



Rewarding Learning

General Certificate of Secondary Education

Centre Number

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Candidate Number

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Biology

Unit 1

Higher Tier



[GBL12]

GBL12

Assessment

TIME

1 hour 15 minutes.

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in black ink only. **Do not write with a gel pen.**

Answer **all nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is **75**.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question **9(a)(i)**.



- 1 (a) Farmers use slurry as a fertiliser.

Slurry is a mixture of faeces and urine from farm animals.

Table 1 shows the mineral content of three types of slurry.

Table 1

Type of slurry	Percentage of mineral content in slurry		
	Nitrogen	Phosphorus	Potassium
Chicken	7.00	0.31	0.23
Cow	2.32	0.37	0.21
Pig	6.05	0.44	0.11

Source: Principal Examiner

Look at **Table 1**.

- (i) Which mineral shows the greatest variation in content between the three types of slurry?

[1]

- (ii) Suggest why there is a large variation in the content of this mineral in the three types of slurry.

[1]



Table 2 shows the minerals needed by different plant crops.

Nitrogen is needed by plants for growth.

Table 2

Plant crop	Mass of mineral needed by crop/arbitrary units	
	Nitrogen	Phosphorus
Wheat	45	45
Maize	65	20
Rice	90	10

Source: Principal Examiner

Look at **Tables 1** and **2**.

(b) Which type of slurry would be best for growing rice?

Use **evidence** from both tables to support your answer.

[2]

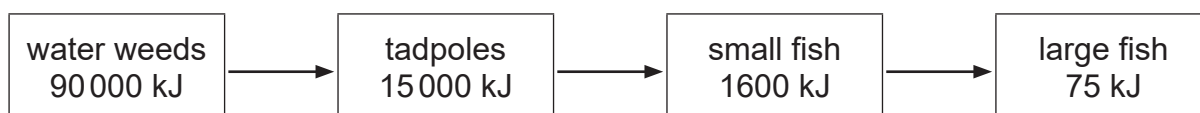
(c) Give the function of nitrogen in the growth of plants.

[1]

[Turn over



2 The diagram shows the transfer of energy along a food chain.



Look at the diagram.

(a) Give the trophic level of the tadpoles.

[1]

(b) Name the secondary consumer in this food chain.

[1]

(c) (i) Calculate the energy lost between the small fish and the large fish.

Show your working.

Energy lost _____ kJ [2]

(ii) Give **two** ways this energy is lost from the food chain.

1. _____

2. _____ [2]



- (d) The percentage (%) efficiency of energy transfer between the water weeds and the tadpoles is calculated using the equation:

$$\% \text{ efficiency} = \frac{\text{energy transferred to the tadpoles}}{\text{total energy in the water weeds}} \times 100$$

- (i) Calculate the % efficiency of the energy transfer from the water weeds to the tadpoles.

Give your answer to **one decimal place**.

Show your working.

% efficiency _____ [3]

- (ii) Suggest why there is not another trophic level in this food chain.

_____ [1]

[Turn over



3 Stem cells are found in the growing points of plants.

(a) Name the growing points of plants which contain stem cells.

[1]

(b) Stem cells are also found in humans.

(i) Give **two** sources of human stem cells.

1. _____

2. _____

[2]

(ii) Give **one** similarity and **one** difference between human and plant stem cells.

Similarity _____

Difference _____

[2]





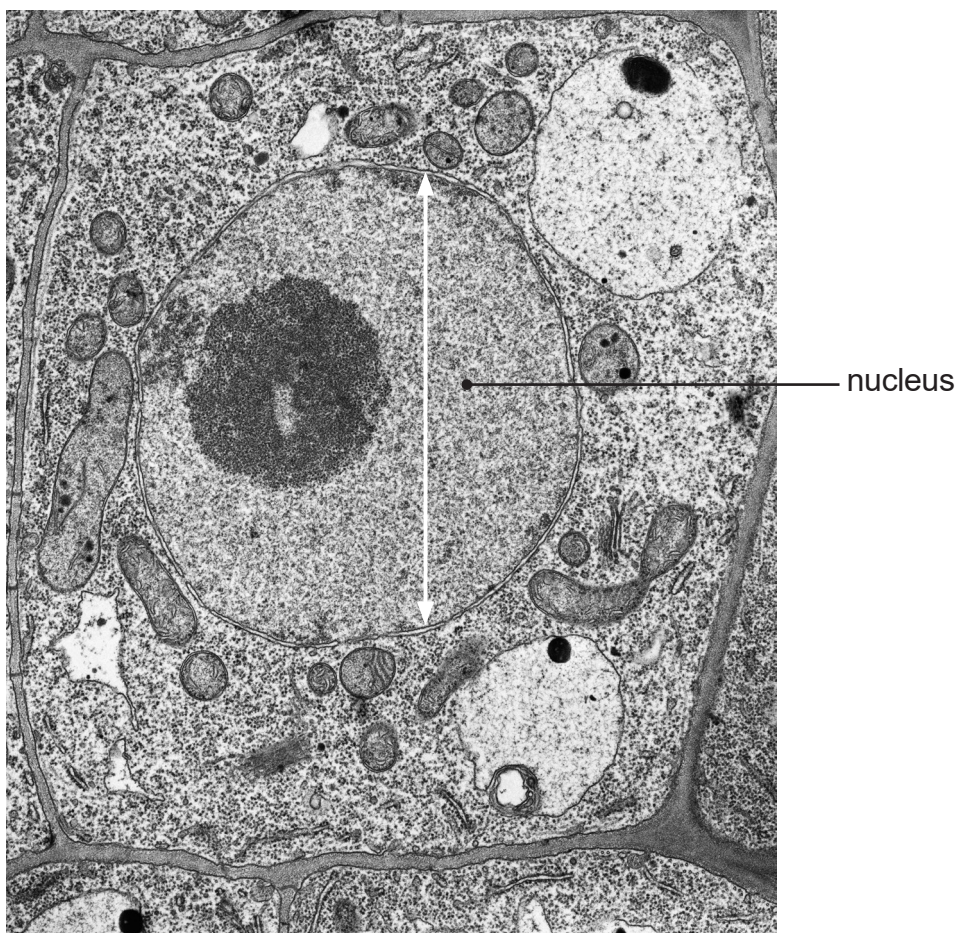
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(Questions continue overleaf)



- 4 The photograph shows a plant cell viewed under an electron microscope.



Source: © Biophoto Associates / Science Photo Library

There are no chloroplasts visible in the photograph.

(a) Suggest why.

[1]



An electron microscope has a much greater magnification than a light microscope.

The diameter of the nucleus shown by the arrow measures 60 **millimetres**.

The actual diameter of the nucleus is 15 **micrometres**.

(b) Calculate the magnification of the photograph.

Show your working.

Magnification _____ [3]

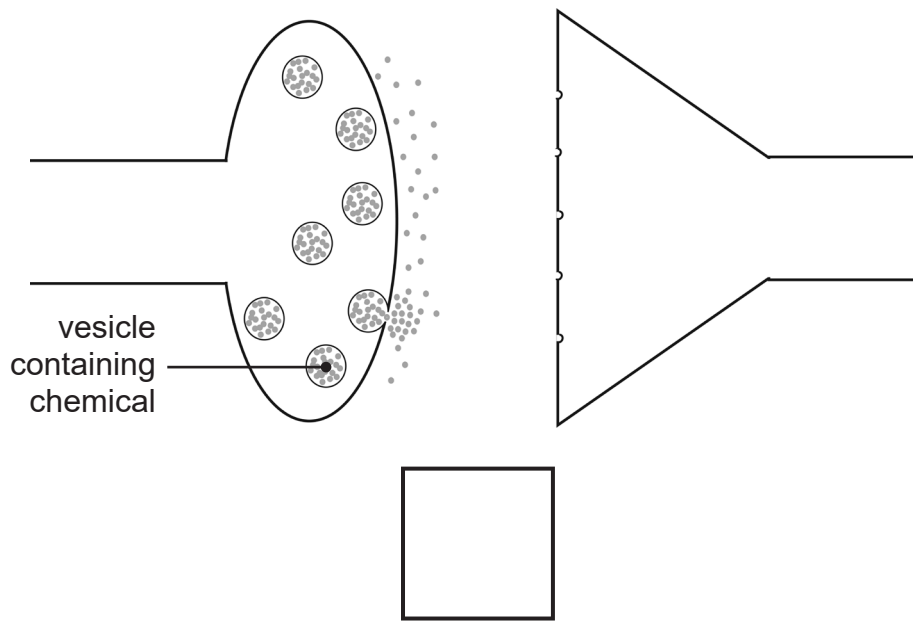
An electron microscope has a greater **resolution** than a light microscope.

(c) What does the term resolution mean?

_____ [1]



5 The diagram shows a gap between two neurones.



(a) Draw an arrow **in the box** under the diagram to show the direction of a nerve impulse across the gap. [1]

(b) Use the diagram and your knowledge to complete the passage about how nerve impulses travel between neurones.

A nerve impulse arrives at the end of a neurone. This causes vesicles to release a _____ chemical into the gap between the neurones.

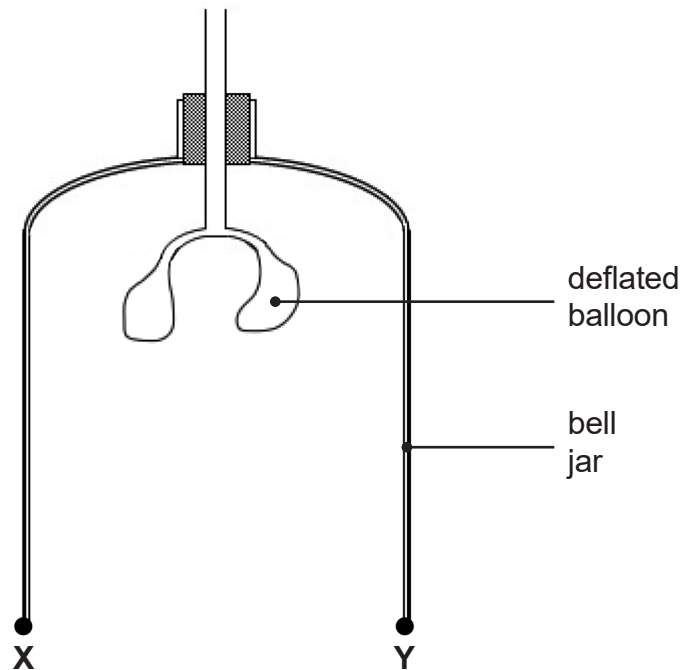
This gap is called a _____ .

The chemical _____ across the gap.

If a high enough _____ of this chemical reaches the next neurone, an _____ impulse is generated. [5]



6 (a) The diagram shows a bell jar model of the thoracic cavity.



A rubber sheet is used in this model to represent the diaphragm.

(i) **Complete the diagram** by drawing the position of the rubber sheet, between points **X** and **Y**, during **exhalation** (breathing out). [1]

(ii) Describe the changes inside the bell jar which caused the balloons to deflate.

[2]

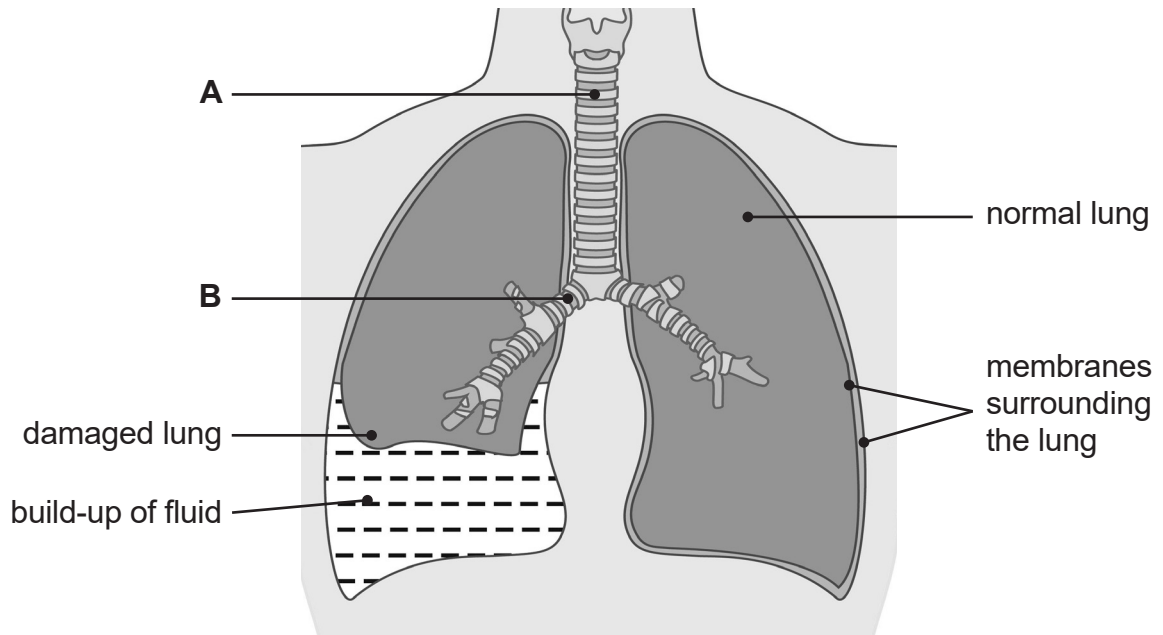
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(iii) Describe how the action of the ribs and intercostal muscles differs from the action of this model during exhalation.

[3]

(b) The diagram shows a patient with a medical condition where fluid builds up between the membranes surrounding the lungs.



Source: © Peter Gardiner / Science Photo Library

(i) Name parts A and B.

A _____

B _____

[2]



(ii) Name the membranes which surround the lungs and describe their function.

Name _____

Function _____

_____ [2]

(iii) Use evidence from the diagram to describe the effect of the build-up of fluid on the damaged lung.

_____ [1]

(iv) Explain how this build-up of fluid may affect the patient.

_____ [2]



- 7 (a) A scientist counted the number of mitochondria in the cells from the roots of two different plants.

Table 1 shows his results.

Table 1

Plant	Number of mitochondria			Average
A	27	35	25	29
B	13	9	11	11

- (i) Where are mitochondria found in a cell?

[1]

- (ii) What is the function of mitochondria in a cell?

[1]

The scientist then measured the mineral content in the roots of the two plants.

Table 2 shows these results.

Table 2

Mineral	Mineral content of each plant / arbitrary units	
	A	B
Magnesium	14	5
Calcium	15	6
Nitrate	24	9



(b) (i) Give **two** trends from **Table 2**.

1. _____

2. _____

_____ [2]

(ii) Suggest an explanation for the differences in the mineral content in the roots of the two plants.

Use **data** from **Table 1** and **Table 2** to support your answer.

_____ [4]

(iii) Give the function of calcium and magnesium in plants.

Calcium _____

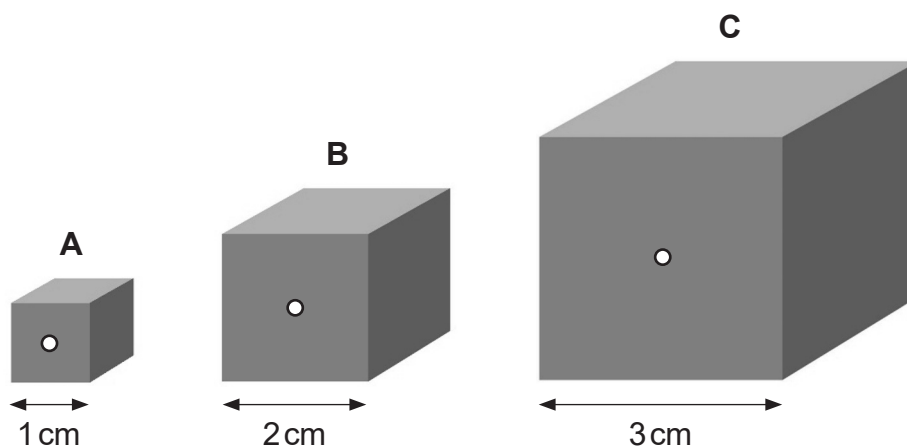
Magnesium _____ [2]

[Turn over



- 8 (a) The diagram shows three cubes which represent different sized **animals**.

The circle in each cube represents a single cell in the centre of each animal.



- (i) Complete the table for cube **B**.

Show your working.

Cube	Length of each side /cm	Surface area /cm ²	Volume /cm ³	Surface area to volume ratio
A	1	6	1	6 : 1
B	2	24		
C	3	54	27	2 : 1

[2]



- (ii) Describe the relationship between the size of an animal and its surface area to volume ratio.

Use data from the table to support your answer.

[2]

- (b) The oxygen needed by cells diffuses across a specialised gas exchange surface.

- (i) Name the specialised gas exchange surface in the lungs of animals.

[1]

- (ii) Use evidence from the diagram and the table to help explain why large animals need a specialised gas exchange surface.

[2]

Large animals with a specialised gas exchange surface also need a specialised transport system.

- (iii) Suggest why.

[2]

[Turn over



9 (a) Changes in the level of carbon dioxide in the atmosphere can affect global temperatures.

(i) Explain how changes in the level of carbon dioxide in the atmosphere can affect global temperatures. Your answer should

- describe how the level of carbon dioxide is changing.
- explain how this change in the level of carbon dioxide can affect global temperatures.
- give **two** causes of this change.

In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.

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[6]

The change in global temperatures may increase the frequency of extreme weather.

(ii) Give **two other** problems associated with the change in global temperatures.

1.

2.

[2]

(b) Government initiatives have been taken to reduce the level of carbon dioxide in the atmosphere.

In 2016, 20.6 million tonnes of greenhouse gases, including carbon dioxide, were emitted in Northern Ireland.

In 2017, this level decreased to 20 million tonnes.

(i) Calculate the percentage decrease between the greenhouse gases emitted in 2016 and 2017.

Show your working.

[3]

[Turn over



- (ii) Describe **one** initiative a government could take to reduce carbon dioxide levels in the atmosphere.

[1]

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For Examiner's use only	
Question Number	Marks
1	
2	
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Examiner Number

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