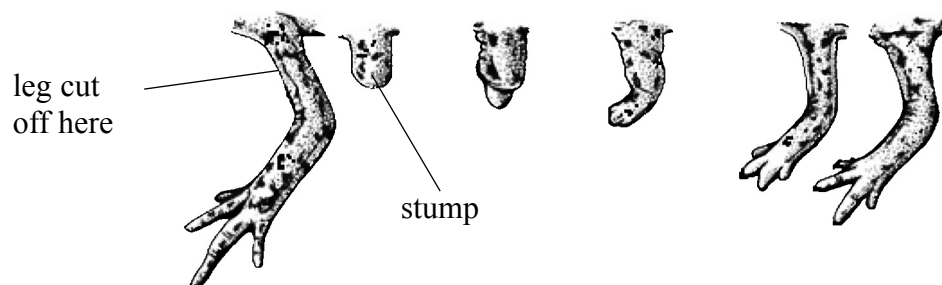


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1. Newts are small animals that live in ponds.
A newt can regenerate a leg if one is accidentally cut off.
The diagrams show the regeneration of the leg over a 24 day period.



- (a) Name the type of cell division that results in the regeneration of a leg.

..... (1)

- (b) Describe the changes that occur in the stump to allow the leg to regenerate.

.....
.....
.....
..... (2)

- (c) Suggest **one** benefit to humans from research into leg regeneration in newts.

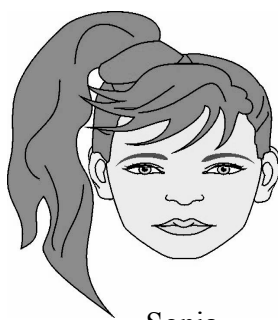
.....
..... (1)

(Total 4 marks)

Q1



2. Sonja, William and Stefan noticed that grass grows less well the nearer it is to a tree.



Sonja

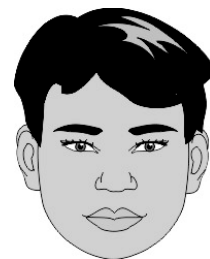
I think that the tree is using up the minerals in the soil and so the grass near it is not getting enough nitrates.

I think that the grass close to the tree is not getting enough light.



William

I think that the tree is using up carbon dioxide so the grass near it can not get enough.



Stefan

(a) Name the process in plants that uses carbon dioxide.

..... (1)



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blank

(b) Explain why Stefan's idea is likely to be incorrect.

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.....
.....

(2)

(c) The three pupils decide to investigate Sonja's idea by varying the concentration of nitrates given to samples of grass grown in the laboratory.

(i) Sonja's task is to find a range of nitrate concentrations in which to grow the samples of grass.

What can Sonja do to work out a suitable range of nitrate concentrations?

.....
.....
.....
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(2)

(ii) William's task is to make sure that it is the different nitrate concentrations that are causing the difference in growth.

State **one** factor, other than the height of the grass, that he should measure and take into account.

.....
.....

(1)

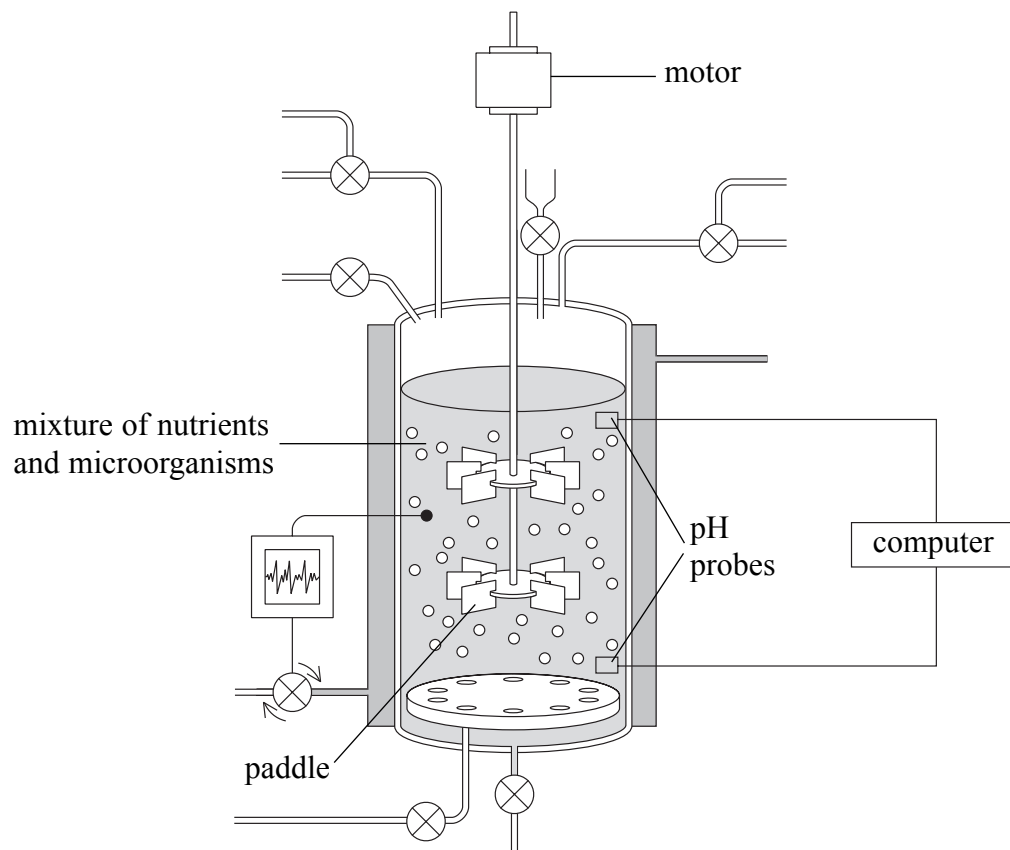
(Total 6 marks)

Q2



3. A model fermenter was used to investigate the effect of stirring the mixture at different speeds.

Two pH probes were put into the fermenter, one at the top and one at the bottom.



The paddles were spun at a speed of 10 revolutions per minute.
 5 cm³ of acid was poured into the top of the fermenter.
 After 20 seconds the pH at the top and the bottom of the fermenter was recorded.
 This was repeated for different speeds.

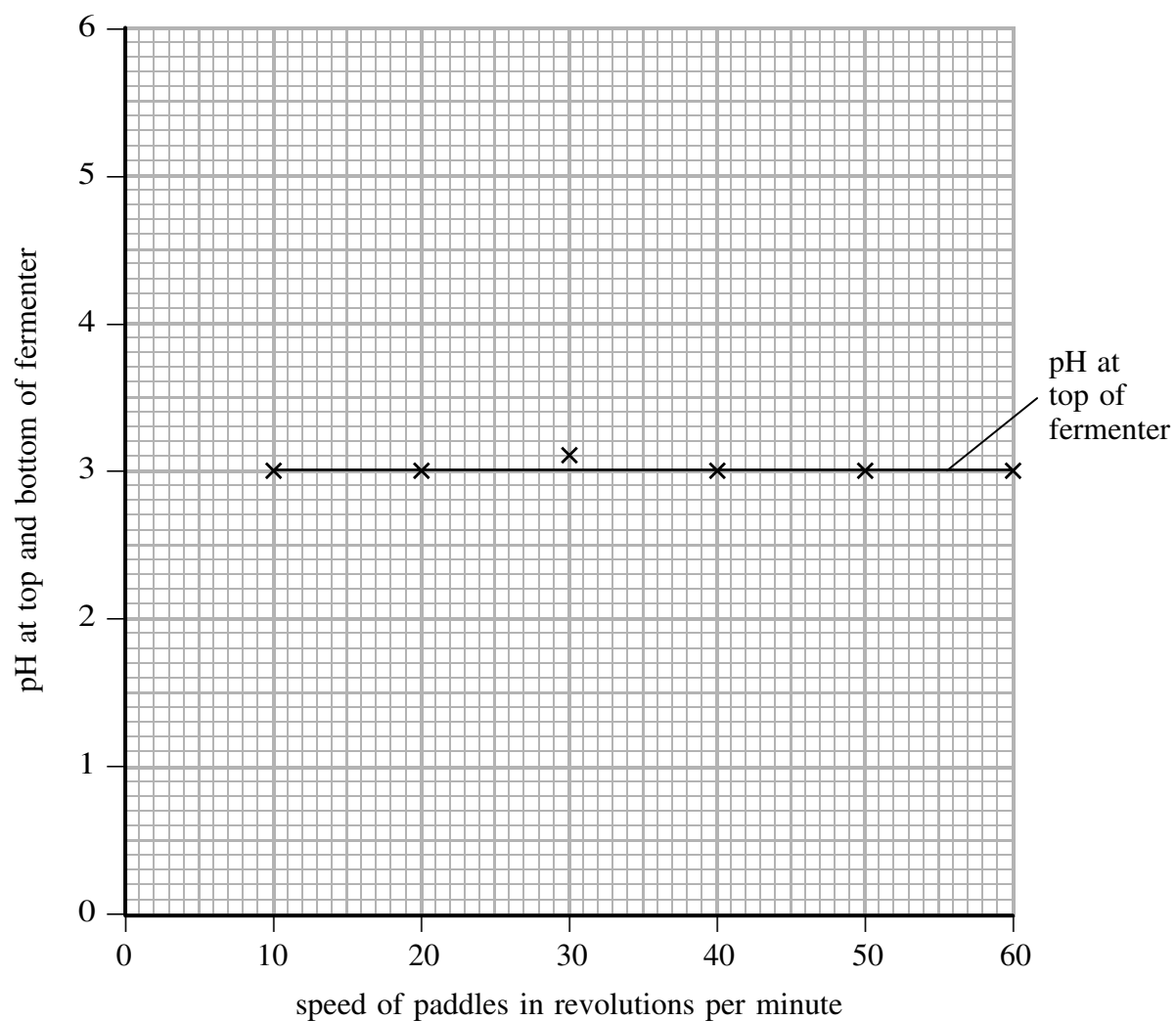
Here are the results

speed of paddles (revolutions per minute)	pH at top of fermenter after 20 seconds of stirring	pH at bottom of fermenter after 20 seconds of stirring
10	3.0	5.2
20	3.0	4.9
30	3.1	4.3
40	3.0	3.5
50	3.0	3.6
60	3.0	3.5



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- (a) Complete the graph by plotting the pH at the bottom of the fermenter against the speed of the paddles. Draw a line of best fit.
The pH at the top of the fermenter has already been plotted.



(3)

- (b) Describe the trend that is shown by these results.

.....

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.....

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(2)

QUESTION 3 CONTINUES ON THE NEXT PAGE



(c) State why stirring the mixture effectively is a key process in the efficient use of a fermenter.

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(1)

(Total 6 marks)

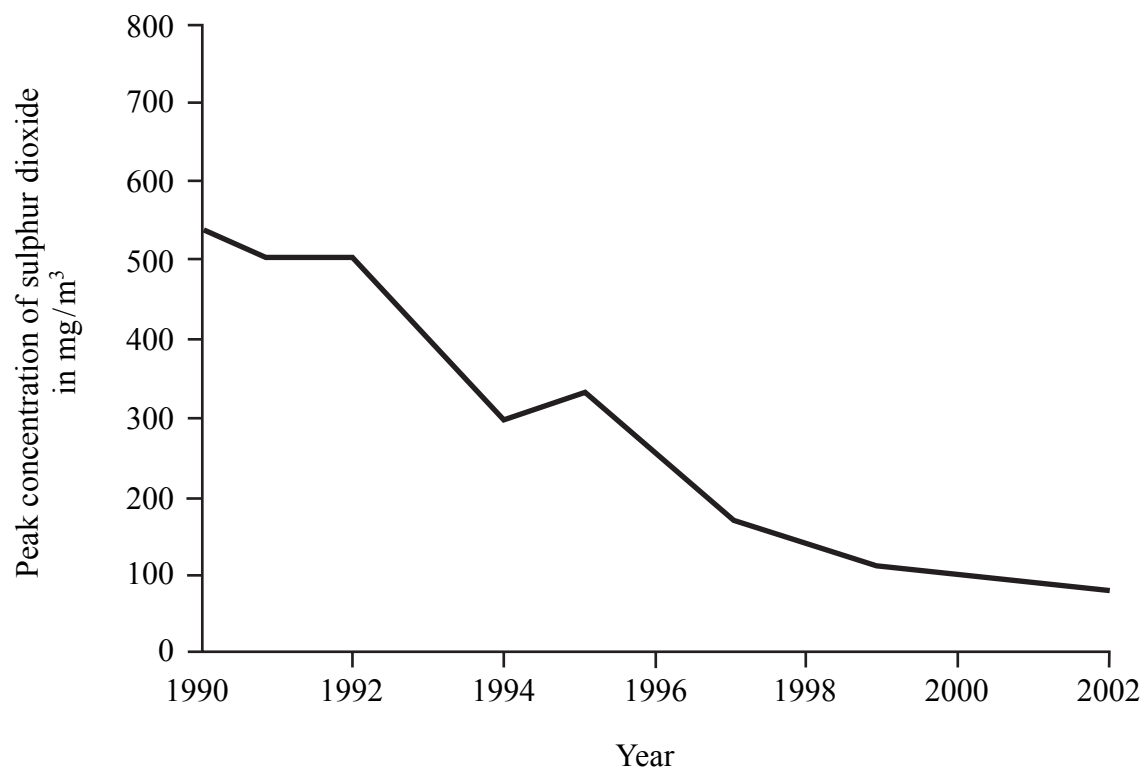
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Q3



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4. The graph shows the peak concentration of sulphur dioxide in the air of UK towns from 1990 to 2002.



- (a) Suggest **one** reason why the sulphur dioxide concentrations decreased between 1990 and 2002.

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(1)

- (b) Suggest what effect this trend may have on lichen biodiversity.

.....
.....
(1)

(Total 2 marks)

Q4



5. Scientists are studying whether it would be possible to live on the planet Mars. They are designing a dome for 50 people to live in for up to ten years. The dome must be completely self supporting. To test this, a dome will have to be built on Earth.

Algae will be used to supply the food and oxygen for the dome. On Earth, 19 m³ of active algae are required to supply the oxygen for one person for one day.

(a) Calculate how much algae would be required in a dome on Earth to supply oxygen for 50 people for one day.

.....
.....
.....

..... m³
(2)

(b) Suggest **two** reasons why more than 19 m³ of algae per person per day may be required in a dome on Mars.

.....
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.....
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(2)

(c) Suggest **two** reasons why algae is a better choice to grow on Mars than food crops such as wheat.

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(2)



(d) Suggest how incorporating solar panels into the dome could make the growth of algae more efficient.

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(1)

(Total 7 marks)

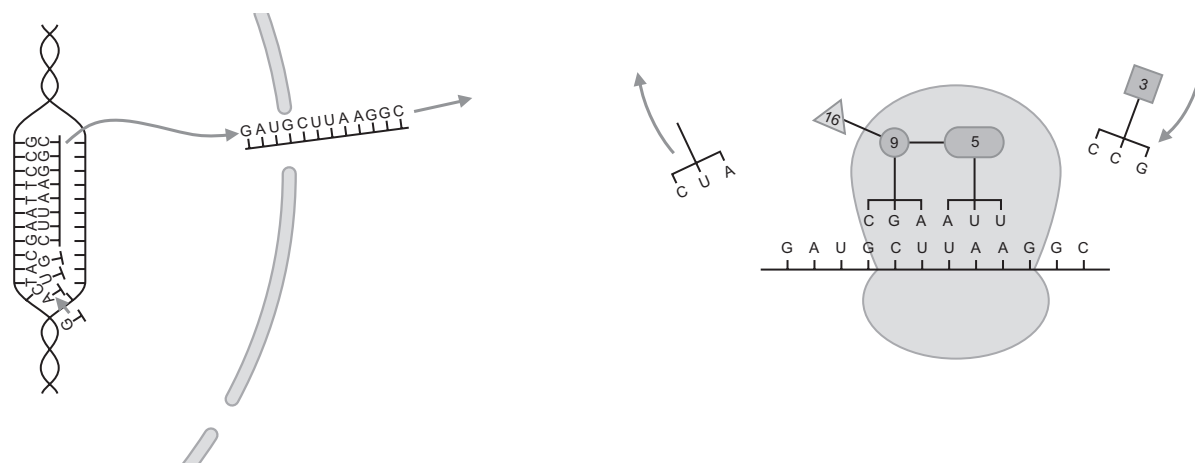
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Q5



N 3 3 0 2 8 A 0 1 1 1 2

6. The diagram shows some of the chemicals and organelles involved in protein synthesis.



Use the diagrams to help you explain how protein synthesis occurs.

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(Total 5 marks)

Q6

TOTAL FOR PAPER: 30 MARKS

END

