

- 1 Australia has added fluoride to much of its drinking water since 1953. Other countries, such as Chile, do not add fluoride to their drinking water.

(a) Outline the arguments for **and** against the addition of fluoride to public drinking water.

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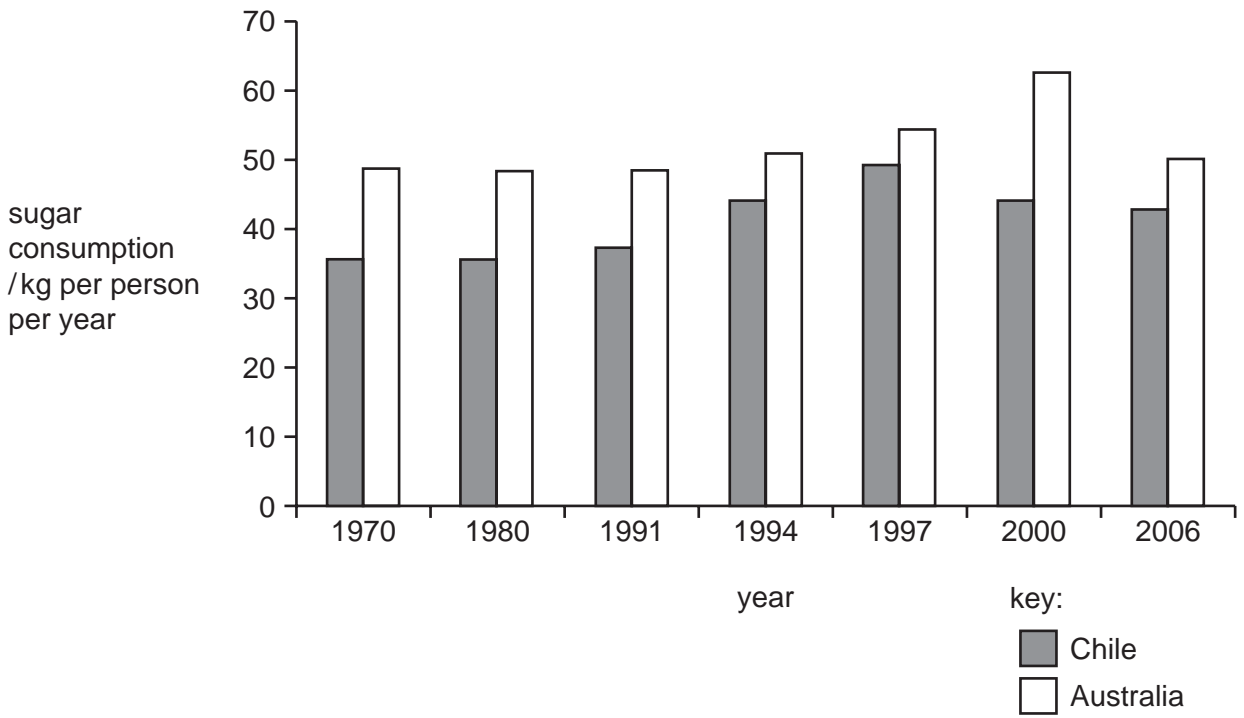
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..... [3]

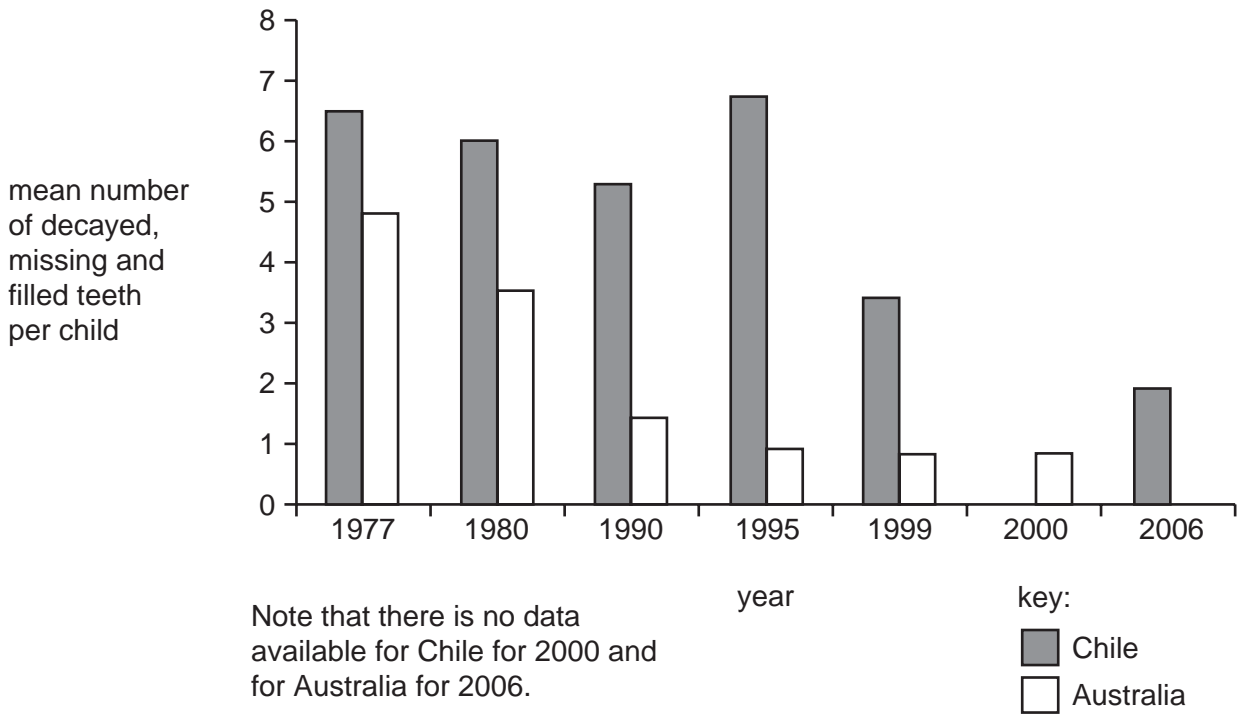
Studies of the relationship between sugar consumption, tooth decay and fluoridation of drinking water have been carried out. Data was collected on tooth decay in 12 year-old children in Australia and Chile.

Fig. 5.1 shows changes in sugar consumption in Australia and Chile between 1970 and 2006.

Fig. 5.2 shows changes in tooth decay in the same countries over a similar time period.



**Fig. 5.1**



**Fig. 5.2**

- (b) Describe the changes in sugar consumption and tooth decay in Australia and Chile between 1970 and 2006.

*sugar consumption* .....

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

*tooth decay* .....

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

[4]

- (c) The peaks for sugar consumption and tooth decay in 12 year-old children in Chile occurred at about the same time. It has been suggested that an increase in sugar consumption in children caused an increase in tooth decay.

Explain how an increase in sugar consumption may cause tooth decay.

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[4]

- (d) Fig. 5.1 shows that sugar consumption in these two countries is similar. Fig. 5.2 shows the changes in tooth decay in 12 year-old children.

Suggest explanations for the similarities **and** differences in tooth decay in 12 year-old children in Australia and Chile.

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..... [3]

[Total: 14]

2 Fig. 2.1 shows a villus from the small intestine of a mammal and an enlarged view of a cell from region **A**.

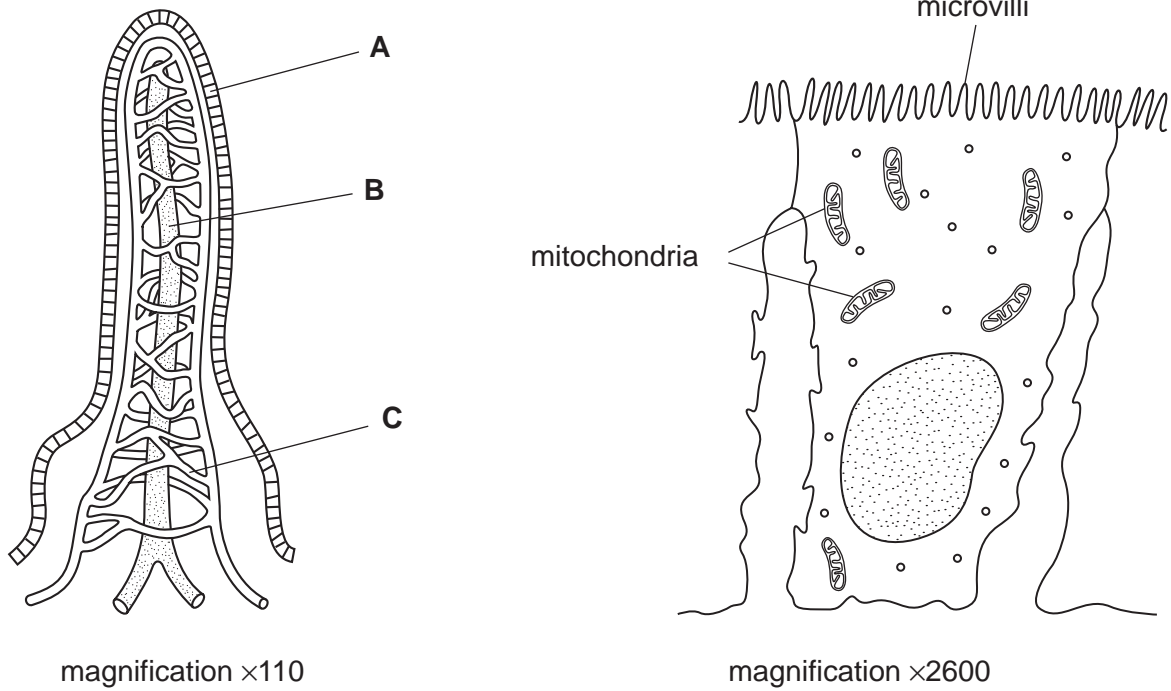


Fig. 2.1

(a) Name regions **A**, **B** and **C**.

- A** .....
- B** .....
- C** ..... [3]

(b) Explain why the cells from region **A** have many microvilli and mitochondria.

- many microvilli* .....
- .....
- .....
- many mitochondria* .....
- .....
- ..... [4]

(c) The Food Standards Agency in the UK defines a food additive as:

‘any substance intentionally added to food for a specific function that is not normally eaten as a food or used as a characteristic ingredient in food.’

Some additives are naturally occurring substances, but others are man-made. Some additives have been identified as a risk to people’s health.

(i) State two benefits of using food additives in processed foods.

- 1. ....  
.....
  - 2. ....  
.....
- [2]

(ii) State **four** possible risks to health that have been linked to food additives.

- .....
  - .....
  - .....
  - .....
  - .....
  - .....
- [4]

[Total: 13]

- 3 Mycoprotein is similar to single cell protein and is sold as an alternative to meat such as beef.

Table 3.1 shows the composition of mycoprotein and beef.

**Table 3.1**

nutrient	dry mass/g per 100 g	
	mycoprotein	beef
protein	49.0	51.4
fat	9.2	48.6
fibre (roughage)	19.5	0.0
carbohydrate	20.6	0.0

- (a) (i) State two differences in composition between mycoprotein and beef.

1. .... [2]  
 2. ....

- (ii) Using data from Table 3.1, suggest two reasons why eating mycoprotein is better for health than eating beef.

Explain your answers.

- reason 1 .....  
 explanation .....  
 .....  
 reason 2 .....  
 explanation .....  
 ..... [4]

- (b) (i) Calculate the dry mass of mycoprotein **not** represented by protein, fat, fibre or carbohydrate.

Show your working.

Answer .....g [2]

- (ii) Suggest **one** nutrient that this dry mass might contain.

..... [1]

- (c) The antibiotic penicillin is produced by fungi that are grown in a fermenter, as shown in Fig. 3.1. The process is similar to the manufacture of enzymes.

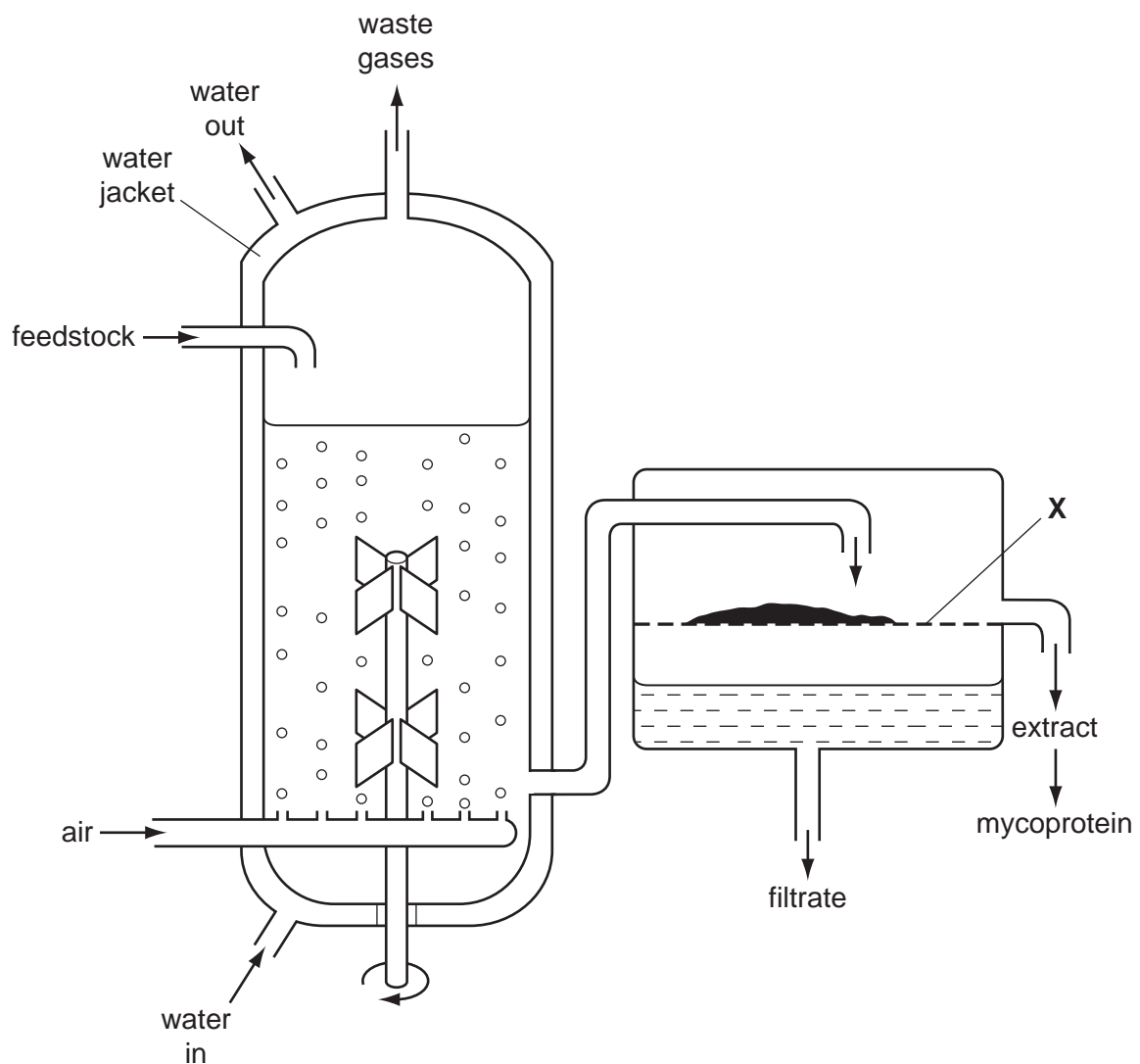


Fig. 3.1

(i) Name the two raw materials likely to be present in the feedstock.

- 1. .... [2]
- 2. .... [2]

(ii) State the function of **X**.

..... [1]

(iii) Suggest the name of the main gas present in the waste gases.

..... [1]

(d) During the fermenting process, the temperature in the container would rise unless steps are taken to maintain a constant temperature.

(i) Suggest a suitable temperature for the feedstock.

..... [1]

(ii) Explain why the temperature rises.

..... [2]  
..... [2]

(iii) Explain why a constant temperature has to be maintained.

..... [2]  
..... [2]  
..... [2]

(iv) Using the information from Fig. 3.1, suggest **how** a constant temperature is maintained.

..... [1]  
..... [1]

[Total: 19]

4 Over-consumption of alcohol is a problem in some countries.

(a) (i) State two long term effects on the body of drinking too much alcohol.

- 1 .....
- 2 ..... [2]

Some alcohol producers have started to promote 'responsible drinking'. Fig. 2.1 shows the label on a bottle of beer.

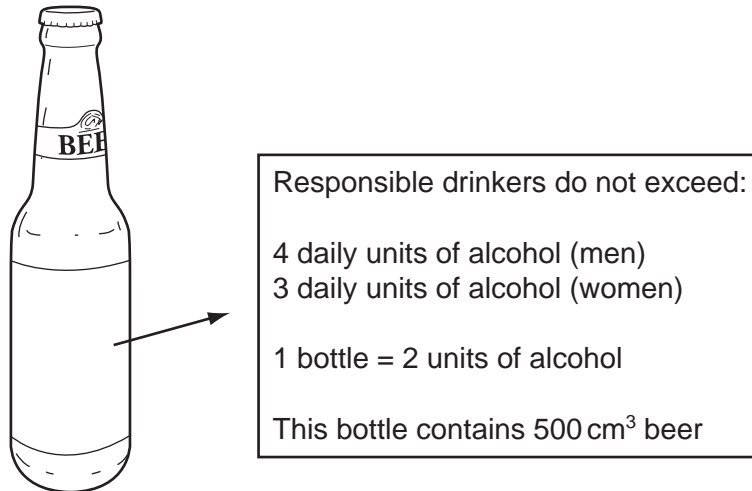


Fig. 2.1

(ii) Using information from this label, calculate the volume of beer which would provide the recommended daily maximum alcohol intake for a responsible male drinker.

..... cm<sup>3</sup> [1]

(b) Unlike most food nutrients, alcohol does not need to be digested. Instead, it is readily absorbed into the blood from, for example, the stomach.

(i) Explain why most food nutrients **do** need to be digested.

- .....
- .....
- ..... [2]

(ii) State the main site of absorption of most products of digestion.

..... [1]

(iii) Name **one** product of digestion which is **not** absorbed directly into the blood stream.

..... [1]

Fig. 2.2 shows the relationship between blood alcohol content and the risk of having a road accident.

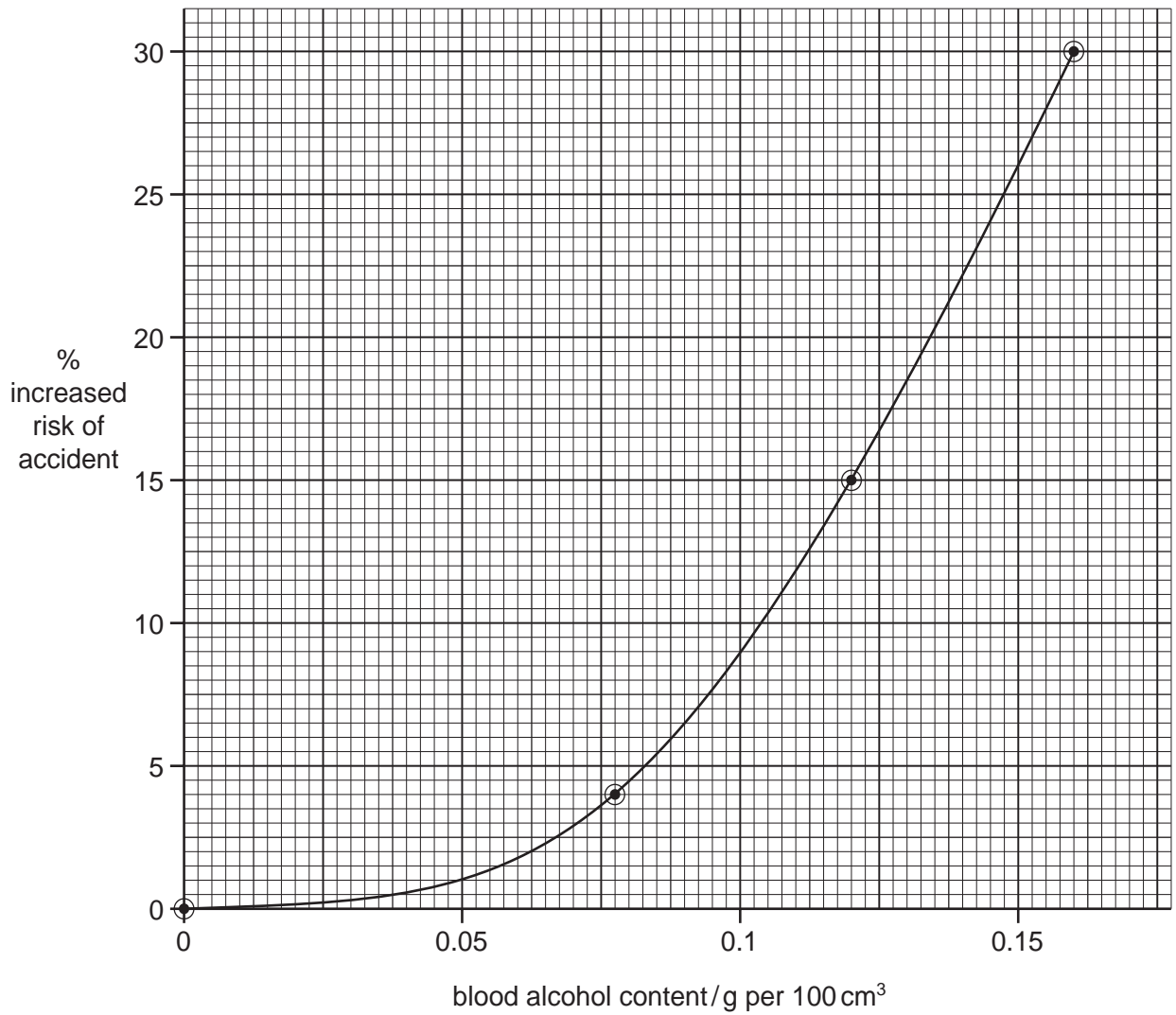


Fig. 2.2

(c) (i) Use the graph to predict the increased risk of a road accident if a driver had a blood alcohol content of 0.10 g per 100 cm<sup>3</sup>.

increased risk ..... [1]

(ii) Describe the relationship shown by the graph between blood alcohol content and the risk of having a road accident.

.....  
.....  
..... [2]

(iii) With reference to the nervous system, explain how drinking alcohol before driving increases the risk of having an accident.

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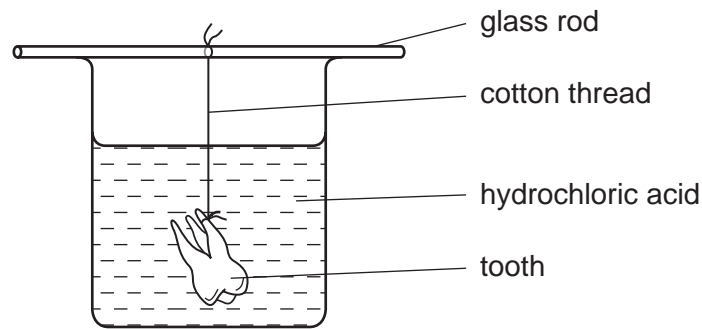
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..... [3]

[Total: 13]

- 5 A human tooth was suspended in hydrochloric acid and left for 24 hours, as shown in Fig. 2.1. When the tooth was removed and washed, the lower part, to which the cotton was attached, was no longer hard, but soft and rubbery. After replacing the tooth in the acid for another 24 hours, the rest of the tooth was also soft.



**Fig. 2.1**

- (a) (i) Name the part of the tooth to which the cotton was attached.

..... [1]

- (ii) Name the type of human tooth used in this experiment. State two reasons for your answer.

Type of tooth .....

Reason 1 .....

.....

Reason 2 .....

..... [3]

- (iii) With reference to tooth structure, suggest and explain why the lower part of the tooth became soft before the upper part.

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..... [3]

Fig. 2.2 shows a tube of 'White Teeth' toothpaste.



Fig. 2.2

(b) State and explain two reasons why regular brushing with this toothpaste would help to protect teeth from decay.

1 .....

.....

.....

2 .....

.....

..... [4]

(c) Brushing is not the only way of protecting teeth from decay.

State two other ways of maintaining healthy teeth.

1 .....

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2 .....

..... [2]

[Total: 13]