

Candidate Name	Centre Number	Candidate Number
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GCSE

239/02

ADDITIONAL SCIENCE

HIGHER TIER

BIOLOGY 2

A.M. THURSDAY, 13 January 2011

45 minutes

For Examiner's use only		
Question	Max. Mark	Mark Awarded
1	6	
2	5	
3	4	
4	5	
5	5	
6	5	
7	7	
8	6	
9	7	
Total	50	

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.

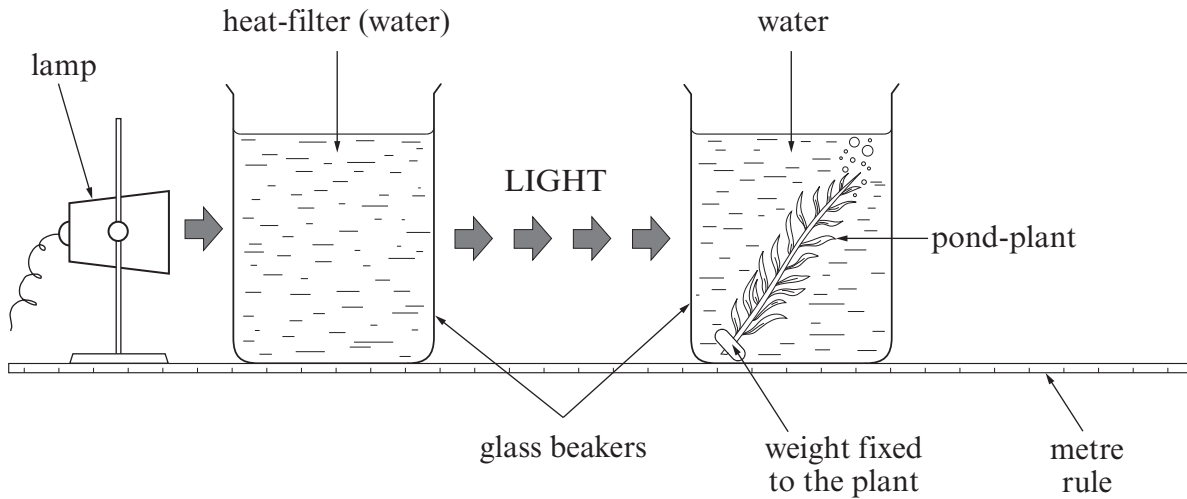
You are reminded of the necessity for good English and orderly presentation in your answers.

Answer all questions.

1. (a) Name the chemical used by green plants to absorb sunlight energy during photosynthesis. [1]

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- (b) The following apparatus was set up by students in a school laboratory.



Explain how you could use the apparatus to investigate the effect of different light intensities on the **rate** of photosynthesis of the pond plant. [3]

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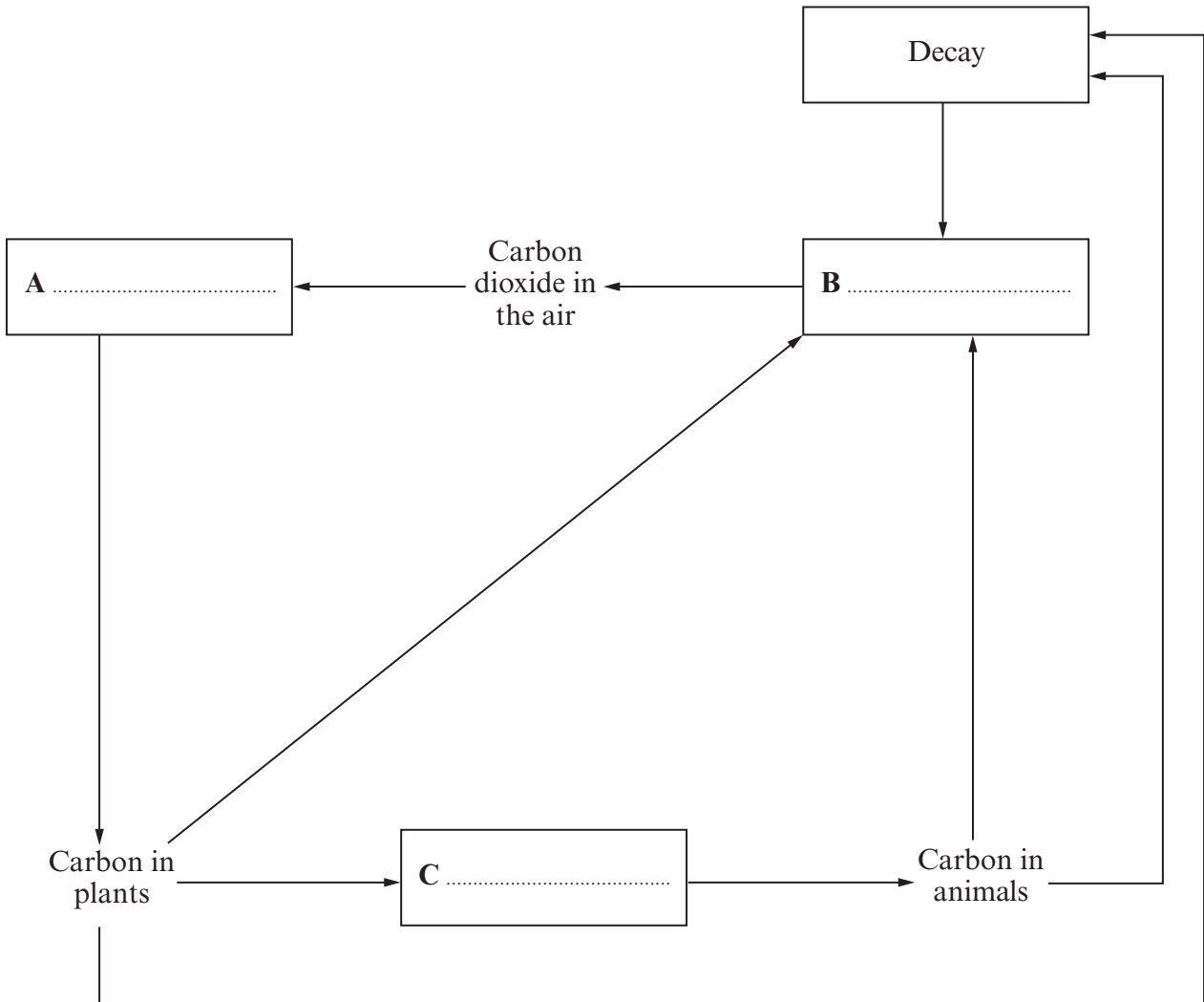
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- (c) State **two** ways in which plant cells use the glucose produced in photosynthesis. [2]

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2. The diagram shows the carbon cycle.



(a) Complete the diagram of the carbon cycle by naming the processes **A**, **B** and **C**. [3]

(b) Explain the part played by microbes in the carbon cycle. [2]

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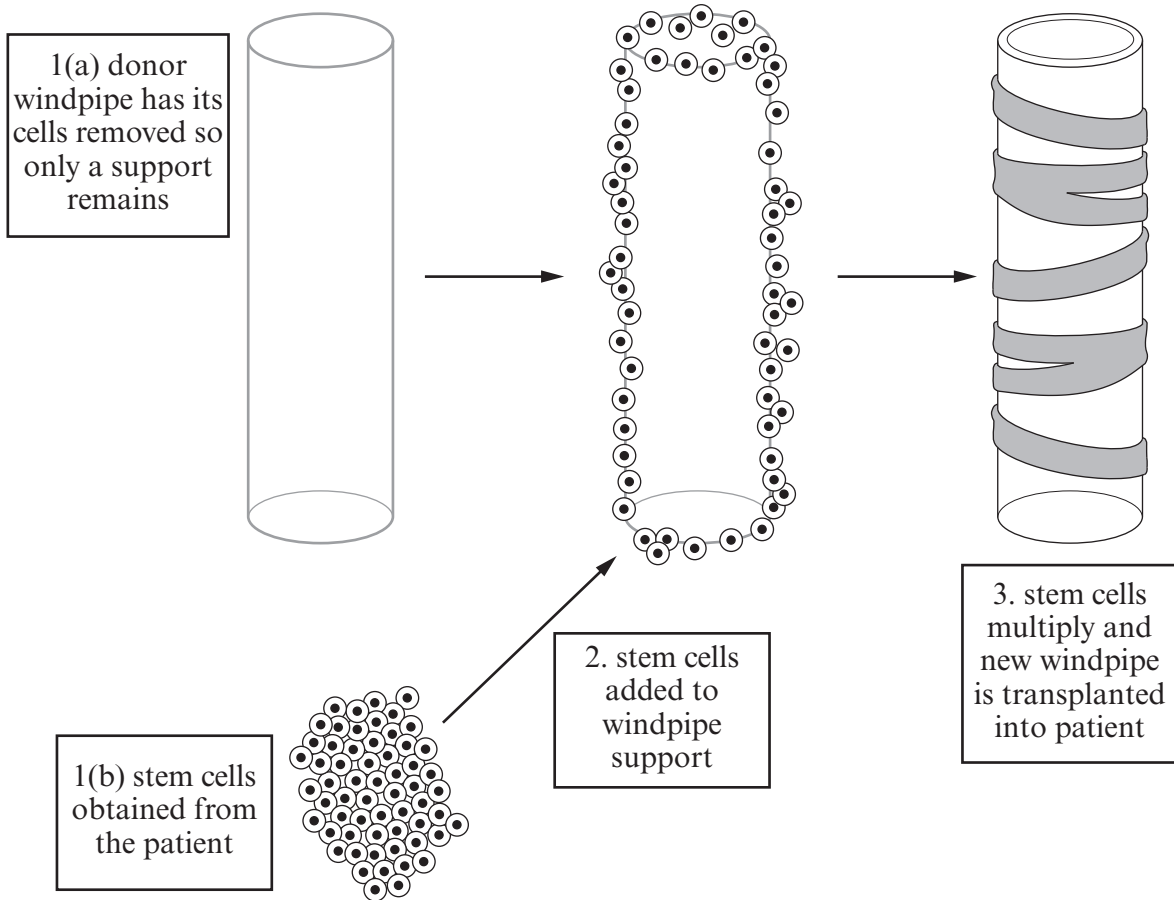
3. (a) What are stem cells?

[2]

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(b) In 2008 scientists carried out the first successful windpipe transplant in humans using the patient's own stem cells.

The process involved the following stages:

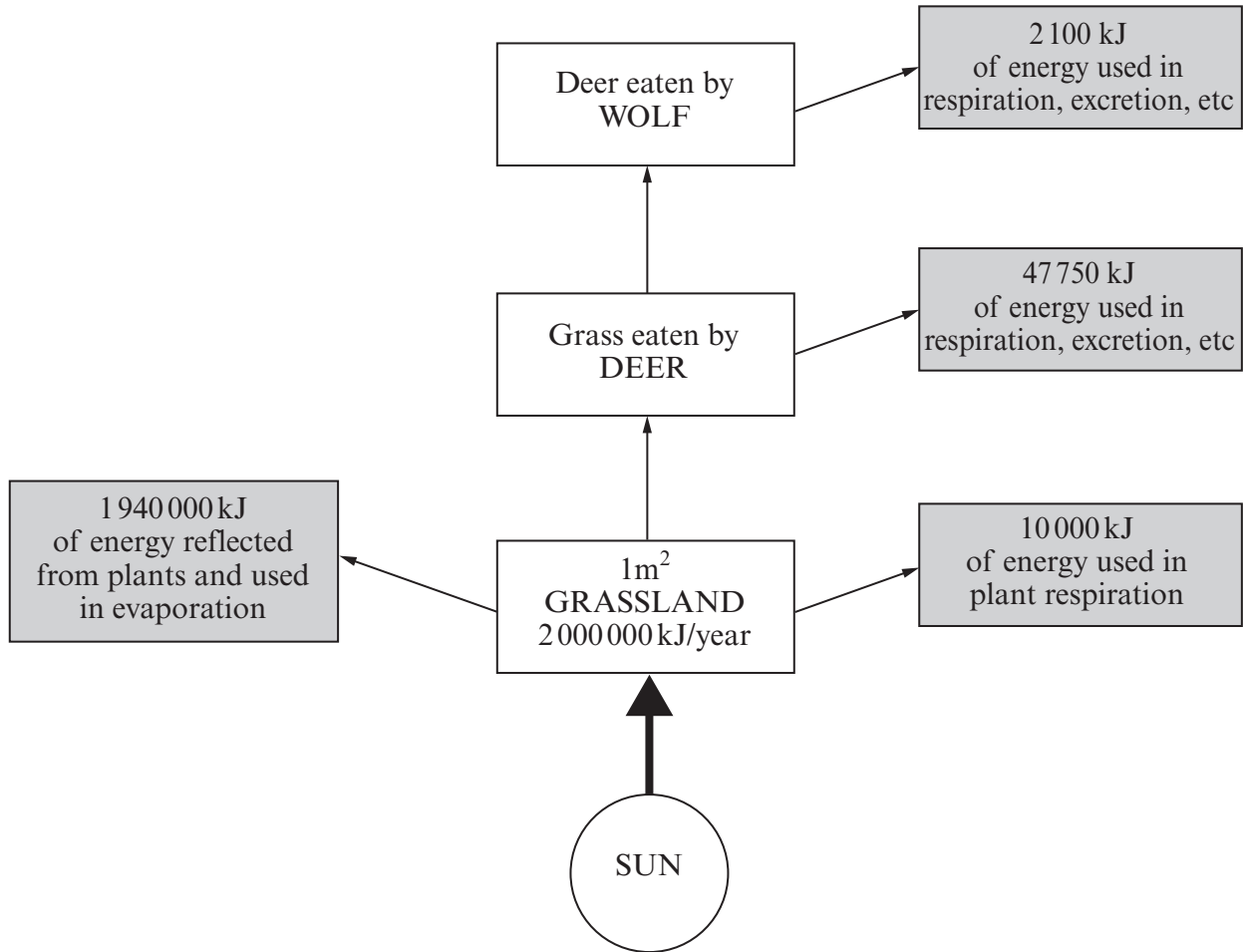


State **two** advantages to the patient of using their own stem cells rather than using embryonic stem cells. [2]

(i)
.....
(ii)
.....

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4. The diagram shows how the sunlight energy landing on 1m^2 of grassland in a year is moved through, and lost from, a food chain. The units of energy are in kilojoules (kJ).



- (a) Calculate the amount of energy transferred to the deer. Show your working. [2]

Answer kJ

(b) Give **two** uses of the energy that is released during respiration. [2]

1.

2.

(c) Why would this food chain not support a third stage consumer? [1]

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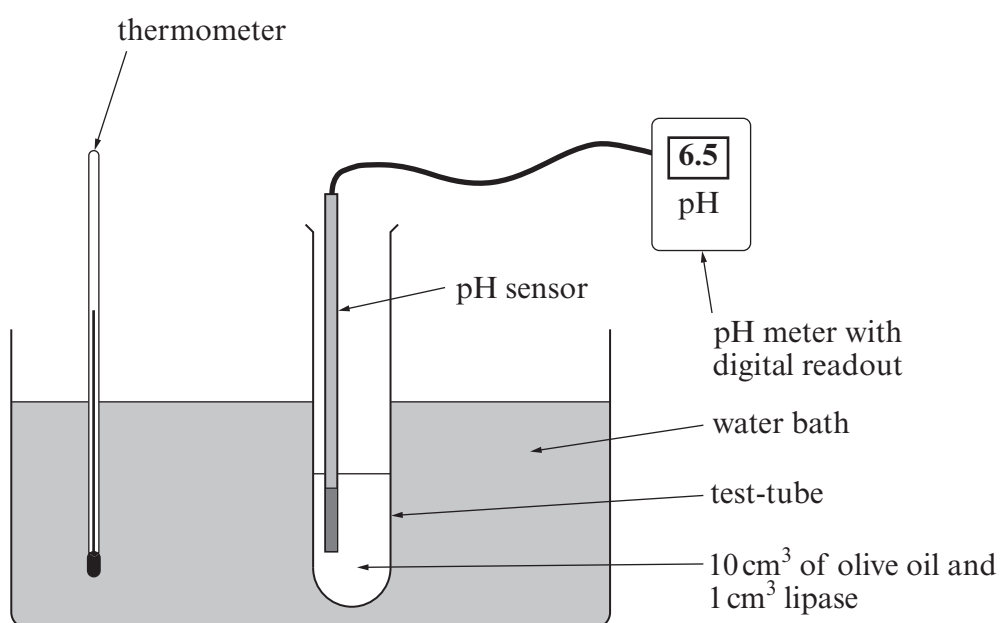
5. (a) Complete the following statement:

[1]

Lipase enzymes digest lipids (fats and oils) into glycerol and

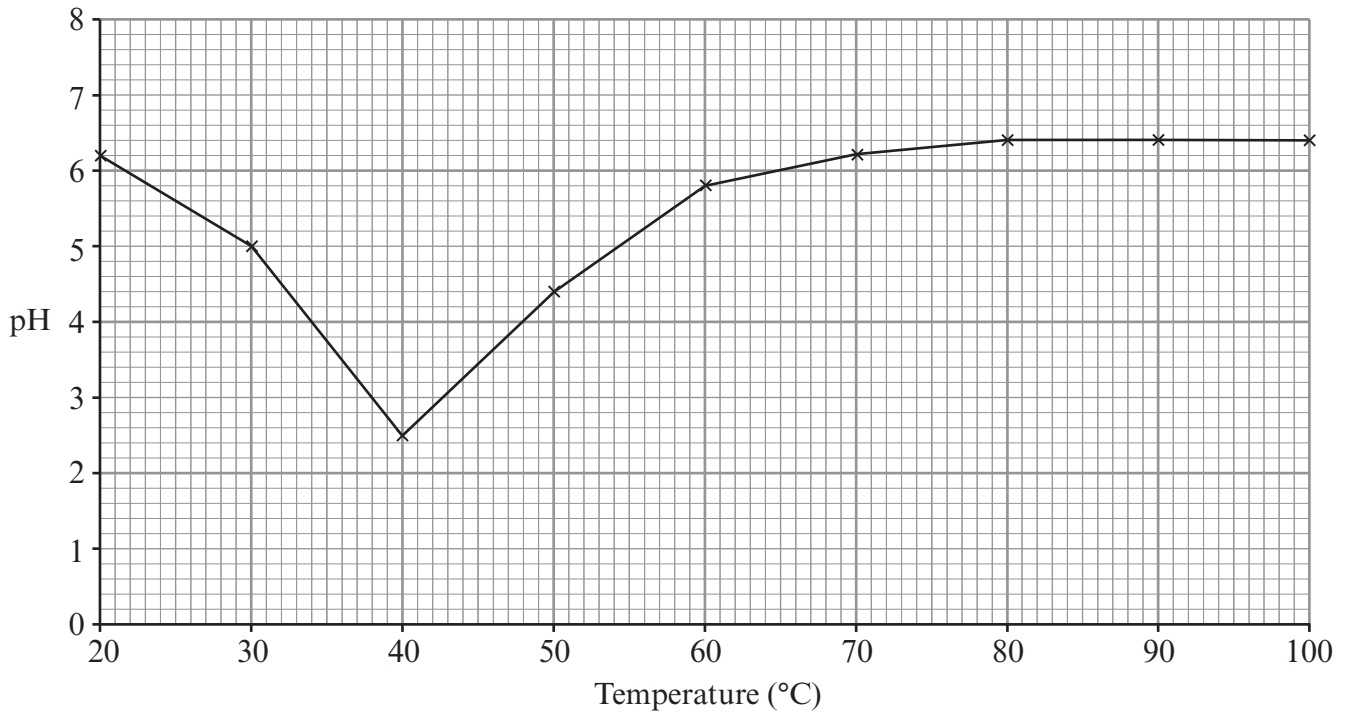
(b) An experiment was set up to discover the effect of temperature on the action of lipase enzyme.

- 9 test-tubes were set up as shown below and kept at a range of temperatures between 20°C and 100°C.
- At the start of the experiment the contents of each tube was at pH 6.5



Each test-tube was left for 30 minutes and the reading on the digital pH meter was then recorded.

The results of the experiment are shown in the graph below.



(i) Why did the pH fall between 20 and 40°C? [1]

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(ii) What is the optimum temperature for this enzyme? [1]

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(iii) Explain why the pH did not change between 80 and 100°C. [1]

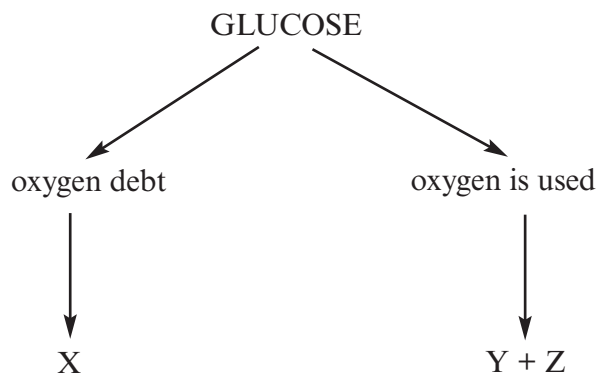
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(c) Where in the digestive system would you find an enzyme working at pH 2.5? [1]

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6. A sprinter starts a race.
The following is a simplified diagram representing respiration in his muscle cells.



(a) Name substances

(i) X,

(ii) Y,

(iii) Z.

[3]

(b) Why is aerobic respiration more efficient than anaerobic respiration?

[1]

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(c) Underline the most suitable description of “oxygen debt” below.

(i) The body’s oxygen supply exceeds its demand.

(ii) More oxygen is breathed out than is breathed in.

(iii) The body’s oxygen demand exceeds its supply.

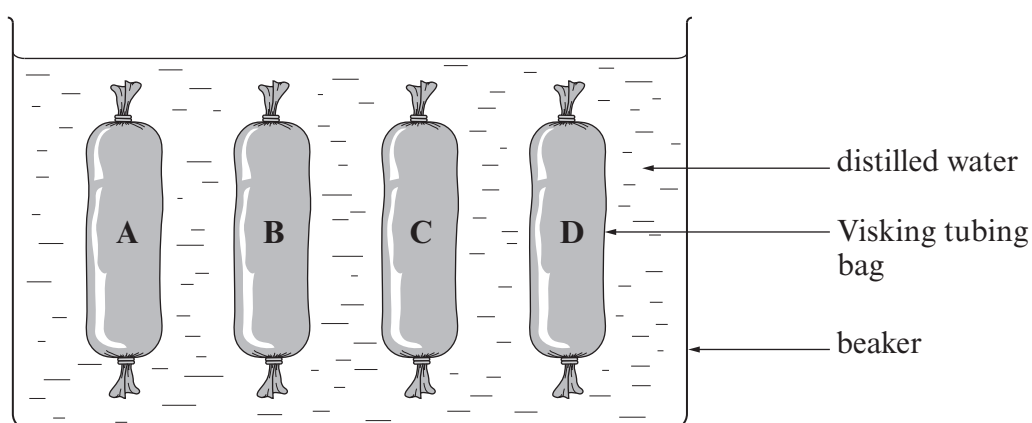
(iv) There is less oxygen in the air than carbon dioxide.

[1]

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7. A student investigated osmosis as follows.

- Three equal sized Visking tubing bags were filled with salt solutions of different concentrations and their ends tied with thread. A fourth bag was filled with distilled water.
- Each bag had a mass of 20g.
- The bags were placed in a beaker of distilled water, as shown in the diagram, and left for 1 hour.
- The bags were then re-weighed and the results noted in the table shown.



Results

Bag	Initial mass (g)	Final mass (g)
A	20.0	21.9
B	20.0	20.0
C	20.0	26.5
D	20.0	29.5

(a) Which bag contained

- distilled water;
- the lowest concentration of salt;
- the highest concentration of salt?

[3]

(b) Which substance was able to pass through the Visking tubing? [1]

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(c) What term is used to describe a property of the Visking tubing that allows osmosis to take place? [1]

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(d) How would you improve the reliability of this investigation? [1]

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(e) Explain what is happening in tube B. [1]

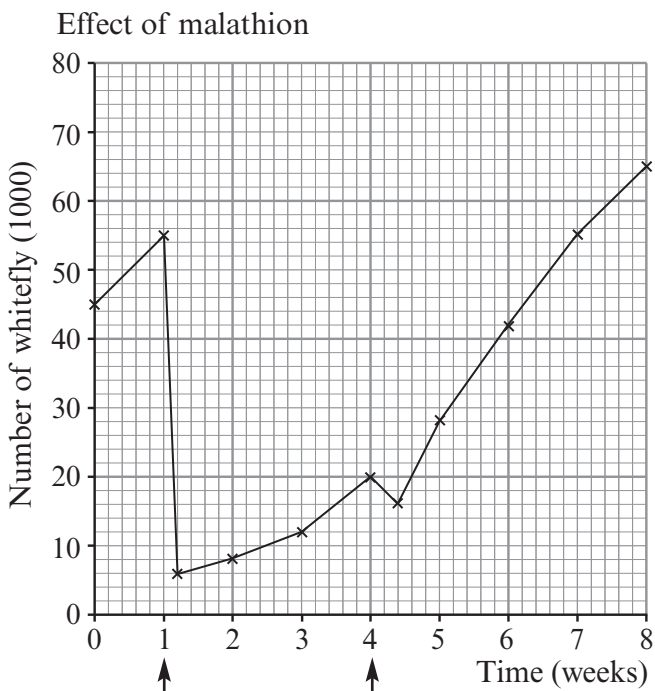
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8. Whitefly are insects that feed on the cell sap of tomato plants. A tomato grower considered using either an insecticide (malathion) or a predatory insect (*Encarsia*) to eliminate an infestation of whitefly in his greenhouses.

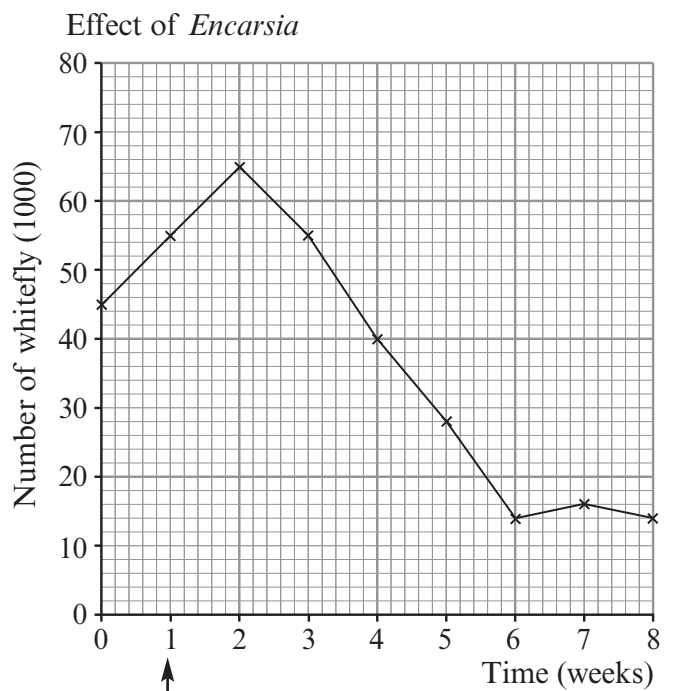
- Encarsia*
- survives best between 18°C and 27°C.
 - is killed at 0°C.
 - above 30°C, it leaves the greenhouses.

The tomato grower used this information and the data in the following graphs to decide which method to use.



First spraying with malathion

Second spraying



Encarsia introduced

(a) Use ONLY the information given to suggest each of the following.

(i) An advantage of using malathion instead of *Encarsia*. [1]

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(ii) A disadvantage of using malathion. [1]

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(iii) An advantage of using *Encarsia* instead of malathion. [1]

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(iv) A disadvantage of using *Encarsia*. [1]

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(b) Why would it not be a good idea to use malathion and *Encarsia* together? [1]

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(c) What term describes the use of the predator *Encarsia* to reduce the number of whitefly? [1]

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9. The awarding of *Blue Flag* status to unpolluted beaches is based on world-recognised standards.

In 2009, the number of *Blue Flag* beaches in Wales fell from 69 to 58.

Scientists say that the heavy rains and floods of the summers of 2007 and 2008 caused polluted water from farms and sewage treatment works to reach the beaches.

(a) Suggest why the Welsh Assembly Government is concerned about the loss of *Blue Flag* status awards in Wales. [1]

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(b) Explain how the polluted water from farms or sewage works could affect the animals and plants that live in coastal waters. [6]

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