



**Wallington**  
County Grammar School

**NAME OF DEPARTMENT: Biology**  
Bridging Work and Reading List 2024/25

| NAME OF SUBJECT   |   |
|---|---|
| <b>Name and email address of Subject Leader to be contacted if you have any issues with this Bridging Work:</b> | Simon Smith<br><a href="mailto:ssmith@wcgs.foliotrust.uk">ssmith@wcgs.foliotrust.uk</a>   |
| <b>Time required to complete this task:</b>   | 3 hours maximum   |
| <b>Task details:</b>  | Please see task on Biological Molecules below   |
| <b>Resources required:</b>  | <a href="https://www.ocr.org.uk/Images/171736-specification-accredited-a-level-gce-biology-a-h420.pdf">https://www.ocr.org.uk/Images/171736-specification-accredited-a-level-gce-biology-a-h420.pdf</a> |
| <b>Submission details:</b>  | Hand in a hard copy on the first day of the school year.  |

## Reading list

| Title:  | Author(s):                         | ISBN:             | Amazon Link:  | When needed: |
|---|------------------------------------|-------------------|---|--------------|
| BIOZONE OCR Biology 1 A Level Year 1/AS Student Workbook (Biology Student Workbook) | Greenwood, Tracey                  | 978-1927309131    | <a href="https://amzn.eu/d/Of9Aw5hq">https://amzn.eu/d/Of9Aw5hq</a> | Start of Y12 |
| OCR A level Biology 1 Hodder  | Fosbery, Schmit & Wakefield-Warren | 978-1-4718-0915-6 | <a href="https://amzn.eu/d/0bz2X9Jq">https://amzn.eu/d/0bz2X9Jq</a> | Start of Y12 |
|   |                                    |                   |   |              |



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# WCGS BIOLOGY DEPARTMENT

## BRIDGING UNIT

### 2024 - 25

This project contains compulsory work that must be completed before term starts in September. You will prepare for the new challenges of Sixth Form study by researching some key content and gaining an understanding of important biological principles. You will complete 6 tasks, and attempt an extension task, that will provide information to help with the first topic on the A Level Biology course on biological molecules.

*Specification for reference:*

<https://www.ocr.org.uk/Images/171736-specification-accredited-a-level-gce-biology-a-h420.pdf>

## **BIOLOGICAL MOLECULES**

### **Unit description**

All life on Earth shares a common chemistry. This provides indirect evidence for evolution.

Despite their great variety, the cells of all living organisms contain only a few groups of carbon based compounds that interact in similar ways.

Carbohydrates are commonly used by cells as respiratory substrates. They also form structural components in plasma membranes and cell walls.

Lipids have many uses, including the bilayer of plasma membranes, certain hormones and as respiratory substrates.

Proteins form many cell structures. They are also important as enzymes, chemical messengers and components of the blood.

Nucleic acids carry the genetic code for the production of proteins. The genetic code is common to viruses and to all living organisms, providing evidence for evolution.

The most common component of cells is water; hence our search for life elsewhere in the universe involves a search for liquid water.

### **By the end of the bridging work you will be expected to be able to:**

- Explain what a monomer and polymer are
- Identify some biological polymers, and the monomer from which they are made
- Describe the stages of the Benedict's test
- Describe the stages of the Iodine test
- Describe the stages of the emulsion test
- Identify common monosaccharides
- Describe the monosaccharides from which lactose, maltose and sucrose are made
- Explain what is meant by a glycosidic bond and how they form through condensation

## 1. Define the following key terms related to Biological molecules

|                   |  |
|-------------------|--|
| Activation energy |  |
| Amino acids       |  |
| Base pairing      |  |
| Carbohydrate      |  |
| Chromatography    |  |
| Colorimetry       |  |
| Condensation      |  |
| Denaturation      |  |
| Dipeptide         |  |
| Disaccharide      |  |
| DNA               |  |
| Enzyme            |  |
| Fatty acid        |  |
| Fibrous protein   |  |
| Hydrolysis        |  |
| Globular protein  |  |
| Glycerol          |  |
| Hydrogen bonding  |  |
| Inhibition        |  |
| Inorganic ion     |  |
| Isomer            |  |
| Lipid             |  |
| Macromolecule     |  |
| Monomer           |  |
| Nucleic acid      |  |
| Phospholipid      |  |

|                      |  |
|----------------------|--|
| polymer              |  |
| Polypeptide          |  |
| Polysaccharide       |  |
| Primary structure    |  |
| Protein              |  |
| Quaternary structure |  |
| RNA                  |  |
| Secondary structure  |  |
| Tertiary structure   |  |
| Triglyceride         |  |
| Water                |  |

## **2. Describe the following tests for Biological molecules:**

### **Benedict's test**

Method:

Positive result:

### **Biuret test**

Method:

Positive result:

### **Lipid emulsion test**

Method:

Positive result:

**3. Draw the structure of the following:**

**a)  $\alpha$  Glucose**

**b)  $\beta$  glucose**

**c) Describe the differences between the structure of  $\alpha$  and  $\beta$  glucose**

.....  
.....

**d) Are these structures triose, pentose or hexose sugars?**

.....

**e) Draw the general structure for an amino acid:**



**4. State the name or names of the monomers related to the polymer:**

| <b>Polymer</b> | <b>Monomer (s)</b> |
|----------------|--------------------|
| DNA            |                    |
| Maltose        |                    |
| Starch         |                    |
| Glycogen       |                    |
| Sucrose        |                    |
| Lactose        |                    |
| Protein        |                    |

## 5. Complete the following information about carbohydrates by filling in the gaps:

Carbon atoms are able to bond with other carbon atoms. These form a backbone along which other atoms can be attached. This permits the formation of a great number of types and sizes of molecule, all based on carbon. The variety of life that exists on earth is a consequence of all living organisms being based on carbon. Carbon-containing molecules are known as organic molecules. In living organisms, there are relatively few other atoms that attach to carbon. Life is therefore based on a small number of chemical elements. In the Biology course you will study the following Biological molecules; Carbohydrates, proteins, lipids, water and nucleic acids.

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Carbohydrates are made up of sugar units and have the general formula \_\_\_\_\_.

\_\_\_\_\_ are the simplest carbohydrates, with only one sugar unit. Examples are \_\_\_\_\_, fructose and galactose.

Two monosaccharides join together to form a \_\_\_\_\_ in a \_\_\_\_\_ reaction. Two hydroxyl (OH) groups react – a \_\_\_\_\_ molecule is lost, and the remaining oxygen atom joins the two sugar units together. This is called a \_\_\_\_\_. The bond can be broken in a \_\_\_\_\_ reaction, which is a reverse of the condensation reaction. The position of the OH groups that react determines the \_\_\_\_\_, and therefore properties of the disaccharide.

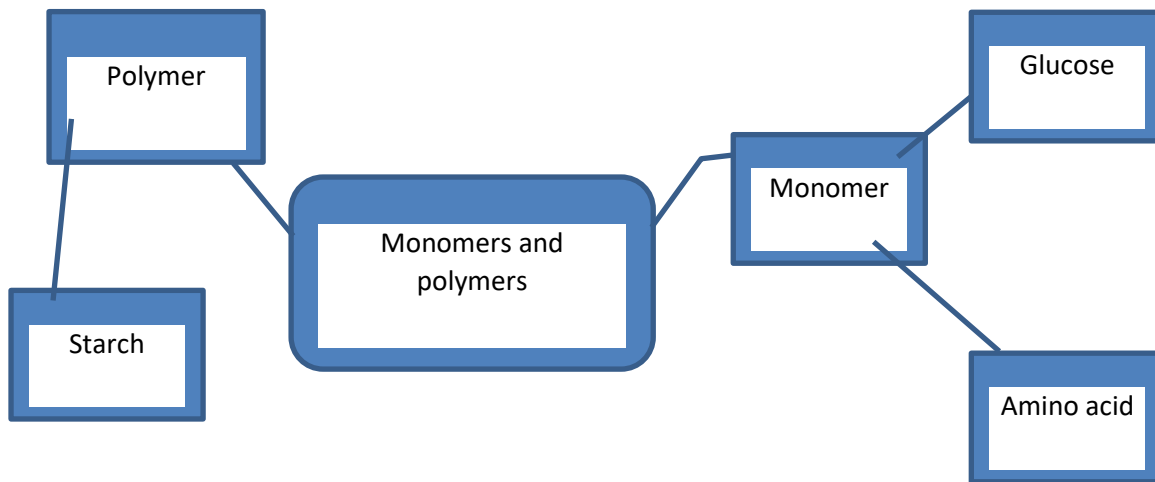
A series of condensation reactions between monosaccharides can create a \_\_\_\_\_ molecule – its features will depend on the sugar monomers from which it is formed.

**Starch** is formed from two \_\_\_\_\_ polymers: \_\_\_\_\_ and \_\_\_\_\_. The former has 1,4 glycosidic links and forms helices, whilst the latter has many 1,6 glycosidic links, which cause the chain to branch. Starch is a good energy storage molecule because it is \_\_\_\_\_, insoluble and does not take part in reactions in the cell.

**Glycogen** is also formed from chains of \_\_\_\_\_. It is found in animal livers, where it acts as an intermediate energy store. It contains 1,4 and 1,6 glycosidic links, so it is more \_\_\_\_\_ than starch.

\_\_\_\_\_ molecules lie straight and form \_\_\_\_\_ with their neighbours. Bundles of these cross-linked molecules form strong \_\_\_\_\_ visible in the plant cell wall.

**6. Construct a mind map for Monomers and polymers. Use as many of the key terms from task 1 as you can/are relevant. This has been started for you below:**



## **7. EXTENSION ACTIVITIES**

**1. Complete the table:**

| <b>Monosaccharide</b> | <b>Number of carbon atoms per molecule</b> | <b>Where is it found in living organisms</b> |
|-----------------------|--|--|
| <b>Glyceraldehyde</b> |  |  |
| <b>Ribose</b>         |  |  |
| <b>Deoxyribose</b>    |  |  |
| <b>Fructose</b>       |  |  |
| <b>Glucose</b>        |  |  |

**2. Glucose and fructose have the same general formula; can you explain why they are distinct monosaccharides?**

**3. Name the elements present in carbohydrates.**

**4. Write down the molecular formula of a triose.**

**5. Suggest how many carbon atoms are present in a pentose.**

(d) Figure 8.1 shows the incomplete structural formula of a monosaccharide.

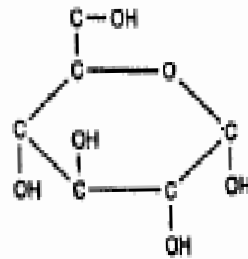


Figure 8.1

(i) Is this molecule a triose, a pentose or a hexose?

(ii) Complete the diagram by inserting H for hydrogen in the appropriate places.  
(Hint: The number of bonds formed is: hydrogen 1, oxygen 2 and carbon 4.)

## 7.EXTENSION

### TQ3

Figure 8.3 shows the disaccharide sucrose. The two monosaccharides of which it is composed are incomplete and so are called monosaccharide residues.

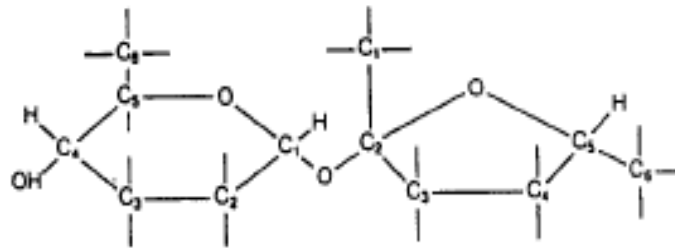


Figure 8.3

- (a) On the diagram: (i) draw a ring around the glycosidic bond;  
(ii) write in the names of the two monosaccharide residues.
- (b) When the bond is broken, which atoms would need to be replaced in order to produce complete monosaccharides?
- .....
- (c) Fructose has a five-sided, or pentagon-shaped ring. Why is fructose a hexose and not a pentose?
- .....

### FIND OUT...

**6** What is the name of the kind of reaction involved in breaking a glycosidic bond?

.....

**7** What does the prefix 'glyco' mean?

.....

Sucrose is the common sugar used for sweetening food and it is also the form in which carbohydrate is transported in plants. Molecules of sucrose are too large to diffuse through plasma membranes. In the small intestine, sucrose is hydrolysed by the enzyme sucrase and the products can then be absorbed. In a test tube, disaccharides can be hydrolysed by boiling with hydrochloric acid.

### STQ4

Which products result from the action of sucrase on sucrose?

.....

### FIND OUT...

**8** (a) Find out the name of another disaccharide not mentioned in this unit.

.....

(b) Where is this disaccharide found in living organisms?

.....

(c) Give one function of this disaccharide.

.....

## 7. EXTENSION

When maltose is formed, the glucose molecules join together through particular carbon atoms. Figure 8.2 shows two glucose molecules where the carbon atoms have been numbered in the standard way, from 1 to 6.

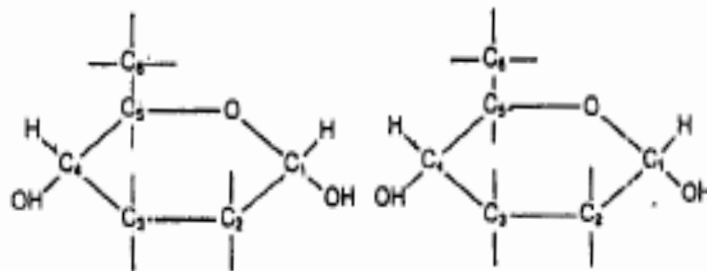


Figure 8.2

### FIND OUT...

- 3 In the space, draw a similar diagram to show how the two glucose molecules join together to form maltose.

- 4 What is the name of this kind of reaction?

.....

- 5 What is the name of the type of bond formed between the two glucose molecules?

.....