Surname	Centre Number	Candidate Number
Other Names		0

New GCSE

4471/02

ADDITIONAL SCIENCE
HIGHER TIER
BIOLOGY 2

A.M. TUESDAY, 15 May 2012

1 hour

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	**5**	
2	**8**	
3	**7**	
4	**4**	
5	**6**	
6	**5**	
7	**6**	
8	**5**	
9	**8**	
10	**6**	
Total	**60**	

4471
020001

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

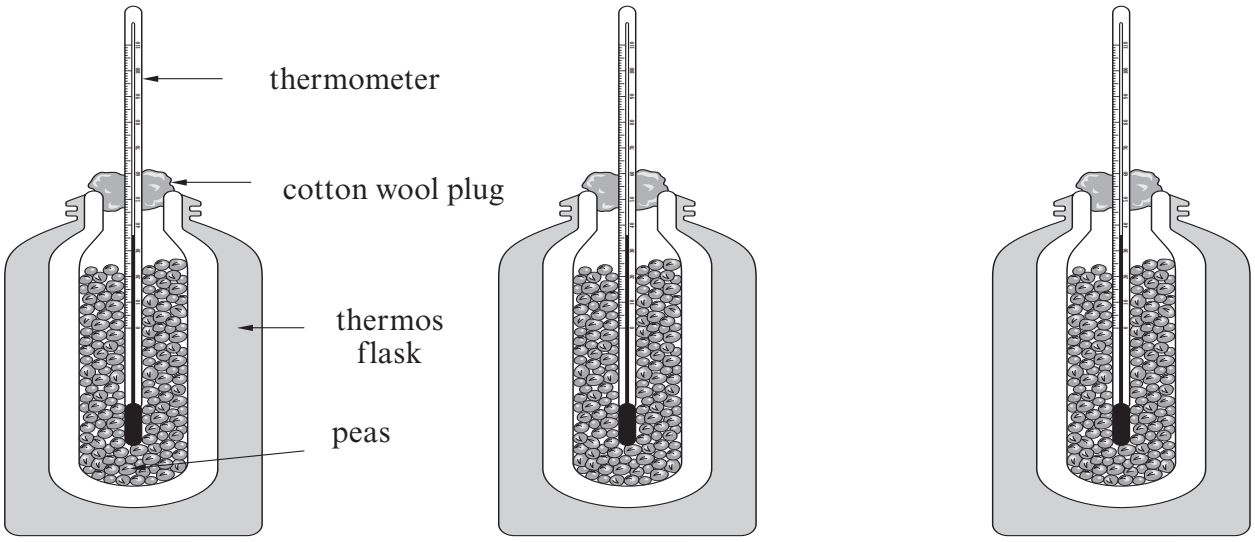
INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication used in your answer to question **2** and question **10**.

Answer **all** *questions*

1. Siân set up the following investigation in a school laboratory. Before the start of the investigation all the peas were soaked in a very weak disinfectant.



Flask **A**
Living peas

Flask **B**
Boiled peas

Flask **C**
Boiled peas and strong disinfectant

Siân recorded the temperature in each flask at the start of the experiment (day 0) and at the same time of day for the next 6 days. She also recorded the room temperature. The results are shown below.

	Temperature °C			
Day	Room	Flask **A** Living peas	Flask **B** Boiled peas	Flask **C** Boiled peas and strong disinfectant
0	14	14	14	14
1	15	16	15	14
2	14	18	14	14
3	16	22	16	14
4	15	24	16	14
5	17	26	19	14
6	16	28	24	14

Examiner only

(a) What process in the living peas caused the temperature to rise? [1]

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(b) (i) Why were all the seeds soaked in weak disinfectant before the start of the experiment? [1]

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(ii) Explain fully the rise in temperature recorded in Flask **B**. [3]

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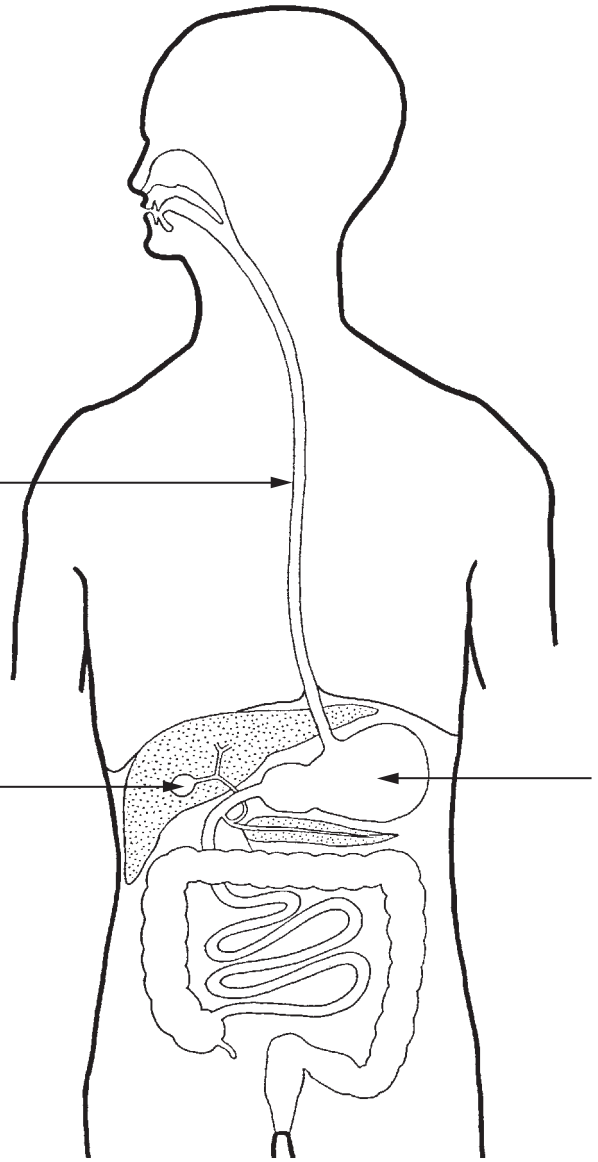
Examiner only

2. The diagram below shows the human digestive system.



Examiner only

(a) Label **A** and **B** on the diagram opposite. [2]

(b) Describe fully the processes involved in the chemical breakdown of food containing **fat** from the time it leaves the stomach. [6 QWC]

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Turn over.

Examiner only

3. The following information appeared in a newspaper in Wales in 2010.

- Some parents who smoke in the car with the window open when travelling with their children think that the smoke will have no effect on their children's health.
- The British Lung Foundation states that smoking just one cigarette, even with the car window open, creates a greater concentration of second-hand smoke than a whole evening's smoking in a pub or a bar.
- Levels of second-hand smoke in cars can be as much as 27 times greater than in a smoker's home.
- Young children breathe faster than adults, their lungs are smaller and are still growing.

(a) (i) Using the information above, explain why the lungs of young children in particular are in danger from breathing in second-hand smoke. [3]

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(ii) The Welsh Government is considering introducing strict new laws where parents who smoke while driving with their children face prosecution.
Using the information given previously suggest **two** *other* important pieces of evidence that the Welsh Government may consider in coming to a decision about introducing these new laws. [2]

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(b) State **two** effects that cigarette smoke has on the cleaning mechanism of the lungs. [2]

(i) .....

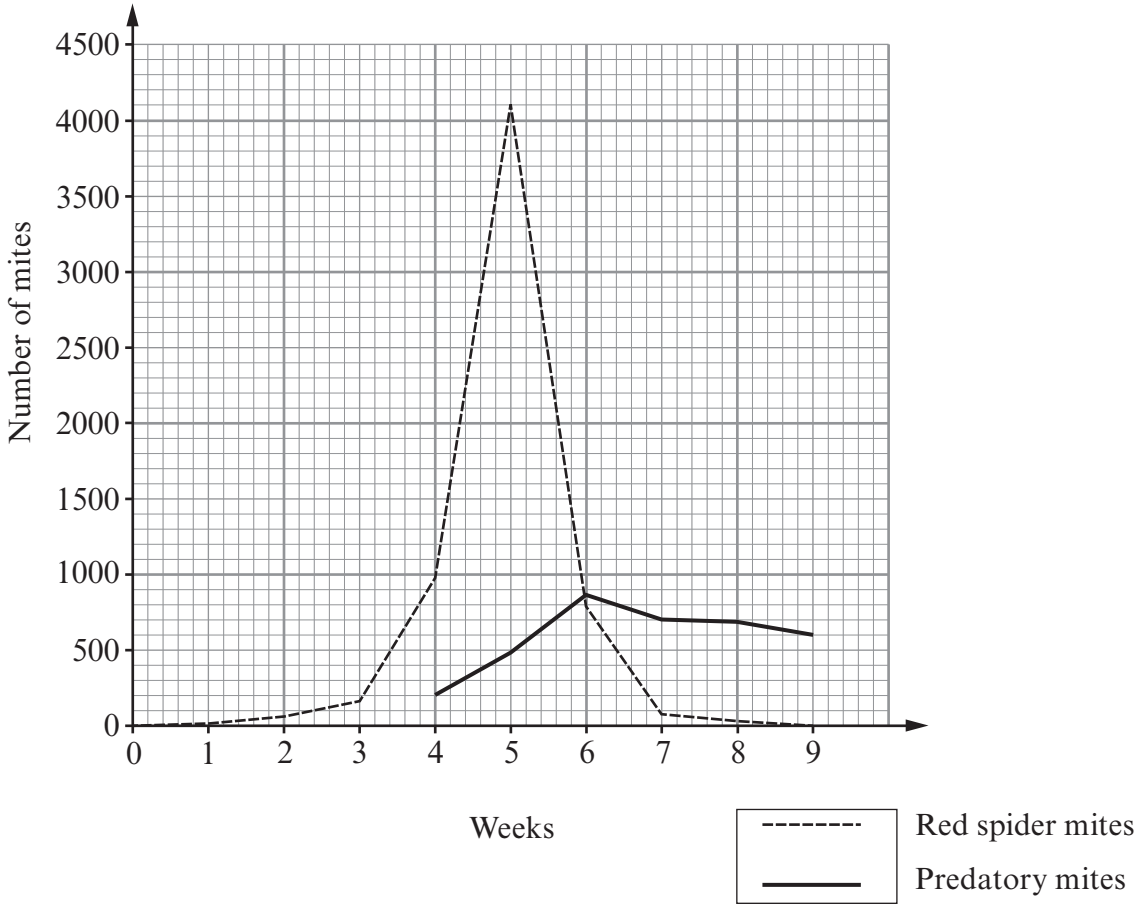
(ii) .....

4. The red spider mite is a pest on fruit trees. It increases in numbers quickly causing damage to the fruit crop.

Red spider mite

Predatory mite

When the number of red spider mites was about 1000 per fruit tree, the farmer introduced predatory mites which eat the red spider mites. This happened on week 4 as shown in the graph below.



Examiner only

(a) Use data from the graph to describe the effect that the introduction of the predatory mites has on the number of red spider mites. [2]

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(b) What name is given to this type of pest control? [1]

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(c) At the end of 9 weeks there are still predatory mites present on the fruit trees. Explain how this could result in a problem. [1]

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Examiner only

5. The diagrams show side views of the chest cavity.

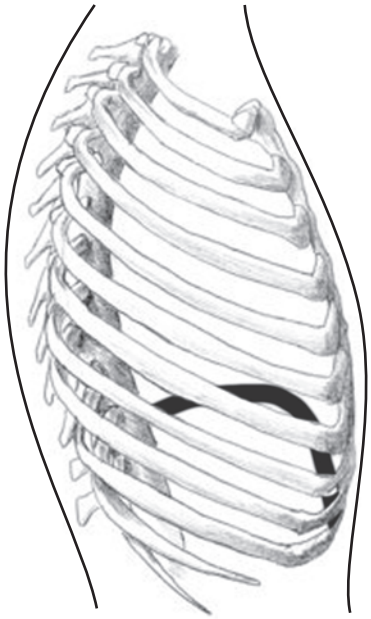

Diagram **A**

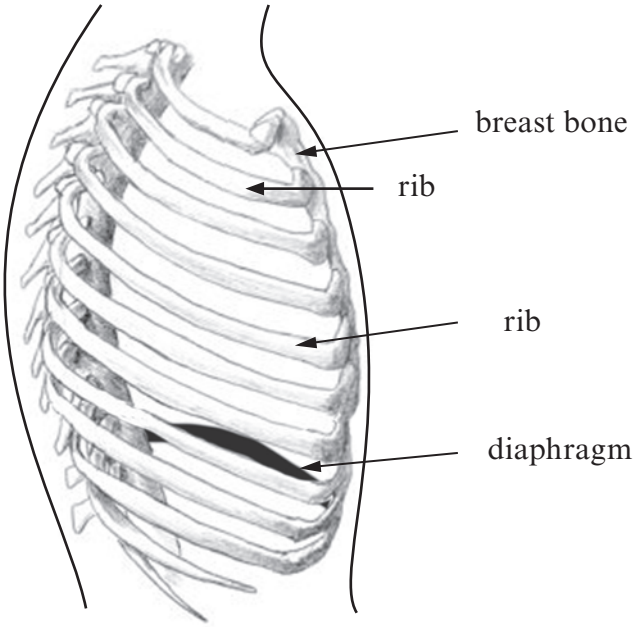

Diagram **B**

(a) State, with reasons, which of the diagrams **A** or **B** shows the chest after inspiration. [2]

Diagram .....

Reasons .....

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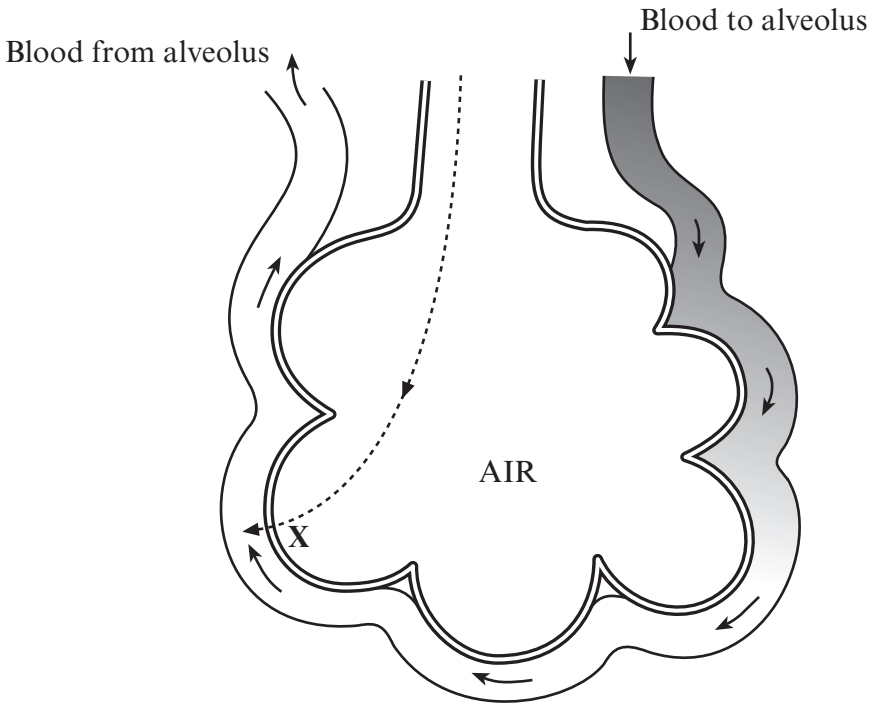
Examiner only

(b) The diagram below shows an alveolus in a lung. The dotted line shows the movement of a gas.



(i) Describe what is happening at point **X** on the diagram. [2]

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(ii) Explain how **two** of the adaptations of alveoli enable them to perform their function. [2]

I .....

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II .....

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Examiner only

6. The following are brief descriptions of two examples of stem cell technology.

1. 82 people who had been accidentally burned, causing blindness in one eye had stem cells from their good eye transplanted to their blind eye.

2. Stem cells from human embryos were genetically modified and injected into mice that had brain cancer. If the cancer is cured, scientists hope to carry out the same method in humans who have brain cancer.

(a) State **two** ethical reasons why the first example is more acceptable than the second. [2]

(i) .....

(ii) .....

(b) Name the type of cell division that takes place in stem cells. [1]

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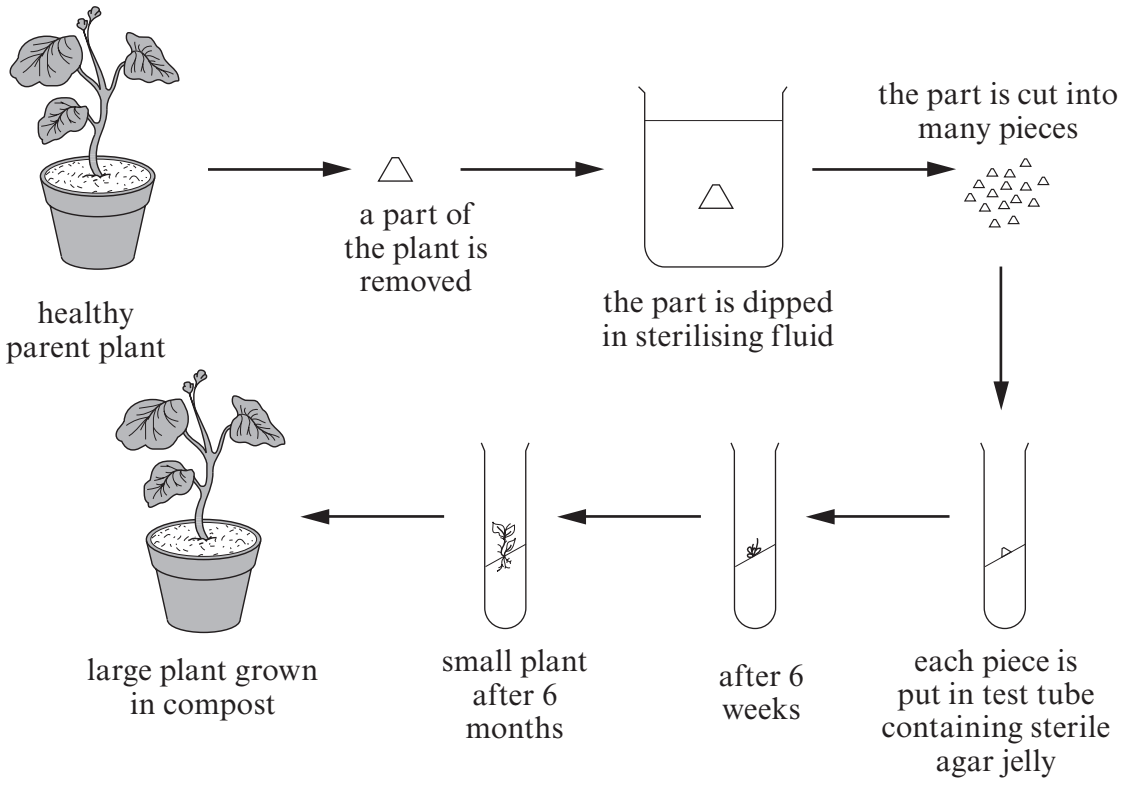
(c) Palm oil plants can be mass produced by the process of tissue culture as shown in the diagram.



Examiner only

(i) Where are stem cells found in plants? [1]

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(ii) If each cell of the adult palm oil plant has 20 chromosomes, how many chromosomes would you expect to be in each cell produced after 6 weeks? [1]

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Examiner only

7. An investigation was carried out to measure the concentration of lactic acid in the blood of an athlete before, during and after vigorous exercise. The results are shown in the table below.

Time (minutes)	Concentration of lactic acid in the blood (units)
0	18
5	18
10	55
15	86
20	66
25	42
30	29
35	21
40	18
45	18

(a) After how many minutes from the start of the investigation did the exercise; [2]

(i) start; .....

(ii) end? .....

(b) For how long was the athlete in oxygen debt?

..... minutes [1]

(c) State why aerobic respiration is more efficient than anaerobic respiration. [1]

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(d) Anaerobic respiration in muscle produces lactic acid. State **two** *other* ways in which anaerobic respiration in muscle differs from anaerobic respiration in yeast. [2]

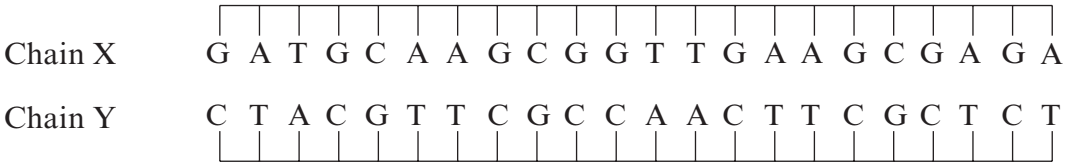
(i) .....

(ii) .....

6

Examiner only

8. The diagram shows the two chains of a DNA molecule which have been separated. The letters represent chemicals which code for units of protein. Three letters in a row code for a single unit of a protein.



(a) What group of chemicals is represented by the letters A, T, C, G? [1]

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(b) Name the units of a protein molecule. [1]

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(c) What is the maximum number of units of protein that can be coded by chain X? [1]

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(d) Normally the two chains are twisted around each other. What is the name for this shape of the DNA molecule? [1]

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(e) Name a group of proteins which have an important function in the body. [1]

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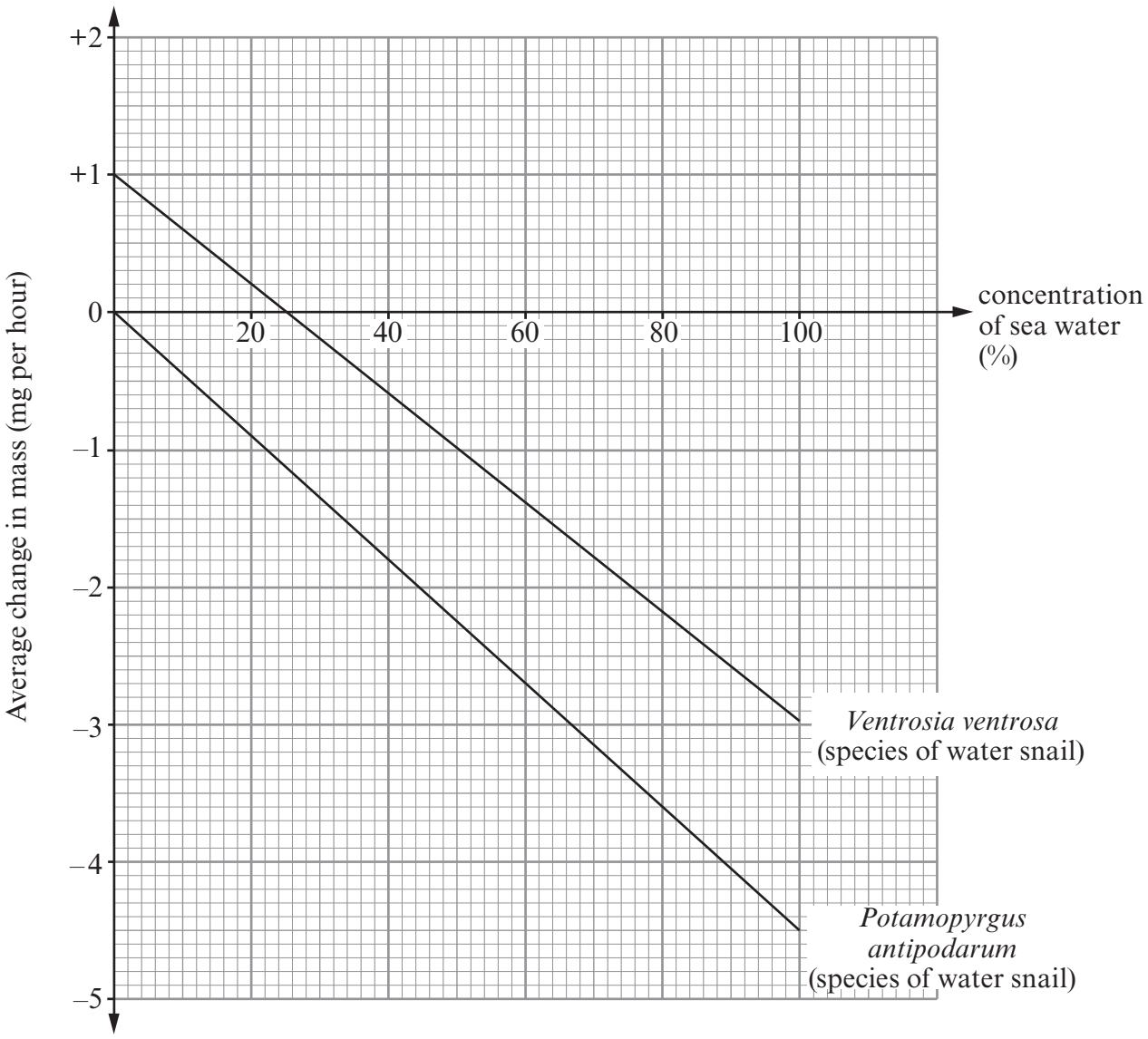
9. The graphs show the average change in mass per hour of samples of two different species of water snails when they were placed in sea water of different concentrations.



Examiner only

(a) The rate at which water passes into animals that live in water is equal to the rate at which it is removed. This results in no change in the mass of the animals.
Use the graphs to determine the concentration of sea water in which *Ventrosia ventrosa* normally lives. [1]

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(b) Name the process which causes *Potamopyrgus antipodarum* to decrease in mass as the concentration of sea water increases. Explain how this process takes place. [4]

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(c) Snails that live in sea water can take certain salts into their bodies against a concentration gradient.

(i) Name the process responsible for taking in these salts. [1]

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(ii) Name **two** chemicals that are needed for this process. [2]

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Turn over.

Examiner only

10. In order to find out the effect of a weedkiller on dandelions, a sample of the weedkiller was sprayed on a $10m^2$ lawn. The number of plants was counted in a $1m^2$ quadrat.
Describe how you would use the quadrat to estimate the total number of living dandelions on the whole lawn before and after treatment with the weedkiller. [6 QWC]

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THERE ARE NO MORE QUESTIONS IN THIS EXAMINATION.