

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

**J250/07** Paper 7, B1–B3 and CS7 (PAGs B1–B5)  
(Higher Tier)

**Tuesday 15 May 2018 – Afternoon**

**Time allowed: 1 hour 10 minutes**

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**You must have:**

- a ruler (cm/mm)

**You may use:**

- a scientific or graphical calculator
- an HB pencil



First name

Last name

Centre  
number

Candidate  
number

## INSTRUCTIONS

- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Write your answer to each question in the space provided. Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the barcodes.

## INFORMATION

- The total mark for this paper is **60**.
- The marks for each question are shown in brackets [ ].
- Quality of extended responses will be assessed in questions marked with an asterisk (\*).
- This document consists of **24** pages.

## SECTION A

Answer **all** the questions.

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

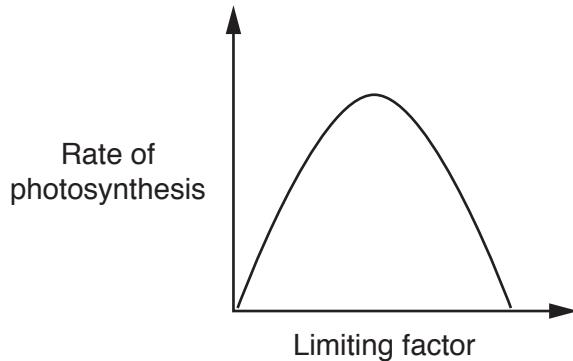
1 Which of these statements about photosynthesis is correct?

- A Single stage endothermic reaction
- B Single stage exothermic reaction
- C Two stage endothermic reaction
- D Two stage exothermic reaction

Your answer

[1]

2 The graph shows how one limiting factor affects the rate of photosynthesis.



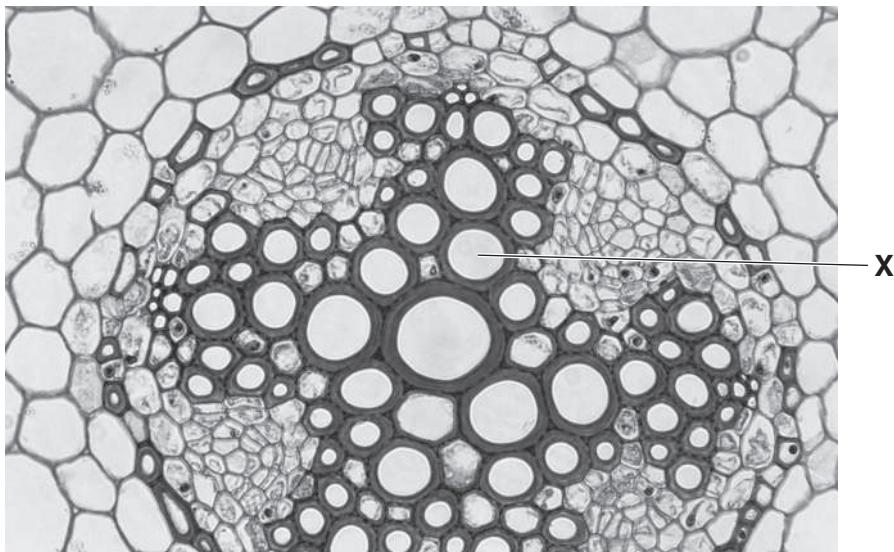
Which limiting factor is having the effect shown in the graph?

- A Carbon dioxide concentration
- B Humidity
- C Light intensity
- D Temperature

Your answer

[1]

3 The picture shows cells from the centre of a root, seen using a light microscope.



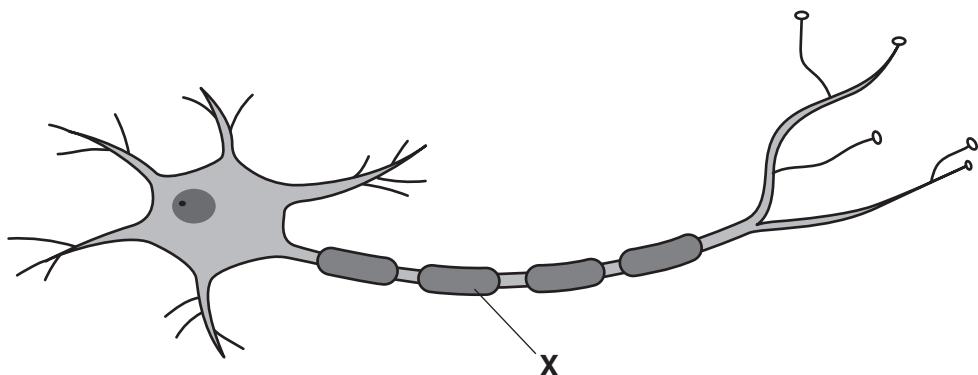
Which type of transport cell is labelled **X**?

- A Phloem
- B Root hair
- C Stomata
- D Xylem

Your answer

[1]

4 The diagram shows a motor neurone.



What is the function of part X?

- A Generates an impulse
- B Insulates the axon
- C Slows down the speed of an impulse
- D Stops an impulse travelling the wrong way

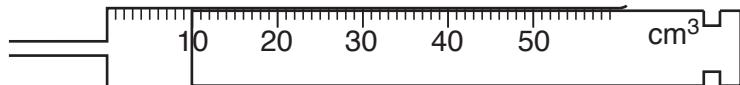
Your answer

[1]

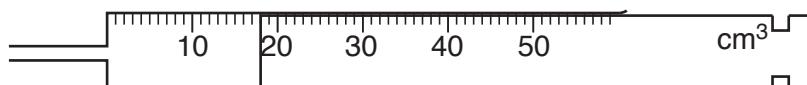
5 A student investigates an enzyme controlled reaction. She collects the gas produced during the reaction in a gas syringe.

The diagrams show the volume of gas in the gas syringe at the **start** and after **five minutes**.

Volume of gas at start



Volume of gas after five minutes



What is the rate of the reaction?

- A  $0.625 \text{ cm}^3/\text{min}$
- B  $1.6 \text{ cm}^3/\text{min}$
- C  $3.6 \text{ cm}^3/\text{min}$
- D  $8 \text{ cm}^3/\text{min}$

Your answer

[1]

6 An elephant has a volume of  $4.80 \text{ m}^3$ .

The surface area to volume ratio of the elephant is 3.84.

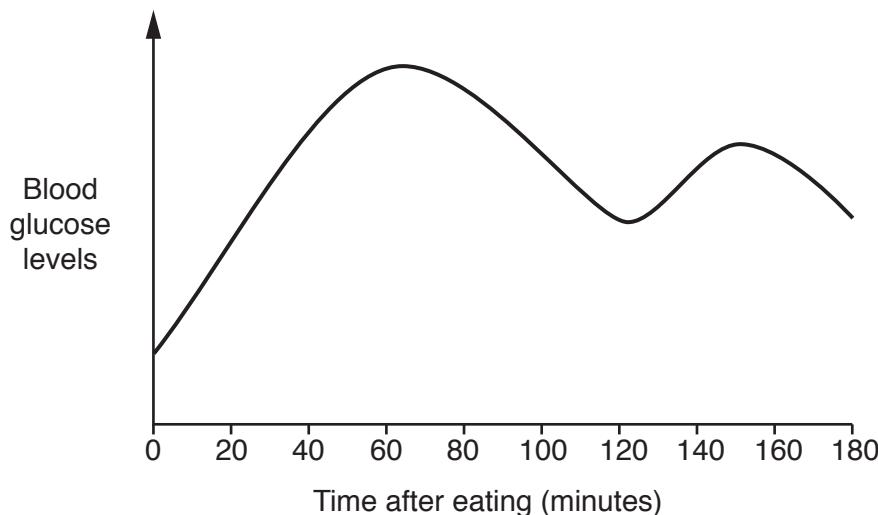
Calculate the surface area of this elephant.

- A  $0.80 \text{ m}^2$
- B  $1.25 \text{ m}^2$
- C  $8.64 \text{ m}^2$
- D  $18.43 \text{ m}^2$

Your answer

[1]

7 The graph shows blood glucose levels of one individual after they have eaten a meal.



Explain the change in blood glucose levels after 120 minutes.

- A Glucagon is released to convert the glucose to glycogen.
- B Glucagon is released to convert the glycogen to glucose.
- C Insulin is released to convert the glucose to glycogen.
- D Insulin is released to convert the glycogen to glucose.

Your answer

[1]

8 Translocation is a process that occurs in plants.

	Transport tissue	Substances transported	Direction of movement	Involves active transport
A	Phloem	Sucrose	Two way flow	Yes
B	Phloem	Mineral ions	One direction only	No
C	Xylem	Mineral ions	One direction only	No
D	Phloem	Sucrose	Two way flow	No

Which row describes translocation?

Your answer

[1]

9 Which of these is **not** an effect of adrenaline on the body?

- A Air passages of the lungs expand
- B Blood flow to the digestive system increases
- C Blood pressure increases
- D Pupils dilate

Your answer

[1]

10 The table shows the dietary intake of four amino acids by one individual.

It also shows the recommended daily allowance (RDA) for the same individual.

Amino acid	Dietary intake (g/day)	RDA (g/day)
A	1.52	0.95
B	3.98	2.85
C	2.98	2.58
D	2.32	1.36

The individual has taken in more than 100% of the RDA for each of the four amino acids.

Which amino acid in their diet has the **highest** percentage of the RDA?

Your answer

[1]

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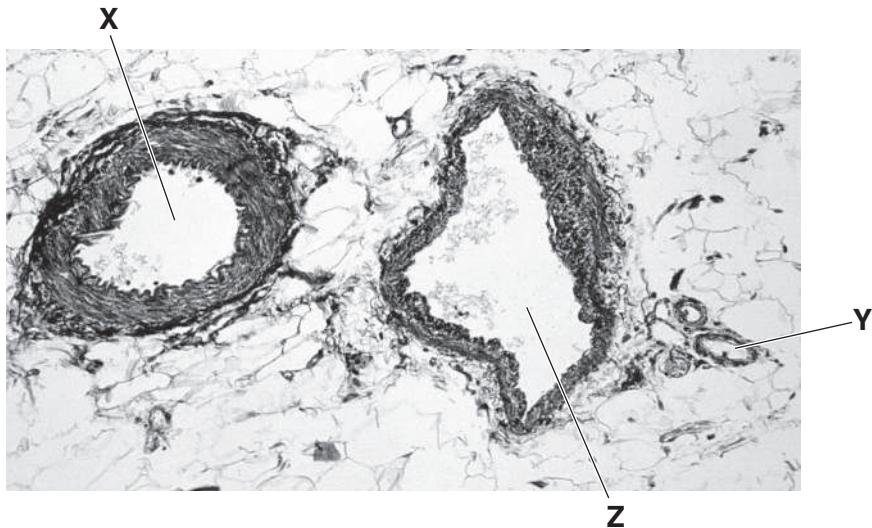
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## SECTION B

Answer **all** the questions.

11 This question is about circulatory systems.

(a) The picture shows three different blood vessels **X**, **Y** and **Z**, seen using a light microscope.



(i) Compare blood vessels **X** and **Z** and describe the differences that can be **seen** in the picture.

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[2]

(ii) Blood vessel **Y** is a capillary. Explain how the structure of a capillary is adapted to its function.

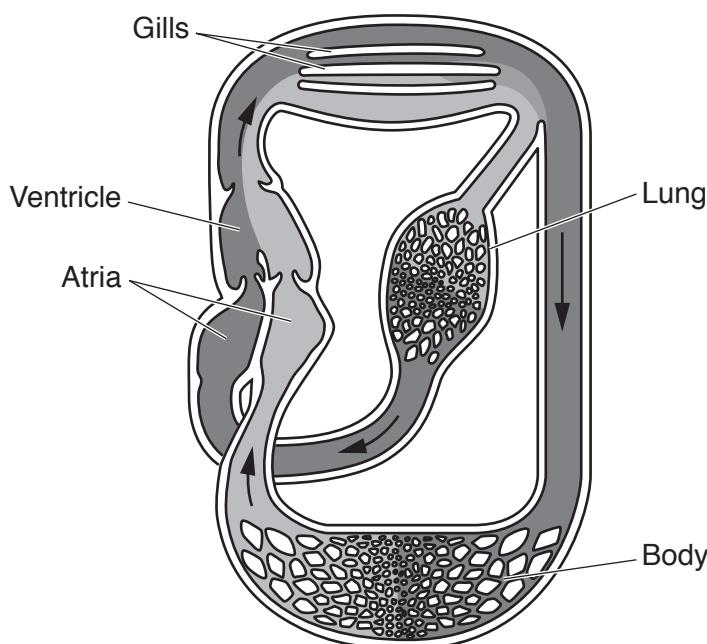
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[2]

(b) Lungfish are fish that have both gills and a lung.

When in water, the blood flows through the gills. When on land, blood flow to the gills is stopped and the blood enters the lung instead.

The diagram shows the circulatory system of a lungfish.



The lungfish circulatory system is different to that of humans.

Blood in the lungfish can flow through gills and lungs, humans only have lungs.

(i) Write down one **other** way the **structure** of the lungfish circulatory system is different to that of humans.

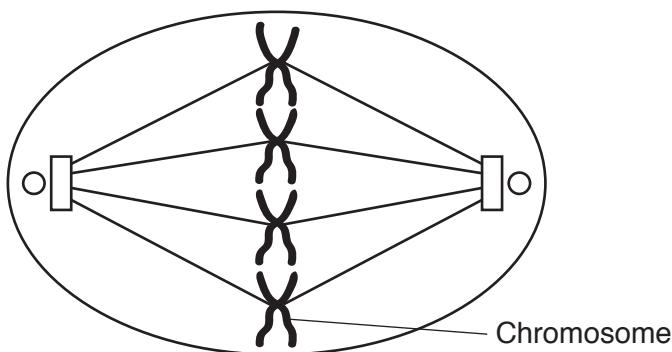
..... [1]

(ii) When lungfish and humans are on land, the human circulatory system is more efficient than that of lungfish.

Suggest why the human circulatory system is more efficient.

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..... [2]

12 (a) The diagram shows a cell during one stage of **mitosis**.



(i) Describe **two** things that happen to the chromosomes in the next stage of mitosis.

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[2]

(ii) Chromosomes are made of DNA.

Describe the structure of DNA.

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[2]

(b) After mitosis, cell differentiation takes place.

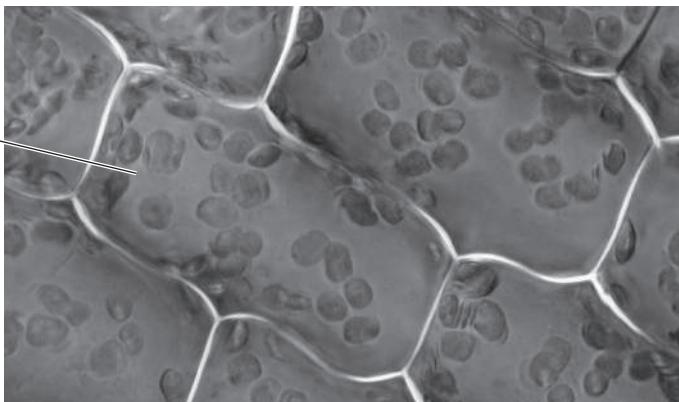
What is meant by the term **cell differentiation**?

.....  
.....

[1]

13 The picture shows plant cells as they are seen using a light microscope.

X



(a) The actual length of plant cell X is  $75\text{ }\mu\text{m}$ .

You can use this fact to calculate the magnification of the image.

Explain how.

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[2]

(b) The same cells can be observed using an electron microscope.

Magnification of the cells can be increased using an electron microscope.

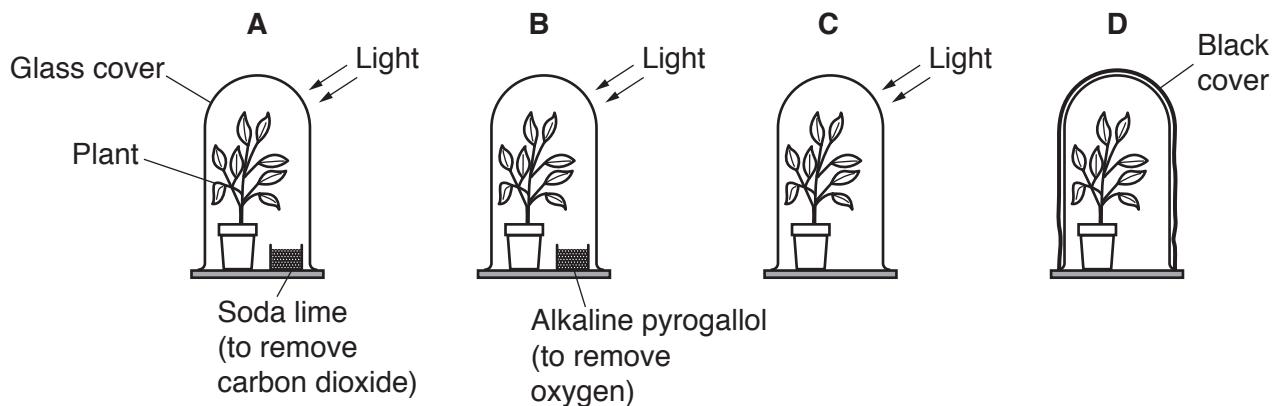
Explain how and why the image may also look different.

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[3]

(c) A student investigates different conditions that affect photosynthesis.

He sets up four different sets of apparatus, **A**, **B**, **C** and **D**.



The plants used are all of a similar age and size. Each plant is left under cover at room temperature.

After three days one leaf from each plant is tested for the presence of starch.

(i) Describe all the stages required to test the leaves for the presence of starch.

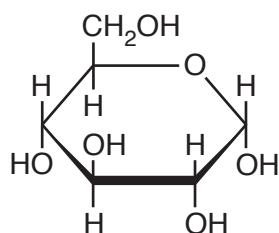
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(ii) What are the expected results of the starch test on each plant?

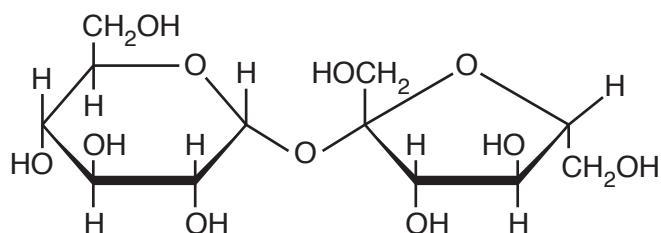
Write down reasons for your answers

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14 The diagrams show the molecular structure of glucose and sucrose.



Glucose



Sucrose

(a) Compare the structures of these two carbohydrates.

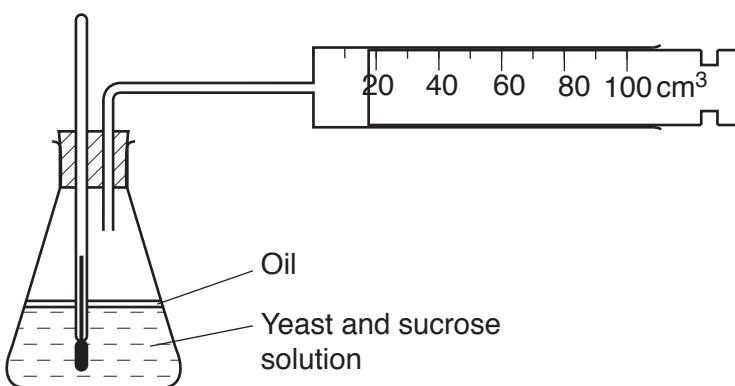
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[2]

(b) Two students investigate **anaerobic** respiration using yeast with sucrose solution.

They measure the volume of gas collected every 5 minutes for 40 minutes.

The students then repeat the investigation using yeast with glucose solution.

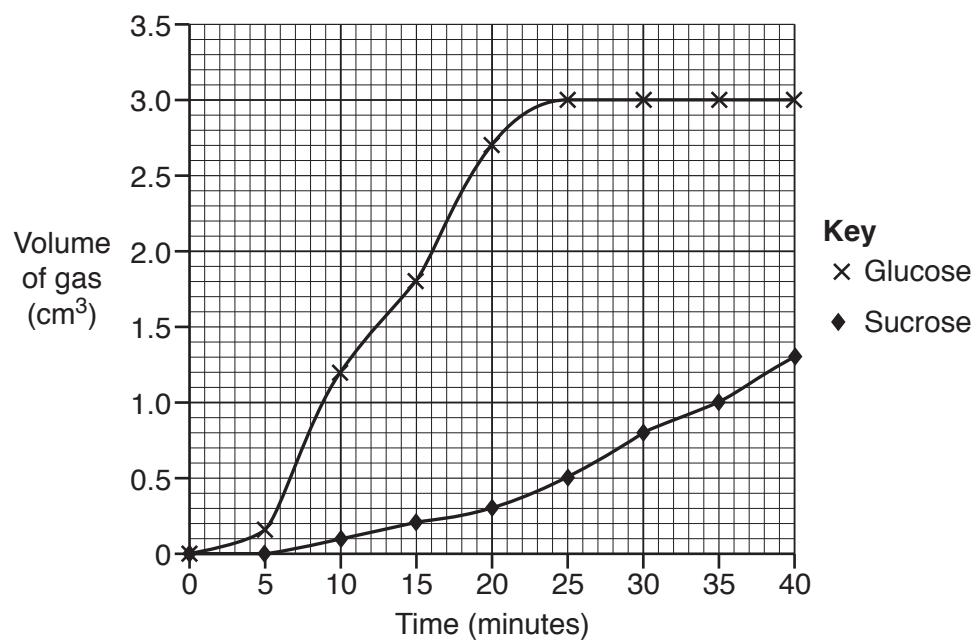


(i) Explain how and why the temperature of the solution could change during the investigation and how this could be controlled.

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[2]

(ii)\* The graph shows the results of the investigation.



Explain the patterns seen in the results.

[6]

15 A student investigates the effect of concentration on osmosis.

He cuts out five potato chips of similar mass. The student measures the mass of each potato chip.

He then places the potato chips in different concentrations of sugar solution.

After 30 minutes he removes the potato chips from the solution. He dries them with a paper towel before measuring the new mass.

(a) The potato chips are dried before the new mass is measured.

Explain why.

.....  
.....

[1]

(b) The table shows his results.

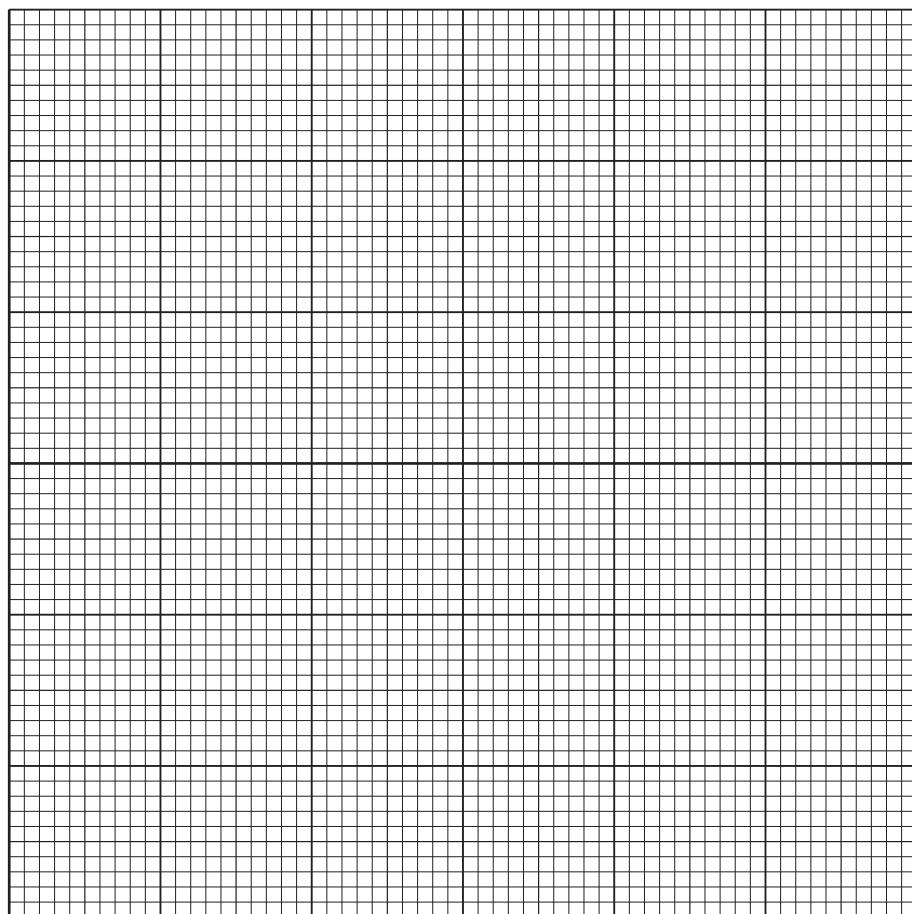
Concentration of sugar solution (mol/dm <sup>3</sup> )	Mass of potato chip (g)		Change in mass (g)	Percentage change in mass
	At start	After 30 minutes		
0.0	2.1	2.7	+0.6	+28.6
0.2	2.2	2.3	+0.1	+4.5
0.4	2.0	1.8	-0.2	-10.0
0.6	2.0	1.6	-0.4	-20.0
0.8	2.3	1.7		
1.0	2.2	1.6	-0.6	-27.3

Calculate the percentage change of mass for the potato chip in **0.8 mol/dm<sup>3</sup>** sugar solution.

Record your answer to **1** decimal place.

Answer = ..... % [2]

(c) Plot a graph of the percentage change in mass against concentration of sugar solution and draw a line of best fit.



[4]

(d) (i) Estimate the concentration of sugars inside the potato cells.

Answer = ..... mol/dm<sup>3</sup> [1]

(ii) Use ideas about osmosis to explain the patterns in the results.

.....

.....

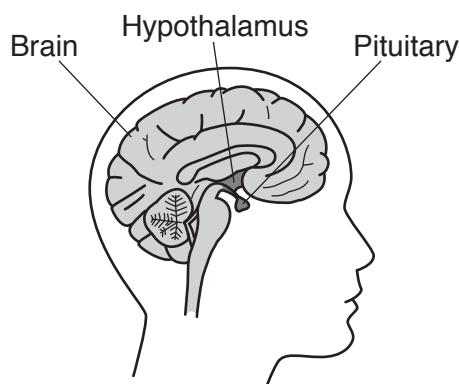
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[3]

16 The diagram shows the position of the pituitary gland and hypothalamus in the body.

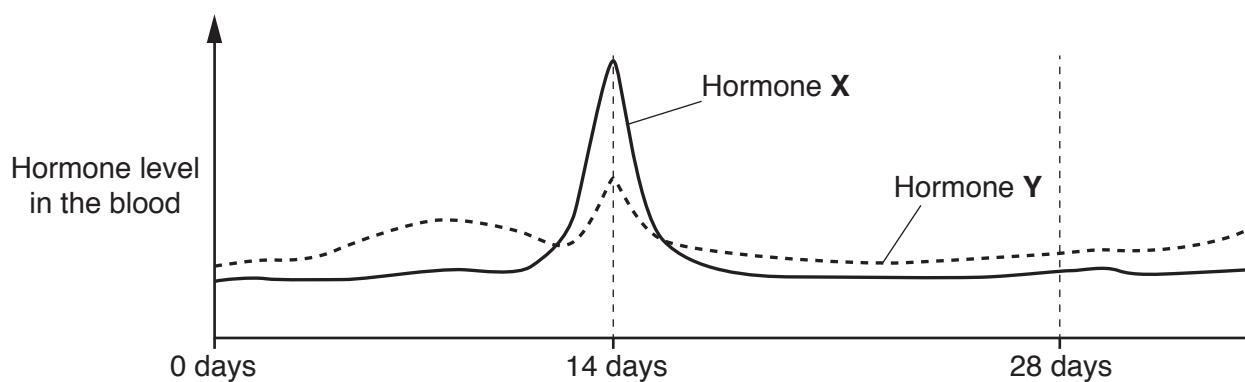


(a) (i) Two hormones released by the pituitary are involved in controlling the menstrual cycle.

Write down the names of these **two** hormones.

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

(ii) The graph shows the levels of these two hormones during the menstrual cycle.



Use the graph to explain how these two hormones work together to cause ovulation.

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

**(b)** The hypothalamus is involved in the regulation of body temperature.

Explain why this function of the hypothalamus is important to the role of enzymes.

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**[3]**

**END OF QUESTION PAPER**

**ADDITIONAL ANSWER SPACE**

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).







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