4. Biological molecules

4.1 Biological molecules

Paper 3 and 4

Question Paper

Paper 3

Questions are applicable for both core and extended candidates

1 **(b)** A student investigated a variegated leaf from a plant that had been kept in the light for 24 hours.

The student prepared the leaf by boiling it and then placing it in ethanol to remove the green pigment.

The student then tested the leaf with iodine solution.

Table 2.1 shows the results.

Table 2.1

part of the leaf	colour with iodine solution
green	blue-black
white	yellow-brown

Explain the results shown in Table 2.1 for the white part of the leaf.

.....

.....

.....

.....

.....

.....

..... [3]

(c) This investigation was repeated with a plant that was kept for 24 hours in an environment where all the carbon dioxide was removed.

Complete Table 2.2 to predict the results.

Table 2.2

part of the leaf	colour with iodine solution
green	
white	

[2]

(d) (i) The boxes on the left show the names of some substances that are made in plants.

The boxes on the right show uses of these substances in plants.

Draw lines to link each substance with its correct use in plants. Draw **three** lines.

substance	**use in plants**
	to attract insects for pollination
cellulose	
	to build cell walls
nectar	
	for transpiration
sucrose	
	for transport in the phloem

[3]

(ii) List the chemical elements contained in carbohydrates.

..... [1]

2 **(d)** Proteins contain carbon.

State **two other** chemical elements all proteins contain.

1 .....

2 .....

[2]

3 **(b)** The boxes on the left show some examples of nutrients.

The boxes on the right show some examples of molecules.

Draw lines to link each nutrient to a molecule found in that nutrient.

Draw **two** lines.

nutrient	**molecule**
	amino acid
fat	glucose
protein	glycerol
	hydrochloric acid

[2]

4 **(c)** **(i)** State the name of **two** large carbohydrate molecules found in plants that can be made from glucose.

1 .....

2 .....
[2]

(ii) Plants can make glucose and proteins.

Using the words from the list, complete Table 6.2 to show **all** of the chemical elements that are found in glucose and all proteins.

Each word may be used once, more than once or not at all.

carbon **hydrogen** **oxygen**

nitrogen **magnesium**

Table 6.2

glucose	all proteins

[2]

5 **(a)** **(i)** List the chemical elements in a carbohydrate.

..... [1]

(ii) State the name of **one** chemical element that is found in a protein but is **not** found in a carbohydrate.

..... [1]

6 **(c)** Starch is a large molecule.

The boxes on the left show the names of some other large molecules.

The boxes on the right show some sentence endings.

Draw **five** lines to make five correct sentences.

large molecule	**sentence endings**
Cellulose	is made from amino acids.
DNA	is made from fatty acids and glycerol.
Glycogen	is made from glucose.
Oil	is the genetic material.
Protein	

[5]

7 **(c)** Enzymes are proteins.

State the chemical elements that enzymes are made from.

..... [2]

8 This question is about biological molecules.

Choose words or phrases from the list to complete the sentences.

Each word or phrase may be used once, more than once, or not at all.

calcium	**carbon**	**carbon dioxide**	**carbohydrate**
cellulose	**chloroplasts**	**fat**	**glycerol**
glycogen	**iron**	**methane**	**nitrogen**
oxygen	**protein**	**starch**	

Fats are composed of the elements ..... , hydrogen and

..... only. All proteins contain these three elements and the element

..... .

Glucose is a type of ..... .

Animals store excess glucose as ..... in the liver.

Plants store excess glucose as ..... . Plants also convert glucose to

..... which is used to make cell walls.

[7]

[Total: 7]

Paper 4

Questions are applicable for both core and extended candidates unless indicated in the question

9 **(e)** Antibodies are proteins.

State the chemical elements present in all proteins that are also found in carbohydrates and fats.

..... [1]

10 Chromosomes are made of DNA.

(a) Describe the structure of a DNA molecule. **(extended only)**

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..... [4]