1 **(a)** Complete the following passage by using the most appropriate terms from the list to fill the gaps. Each term should not be used more than once.

anti-parallel	**β-pleated sheet**	**covalent**
double helix	**hydrogen**	**parallel**
polypeptide	**ribose**	**sugar-phosphate**

DNA is found in the nucleus. The molecule is twisted into a .... in which each of the strands are ..... . It has two ..... backbones attached to one another by complementary bases. These bases pair in the centre of the molecule by means of ..... bonds. **[4]**

(b) Table 1.1 shows the relative proportions of different DNA bases in four different organisms.

Table 1.1

	relative proportions of bases in DNA as a percentage			
organism	A	C	G	T
human	30.9	19.8	19.9	29.4
grasshopper	29.3	20.7	20.5	29.3
wheat	27.3	22.8	22.7	27.1
E. coli	24.7	25.7	26.0	23.6

(i) Describe the patterns shown by the data given in Table 1.1.

.....

.....

.....

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.....

.....

..... **[3]**

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(ii) Suggest how the data given in Table 1.1 might have been helpful to scientists in working out the structure of DNA.

.....

.....

.....

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

(c) DNA in the nucleus acts as a template for the production of RNA.

Complete the table below to show **three** ways in which the structure of DNA differs from that of RNA.

feature	DNA	RNA
number of strands		
bases present		
sugar present		

[3]

(d) DNA codes for the structure of polypeptides.

State the role of messenger RNA (mRNA).

.....

.....

.....

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

[Total: 14]

2 In the search for new biofuels, research has been done into the digestion of wood waste by fungi.

The cellulase enzymes produced by the fungi break cellulose into sugars. These sugars can then be converted into ethanol, a biofuel.

Fig. 3.1 shows the stages in this digestion process.

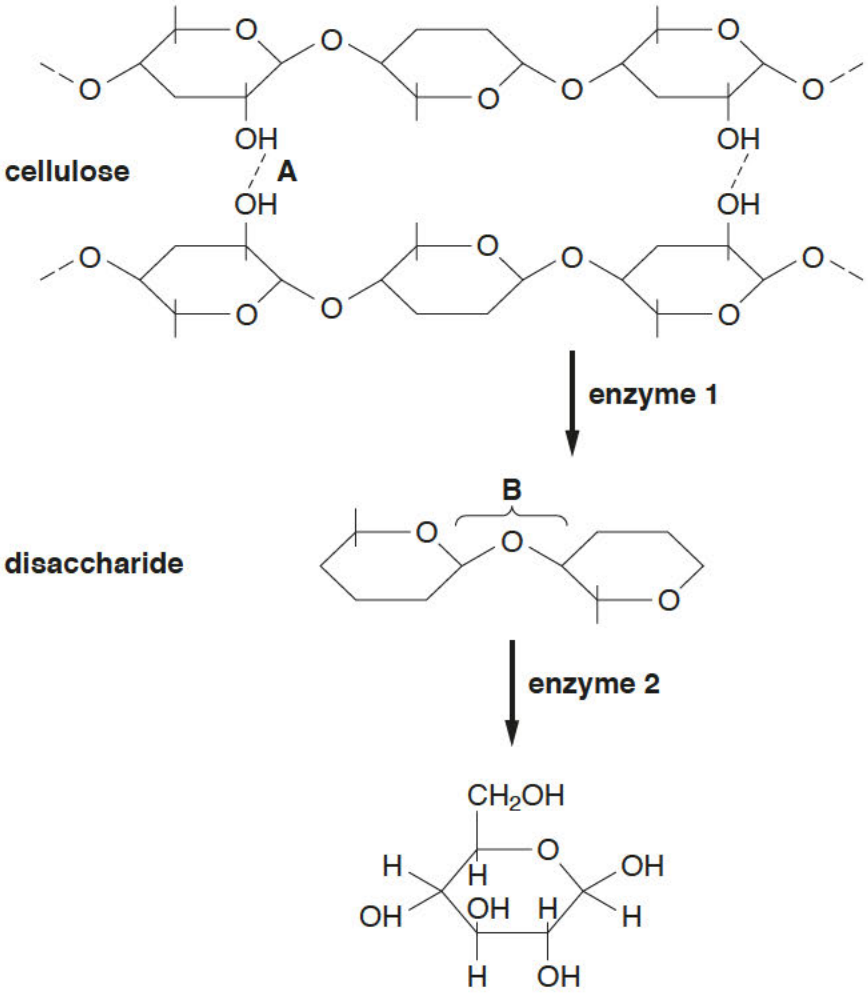


Fig. 3.1

(a) (Name bonds **A** and **B** shown in Fig. 3.1.

A .....

B ..... **[2]**

(ii) State how bond **B** is broken in the digestion of the disaccharide.

.....

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

(iii) Name the sugar that is the **final** product of this digestion process.

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

(b) Explain why **different** enzymes are involved in each stage of the digestion process.

.....

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..... **[3]**

(c) Fig. 3.2 shows the effect of changing pH on the rate of activity of **enzyme 2**.

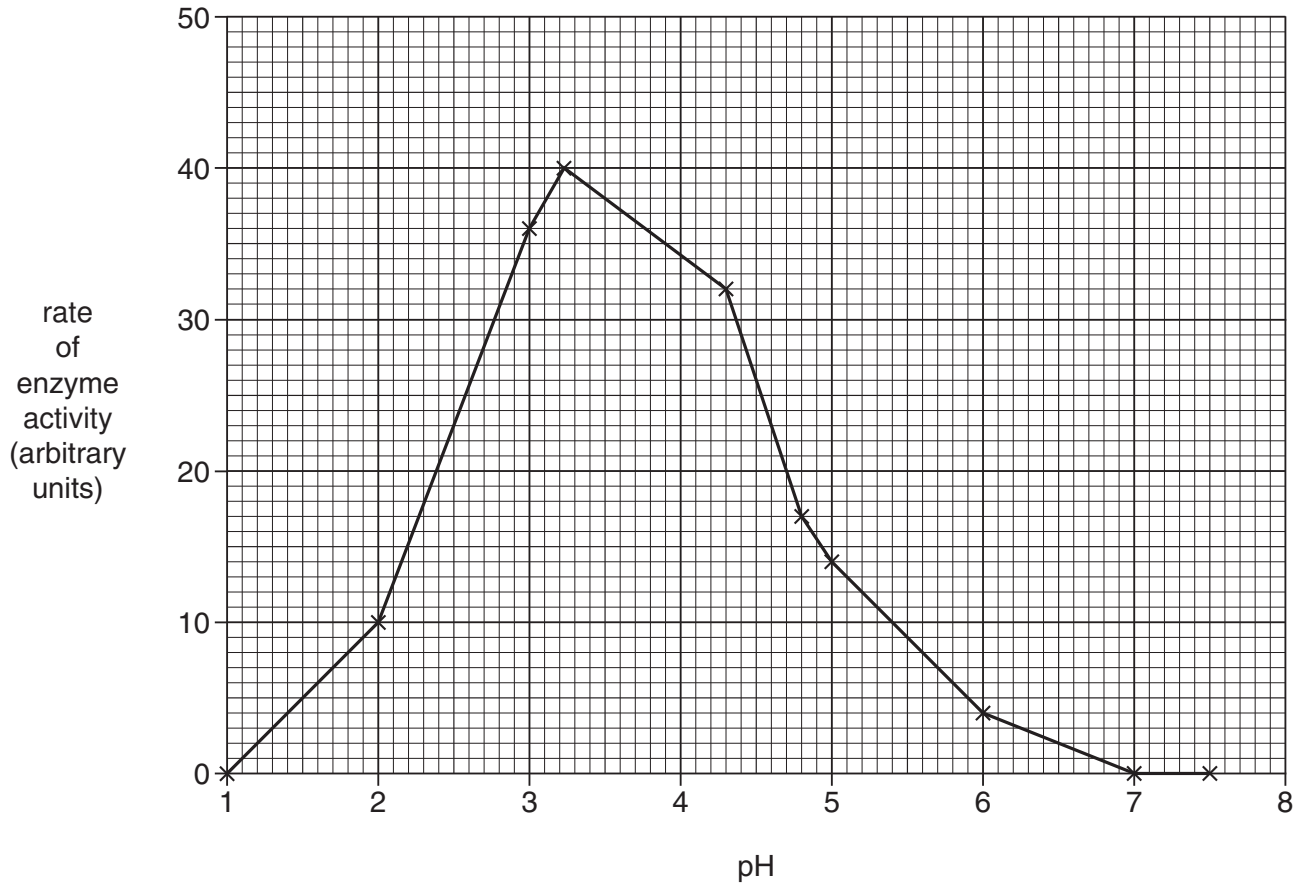


Fig. 3.2

(i) Explain why the activity of **enzyme 2** falls to zero at pH 7.

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.....

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..... **[3]**

(ii) State **two** factors that should have been controlled when investigating the effect of pH on the activity of **enzyme 2**.

1 .....

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

(d) The activity of an enzyme can be measured by testing for the concentration of its product at regular intervals.

Describe how the concentration of a reducing sugar can be measured using a colorimeter.

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..... **[6]**

[Total: 18]

3 Malaria is a disease that is estimated to kill around 80 people every hour worldwide.

(a) The symptoms of malaria are caused by a single-celled organism belonging to the genus *Plasmodium*.

(i) *Plasmodium* is described as a parasite.

Define the term *parasite*.

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..... **[3]**

(ii) Explain why the human body's primary defences do **not** prevent the entry of *Plasmodium* into the body.

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

(iii) Suggest why malaria is much more common in tropical areas than in other parts of the world.

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

(iv) Suggest **two** reasons why governments in parts of the world other than tropical areas, are also becoming increasingly concerned about malaria.

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

(b) People with the disease known as iron-deficient anaemia (IDA) are resistant to malaria. This resistance is not well understood but is thought to involve phagocytosis.

Fig. 2.1 shows the process of phagocytosis of a pathogen by a phagocyte.

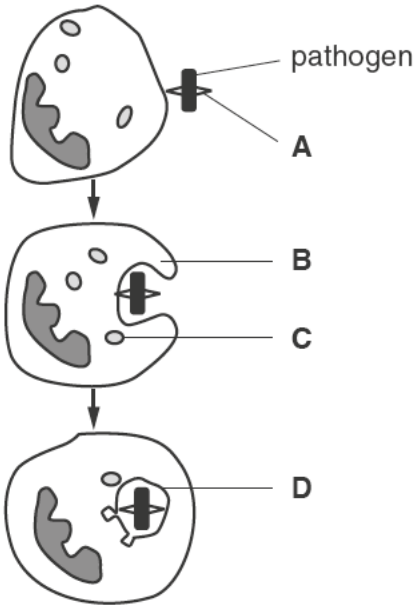


Fig. 2.1

(i) Identify the structures represented by the letters **A**, **B**, **C** and **D**.

A .....

B .....

C .....

D .....

[4]

(ii) In patients with IDA, anaemia is caused by the destruction of erythrocytes (red blood cells) by phagocytosis.

Suggest why erythrocytes that contain *Plasmodium* are more likely to be destroyed by phagocytosis than healthy erythrocytes.

.....

.....

.....

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

(c) Erythrocytes contain haemoglobin, which is a globular protein.

Blood vessel walls contain collagen, which is a fibrous protein.

Describe the differences between globular and fibrous proteins using haemoglobin and collagen as examples.



In your answer you should refer to collagen and haemoglobin.

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..... **[8]**

[Total: 21]