Remedial Practice:
(Topic A & C: Biomolecules & Enzymes)

Name: _____ Class: _____ Date: _____

1 **Fig. 1.1** shows five different biological molecules.

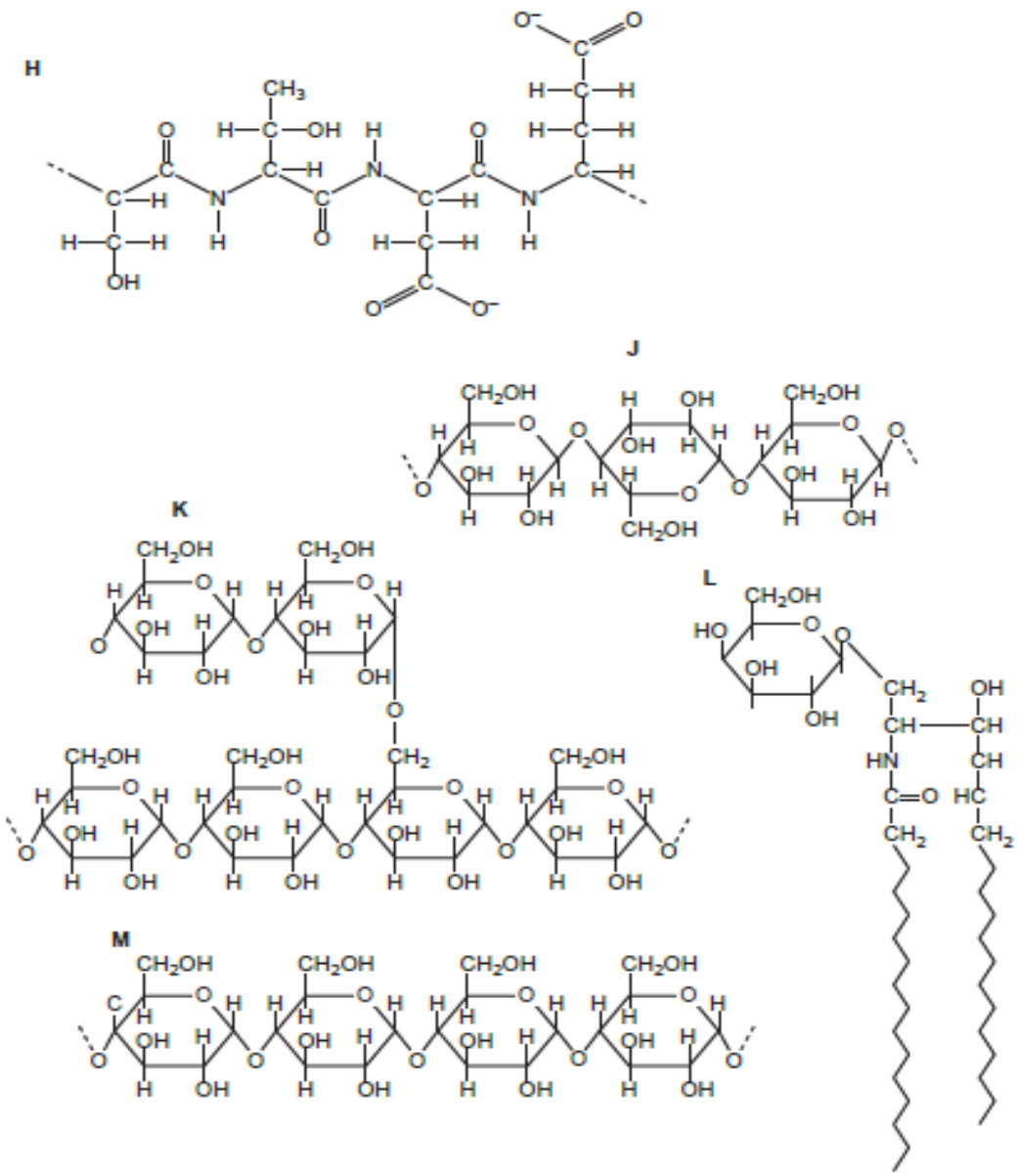

Fig. 1.1

(a) Complete **Table 1.1** by indicating which molecule matches each statement.

You may use each letter (**H** to **M**) once, more than once, or not at all.

You should write only one letter in each box.

Table 1.1

statement	letter
contains peptide bonds	
part of the molecule forms the hydrophobic part of cell membranes	
contains 1,4 and 1,6 glycosidic bonds	
forms the primary structure of a protein	
forms a helical structure	
the sub-unit molecule is β-glucose	

[3]

(b) **Fig. 1.2** is a diagram of part of an α-helix of a polypeptide chain commonly found in many types of protein.

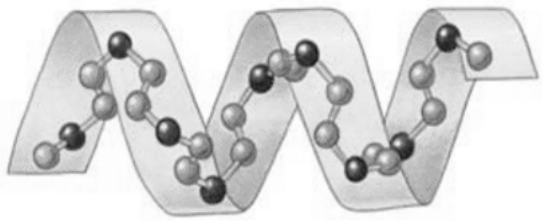

Fig. 1.2

(i) Name the repeating monomer of a polypeptide chain.

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[1]

(ii) Explain what would happen to the α-helix if the polypeptide chain was heated to a temperature above 60 °C.

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..... [3]

The primary structure of a collagen polypeptide has a repeating pattern of three amino acids. Fig. 1.3 shows the two forms of this pattern.

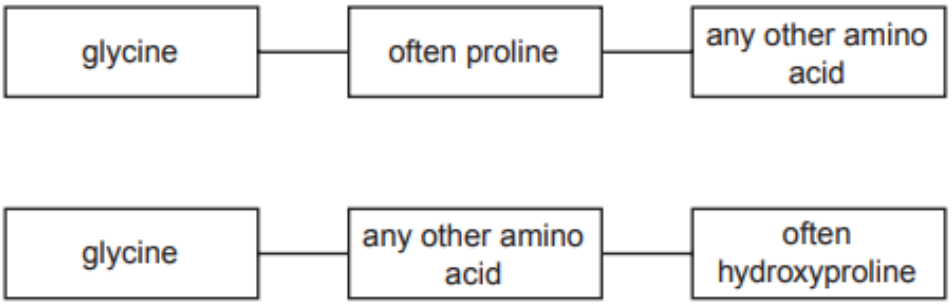

Fig. 1.3

(c) Glycine makes up approximately 30% of the total amino acid composition of collagen.

Fig 1.4 shows the molecular structure of glycine.

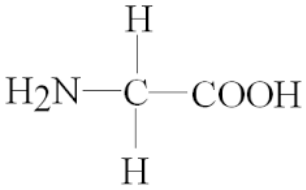

Fig. 1.4

(i) On Fig. 1.4, draw a box around the R-group of glycine. [1]

(ii) Explain how glycine plays an essential role in the structure of collagen.

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[2]

Collagen and cellulose are structurally similar and both provide structural functions. Collagen is a key biomolecule found in the skin, bone, connective tissue and tendons in animals while cellulose is found in plant cell walls.

(d) (i) Describe how the similarities in their structures that allow them to perform structural and supportive functions.

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[3]

(ii) Describe how, other than the chemical bonds and the names of the monomers present, the structure of a cellulose differs from that of collagen.

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[2]
[Total: 15]

2 Monosaccharides may be used to build a wide variety of biological structures.

Fig. 2.1 shows two simplified β-glucose molecules.

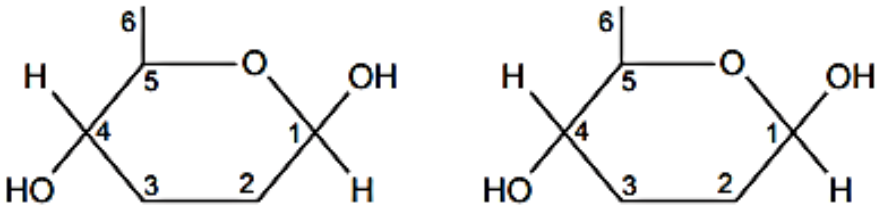

Fig. 2.1

(a) (i) Draw a diagram in the space below to show how these molecules can bond together.

[2]

(ii) State the name of the bond you have drawn.

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[1]

(b) State one similarity and one difference between the structure of ribose and the structure of β-glucose.

similarity

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difference

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[2]

(c) Another form of glucose is α-glucose.

(i) Describe the advantages to a plant of condensing α-glucose molecules into starch.

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[4]

(ii) Suggest why mammals store α-glucose as glycogen rather than as starch.

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[1]

[Total: 10]

3 Starch phosphorylase is an enzyme found in plant cells. In potato tuber cells, the enzyme takes part in the breakdown of starch when the tube begins to grow. Starch phosphorylase can be inhibited by competitive inhibitors like cyclodextrin.

starch + phosphate ions $\xrightarrow{\text{starch phosphorylase}}$ glucose 1-phosphate

Fig. 3.1 illustrates the model of enzyme action of starch phosphorylase.

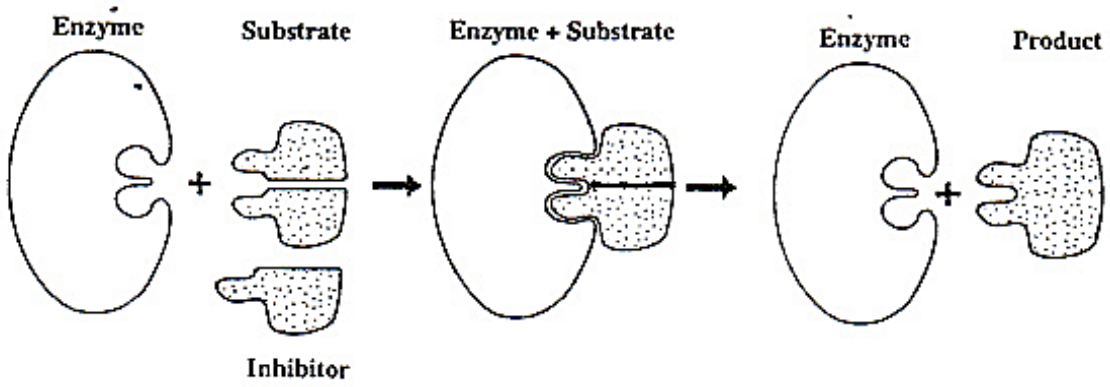

Fig. 3.1

(a) Using **Fig. 3.1**,
(i) describe how the enzymes take part in chemical reactions.

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[3]

(ii) explain competitive inhibition.

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[3]

A student investigated the effect of pH on this reaction using two buffer solutions. The student prepared three test-tubes, **A** to **C**, as shown in **Table 3.1**.

The enzyme extract was made from potato tissue. A solution of potassium dihydrogen phosphate was added to some tubes as a source of phosphate ions.

The test-tubes were left for ten minutes in a water bath at 30°C and then samples were tested with iodine solution.

Table 3.1

test-tube	contents					results with iodine solution after ten minutes
	volume of starch solution/cm^3	volume of glucose-1-phosphate solution/cm^3	volume of potassium dihydrogen phosphate solution/cm^3	pH of buffer solution	enzyme extract	
A	2	0	0.5	6.5	unboiled	negative
B	2	0	0.5	2.0	unboiled	positive
C	2	0	0.5	6.5	boiled	positive

(b) Suggest why the student boiled some of the extract in this investigation.

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[2]

(c) Explain the results of Tube **B** shown in **Table 3.1**.

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[3]
[Total: 11]

4 Explain the mode of action of an enzyme in relation to its protein structure. [7]