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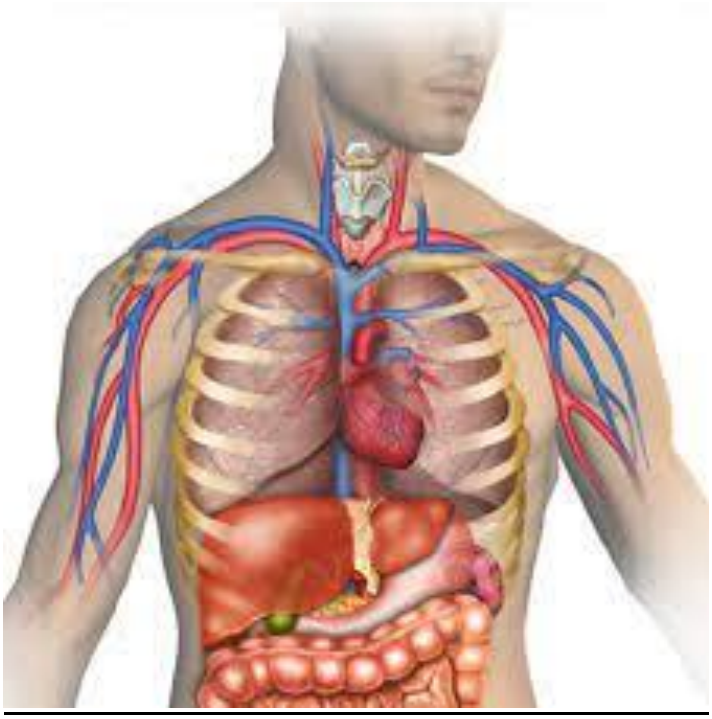
BTEC Medical Science

Summer Independent Learning (SIL)

Year 11 - 12



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BTEC Medical Science

Summer Independent Learning (SIL)

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

1. **Watch the videos** provided and **answer the questions for tasks 1-6** using the videos to help you
2. **In a different colour pen self-assess and correct your work** using the answers at the back of the booklet and add in any missing or incorrect information. Your teacher will be checking that you have attempted the questions first before using the answers to check your work.
3. **Complete task 7** which is a video to help you identify revision strategies.
4. **Create revision resources** on the information in this booklet to help you memorise the information in preparation for an **assessment** in your first few weeks at college. You need to be able to show your teacher your revision resources.

You can either print the booklet, write on the PDF file on screen or answer the questions on paper.

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Unit 1 – Principles of Human Physiology, Anatomy and Pathology

Overview of the tasks

Part 1: Structure of Carbohydrates, Lipids and Proteins

Task 1: Carbohydrate Structure

Task 2: Lipid Structure

Task 3: Protein Structure

Task 4: Nucleic acid structure

Part 2: Cell Structure

Task 5: Cell Structure

Task 6: Function of organelles

Part 3: Revision techniques for the assessment

Task 7: how to revise for your initial assessment. Bring the revision resources that you have created to help you learn the facts covered in tasks 1-6.

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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=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?

Can you complete the table to show how many carbon atoms are in each type of monosaccharide?

Type of monosaccharide	Number of carbons	Example
Triose sugar		glycerol
Pentose sugar		Ribose and deoxyribose
Hexose sugar		Glucose, fructose and galactose

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

Video 3

https://www.youtube.com/watch?v=E0GEp3zgK7w

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?

What are the three parts of a phospholipid?

What is meant by hydrophilic?

What is meant by hydrophobic?

Which part of a phospholipid is hydrophilic?

Which part of a phospholipid is hydrophobic?

What are phospholipids used for in cells?

What role does cholesterol have in cells?

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?

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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?

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Task 4: Nucleic acids

Watch the following videos:

https://www.youtube.com/watch?v=Mh0uieUVubw

https://www.youtube.com/watch?v=HRga77i64nY

What are the three parts of a DNA nucleotide?

What are the three parts of an RNA nucleotide?

Draw and label a DNA nucleotide

What are the four different organic bases that can be present on a DNA nucleotide?

Give two differences between a DNA nucleotide and an RNA nucleotide.

What type of bond forms between nucleotides to form a polynucleotide chain?

What are the different types of RNA?

Describe the structure of DNA

What is meant by complementary base pairing?

Part 2 – Cell Structure

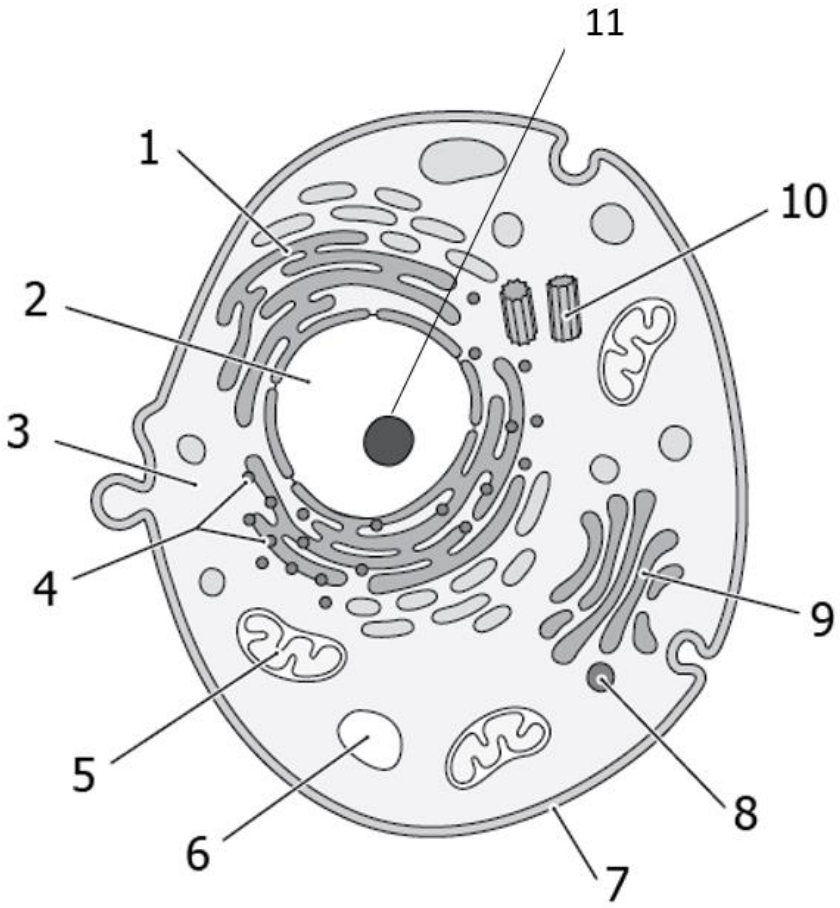
Task 5

Watch the following video. Then answer the following questions.

https://www.youtube.com/watch?v=cfEFw4dcEFw&list=PL0Mjub5NT757WwL_BTIZzW09lJYk5ChQn&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



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Task 6:

What is the function of:

nucleus and nucleolus

mitochondria

rough endoplasmic reticulum

smooth endoplasmic reticulum

golgi apparatus

vesicles

lysosomes

80S ribosomes

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Part 3 – How to revise

Task 7

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

Can you complete the table to show how many carbon atoms are in each type of monosaccharide?

Type of monosaccharide	Number of carbons	Example
Triose sugar	3	glycerol
Pentose sugar	5	Ribose and deoxyribose
Hexose sugar	6	Glucose, fructose and galactose

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

What are the three parts of a phospholipid?

Glycerol, 2 fatty acids, one phosphate group.

What is meant by hydrophilic?

Attracted to water

What is meant by hydrophobic?

Repels water/not attracted to water

Which part of a phospholipid is hydrophilic?

The glycerol and phosphate head

Which part of a phospholipid is hydrophobic?

The fatty acid tails

What are phospholipids used for in cells?

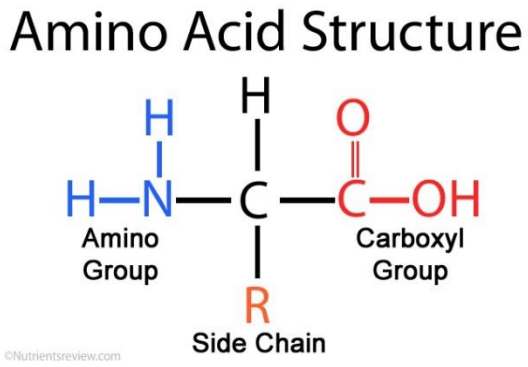
To make cell membranes (phospholipid bi-layers)

What role does cholesterol have in cells?

It inserts into cell membrane and controls the fluidity of the cell membrane.

Task 3: Protein structure

What is the general structure of an amino acid?



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)

Task 4: Nucleic acids

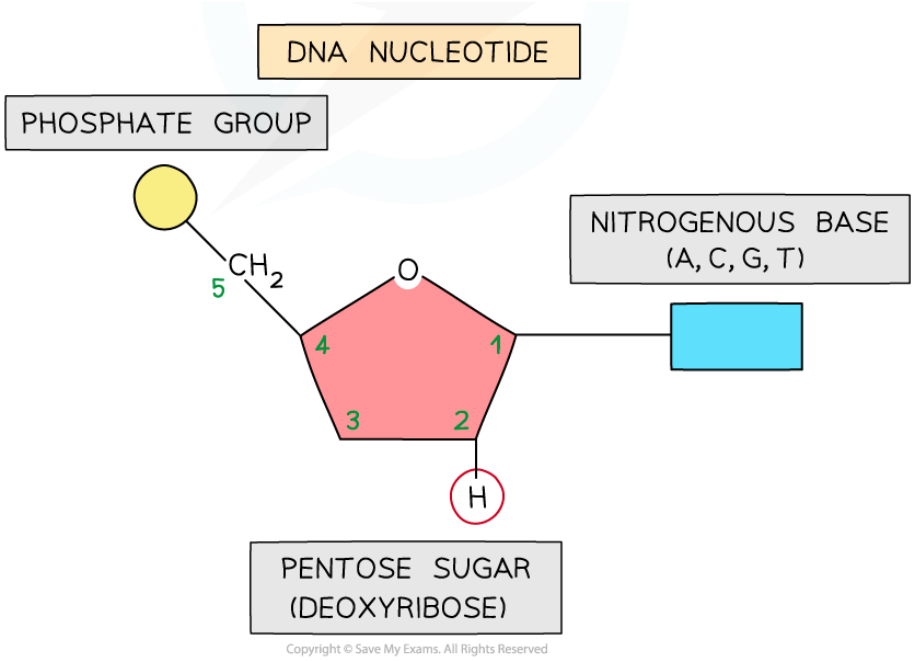
What are the three parts of a DNA nucleotide?

Deoxyribose sugar, organic base, phosphate group.

What are the three parts of an RNA nucleotide?

Ribose sugar, organic base, phosphate group.

Draw and label a DNA nucleotide



What are the four different organic bases that can be present on a DNA nucleotide?

thymine, adenine, guanine and cytosine

Give two differences between a DNA nucleotide and an RNA nucleotide.

- DNA nucleotides have deoxyribose sugar whereas RNA have ribose
- DNA nucleotides have thymine, adenine, guanine and cytosine organic bases but RNA has uracil, adenine, guanine and cytosine

What type of bond forms between nucleotides to form a polynucleotide chain?

Phosphodiester bonds

What are the different types of RNA?

tRNA (transfer RNA), mRNA (messenger RNA) and rRNA (ribosomal RNA)

Describe the structure of DNA

-Polymer of DNA nucleotides

-Double stranded (2 polynucleotide strands)

-Helix shape (coiled into a helix)

-The strands are anti-parallel

-Hydrogen bond between complementary base pairs hold the strands together

What is meant by complementary base pairing?

Hydrogen bonds will only form between Cytosine and Guanine or between Adenine and thymine.

In RNA, thymine is not present so adenine forms hydrogen bonds with uracil.

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Part 2 – Cell Structure

Task 5

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

Task 6:

What is the function of:

Nucleus: contains DNA/the genome

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 to the Golgi, folds proteins.

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 involved in cellular digestion, autophagy and the immune response

80 S ribosomes: site of protein synthesis