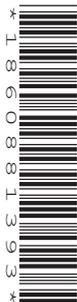


## Tuesday 13 May 2025 – Afternoon

### GCSE (9–1) Combined Science A (Gateway Science)

#### J250/01 Biology (Foundation Tier)

Time allowed: 1 hour 10 minutes



**You must have:**

- a ruler (cm/mm)

**You can use:**

- a scientific or graphical calculator
- an HB pencil



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

--	--	--	--

First name(s)

---

Last name

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### INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.

### INFORMATION

- The total mark for this paper is **60**.
- The marks for each question are shown in brackets [ ].
- Quality of extended response will be assessed in questions marked with an asterisk (\*).
- This document has **20** pages.

### ADVICE

- Read each question carefully before you start your answer.

## Section A

You should spend a **maximum of 20 minutes** on this section.

Write your answer to each question in the box provided.

1 Which chamber of the heart pumps blood to the kidneys?

- A Left atrium
- B Left ventricle
- C Right atrium
- D Right ventricle

Your answer

[1]

2 What is the shape of a **red** blood cell?

- A Biconcave
- B Cuboidal
- C Cylindrical
- D Spherical

Your answer

[1]

3 Which statement is correct about **anaerobic** respiration in plants?

- A It produces glucose.
- B It produces carbon dioxide.
- C It produces lactic acid.
- D It produces oxygen.

Your answer

[1]

4 What are **proteins** made up of?

- A Amino acids
- B Fatty acids
- C Glycerol
- D Sugars

Your answer

[1]

5 Which statement describes the relationship between insulin and blood sugar levels?

- A Insulin decreases blood sugar levels.
- B Insulin has no effect on blood sugar levels.
- C Insulin increases blood sugar levels.
- D Insulin only effects blood sugar levels in type 2 diabetes.

Your answer

[1]

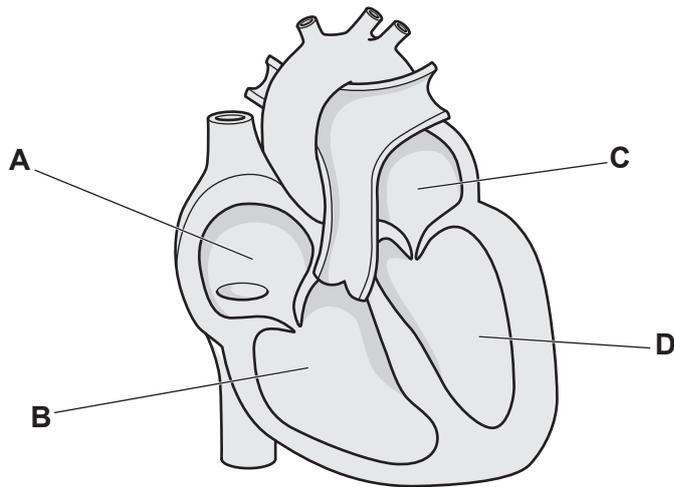
6 What is the role of **mitosis** in a multicellular organism such as a human?

- A To make gametes
- B To make genetically different cells
- C To make genetically identical cells
- D To make stem cells from body cells

Your answer

[1]

7 Which label is pointing to the **left ventricle**?



Your answer

[1]

8 Four students measure their reactions by dropping a ruler and measuring the distance the ruler falls before they catch it.

Each student does this five times.

The table shows their results.

Student	Distances the ruler falls (cm)				
<b>A</b>	4	4	5	6	8
<b>B</b>	3	5	6	6	9
<b>C</b>	5	7	9	10	10
<b>D</b>	4	4	5	7	9

Which student has results where the median and the mode are equal?

Your answer

[1]

9 What is the main source of **testosterone** in the human body?

- A Adrenal glands
- B Pancreas
- C Pituitary gland
- D Testes

Your answer

[1]

10 Which substance has a net outward movement from plants during the day?

- A Nitrates
- B Nitrogen
- C Oxygen
- D Urea

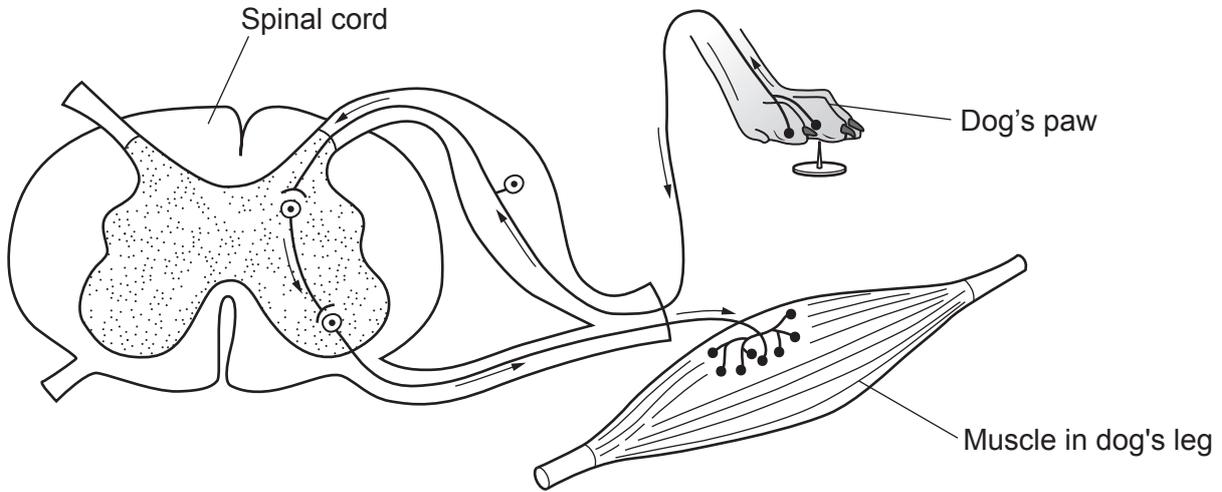
Your answer

[1]

Section B

11 The nervous system allows the body of animals to respond to the environment.

The diagram shows a reflex arc of a dog stepping on a pin.



(a) Moving a paw away after standing on a pin is an example of a reflex.

Explain how a reflex arc prevents harm to the dog.

.....

.....

.....

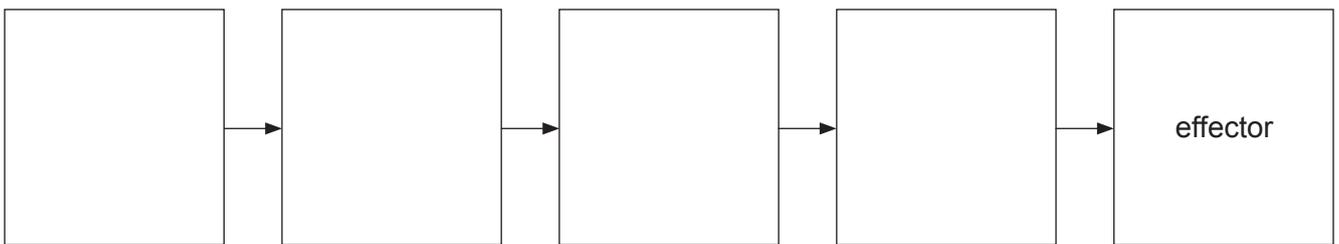
..... [2]

(b) Complete the flow diagram to show the order that structures are stimulated in this reflex arc.

One has been done for you.

Choose words from the list.

- |               |          |               |                 |
|---------------|----------|---------------|-----------------|
| motor neurone | receptor | relay neurone | sensory neurone |
|---------------|----------|---------------|-----------------|



[3]

12 Microscopes are used in biology to see objects too small for the human eye.

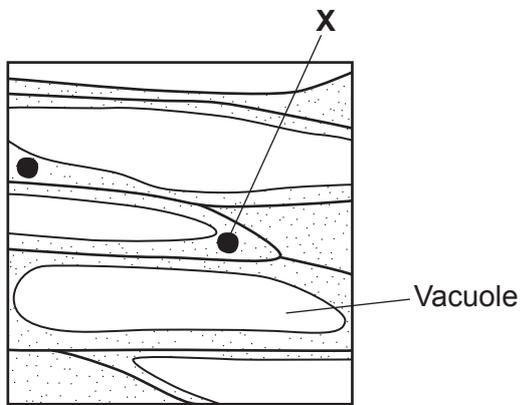
A student makes a microscope slide of a layer of onion epidermal cells.

(a) The student uses a coverslip to make the slide.

Describe the function of the coverslip.

.....  
.....  
..... [2]

(b) When the student looks down the microscope, they see an image like the one below.



Identify **subcellular structure X** and describe its function.

Name .....

Function .....

.....

[2]

(c) The student prepared the slide by covering the onion epidermal cells with water.

The student looks at the cells again after one hour and the vacuoles look larger.

Explain why the vacuoles look larger.

Use your knowledge of **transport in cells**.

.....

.....

.....

.....

..... [3]

13 Plants and animals have stem cells.

These are cells that have **not** undergone changes to become specialised cells.

(a) Which process do stem cells go through to become specialised cells?

Tick (✓) **one** box.

- Differentiation
- Resolution
- Respiration

[1]

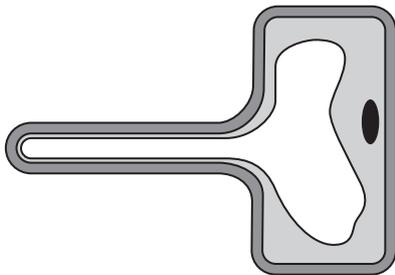
(b) The table gives features of different types of stem cells.

Complete the table by putting **one** tick (✓) in each row.

Stem cell features	Adult stem cells only	Embryonic stem cells only	Both embryonic and adult stem cells
Only found in the embryo			
Can form specialised cells			
Can form many types of cells			

[3]

(c) One type of specialised cell in a plant is a root hair cell, shown in the diagram.



Give a function of a root hair cell and state how it is adapted for that function.

Function .....

.....

Adaptation .....

[2]

(d) One role of a root hair cell is to move ions into the plant **against** the concentration gradient.

State the name given to this type of transport.

..... [1]

14 Hormones are important in the menstrual cycle.

(a) Draw **three** lines to connect each **hormone** and its **role in the menstrual cycle**.

Hormone	Role in the menstrual cycle
FSH	causes an egg to mature in the ovary
Oestrogen	maintains the uterus lining
Progesterone	thickens and repairs the uterus lining

[2]



15 Most animals have a circulatory system that consists of a heart and blood vessels.

(a) Describe the role of the **valves** in the heart.

.....  
..... [1]

(b) Explain why the heart is described as a '**double pump**' in mammals.

.....  
.....  
.....  
..... [2]

(c) Describe the pathway of a red blood cell as it travels from the right side of the heart to the left side.

.....  
.....  
.....  
.....  
..... [3]

16 It is important to maintain internal environments in the human body.

(a) Why is a constant body temperature needed to allow metabolic reactions to happen at the correct rate?

Tick (✓) **two** boxes.

At low temperatures, there are fewer successful collisions between enzymes and substrates.

Catalysts are needed to slow down metabolic reactions.

Enzymes are denatured at high temperatures.

Enzyme production is too fast at high temperatures.

Low body temperatures destroy enzymes.

[2]

(b) Diabetes is a medical condition that can affect blood glucose levels.

Give **three** ways that type 1 diabetes is different to type 2 diabetes.

1 .....

.....

2 .....

.....

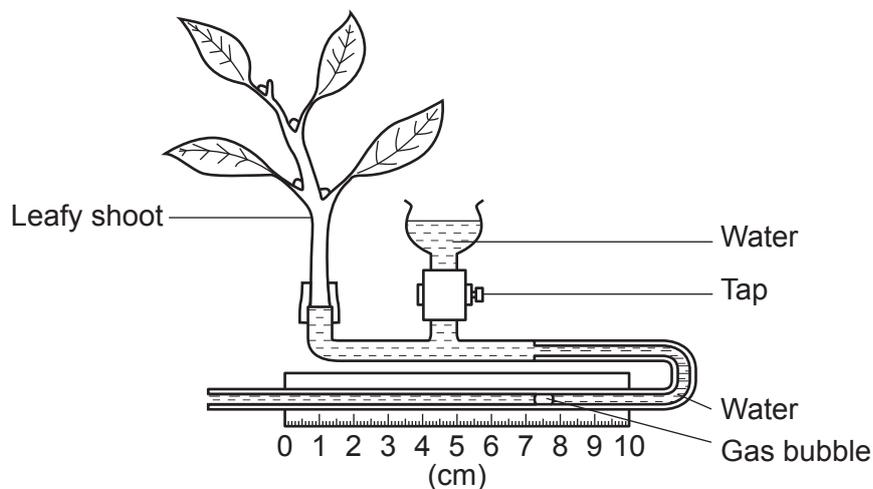
3 .....

.....

[3]

17 Plants need to move water and other molecules through their stems.

(a) A student uses this apparatus to estimate water uptake by a leafy shoot.



(i) State the name of this apparatus.

..... [1]

(ii) Describe how the student can use this apparatus to find the rate that the gas bubble moves in cm/minute.

.....  
 .....  
 .....  
 ..... [2]

(iii) To find this estimate of water uptake in 10 minutes, the student took measurements for 60 minutes and divided their answer by 6.

Suggest why they did this.

.....  
 ..... [1]

(iv) The student wanted to check the **reproducibility** of their results.

State **one** way that they could do this.

.....  
 ..... [1]

- (v) The student wants to extend their experiment to investigate the effect of leaf area on the rate of water uptake.

Suggest how the student could measure the area of a leaf.

.....

.....

..... [2]

- (b) The student then investigates the number of stomata on the upper and the lower surfaces of one of the leaves from the shoot.

The table shows their results.

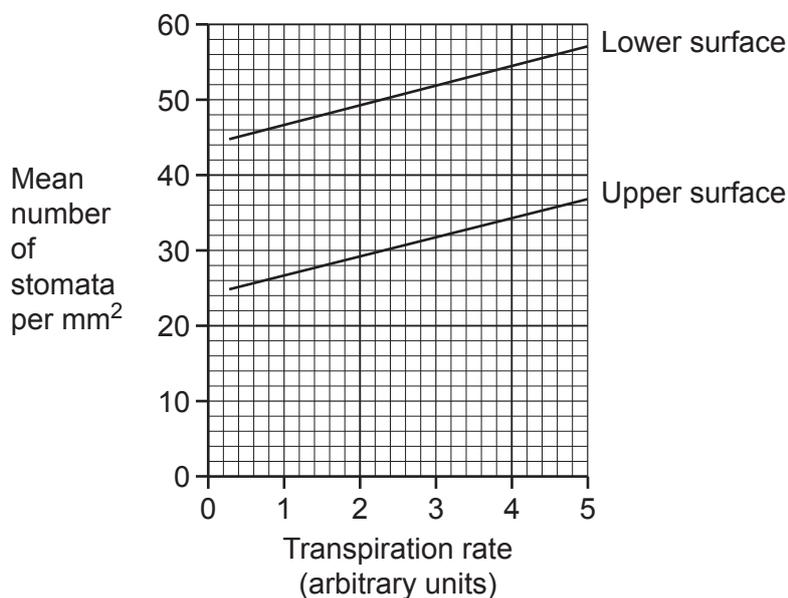
	Number of stomata per mm <sup>2</sup> of leaf surface		
Leaf surface	1st result	2nd result	3rd result
Upper	28	26	33
Lower	47	48	52

Calculate the mean number of stomata on the **upper** surface.

Mean number of stomata = ..... per mm<sup>2</sup> [2]

(c) The student then finds this graph as part of their investigation.

It shows the relationship between transpiration rate of plants and the mean number of stomata on the two surfaces of the leaves.



(i) The mean number of stomata on the lower surface of the student's leaf is 49 per mm<sup>2</sup>.

Use this value and the graph to find the transpiration rate for this plant.

Transpiration rate = ..... arbitrary units [1]

(ii) Suggest **two** conclusions that can be made from the trends shown in this graph.

- 1 .....
- .....
- 2 .....
- .....

[2]

**END OF QUESTION PAPER**

**EXTRA ANSWER SPACE**

If you need extra space use these lined pages. You must write the question numbers clearly in the margin.

The page contains a large rectangular area for writing, bounded by horizontal dotted lines. A solid vertical line is positioned on the left side of this area, defining a margin. This layout is designed for students to write their answers to questions, with the question numbers being written in the margin.





A large area of the page is reserved for writing, featuring a vertical solid line on the left side and horizontal dotted lines extending across the page.



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