



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

Thursday 22 June 2023

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.
- 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	
6	
<b>TOTAL</b>	



J U N 2 3 A S C 4 0 1

Answer **all** questions.

Do not write  
outside the  
box

0 1

Dieticians give advice to people about eating a healthy diet.

0 1 . 1

Draw **one** line from each type of nutrient in food to its role in the body.

[3 marks]

**Nutrient in food**

**Role in the body**

	Used for cell growth and repair of tissues.
Carbohydrate	Used in respiration to provide energy.
Vitamin C	Used to make skin and blood vessels.
Vitamin D	Used to provide insulation.
	Used to regulate calcium uptake.

0 1 . 2

Which disorder is caused by vitamin C deficiency?

Tick (✓) **one** box.

[1 mark]

- Obesity
- Rickets
- Scurvy



0 1 . 3

A child is referred to a dietician. The dietician advises the child to start eating oranges, strawberries, eggs and some red meat.

Which **two** nutrients is the child deficient in?

Tick (✓) **two** boxes.

[2 marks]

Calcium

Carbohydrate

Sodium

Vitamin C

Vitamin D

0 1 . 4

The products of digestion are absorbed in the small intestine.

Describe how the structure of the small intestine makes sure absorption is efficient.

[2 marks]

---

---

---

---

Question 1 continues on the next page

Turn over ►



0 1 . 5

**Table 1** shows some nutritional information for three types of milk.

**Table 1**

Per 100 g	Goat's Milk	Cow's Milk	Soya Milk
Total fat / g	4.5	1.0	1.8
Sugar / g	4.3	5.0	4.0
Calcium / g	0.134	0.125	0.025
Iron / g	0.00004	0.0	0.0007

The recommended daily amount (RDA) of calcium for a 10-year-old child is 0.55 g.

The child could drink soya milk instead of cow's milk to get their entire RDA of calcium.

Calculate how many **more** grams of soya milk the child would need to drink compared to cow's milk.

**[3 marks]**

Answer = \_\_\_\_\_ g

0 1 . 6

Explain **one** possible advantage and **one** possible disadvantage of drinking goat's milk instead of cow's milk.

Use information from **Table 1**.

**[2 marks]**

Advantage \_\_\_\_\_

\_\_\_\_\_

Disadvantage \_\_\_\_\_

\_\_\_\_\_

13



**Turn over for the next question**

*Do not write  
outside the  
box*

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

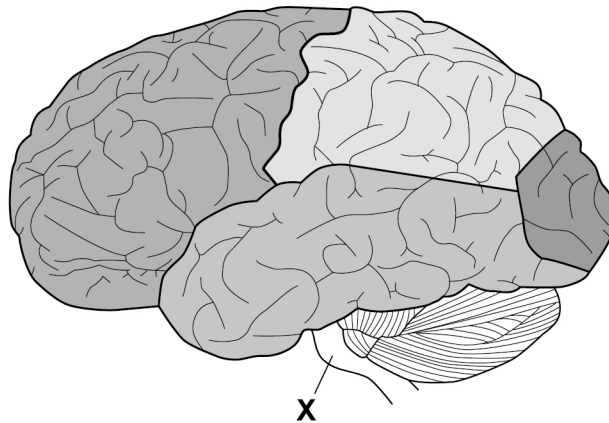
**Turn over ►**



0 2

**Figure 1** shows a diagram of the human brain.

**Figure 1**



0 2 . 1

Label the frontal lobe with an **A** on **Figure 1**.

[1 mark]

0 2 . 2

Label the cerebellum with a **B** on **Figure 1**.

[1 mark]

0 2 . 3

Suggest **two** symptoms a person might show if part **X** of the brain in **Figure 1** is damaged.

[2 marks]

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_



**0 2 . 4** What is the occipital lobe associated with?

Tick (✓) **one** box.

**[1 mark]**

Balance

Problem-solving

Speech

Visual processing

**Question 2 continues on the next page**

**Turn over ►**



The nervous system is organised into the somatic nervous system and the autonomic nervous system.

**0 2 . 5** What is the role of the somatic nervous system?

Give an example.

**[2 marks]**

Role \_\_\_\_\_

\_\_\_\_\_

Example \_\_\_\_\_

\_\_\_\_\_

**0 2 . 6** The sympathetic nervous system is part of the autonomic nervous system.

Give **two** effects of stimulating the sympathetic nervous system.

**[2 marks]**

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

9



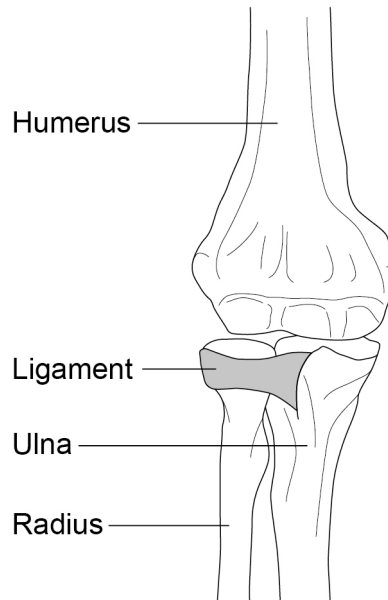


0 3

There are different types of joint in the human body that allow movement.

**Figure 2** shows the human elbow joint.

**Figure 2**



The joint between the humerus and the ulna and radius is a hinge joint.

0 3 . 1

What type of joint is between the ulna and radius?

[1 mark]

---

0 3 . 2

What is the function of the ligament in **Figure 2**?

[1 mark]

---



---

0 3 . 3

A young child breaks a humerus bone. After 6 weeks the bone has healed.

Name the **two** processes that happen in the bone to heal the break.

[2 marks]

1 \_\_\_\_\_

2 \_\_\_\_\_

**Question 3 continues on the next page**

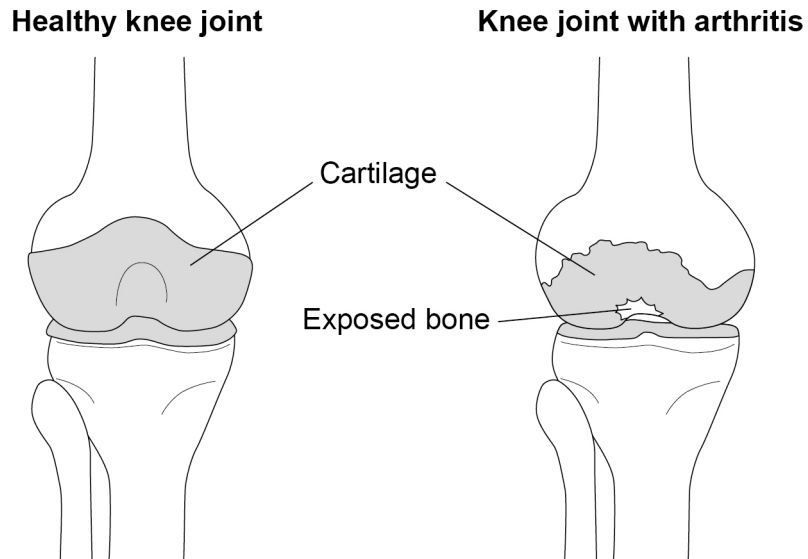
**Turn over ►**



**0 3 . 4** Arthritis is a condition affecting joints. Arthritis often develops as people get older.

**Figure 3** shows a healthy knee joint and a knee joint with arthritis.

**Figure 3**



Knee pain is one of the symptoms of arthritis of the knee joint.

Explain why walking causes pain in the knee joint with arthritis.

Use information from **Figure 3**.

**[2 marks]**

---



---



---



---

**0 3 . 5** The elbow and knee joints are examples of synovial joints.

Synovial joints have synovial fluid within the joint.

What is the function of the synovial fluid?

**[1 mark]**

---



---



**Turn over for the next question**

*Do not write  
outside the  
box*

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

**Turn over ►**



0	4
---	---

Ketogenic diets are very high in fat and very low in carbohydrate.

Ketogenic diets are used by some people as a weight-loss programme.

0	4	.	1
---	---	---	---

Suggest **one** symptom a person might have on a low carbohydrate diet.

Do **not** refer to weight loss in your answer.

**[1 mark]**

---

---



Scientists investigated the effect of a ketogenic diet on the body mass and muscle strength of mice.

The scientists used two groups of mice:

- group 1 were fed a normal diet
- group 2 were fed a ketogenic diet.

0 4 . 2

The ratio of carbohydrate:protein:fat in the normal diet was 3:1:20

The ketogenic diet contained:

- 0.98 g of carbohydrate
- 7.84 g of protein
- 74.0 g of fat.

Calculate the whole number ratio of carbohydrate:protein:fat in the ketogenic diet.

**[3 marks]**

Whole number ratio = \_\_\_\_\_ : \_\_\_\_\_ : \_\_\_\_\_

**Question 4 continues on the next page**

**Turn over ►**

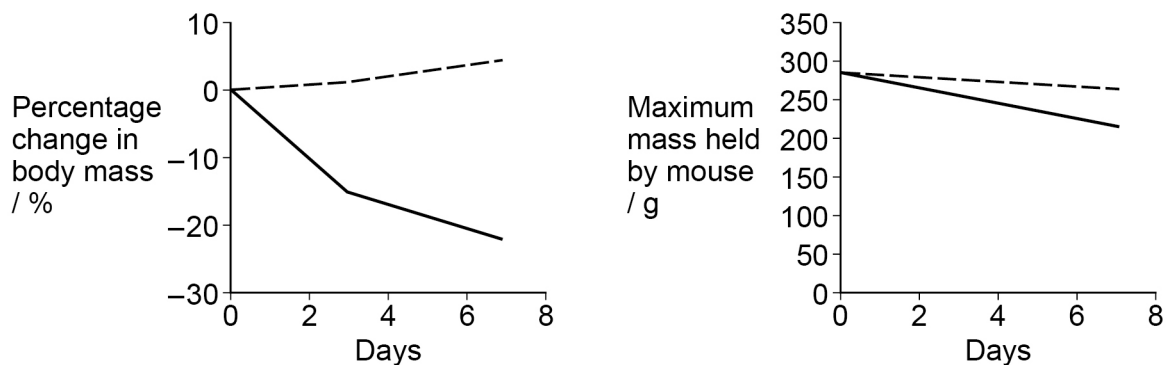


During the investigation the scientists recorded the body mass and muscle strength of the mice.

The muscle strength of mice is measured by the maximum mass the mouse can hold.

Figure 4 shows some of the scientists' results.

Figure 4



Key

- Normal diet
- Ketogenic diet

0 4 . 3 Suggest **two** concerns about **humans** using a ketogenic diet to lose body mass.

Use information from **Figure 4**.

[2 marks]

- 1 \_\_\_\_\_  
\_\_\_\_\_
- 2 \_\_\_\_\_  
\_\_\_\_\_

0 4 . 4 The muscles tested for strength in the investigation have a high proportion of fast-twitch muscle fibres.

Why are fast-twitch fibres used for short bursts of explosive action?

[1 mark]

- \_\_\_\_\_
- \_\_\_\_\_



0 4 . 5

Give **two other** features of fast-twitch muscle fibres.**[2 marks]**

1 \_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

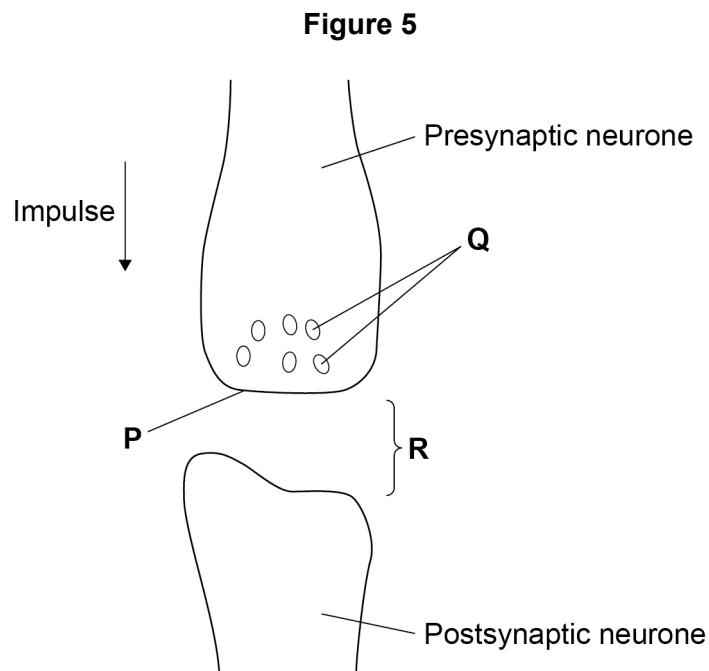
\_\_\_\_\_

---

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

0 5

Figure 5 shows a synapse.



0 5 . 1

Name parts **P**, **Q** and **R** in **Figure 5**.**[3 marks]**

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

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

**R** \_\_\_\_\_





**0 5 . 2** An action potential arrives at the synapse in **Figure 5**.

Describe what happens in the presynaptic neurone when the action potential arrives.

**[4 marks]**

---

---

---

---

---

---

---

---

---

---

**Question 5 continues on the next page**

**Turn over ►**



Neurotransmitters are chemicals that have a role in the transmission of nerve impulses.

**0 5 . 3** Complete **Table 2**.

Give the name of a disorder linked to the lack of each neurotransmitter.

**[3 marks]**

**Table 2**

Neurotransmitter	Disorder linked to a lack of the neurotransmitter
Acetylcholine	
Dopamine	
Serotonin	

**0 5 . 4** When a neurotransmitter binds to receptors on the postsynaptic membrane an action potential is generated.

Enzyme **Y** then breaks down the neurotransmitter so it can be recycled back into the presynaptic neurone.

Donepezil is a drug used to treat people with Alzheimer's disease. Donepezil inhibits or stops the action of enzyme **Y**.

Suggest how donepezil reduces the symptoms of Alzheimer's disease.

**[2 marks]**

---



---



---



---

**12**



0	6
---	---

Oxygen is transported by haemoglobin in the red blood cells.

0	6	.	1
---	---	---	---

Describe the structure of haemoglobin.

**[2 marks]**

---

---

---

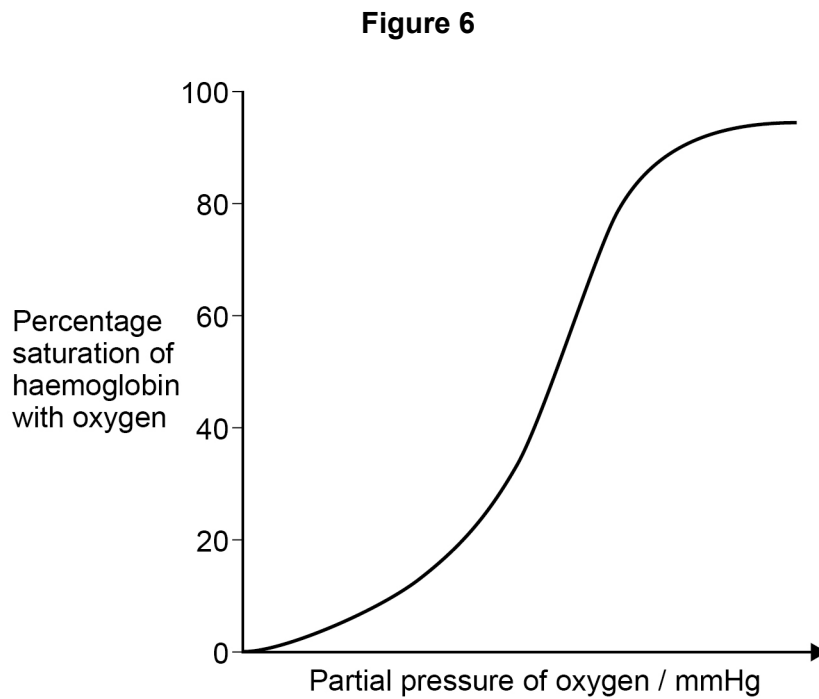
---

**Question 6 continues on the next page**

**Turn over ►**



**Figure 6** shows an oxygen dissociation curve.



- 0 6 . 2** Sketch the dissociation curve on **Figure 6** that you would expect to see if there was an increased concentration of carbon dioxide.

**[2 marks]**

- 0 6 . 3** Four molecules of oxygen can bind to each haemoglobin molecule.

After the first molecule of oxygen binds to the haemoglobin, it is easier for a second oxygen molecule to bind.

Explain why.

**[2 marks]**

---



---



---



---



**0 6 . 4** Oxygen saturation is often measured by doctors.

Name the non-invasive way of measuring oxygen saturation.

**[1 mark]**

---

**0 6 . 5** Explain how high-altitude training affects oxygen transportation.

**[3 marks]**

---

---

---

---

---

---

**10**

**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**





