

**BTEC LEVEL 3  
NATIONAL EXTENDED  
CERTIFICATE IN  
APPLIED HUMAN  
BIOLOGY**

**TRANSITION BOOKLET 2**

**UNIT 1**

**LEARNING AIM A: FUNDAMENTAL  
DEVELOPMENT AND FUNCTION**

**QUEEN ELIZABETH HIGH SCHOOL**

### **About this resource**

This resource was produced in May 2020 by Mrs Fraser for Queen Elizabeth High School.

Resources used in the production of this booklet include:

BTEC Level 3 National Extended Certificate in Applied Human Biology specification issue 5 (2019)  
[https://qualifications.pearson.com/content/dam/pdf/BTEC-Nationals/applied-human-biology/2018/specification-and-sample-assessments/9781446958599\\_BTECNAT\\_L3\\_EXTCERT\\_APPHUMBIO\\_SPEC\\_PPV2\\_070618upd.pdf](https://qualifications.pearson.com/content/dam/pdf/BTEC-Nationals/applied-human-biology/2018/specification-and-sample-assessments/9781446958599_BTECNAT_L3_EXTCERT_APPHUMBIO_SPEC_PPV2_070618upd.pdf)  
(accessed 13/05/2020)

AQA Transition Guide: Biology. <https://filestore.aqa.org.uk/resources/biology/AQA-7401-7402-TG.PDF> (accessed 13/05/2020)

Student Support: GCSE to A Level Biology Transition. Oxford University Press (2019)  
<https://www.kerboodle.com/app/courses/16091/modules/Resources> (accessed 13/05/2020)

Biology Bridging work, Mrs Fletcher Woods, May 2020

## Welcome

BTEC Nationals are widely recognised by industry and higher education as the signature vocational qualification at Level 3. YouGov research shows that 62 per cent of large companies have recruited employees with BTEC qualifications. What's more, well over 100,000 BTEC students apply to UK universities every year and their BTEC Nationals are accepted by over 150 UK universities and higher education institutes for relevant degree programmes either on their own or in combination with A Levels.

The Applied Human Biology course you have chosen is designed to allow you to continue your education in science in order to continue on to education or employment, possibly in the health and health science sectors. With 50,000 people currently employed in the applied health science sector, and over 3 million nurses in the UK, Applied Human Biology gives students a good progression pathway into many future careers.

## A word to students

Today's BTEC Nationals are demanding, as you would expect of the most respected applied learning qualification in the UK. You will have to choose and complete a range of units, be organised, take some assessments that we will set and mark and keep a portfolio of your assignments. But you can feel proud to achieve a BTEC because, whatever your plans in life – whether you decide to study further, go on to work or an Apprenticeship, or set up your own business – your BTEC National will be your passport to success in the next stage of your life.

## How this course works

Unlike with A-levels, you will have an exam at the end of year 12, and both years you will complete coursework assignments.

Year	Unit	Assessment method	Contribution to overall grade
12	1- Principles of Applied Human Biology	Exam	25%
12	2- Microorganisms and infectious disease	Assignments	25%
13	3- Human Biology and health issues	Exam	33%
13	TBC	Assignments	17%

At the end of year 12 we will review each students progress. There will be opportunities to resit the unit 1 exam however we will not allow students to progress into year 13 if they have not achieved a minimum of a "near pass" in unit 1 alongside a pass in unit 2.

### *Unit 1 – Principles of Applied Human Biology (Year 12)*

This unit covers some of the biological principles that underpin human biology. You will study human body functions at a genetic, cellular, and tissue level. You will examine the link between lifestyle factors and health, and explore the ways this knowledge can be applied to improve diagnostic and health outcomes.

### *Unit 2 – Microorganisms and Infectious Diseases (Year 12)*

You will investigate the effect of antimicrobials agents on the growth of microorganisms, carrying out a wide range of practical techniques. You will develop their knowledge and understanding of microorganisms and infectious disease.

### *Unit 3 – Human Biology and Health issues (Year 13)*

You will develop their skills in researching, evaluating and reporting whilst exploring the impact of health issues on our society.

### *Internally assessed unit (Year 13)*

You will carry out three internally assessed assignments widening your knowledge of a particular area of the body. The unit content is to be confirmed but will focus on one of the following: functional physiology, disease and disorder, biomedical science, or human reproduction.

### **Places to go for help**

1. The exam board website is a good place to start  
Visit <https://qualifications.pearson.com/en/qualifications/btec-nationals/applied-human-biology.html>. The Biology webpages are aimed at teachers, but you may find them useful too.  
Information includes:
  - The specification – this explains exactly what you need to learn for your exams.
  - Specimen exam papers
2. Royal Society of Biology  
“A single unified voice for biology”. They work with everyone from government policy makers to students, as well as universities and researchers studying biology. Their website includes a dedicated student section. Have a look at [rsb.org.uk](http://rsb.org.uk)
3. The student room  
Join the A-level Biology forums and share thoughts and ideas with other students if you’re stuck with your homework. Just be very careful not to share any details about your assessments, there are serious consequences if you’re caught cheating. Visit [thestudentroom.co.uk](http://thestudentroom.co.uk)
4. Textbooks and Revision Guides  
BTEC have not yet published a textbook or revision guide for Applied Human Biology. In school we will make use of a number of resources including the A-level Biology textbooks. We will make sure that you have access to these on kerboodle outside of school.
5. YouTube  
YouTube has thousands of Biology videos. Just be careful to look at who produced the video and why because some videos distort the facts. Check the author, date and comments – these help indicate whether the clip is reliable. If in doubt, ask your teacher.
6. Magazines  
Focus, New Scientist or Philip Allan updates can help you put the biology you’re learning in context. Have a look in the LRC for the latest edition.

## **Activities to help you prepare for year 12**

We have put together this transition booklet to help you prepare for the move into year 12. This booklet focuses on knowledge you have acquired at GCSE that will be required for unit 1. The first section of unit 1, learning aim A, focuses on fundamental development and function, and includes:

- Cells, tissues, and biological molecules
- The nervous system
- Cardiovascular and respiratory system
- Digestive and excretory system
- Cellular injury and repair
- Diagnostic techniques

Use this page to record what you have done:

Activity Number	Title	Initial reaction from GCSE knowledge- Red/Amber/Green	Date completed	Date checked	Red/Amber/Green rating following completion and marking
1	Biological molecules				
2	Eukaryotic cells				
3	Cell transport				
4	Respiration				
5	Cell cycle and mitosis				
6	Meiosis				
7	Reflexes				
8	Synapses				
9	Heart				
10	Blood vessels				
11	Lungs				
12	Digestive system				

# 1. Biological molecules

At GCSE, you have encountered four biological molecules- proteins, fats, carbohydrates, and DNA.

Complete the following table to summarise your current level of knowledge. Two boxes have been filled in for you.

Biological molecule	Made of	Purpose
Proteins	Amino acids	
Carbohydrates - Starch - Cellulose - Glycogen		
Fats / Lipids		Storage Insulation
DNA		

In BTEC level 3 Applied Human Biology we look at the structure of DNA in detail. In the space below draw and label what you can remember about DNA from GCSE. Fill in the missing words where appropriate

	<p>DNA stands for _____</p> <p>A monomer of DNA is called a _____</p> <p>The monomer of DNA is made up of 3 components s_____, p_____ and a nitrogen b_____</p> <p>A polymer of DNA is called a _____</p> <p>There are 4 different types of base present in DNA. They are called _____, _____, _____ and _____</p> <p>A nucleotide looks like this:</p>
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Here are some new facts that you will be learning in the first half term of year 12.

Learn the answers to the questions below then cover the answers column with a piece of paper and write as many answers as you can. Check and repeat.

What are monomers?	smaller units from which larger molecules are made
What are polymers?	molecules made from a large number of monomers joined together
What is a condensation reaction?	a reaction that joins two molecules together to form a chemical bond whilst eliminating of a molecule of water
What is a hydrolysis reaction?	a reaction that breaks a chemical bond between two molecules and involves the use of a water molecule
What is a monosaccharide?	monomers from which larger carbohydrates are made
How is a glycosidic bond formed?	a condensation reaction between two monosaccharides
Name the three main examples of polysaccharides.	glycogen, starch, cellulose
Name the two main groups of lipids	phospholipids, triglycerides (fats and oils)
Give four roles of lipids	source of energy, waterproofing, insulation, protection
What is an ester bond?	a bond formed by a condensation reaction between glycerol and a fatty acid
What are the monomers that make up proteins?	amino acids
Draw the structure of an amino acid	$  \begin{array}{c}  \text{R} \\    \\  \text{H}_2\text{N} - \text{C} - \text{COOH} \\    \\  \text{H}  \end{array}  $
How is a peptide bond formed?	a condensation reaction between two amino acids
What is a polypeptide?	many amino acids joined together
How does an enzyme affect a reaction?	it lowers the activation energy
Give five factors which can affect enzyme action.	temperature, pH, enzyme concentration, substrate concentration, inhibitor concentration

## 2. Eukaryotic cells

For Applied Human Biology, the focus is on humans.

Human cells are Eukaryotic. What does this mean?

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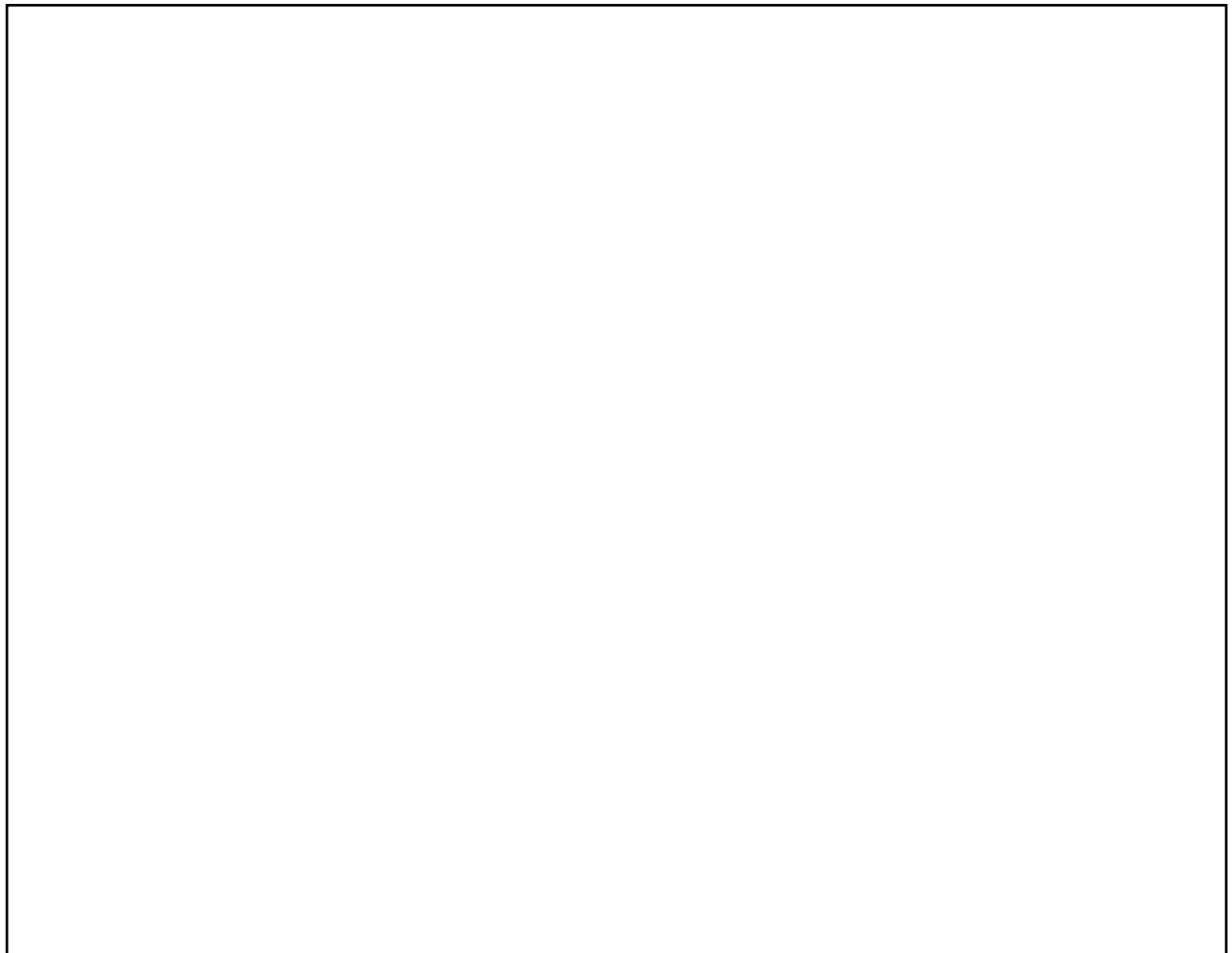
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Match up the cell parts with their function:

Nucleus
Cytoplasm
Mitochondria
Cell Membrane
Ribosomes

Where chemical reactions occur.
Where protein synthesis occurs.
Controls the cell. Contains the DNA in the form of chromosomes.
The site of aerobic respiration.
Controls the movement of substances in and out of cells.

In the space below, draw and label a general, unspecialised human cell:





### 3. Cell transport

At GCSE you learnt about three types of cell transport: diffusion, osmosis, and active transport.

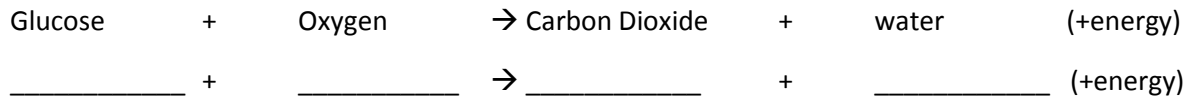
Sort the statements below into the appropriate columns:

- Movement of water only
- Movement across a partially/ semi permeable membrane (use twice)
- How minerals enter root hair cells
- Does not require energy (use twice)
- How water enters root hair cells
- Passive (use twice)
- Requires energy
- Active
- How carbon dioxide enters a plant
- Substances move from an area of high concentration to an area of low concentration
- Only occurs in nature (use twice)
- Water moves from an area of high concentration of water to an area of low concentration of water
- Can happen in any gas or liquid
- Substances move from an area of low concentration to an area of high concentration

Diffusion	Osmosis	Active Transport

## 4. Respiration

Here is the word equation for respiration. Write the symbol equation below:



Read the paragraph below. Highlight the errors and write the correction above it:

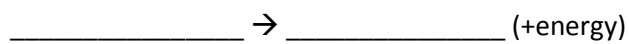
When plenty of nitrogen is available, aerobic respiration occurs. This takes place in the ribosomes.

Plenty of energy is released along with carbon dioxide and water which are waste products.

Without sufficient oxygen, the complete breakdown of glucose occurs. More energy is released, and toxic ethanol is made. To get rid of this, you need more oxygen. This is known as the oxygen debt.

Your heart rate decreases and you breathe more deeply to try and get more oxygen in. Your muscles will feel fatigued until the non-toxic lactic acid is removed by nitrogen.

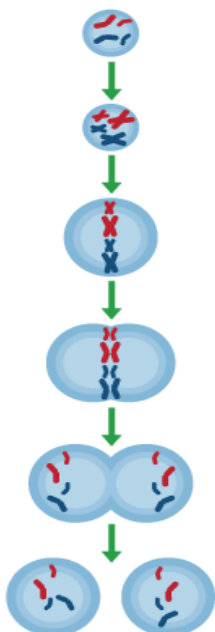
Now write the word equation for anaerobic respiration.



## 5. Cell cycle and mitosis

You looked at the cell cycle and mitosis in Yr 10 as part of the cells topic.

The cell cycle is made up of the 3 stages, I \_\_\_\_\_, Mitosis & C \_\_\_\_\_. Below is a simple diagram of mitosis. Add some descriptions to the side and then finish the sentences on the next page.



Interphase is the first stage of the cell cycle. During this stage....

The process of mitosis produces....

Cytokinesis is....

In mitosis, the chromosome number....

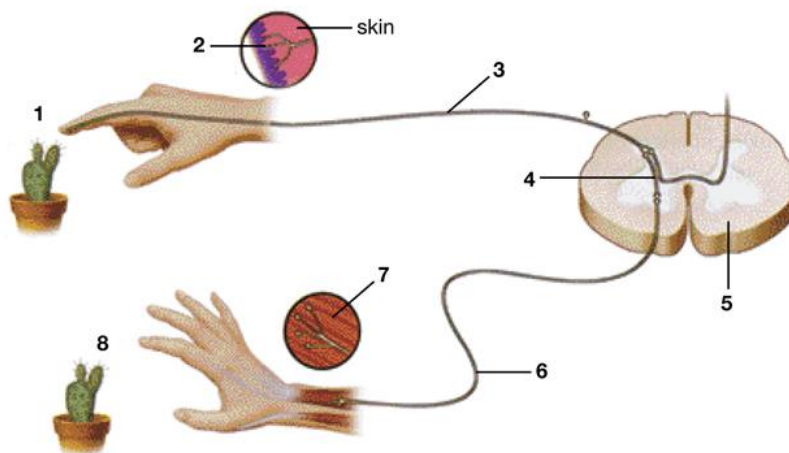
## 6. Meiosis

Meiosis is another type of cell division, and is used in the production of gametes. Read the statements below and decide whether they apply to mitosis or meiosis.

Statement	Mitosis	Meiosis
4 daughter cells produced		
2 daughter cells produced		
Gives variation		
1 division happens		
Chromosome number is halved		
Daughter cells are identical		
Produces gametes		
Chromosome number stays the same		
2 divisions happen		
Produces body cells		

## 7. Reflexes

Identify the parts of a reflex arc. Then complete the paragraph on the next page.

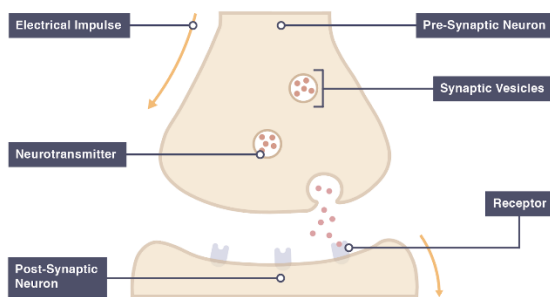


A (1) \_\_\_\_\_ like pressure from the cactus spines is detected by a (2) \_\_\_\_\_. From there the impulse travels along a (3) \_\_\_\_\_ neurone, then a (4) \_\_\_\_\_ neurone which is found in the (5) \_\_\_\_\_. Next the impulse travels along a (6) \_\_\_\_\_ neurone to the (7) \_\_\_\_\_. This can be either a muscle or a gland and it carries out the (8) \_\_\_\_\_.

### 8. Synapses

Describe how a message is transmitted between 2 neurones.

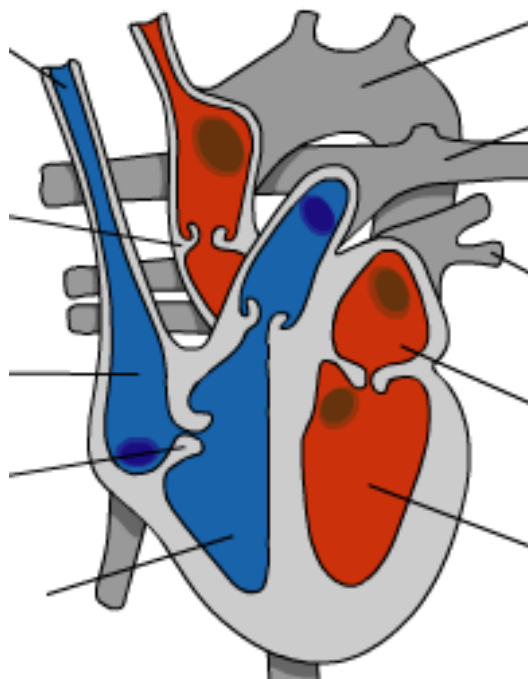
*Key words: synapse, chemicals, diffuse, impulse*



### 9. Heart

The diagram below shows the structure of the mammalian heart.

Label the diagram in as much detail as you can.



Write a brief description for each part you have labelled.

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## 10. Blood vessels

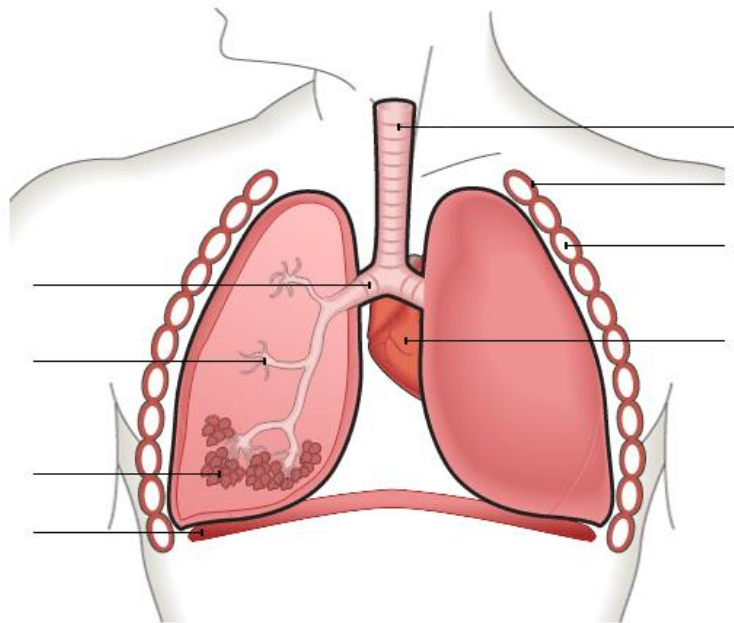
There are three major types of blood vessels in the human circulatory system: veins, arteries and capillaries.

Complete the table below to summarise the difference in structure and function between these blood vessels.

	Function	Structure
<b>Arteries</b>	Carry oxygenated blood (blood containing oxygen) away from the heart at high pressure	
<b>Veins</b>		
<b>Capillaries</b>		

## 11. Lungs

Label the diagram below to show the key structures found in the lungs.



Explain the adaptations of the alveoli and how gas exchange occurs using the terms diffusion and concentration gradient:

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## 12. Digestive system

You will look closely at the role of the digestive system and how absorption takes place efficiently.

Fill in the table below to show how different food groups are digested.

Food group	Broken down into...	Enzyme name	Where this happens
Carbohydrates			
	Amino acids		
		Lipase	

Label the diagram below and annotate the diagram of the small intestine with as many adaptations and explanations as to how they help to speed up absorption.

