

Cambridge International AS & A Level

BIOLOGY (9700) PAPER 2

Past Paper Questions By Topic
+ Answer Scheme

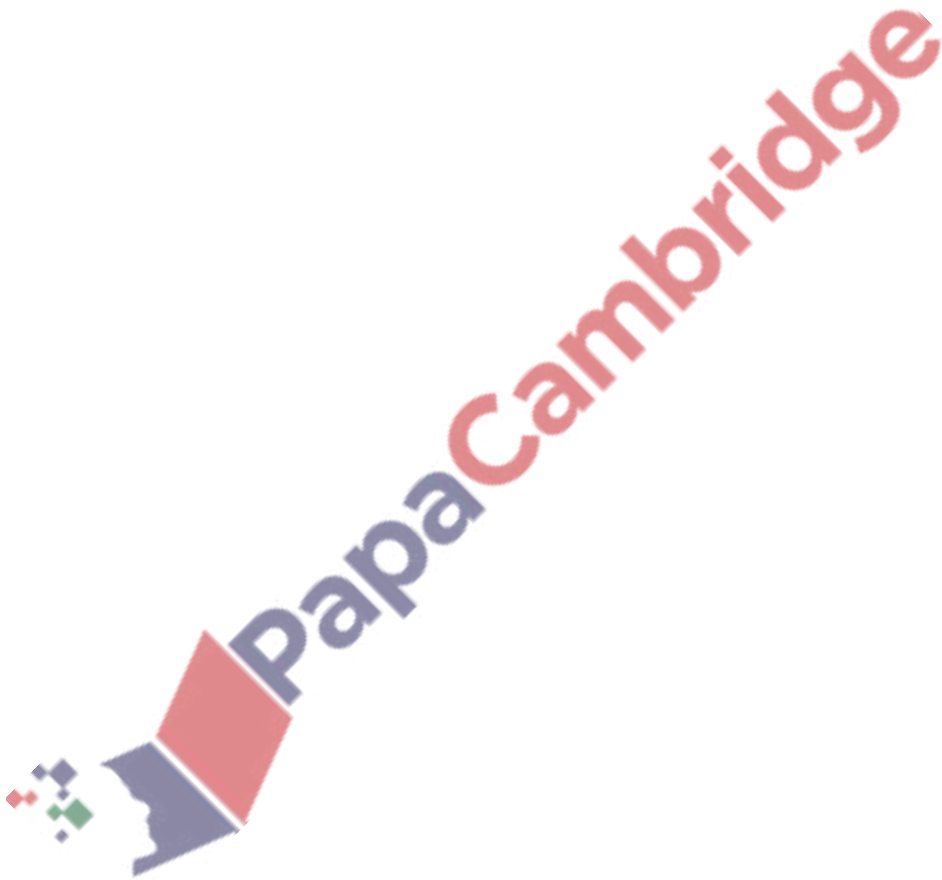
2015 - 2020

Complete Syllabus



Chapter 2

Biological molecules



2.1 Carbohydrates and lipids

6. 9700_w15_qp_23 Q: 4

Glycogen is a highly branched polysaccharide molecule that is stored in the liver, kidney and muscles of mammals.

Fig. 4.1 shows a small part of a molecule of glycogen.

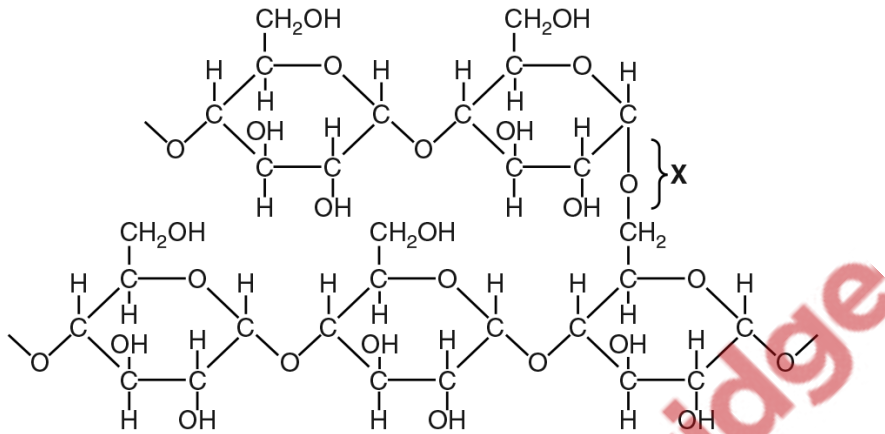


Fig. 4.1

(a) (i) Name the bond at X.

..... [1]

(ii) State the advantages for a mammal of having a storage molecule that is highly branched.

.....

 [2]

(iii) State two ways in which the structure of cellulose differs from the structure of glycogen.

1.

 2.
 [2]

- (b) Glycogen from animals and starch from plants form a large part of the energy intake of humans.

Fig. 4.2 is a flow chart that shows the energy input, in one growing season, into a field of a cereal crop which is processed to provide animal feed.

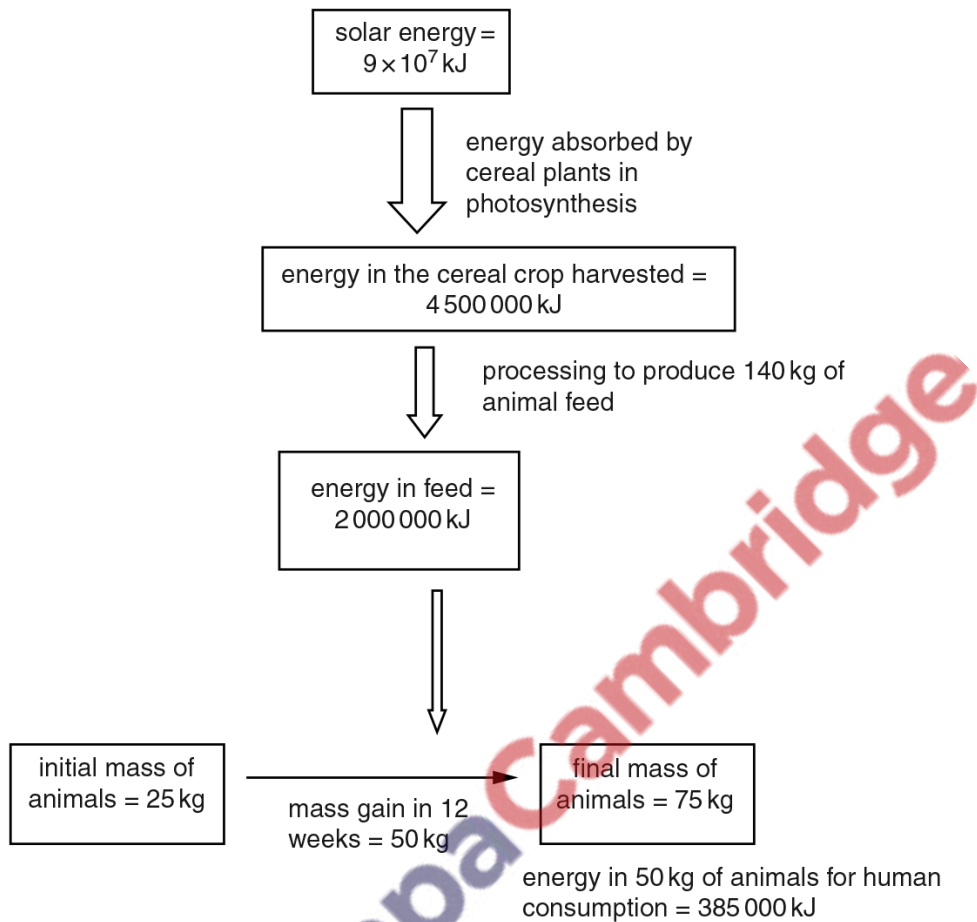


Fig. 4.2

- (i) Calculate the percentage of the energy in animal feed that is converted into energy available for human consumption. Show your working.

answer [2]

- (ii) Explain why the energy available to humans from feeding on animal products is much less than if the energy came directly from crop plants, such as cereals.

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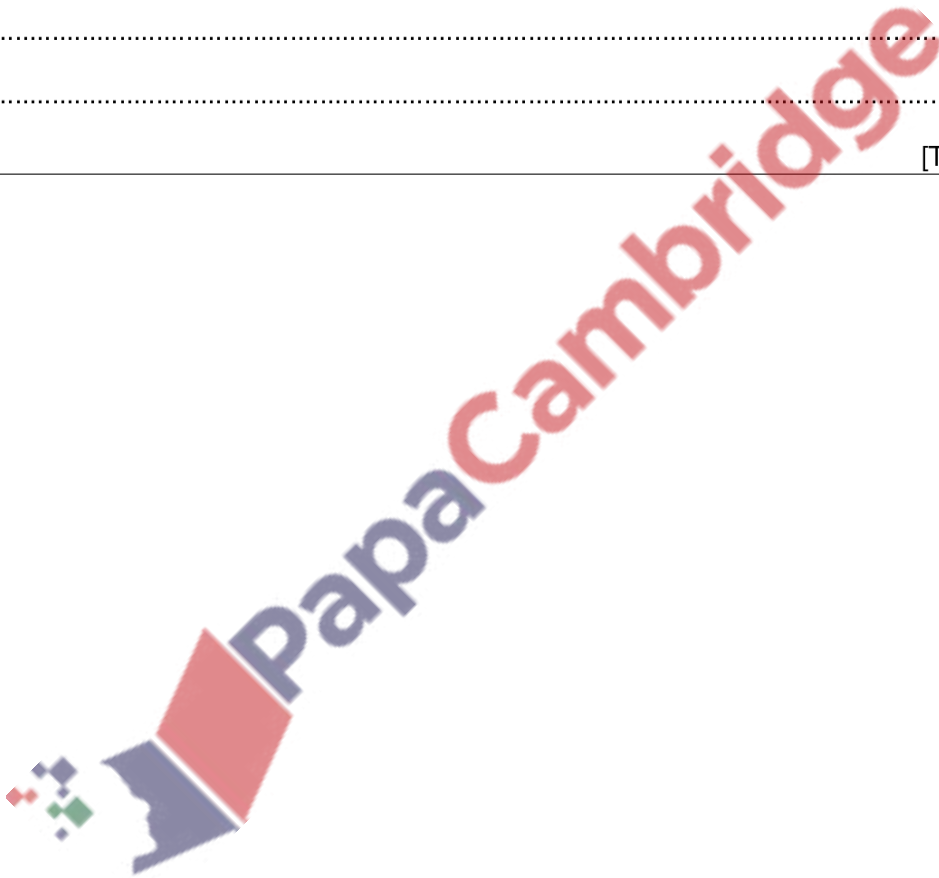
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..... [3]

[Total: 10]



2.2 Proteins and water

7. 9700_s19_qp_22 Q: 5

Cells contain carbohydrates, proteins, lipids and nucleic acids.

(a) Fig. 5.1 is a list of biological molecules, some of which are components of larger molecules.

cellulose
thymine nucleotide
α -glucose
β -glucose
messenger RNA
glycogen
glycine
α -globin

Fig. 5.1

Complete Table 5.1 by using **only** the molecules listed in Fig. 5.1.

- Each example can be written under **one or more** correct headings.
- **All** the examples in Fig. 5.1 should appear at least **once** in Table 5.1.

Table 5.1

examples			
monomers	polymers	monosaccharides	polysaccharides

[5]

- (b) Explain how the structure of phospholipids allows the formation of the phospholipid bilayer of cell membranes.

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[3]

[Total: 8]

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8. 9700_w18_qp_21 Q: 3

(a) Fig. 3.1 is a transmission electron micrograph showing two adjacent cells in a leaf.

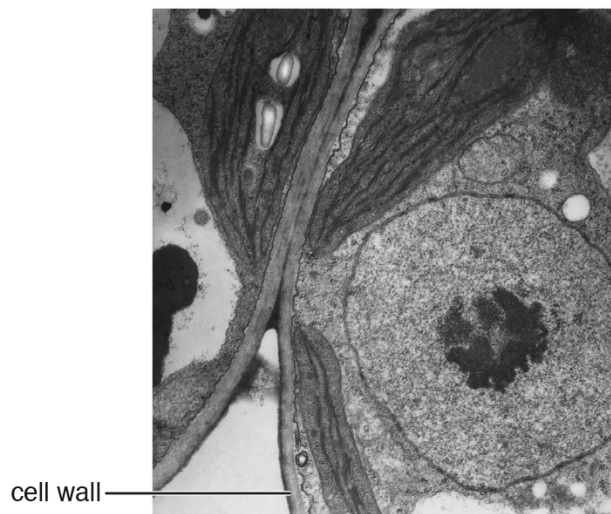


Fig. 3.1

(i) Cellulose is the main polysaccharide in cell walls of plants.

Describe the structure of cellulose.

.....

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..... [3]

(ii) State **one** feature **visible** in Fig. 3.1, other than the cell wall, that identifies the cells as plant cells.

..... [1]

(iii) Outline the role of ATP in a leaf cell.

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

Water is a main component of plant cells.

(b) Fig. 3.2 shows two water molecules linked by a hydrogen bond.

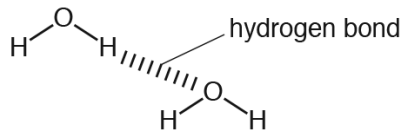


Fig. 3.2

Explain how hydrogen bonding occurs between water molecules.

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

(c) Suggest why water is an excellent solvent for ions.

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

[Total: 11]

9. 9700_w18_qp_23 Q: 1

(a) Aphids are small insects which feed directly on phloem sap.

The salivary glands of aphids have secretory cells that make and release a variety of proteins that assist in feeding.

Fig. 1.1 is a transmission electron micrograph of a small area of a salivary gland cell of an aphid.

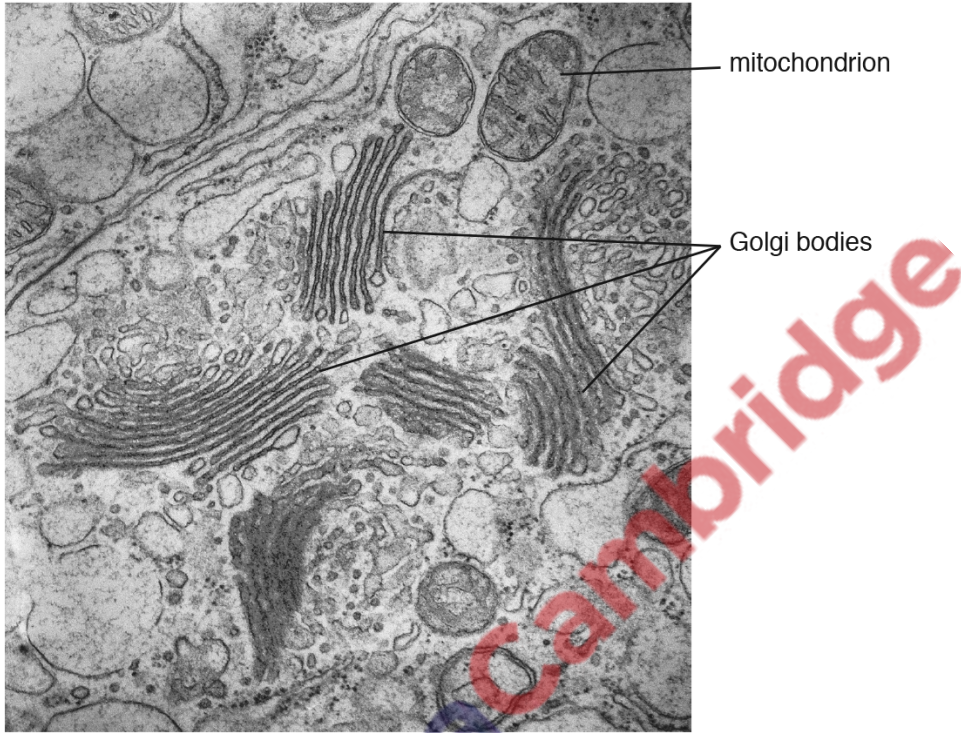


Fig. 1.1

Describe the role of Golgi bodies in secretory cells, such as the salivary gland cells of aphids.

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..... [3]

- (b) (i) Explain why secretory cells have large numbers of mitochondria.

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..... [2]

- (ii) Mitochondria are partly controlled by the nucleus, but can also function independently.

Suggest the features of mitochondria that allow them to function independently of the nucleus.

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

- (c) Aphids are important vectors of plant viral diseases.

- (i) Describe the structure of a typical virus.

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

- (ii) Suggest how viruses are able to pass from one plant cell to the next without crossing membranes.

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

[Total: 11]

10. 9700_w18_qp_23 Q: 2

(a) Proteins are macromolecules composed of many amino acids.

(i) Two amino acids are represented in the diagram in Fig. 2.1.

Complete the diagram to show how the two amino acids react together to form a dipeptide.

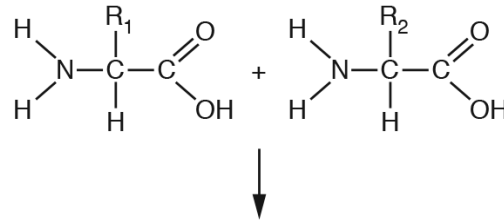


Fig. 2.1

[3]

(ii) State what is represented by R_1 and R_2 in Fig. 2.1.

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.....

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..... [2]



(b) Amylose and cellulose are polysaccharides.

Fig. 2.2 shows the structure of part of a cellulose molecule.

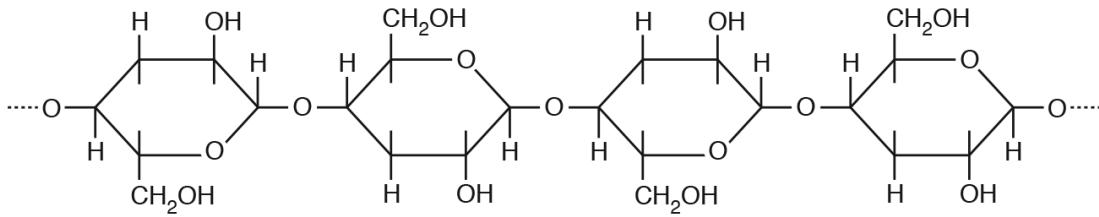


Fig. 2.2

With reference to Fig. 2.2, state how the **structure** of a cellulose molecule differs from the **structure** of an amylose molecule.

.....

 [2]

(c) Cellulose is the main component of plant cell walls.

Explain why cellulose is suitable as a component of plant cell walls.

.....

 [4]

[Total: 11]

11. 9700_M16_qp_22 Q: 1

Statements **A** to **E** relate to biological molecules.

For each statement, identify the most appropriate term that matches the description.

A The molecule formed from a condensation reaction between fructose and glucose.

.....

B The name of the bond broken when two amino acids are separated by hydrolysis.

.....

C The unbranched polymer consisting only of β -glucose molecules.

.....

D The reagent used to test for the presence of proteins.

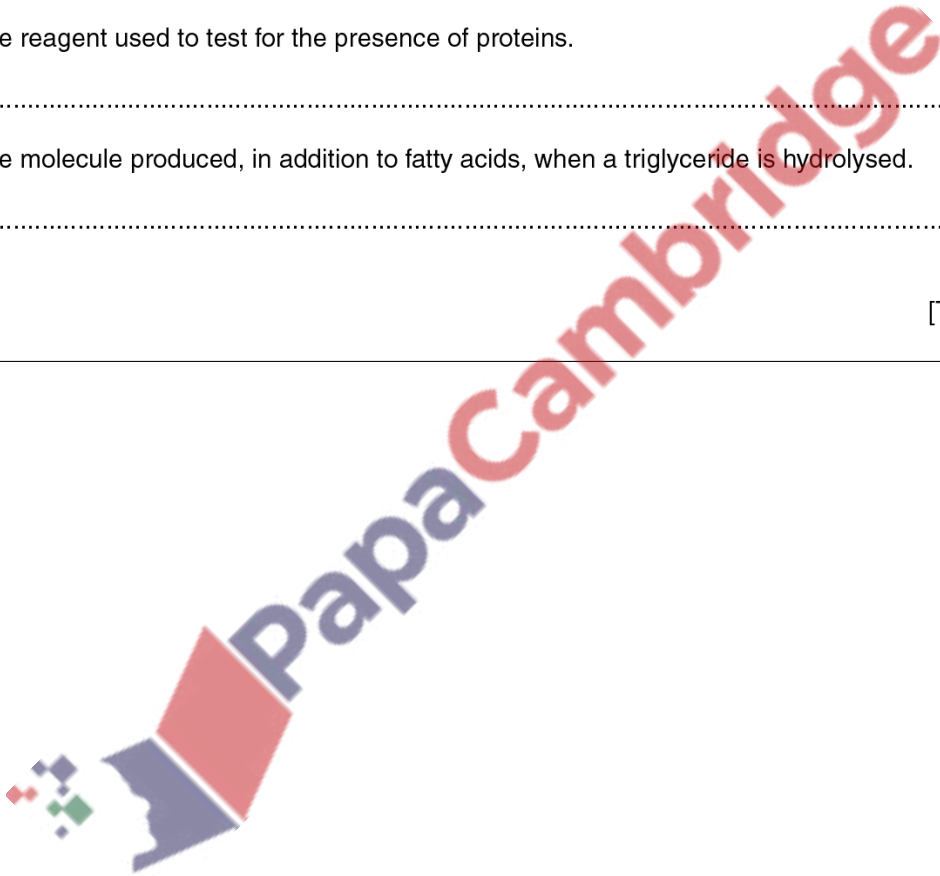
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E The molecule produced, in addition to fatty acids, when a triglyceride is hydrolysed.

.....

[5]

[Total: 5]



12. 9700_s16_qp_22 Q: 6

One of the enzymes involved in glycogen synthesis is glycogen synthase. The monomer of the glycogen polymer is α -glucose.

(a) (i) Draw the ring form of α -glucose in the space provided.

[2]

(ii) Glycogen synthase catalyses the formation of a covalent bond between two α -glucose molecules during glycogen synthesis.

Name the type of bond formed.

.....[1]

(iii) Glycogen branching enzyme is another enzyme that is required for glycogen synthesis.

Suggest why glycogen branching enzyme is needed in addition to glycogen synthase.

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

(b) The gene coding for glycogen synthase in muscle cells is known as *GYS1*.

(i) Explain what is meant by a *gene*.

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

- (ii) There are a number of known mutations for *GYS1*.

Outline how a mutation in *GYS1* can lead to the formation of an altered polypeptide where one amino acid is replaced by a different amino acid.

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.....[3]

- (c) Table 6.1 shows three functions of cell structures that are involved in the synthesis of glycogen synthase.

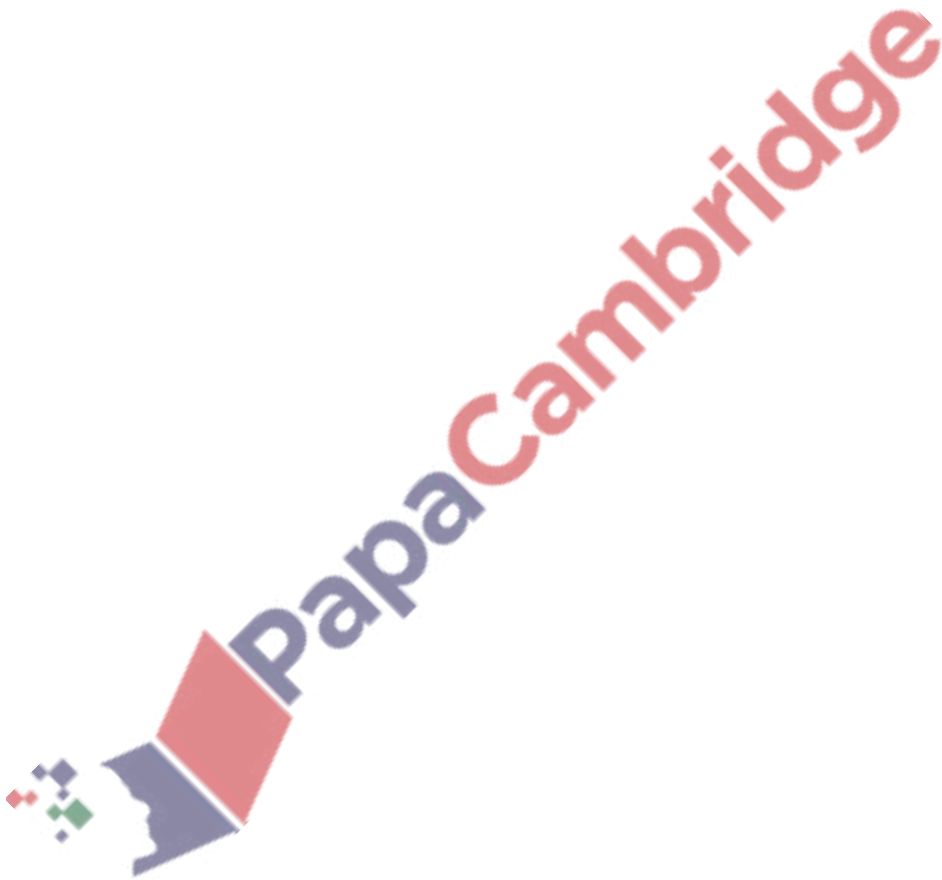
Complete Table 6.1 by naming the cell structure that carries out the function listed.

Table 6.1

function	name of cell structure
assembles ribosomes for polypeptide synthesis	
synthesises ATP to provide a supply of energy for transcription of <i>GYS1</i>	
folds and modifies synthesised polypeptide to produce functioning glycogen synthase	

[3]

[Total: 12]

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