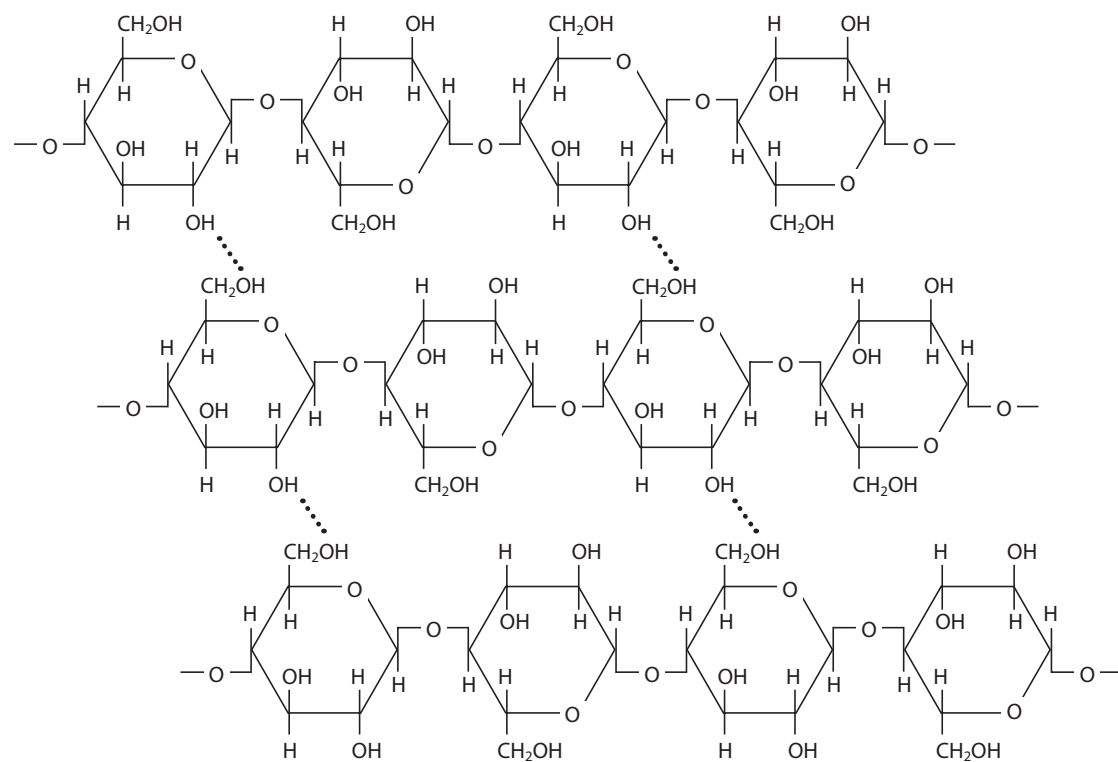**2** Cellulose and mineral ions are important components of a plant.

(a) The diagram below shows part of a cellulose microfibril.

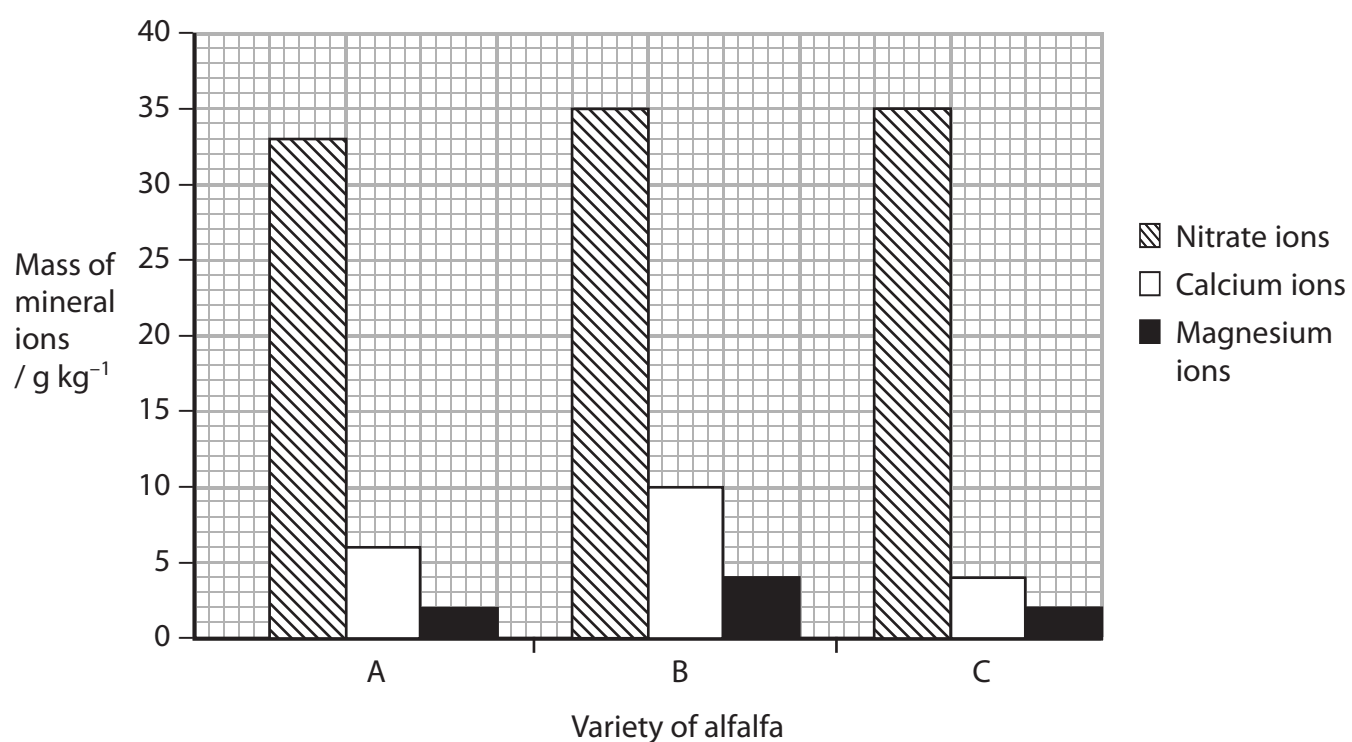(i) On the diagram above, draw a circle labelled **G** round **one** of the glycosidic bonds.

(1)

(ii) On the diagram above, draw a circle labelled **H** round **one** of the hydrogen bonds.

(1)

(b) An investigation was carried out to find the mass of mineral ions in three varieties (A, B and C) of the alfalfa plant.

The results of this investigation are shown in the graph below.

(i) Using the information in the graph, suggest which variety of alfalfa could have the highest concentration of chlorophyll. Give a reason for your answer.

(2)

Variety ....

Reason ....

....

....

(ii) Using the information in the graph, suggest which variety of alfalfa could have the strongest cell walls. Give an explanation for your answer.

(3)

Variety ....

Explanation ....

....

....

....

(c) An investigation was carried out to find the concentration of phosphate ions in a soil sample.

Five wheat seedlings were grown in a solution containing all necessary mineral ions, except for phosphate ions. After three weeks, the increase in height of each seedling was measured and the mean increase in height was calculated.

This procedure was repeated for solutions containing different concentrations of phosphate ions.

The results are shown in the graph below.

Concentration of phosphate ions / arbitrary units
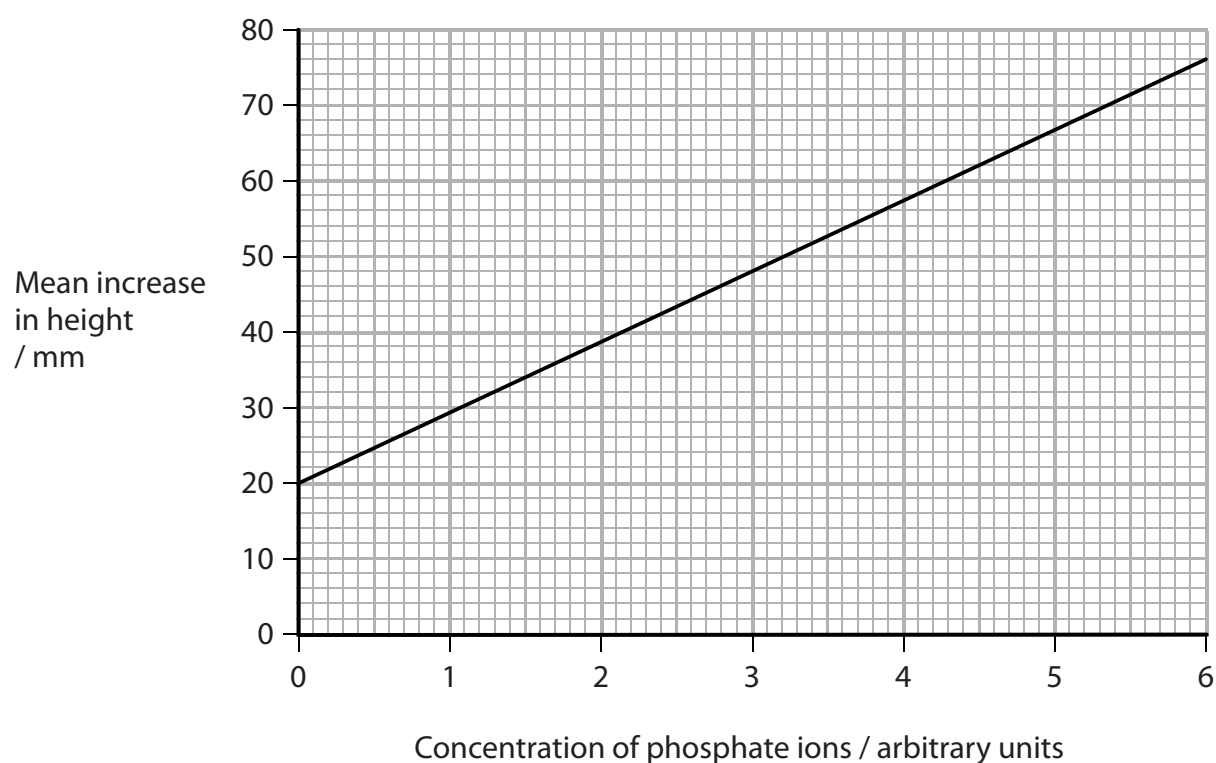
(i) Another five wheat seedlings were grown in a sample of soil for three weeks and their mean increase in height was found to be 45 mm.

Use the graph to estimate the concentration of phosphate ions in this sample of soil.

(1)

Answer .... arbitrary units

(ii) In this investigation, all the seedlings were grown from seeds from the same wheat plant. Suggest why this would improve the validity of the results.

(1)

....

....

....

....

(iii) Suggest **two** factors, other than the time for growth and the source of the seeds, that should have been kept constant in this investigation.

(2)

1 ....

....

2 ....

....

(Total for Question 2 = 11 marks)