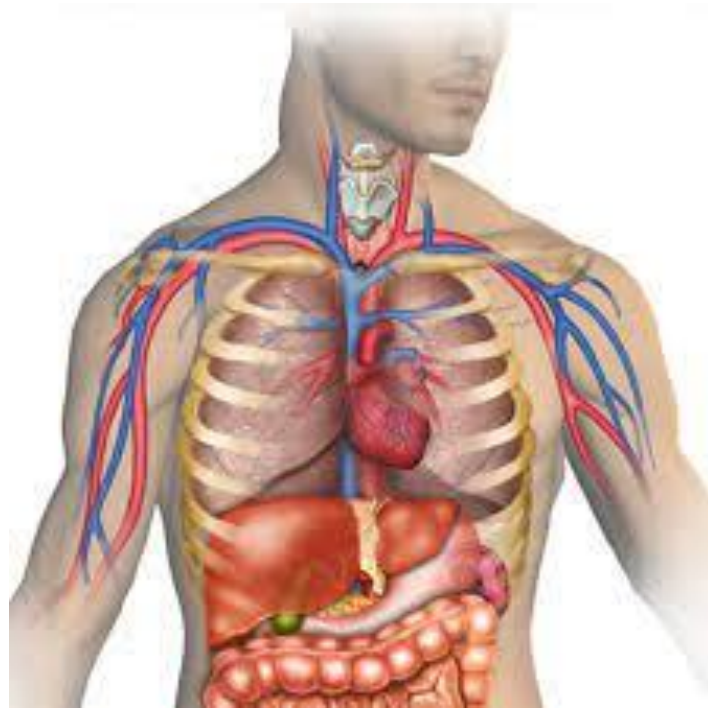


## **BTEC Human Biology**

### **Summer Independent Learning**



**BTEC Human Biology Summer Independent Learning Activity.**

Welcome to BTEC Human Biology, please complete **ALL** of the following tasks ready for your first day at New College.

There are 2 things we are expecting of you from your SIL. Teachers will be checking that this has been completed in the first week back in September.

1. Complete the questions, and self-mark (mark scheme at the back of the paper)
2. Test yourself on the content, in preparation for an **assessment** in your first week of college.

You can print the booklet, write on the PDF file or answer the questions on paper. The Mark Scheme follows the sections at the end of the document.

## **Overview of the tasks**

### **Part 1: Structure of Carbohydrates, Lipids and Proteins**

Task 1: Carbohydrate Structure

Task 2: Lipid Structure

Task 3: Protein Structure

### **Part 2: Cell Structure**

Task 4: Cell Structure

Task 5: Function of organelles

### **Part 3: Revision techniques for the assessment**

Task 6: how to revise for your initial assessment.

**Part 1****Task 1: Structure of carbohydrates**

Use the following video links to support with your answers:



[https://www.youtube.com/watch?v=dSJGCGQ\\_9vA&list=PL0Mjub5NT755dp8xUfC-yoXlbPTcjVM1i&index=7&t=0s](https://www.youtube.com/watch?v=dSJGCGQ_9vA&list=PL0Mjub5NT755dp8xUfC-yoXlbPTcjVM1i&index=7&t=0s)



<https://www.youtube.com/watch?v=wuDxoneoPnY&list=PL0Mjub5NT755dp8xUfC-yoXlbPTcjVM1i&index=5>

**What is a monomer?**

**What is a polymer?**

**Can you describe what a condensation reaction is?**

**Can you describe what a hydrolysis reaction is?**

**Can you describe how larger carbohydrates are made from monosaccharide monomers?**

**Can you list some common monosaccharides?**

**Can you describe how disaccharides are formed?**

**What are maltose, sucrose and lactose formed from?**

**Draw a diagram to show how a condensation reaction occurs between two monosaccharides to form maltose. Label the bond that forms.**

**Can you explain how glycogen and starch are formed?**

**Task 2: Lipid Structure**

<https://www.youtube.com/watch?v=TOFjqpzbMZU&list=PL0Mjub5NT755dp8xUfC-yoXlbPTcjVM1i&index=3>



Video 2 from **10:50 to 12:50**

<https://www.youtube.com/watch?v=QFq9o72Qal8&list=PL0Mjub5NT755dp8xUfC-yoXlbPTcjVM1i&index=7>



**Can you explain how triglycerides are formed? Draw a diagram to show this happening. Label the molecules involved, the type of reaction and the types of bonds formed.**

**Can you explain that the R-group of a fatty acid may be saturated or unsaturated? What do these terms mean?**

**Task 3: Protein structure**

Watch the video:

**From 7:20 – 10:50**



<https://www.youtube.com/watch?v=QFq9o72Qal8&list=PL0Mjub5NT755dp8xUfC-yoXlbPTcjVM1i&index=7>

**What is the general structure of an amino acid?**

**How do two amino acids form a dipeptide?**

**Describe the following protein structures:**

**Primary Structure**

**Secondary Structure**



**Can you describe the role of hydrogen bonds, ionic bonds and disulfide bridges in the structure of proteins?**



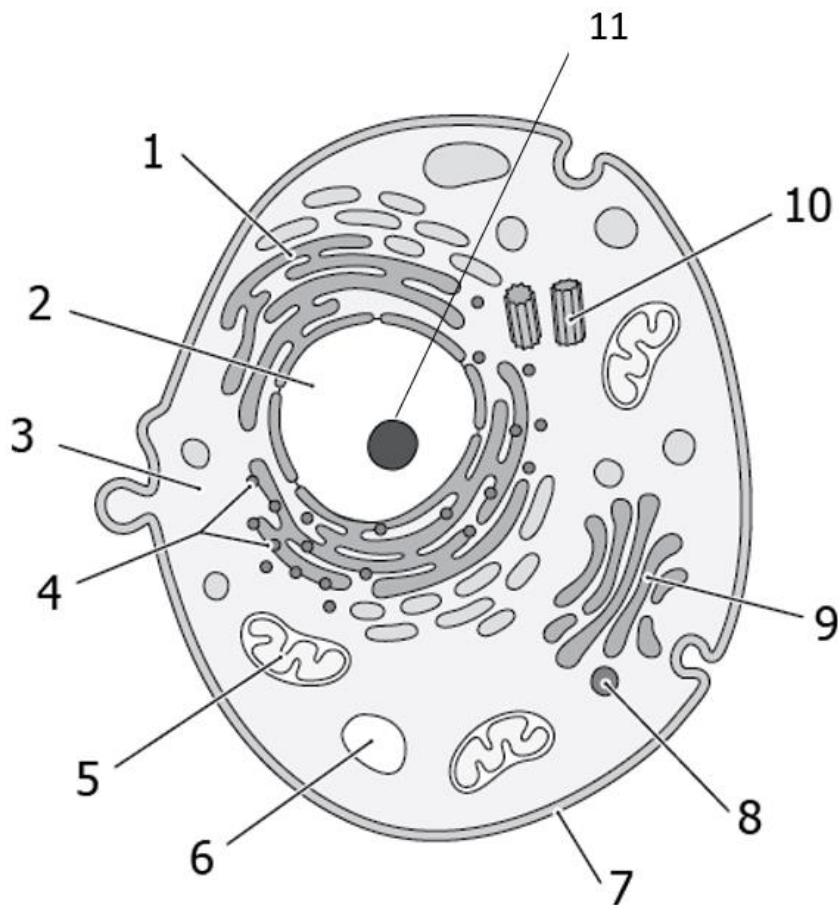
**Task 4**

Watch the following video. Then answer the following questions.

[https://www.youtube.com/watch?v=cfEFw4dcEFw&list=PL0Mjub5NT757WwL\\_BTIZzW09IJYk5ChQn&index=4](https://www.youtube.com/watch?v=cfEFw4dcEFw&list=PL0Mjub5NT757WwL_BTIZzW09IJYk5ChQn&index=4)

Use the following to label the animal cell

**nucleus, nucleolus, mitochondria, rough and smooth endoplasmic reticulum (ER), Golgi apparatus, vesicles, lysosomes, 80S ribosomes, centrosomes, cytoplasm**



**What is the function of:**

**nucleus and nucleolus**

**mitochondria**

**rough endoplasmic reticulum**

**smooth endoplasmic reticulum**

**golgi apparatus**

**vesicles**

**lysosomes**

**80S ribosomes**

**Part 3 – How to revise**

**Task 6**

**Watch the following video. Use some of the techniques suggested to prepare for your initial assessment.**



**<https://www.youtube.com/watch?v=wrDOoBuP9A8>**

## **Mark Scheme**

### **Part 1**

#### **Task 1: Structure of carbohydrates**

**What is a monomer?**

- **Single subunit. Many are joined together to form a polymer.**

**What is a polymer?**

- **Made from many monomers joined together**

**Can you describe what a condensation reaction is?**

- **Formation of a bond with the removal of water**

**Can you describe what a hydrolysis reaction is?**

- **Breaking a bond using water**

**Can you describe how larger carbohydrates are made from monosaccharide monomers?**

- **Condensation of monosaccharides forming a glycosidic bond**

**Can you list some common monosaccharides?**

- **Glucose, Fructose, Galactose**

**Can you describe how disaccharides are formed?**

- **2 monosaccharides join by a glycosidic bond together via condensation reaction.**

**What are maltose, sucrose and lactose formed from?**

**Maltose made from: 2 x alpha glucose monomers**

**Sucrose made from: 1 x glucose and 1 x fructose**

**Lactose made from: 1 x glucose and 1 x galactose**

**Draw a diagram to show how a condensation reaction occurs between two monosaccharides to form maltose. Label the bond that forms.**

See video

**Can you explain how glycogen and starch are formed?**

- **Many alpha glucose monomers join by a glycosidic bond together via condensation reaction.**
- **Starch forms a helix held together by hydrogen bonds**
- **Glycogen is branched**

## Task 2: Lipid Structure

Can you explain how triglycerides are formed? Draw a diagram to show this happening. Label the molecules involved, the type of reaction and the types of bonds formed.

See the video

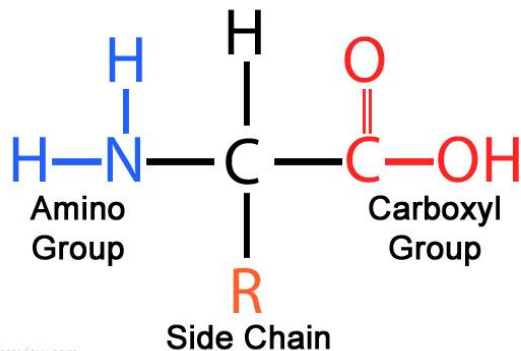
Can you explain that the R-group of a fatty acid may be saturated or unsaturated? What do these terms mean?

Saturated – when there are no C=C bonds in the hydrocarbon chain (i.e. the R group part)

## Task 3: Protein structure

What is the general structure of an amino acid?

### Amino Acid Structure



How do two amino acids form a dipeptide?

- 2 amino acids join via condensation reactions. Held together by a peptide bond

**Describe the following protein structures:**

Primary structure: The sequence/order of amino acids that makes up the polypeptides of a protein.

Secondary structure: The way in which the chain of amino acids in a protein is folded. This forms alpha helix and Beta sheets. Structure held in place by hydrogen bonds

Tertiary structure: The further folding and coiling of the secondary structure to give the protein its 3D shape. Held in place by hydrogen, ionic and disulphide bonds. The tertiary structure is important e.g. the shape of an enzymes active site must be complementary shape to the substrate so they can fit.

**Can you describe the role of hydrogen bonds, ionic bonds and disulfide bridges in the structure of proteins?**

- Hydrogen bonds hold the alpha helix and Beta sheets in place in the secondary structure.
- **hydrogen bonds, ionic bonds and disulfide bridges hold the tertiary structure in place (keeps the protein in that shape)**



**Part 2 – Cell Structure**

**Task 4**

**Use the following to label the animal cell**

**nucleus, nucleolus, mitochondria, rough and smooth endoplasmic reticulum (ER), Golgi apparatus, vesicles, lysosomes, 80S ribosomes, centrosomes, cytoplasm, cell membrane**

1. Smooth ER
2. Nucleus
3. Cytoplasm
4. Ribosome and Rough ER
5. Mitochondria
6. Lysosome
7. Cell membrane
8. Vesicle
9. Golgi apparatus
10. Centrosomes
11. Nucleolus

**What is the function of:**

**nucleus nucleolus**

**where RNA is synthesised**

**mitochondria**

**site of aerobic respiration and where ATP is produced**

**rough endoplasmic reticulum**

**studded with ribosomes and site of protein synthesis. Also transports proteins within the cell**

**smooth endoplasmic reticulum**

**site of production of lipids and steroid hormones**

**golgi apparatus**

**modifies proteins by adding carbohydrates. Packages proteins into vesicles**

**vesicles**

**transports molecules within the cell or to the cell surface membrane for exocytosis**

**lysosomes**

**contains hydrolytic enzymes that digest old organelles**

**80S ribosomes**

**site of protein synthesis**