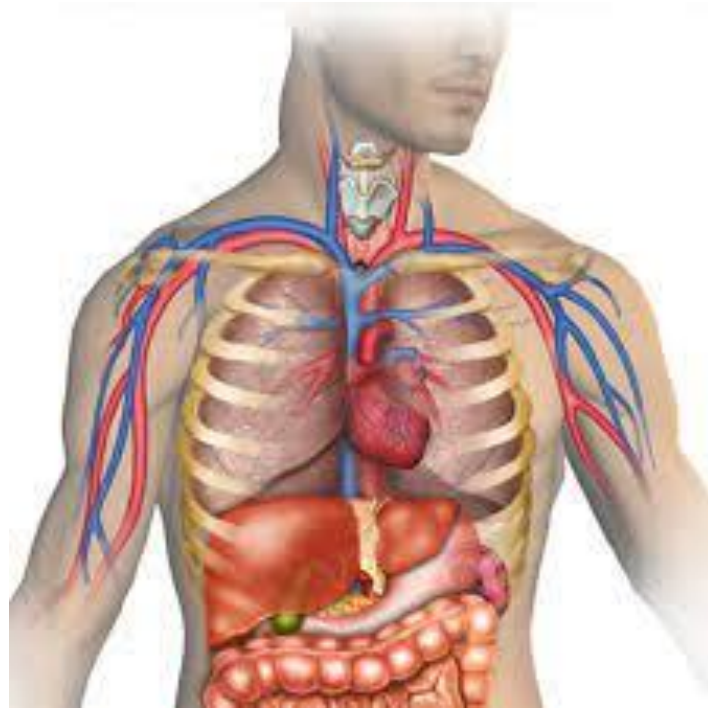


# BTEC Applied Human Biology

## Summer Independent Learning (SIL)

### Year 11 - 12



## **BTEC Applied Human Biology**

### **Summer Independent Learning (SIL)**

Welcome to BTEC Human Biology, please complete all the following tasks ready for your first day at New College. Teachers will be checking that this has been completed in the first week back in September.

The SIL is split into two parts to prepare you for Units 1 and 2 that will be taught during Year 12. The information below explains the expectations for both parts of the SIL:

#### **Unit 1**

1. Complete the questions, and self-mark (using the mark scheme at the back of the paper)
2. Test yourself on the content, in preparation for an **assessment** on your return to 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 this section.

#### **Unit 2**

Complete the research task on 5 different microorganisms

If this is done on the computer, please have it ready to upload to the College Microsoft Teams, or if completed on paper, bring it to the first lesson where your teacher will show you how to scan in and upload your work.

## **Unit 1 – Principles of Applied Human Biology**

### **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=TOFjqpbMZU&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 why 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**

## **Tertiary Structure**

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



## Part 2 – Cell Structure

### Task 4

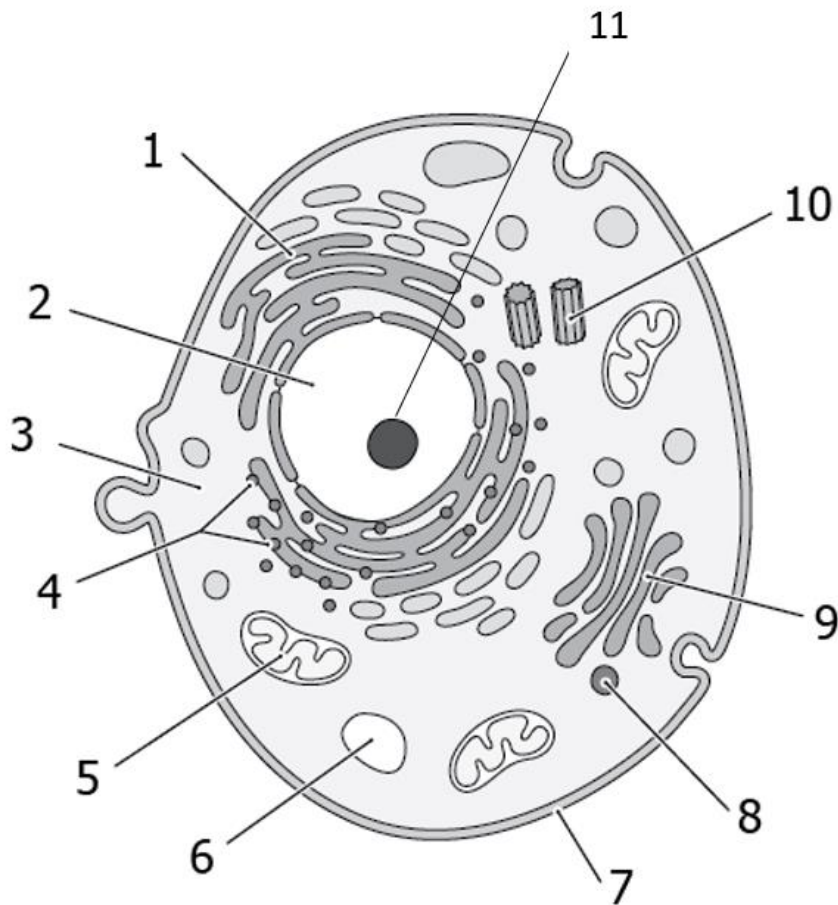
Watch the following video. Then answer the following questions.



[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>**

## Unit 1 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 why the R-group of a fatty acid may be saturated or unsaturated? What do these terms mean?**

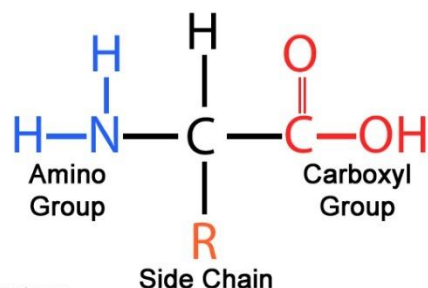
Saturated – when there are no C=C bonds in the hydrocarbon chain (i.e. the R group part)

Unsaturated – the Hydrocarbon chain contains one or more C=C bonds

## **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:** contains DNA

**Nucleolus:** where RNA is synthesised (made)

**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

**80 S ribosomes:** site of protein synthesis

## Unit 2 – Practical Microbiology and Infectious Diseases

### What are microorganisms?

- Any organism that can't be seen with the naked eye
- This includes; bacteria (prokaryotes), some fungi, protists(eukaryotes) and viruses (akaryotes)
- The name also tends to include prions – although technically these are not microorganisms, as we will see!

### What are pathogens?

Most of you will associate microorganisms with disease and disease-causing microbes are called **pathogens**. Watch the following video for an introduction into pathogens:

<https://www.youtube.com/watch?v=WsZS4RCWpcE>



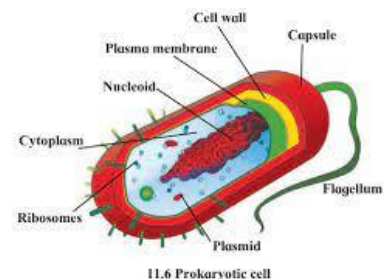
**Complete the following research tasks and present your findings in an essay format (preferably as a Word document or handwritten)**

### Bacteria

Choose one of the following **bacteria** to research:  
e.g. *Mycobacterium tuberculosis*, Meningitis, *Chlamydia*, Cholera

For this bacterial disease you must:

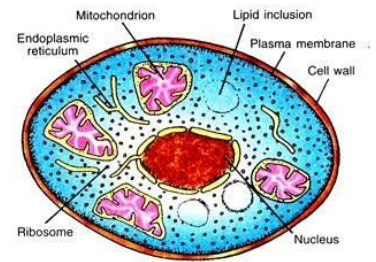
1. Explain how the bacteria is transmitted from one host to another
2. Describe what parts of the body the bacteria affects once it enters the host
3. Describe the signs and symptoms of your bacterial disease (including any relevant tests that maybe carried out by health professionals)
4. Progression of the disease – explain how the bacteria could affect the patient over time
5. Explain the treatments that are given for the bacterial disease, including how the treatment works within the body
6. Reference any websites / written sources that you have used (copy the website address and paste / write it after the information where you have used that source)





## Fungi

Choose one of the following fungi to research:  
e.g. Ringworm, Mucormycosis, Candidiasis.

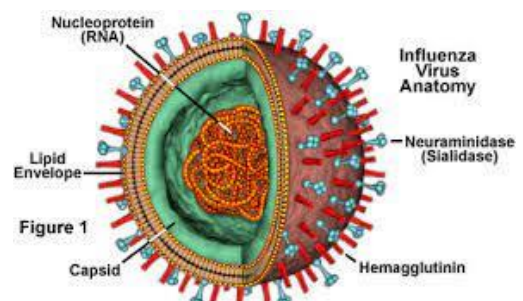


For this fungal disease you must:

1. Explain how the fungi is transmitted from one host to another
2. Describe what parts of the body the fungi affects once it enters the host
3. Describe the signs and symptoms of your fungal disease (including any relevant tests that maybe carried out by health professionals)
4. Progression of the disease – explain how the fungi could affect the patient over time
5. Explain the treatments that are given for the fungal disease, including how the treatment works within the body
6. Reference any websites / written sources that you have used (copy the website address and paste / write it after the information where you have used that source)

## Virus

Choose one of the following virus to research:  
e.g. Human Immunodeficiency Virus (HIV), Ebola, Norovirus, Influenza, Severe Acute Respiratory Syndrome (SARS).



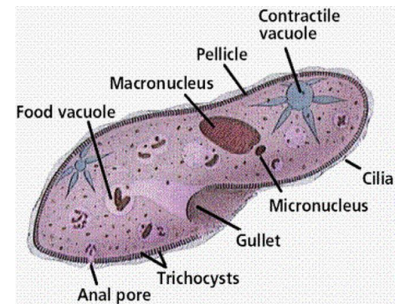
For this viral disease you must:

1. Explain how the virus is transmitted from one host to another
2. Describe what parts of the body the virus affects once it enters the host
3. Describe the signs and symptoms of your viral disease (including any relevant tests that maybe carried out by health professionals)
4. Progression of the disease – explain how the virus could affect the patient over time
5. Explain the treatments that are given for the viral disease, including how the treatment works within the body
6. Reference any websites / written sources that you have used (copy the website address and paste / write it after the information where you have used that source)

## Parasitic

Choose one of the following parasites to research:

- E.g. - protozoal, e.g. Malaria, Giardia, Amoebic dysentery  
 - helminthic, e.g. roundworm, tapeworms  
 - ectoparasitic, e.g. Pediculosis.



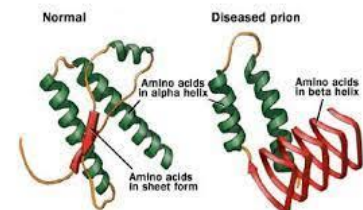
For this parasitic disease you must:

1. Explain how the parasite is transmitted from one host to another
2. Describe what parts of the body the parasite affects once it enters the host
3. Describe the signs and symptoms of your parasitic disease (including any relevant tests that maybe carried out by health professionals)
4. Progression of the disease – explain how the parasite could affect the patient over time
5. Explain the treatments that are given for the parasitic disease, including how the treatment works within the body
6. Reference any websites / written sources that you have used (copy the website address and paste / write it after the information where you have used that source)

## Prion

Choose one of the following prion to research.

e.g. Creutzfeldt-Jakob disease (CJD), Kuru.



For this prionic disease you must:

1. Explain how the prion is transmitted from one host to another
2. Describe what parts of the body the prion affects once it enters the host
3. Describe the signs and symptoms of your prionic disease (including any relevant tests that maybe carried out by health professionals)
4. Progression of the disease – explain how the prion could affect the patient over time
5. Explain the treatments that are given for the prion disease, including how the treatment works within the body
6. Reference any websites / written sources that you have used (copy the website address and paste / write it after the information where you have used that source)