

## **Biology A Level – Preparatory Work 2026**

At college in Biology will you be required to read notes and sometimes complete tasks before lessons. These tasks include what we call 'Basic revision notes'. These are the facts that students need to be able to recall accurately for each topic for each spec point. In lessons you will go through the content to help you understand it. You are required to bring these completed tasks to your first Biology lesson.

### **Task 1**

Read through the notes that follow – you can highlight/annotate if you wish  
Complete any tasks that are within the notes. There is an extra information given to you at the end of these tasks to help you.

### **Task 2**

On the page entitled blurring list – create a list of the terms that you think might be key to this topic particularly words that are new to you

### **Task 3**

Complete the questions using the facts you have been given in the notes to help you.

### **Task 4**

Biology will require you to memorise lots of facts for each topic. Watch this you tube video and then answer the questions that follow <https://www.youtube.com/watch?v=lyvlgRf7u3Y>

1. What activities would be considered passive learning?
2. Why is active learning recall better?
3. Name three things you could do that either you have learnt from this video or elsewhere that will be considered active recall and you could do to help you memorise all the facts needed in A level Biology

### **Task 5**

Approximately 10% of your assessments will test mathematical skills. The majority of this is GCSE maths and in the first few weeks of the term you will have some short maths tasks to complete. The first of these is about percentage change please complete the questions 1-8

## Basic revision Notes 1.1 and 1.2 Biological Molecules Carbohydrates

### Topic 1.1 Monomers and Polymers

1. Explain what a monomer and polymer are.
2. identify some biological polymers and the monomer from which they are made.
3. Explain the concept of condensation and hydrolysis reactions in forming/breaking down polymers.

### Topic 1.2 Carbohydrates

1. Identify common monosaccharides.
2. Describe the monosaccharides from which lactose, maltose and sucrose are made.
3. Explain what is meant by a glycosidic bond and how they form through condensation.
4. Describe how polymerisation of  $\alpha$ -glucose can form starch or glycogen.
5. Describe the tests for starch, a reducing and non-reducing sugar in detail.
6. Explain what is meant by qualitative testing.
7. Represent the structure of  $\alpha$ -glucose and  $\beta$ -glucose diagrammatically.
8. Explain that glycosidic bonds between  $\alpha$ -glucose form starch or glycogen and how this relates to their function and properties.
9. Explain that glycosidic bonds between  $\beta$ -glucose form cellulose and how this relates to its function and properties.

**Topic 1.1 Monomers and Polymers****1. Explain what a monomer and polymer are.**

- Monomers are the smaller units from which larger molecules are made.
- Polymers are molecules made from a large number of monomers bonded together.

**2. identify some biological polymers and the monomer from which they are made.**

- Monosaccharides, amino acids and nucleotides are examples of monomers.
- Starch and glycogen are polymers made from the monomer alpha glucose
- Cellulose is a polymer made from the monomer beta glucose
- Polypeptides are polymers made from amino acids
- Nucleic acids are polymers made from nucleotides

**3. Explain the concept of condensation and hydrolysis reactions in forming/breaking down polymers.**

- A condensation reaction joins two molecules together with the formation of a chemical bond and involves the elimination of a molecule of water.
- A hydrolysis reaction breaks a chemical bond between two molecules and involves the use of a water molecule.

TASK – Watch <https://www.youtube.com/watch?v=LuMzoRGTTyY> This video shows very basically how two monosaccharides can be bonded or broken apart by condensation and hydrolysis. Draw two simple images in this space to illustrate these two reactions.

**2. Describe the monosaccharides from which lactose, maltose and sucrose are made.**

- Lactose , maltose and sucrose are all disaccharides.
- Lactose is formed from glucose and galactose
- Maltose is formed from two alpha glucose molecules
- Sucrose is formed from glucose and fructose

### 3. Explain what is meant by a glycosidic bond and how they form through condensation.

- A glycosidic bond is one formed between carbohydrate groups. A hydroxyl group from one molecule bonds with a hydroxyl group from another forming water and leaving an oxygen bridge between the molecules. (the you tube link that you drew a picture of from 1.1 task shows this happening)

### 4. Describe how polymerisation of $\alpha$ -glucose can form starch or glycogen.

- Starch and glycogen are polymers of  $\alpha$ -glucose.
- 1,4 glycosidic bonds are formed via condensation reactions between the adjacent glucose molecules.
- This forms a long helical chain
- 1,6 glycosidic bonds are also formed between glucose molecules to form branches in the chain

#### TASK –

1. What are the numbers referring to when we describe a bond as 1,4 or 1,6?

2. Read the extra information given to you on starch and glycogen. Copy figure 1.8 of glycogen here labelling a 1,4 and a 1,6 bond.

### 5. Describe the tests for starch, a reducing and non-reducing sugar in detail.

#### Starch

- Add iodine to the sample, the iodine will change from orange to blue-black in a positive test

#### Reducing Sugar

- Add benedict's reagent and heat above 70°C.
- An orange/red precipitate will form with a positive result
- Will remain blue if negative
- NB – glucose, fructose, galactose, lactose and maltose are all reducing sugars
- Sucrose is NOT a reducing sugar

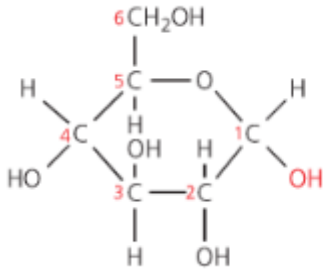
## Non reducing Sugar test

- Obtain a negative reducing sugar test
- Add hydrochloric acid and heat
- Remove from heat and add alkali to neutralise
- Add benedict's reagent and heat above 70°C
- An orange/red precipitate will form with a positive result

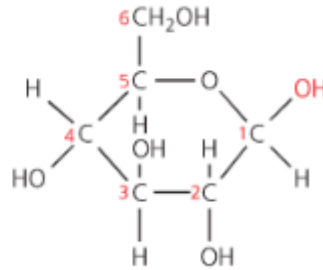
### 6. Explain what is meant by qualitative testing.

- Non – numerical data, such as noting colour change. Can be subjective

### 7. Represent the structure of $\alpha$ -glucose and $\beta$ -glucose diagrammatically.



Alpha glucose



Beta glucose

TASK – look at the diagrams above

- How are alpha and beta glucose similar?
- How are they different?
- The term used to describe these molecules is isomer – what does this mean?

### 8. Explain that glycosidic bonds between $\alpha$ -glucose form starch or glycogen and how this relates to their function and properties.

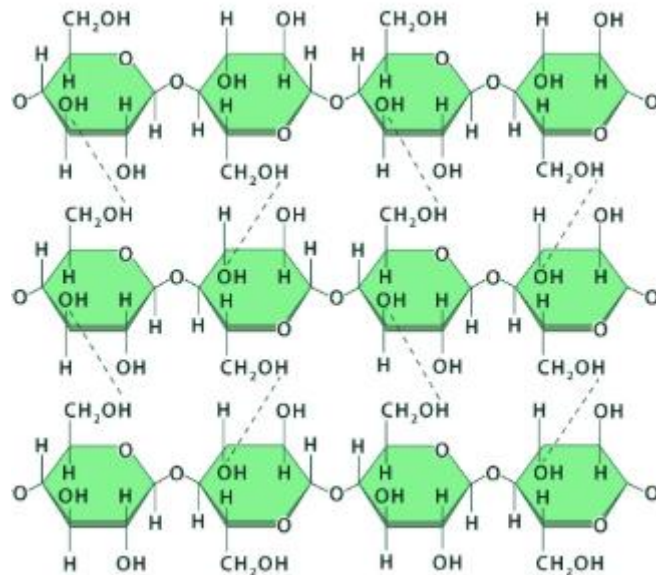
- Helical, so molecule is compact to fit more in a small space
- Branched so more ends for fast hydrolysis to release glucose for respiration
- Glucose polymer so provides respiratory substrate for energy release
- Large molecule, so can't cross the cell membrane
- Insoluble so does not affect water potential

9. Explain that glycosidic bonds between  $\beta$ -glucose form cellulose and how this relates to its function and properties.

- Cellulose is made up of  $\beta$ -glucose monomers
- Alternate monomers are inverted by  $180^\circ$  and 1,4 glycosidic bonds form via a condensation reaction between them.
- This forms long straight chains.
- Chains are joined by hydrogen bonds to form microfibrils
- This structure adds to its strength and rigidity for support to cell walls

TASK – below is a detailed diagram of cellulose, can you label the following using the extra information given to you on cellulose

- Beta glucose
- Glycosidic bond
- Hydrogen bond
- Microfibril



# Key terms for Blurting

hint! These numbers tell you which Spec point will help you!

**TASK 3**

Q1. (a) What is a monomer?

1.1  
1  
A01

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(1)

Q5.

Glucose is a monosaccharide. Two glucose molecules join together to form a disaccharide.

1.2  
3  
A01

(i) Name the products of this reaction.

\_\_\_\_\_

(2)

(ii) Name the type of reaction that joins the glucose molecules together.

\_\_\_\_\_

(1)

(Total 3 marks)

Q6.

(a) Glycogen and cellulose are both carbohydrates. Describe **two** differences between the structure of a cellulose molecule and a glycogen molecule.

1.2  
8  
+  
9  
A02

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2)

(b) Starch is a carbohydrate often stored in plant cells. Describe and explain **two** features of starch that make it a good storage molecule.

1. \_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2)

Q7.

(a) Most blood glucose comes from starch and disaccharides in the diet. Describe a test you could use to check if food in the diet contained starch.

\_\_\_\_\_

1.2  
5  
A01

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(2)

**Maths Tasks – Percentage Change****Calculating Percentage Change**

1. Find the difference between the new value and the original value.
2. Divide the difference by the original value.
3. Multiply by 100.

$$\text{Percentage change} = \frac{\text{New value} - \text{Original value}}{\text{Original value}} \times 100$$

**Some easy questions**

1. A bacterial culture contains **2,500 cells** at the start of an experiment. After 4 hours, it contains **3,200 cells**. Calculate the percentage change in the number of cells.
2. The average heart rate of a student increases from **65 beats per minute** at rest to **91 beats per minute** after exercise. Calculate the percentage change
3. A plant has **48 leaves** before an insect infestation. One week later it has **36 leaves**. Calculate the percentage change in the number of leaves.
4. The concentration of glucose in a blood sample decreases from **5.8 mmol dm<sup>-3</sup>** to **4.9 mmol dm<sup>-3</sup>** after treatment. Calculate the percentage change.
5. A student measures the diameter of a pollen grain as **40 μm** before hydration and **52 μm** after hydration. Calculate the percentage change in diameter

These next questions are all still percentage change but this time within an A level Biology Question. Apply the same principle as you have been to answer these too.

Q6

Body position	Pulse rate / beats per minute			
	Reading 1	Reading 2	Reading 3	Mean
Sitting	80	76	76	77
Standing	84	88	92	88
Lying down	68	72	68	69

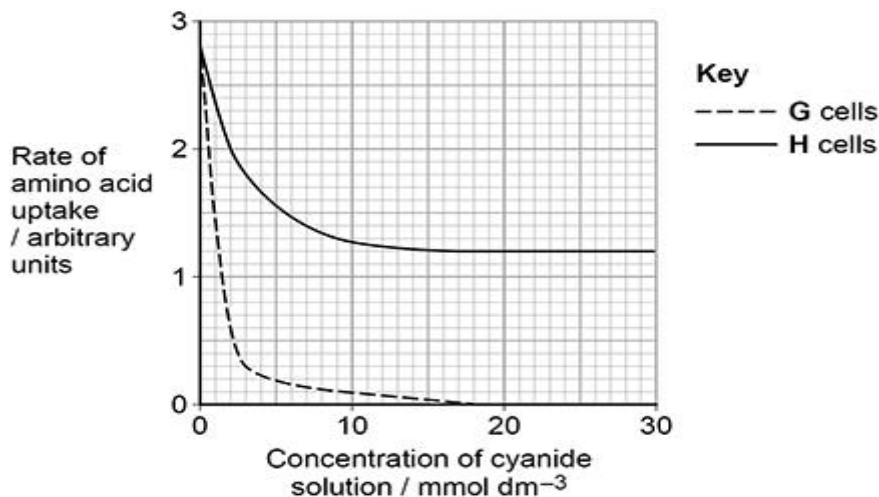
(a) Using the results in the table above, calculate the percentage decrease in mean pulse rate when lying down compared with when standing.

Answer = \_\_\_\_\_ % (2)

Q7 A scientist investigated the effect of cyanide on the rate of amino acid uptake in two types of *Escherichia coli*, G and H.

- G cells produce enzymes involved in ATP production **only** on their cell-surface membrane.
- H cells produce enzymes involved in ATP production on their cell-surface membrane **and** in their cytoplasm.

The graph below shows her results.



(b) Use the graph above to calculate the percentage decrease in the rate of amino acid absorption by H cells in 30 mmol dm<sup>-3</sup> cyanide solution.

Answer \_\_\_\_\_ % (1)

## Starch

Starch, a substance found in plants, is one of the most important fuels in the human diet. It makes up about 30% of what we eat. Starch is a mixture of two substances, amylose and amylopectin. Both these substances are polymers made from a large number of  $\alpha$ -glucose molecules joined together by condensation reactions. In the biochemical test for starch, you add a drop of iodine solution. A blue-black colour indicates the presence of starch.

## Storage molecules

### Starch for storage

We use the starch from plants as a fuel. For many plants, starch is a storage compound, both for short-term storage overnight when photosynthesis cannot occur, and for long-term storage, for example in seeds and in the

organs such as bulbs and tubers that survive through the winter. It is particularly suited for storage because it is insoluble and so does not diffuse out of cells easily or have any effects on water potential and thus osmosis.

As a storage compound it is important that starch can be easily synthesised and broken down. Plants have enzymes that can rapidly carry out these processes.

We have a digestive enzyme called amylase that hydrolyses the starch in our diet to maltose. This can then be hydrolysed into glucose, which is needed to provide a source of fuel for respiration.

### Glycogen for storage

Animals such as humans do not rebuild excess glucose into starch for storage. Instead, we make it into a polysaccharide similar to starch called glycogen.

Like amylopectin, glycogen also consists of  $\alpha$ -glucose chains with both 1,4- and 1,6-glycosidic bonds, but the 1,6 bonds are much more frequent, so the molecules are much more branched (see Figure 1.8, overleaf). This makes glycogen molecules even more compact than starch molecules. In humans, some glycogen is stored in the muscles as a readily accessible store of glucose close to the site where the rate of respiration is regularly raised very rapidly. The liver stores larger reserves of glycogen and continually breaks it down to maintain a stable blood glucose concentration.

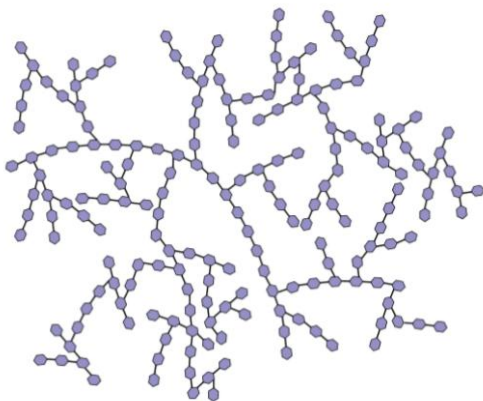


Figure 1.8 A glycogen molecule.

## Cellulose for strength

The main substance in a plant cell wall is the carbohydrate cellulose. Like starch, cellulose is a polysaccharide and is a polymer of glucose. The monomer in cellulose is  $\beta$ -glucose.

In cellulose, the  $\beta$ -glucose molecules join together in chains by condensation. As when starch chains are made from  $\alpha$ -glucose molecules, glycosidic bonds are formed. But in the cellulose chains, every other  $\beta$ -glucose is 'upside-down', so the  $-\text{CH}_2\text{OH}$  side-chains stick out alternately on opposite sides, as you can see in Figure 1.9. This 'alternate' bonding makes the cellulose molecules very straight. They are also very long. They line up parallel with each other and become linked together by many **hydrogen bonds**. Although each hydrogen bond is weak, many together lead to strong binding between the molecules.

