turn over]



04.2

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]

[Turn over]



0	4	.	4
---	---	---	---

Describe the role of the sympathetic nervous system and the role of the parasympathetic nervous system.
[2 marks]

Sympathetic nervous system _____

Parasympathetic nervous system _____

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

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

0	4	.	6
---	---	---	---

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

[Turn over]

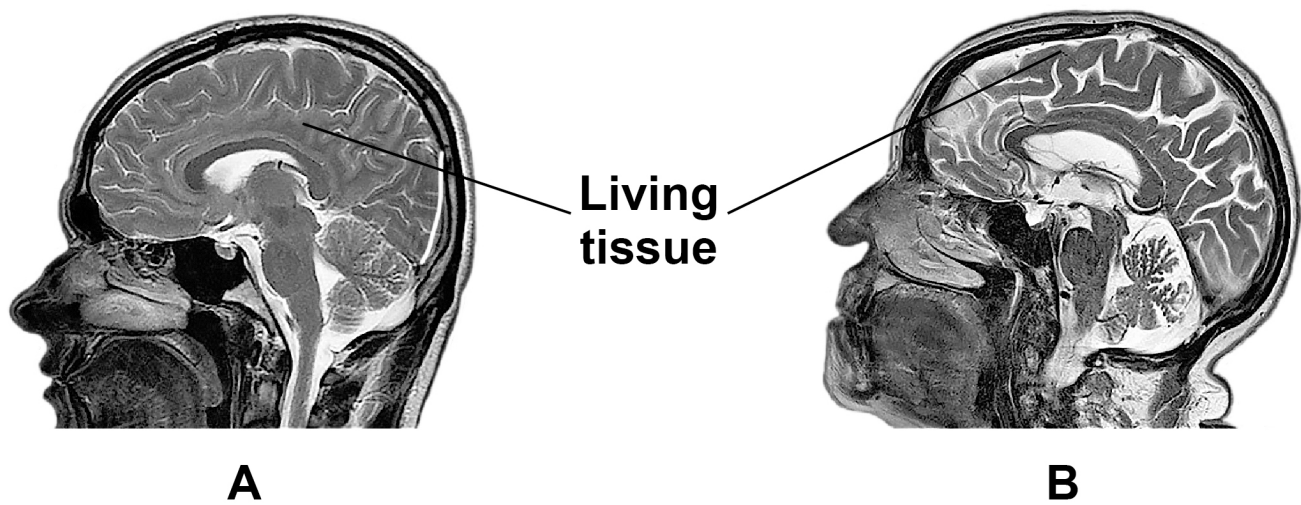


Some people develop dementia as they get older.

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

[Turn over]

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



3

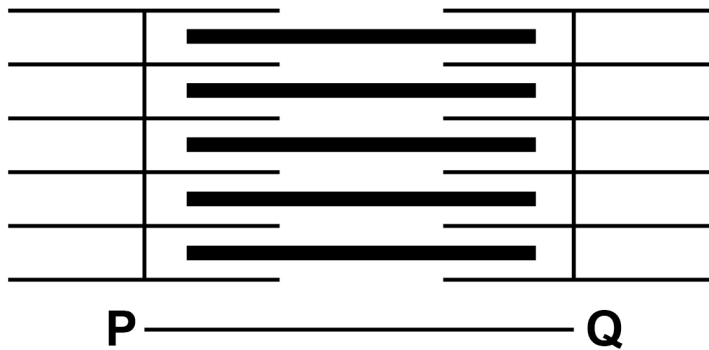
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FIGURE 4 shows a myofibril when it is contracted and when it is relaxed.

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]

0	5	.	3
---	---	---	---

Name the filaments attached at the Z line. [1 mark]

[Turn over]

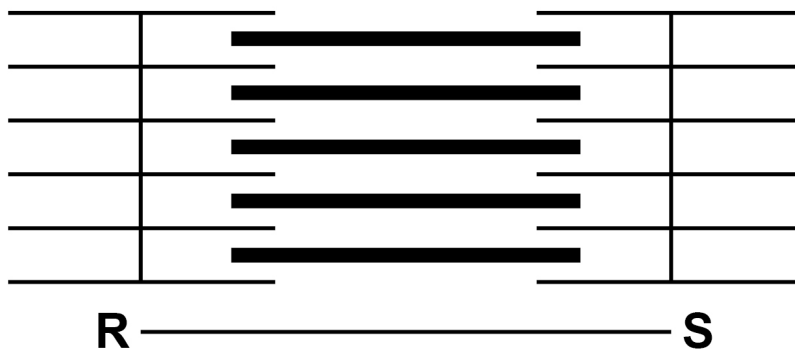


REPEAT OF FIGURE 4

Contracted myofibril



Relaxed myofibril



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

The distance P–Q is 1.7 μm .

The distance R–S is 2.1 μm .

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]



0	5	.	6
---	---	---	---

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

END OF QUESTIONS

14



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Write the question numbers in the left-hand margin.

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Additional page, if required.

Write the question numbers in the left-hand margin.

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Question	Mark
1	
2	
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TOTAL	

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