

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

**TRANSITION BOOKLET 4**

**UNIT 2**

**PRACTICAL MICROBIOLOGY  
AND INFECTIOUS DISEASES**

**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 2. This is the coursework unit and will involve independent research as well as you being taught some of the content. You will also carry out a number of practical activities, some of which you will plan yourself.

This unit will include:

- The characteristics of different microorganisms
- Methods of pathogenicity
- Classification Strategies for microorganisms
- Classification of infectious disease
- Transmission of infectious agents
- Infectious diseases, signs, symptoms and progression
- Prevention and treatment of infectious disease
- Health and safety in the laboratory
- Microscopy and staining techniques
- Culture of microorganisms
- Quantitative analysis of microbes
- Investigating substances that inhibit the growth of microbes
- Interpretation, analysis and evaluation

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	Eukaryotes and Prokaryotes				
2	Routes of transmission				
3	Examples of pathogens				
4	Treating disease				
5	Aseptic technique				
6	Analysing zones of inhibition				
7	Dilutions				

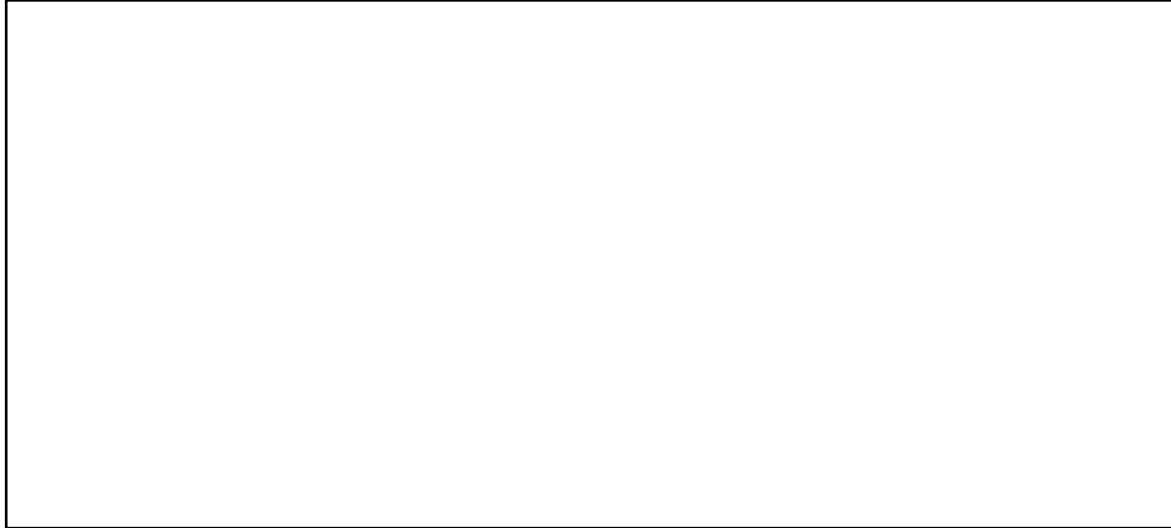
## 1. Prokaryotes and Eukaryotes

What is the key difference between a eukaryotic and a prokaryotic cell?

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In the space below, draw and label a diagram of a bacterium (a typical prokaryote)



What is the function of a flagella?

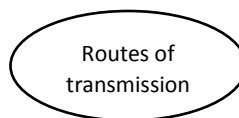
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Why do some bacteria have a slime capsule?

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## 2. Routes of transmission

Create a mindmap to show the different ways that diseases can be spread



### 3. Examples of pathogens

Fill in the table about the example human pathogens you studied at GCSE.

Name	Disease it causes with key symptoms	Type of pathogen (viral, bacterial, protest)	Transmission route	Treatment
Measles				
HIV				
Salmonella				
Gonorrhoea				
Malaria				

#### 4. Treating disease

Fill in the gaps:

\_\_\_\_\_ are used for treating infections caused by bacteria.

Bacteria live and reproduce outside of cells and make us feel ill due to the \_\_\_\_\_ they produce. The first example of this type of drug is \_\_\_\_\_ which was discovered by Alexander Fleming. This used to be very effective against gonorrhoea but this is no longer the case due to the bacteria gaining m\_\_\_\_\_ which made them r\_\_\_\_\_.

\_\_\_\_\_ are hard to treat as they live and reproduce inside cells. Antiviral drugs do exist for some diseases. HIV cannot be cured but antiretroviral drugs are used to manage it.

To treat the symptoms of a disease, you might be given \_\_\_\_\_.

These won't cure you but will make you feel better. An example of a painkiller is \_\_\_\_\_.

#### 5. Aseptic technique

Aseptic technique is used by microbiologists when growing bacteria to make sure that they produce contamination free results.

If you did combined science instead of triple science you may not have carried out a practical using this method and should watch <https://www.youtube.com/watch?v=BkbLI2mAMP8> and read <https://www.bbc.co.uk/bitesize/guides/z8fkmsg/revision/7>.

Name these pieces of equipment.



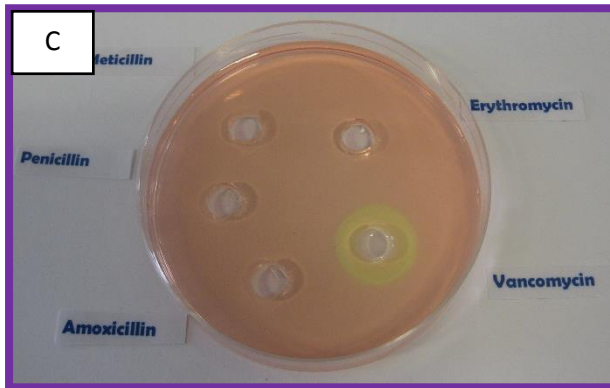
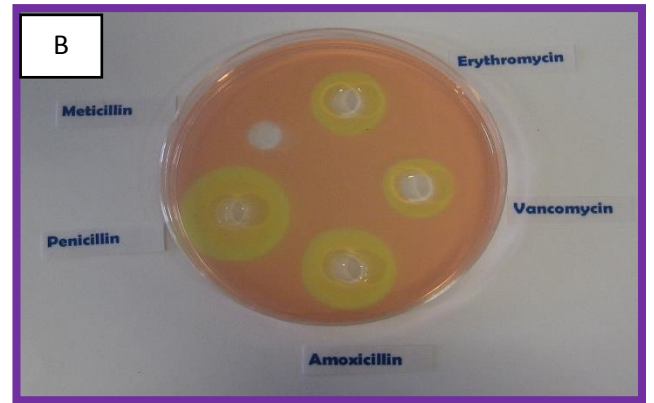
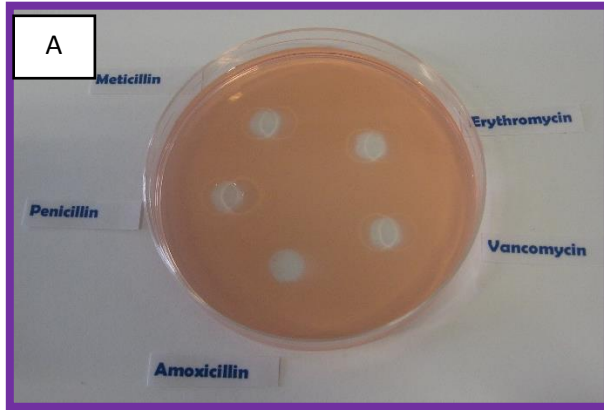


Complete the method by giving the reasons behind each step.

1. Before all the equipment was used, it had to be sterilised. This means.....	
2. The desk was disinfected by....	
3. The experiment was done near a bunsen because...	
4. The forceps (tweezers) were sterilised by...	
5. The tweezers were used to pick up a paper disk which...	
6. The lid of the plate was...	
7. We repeated this with...	
8. The plate was labelled on the agar side so...	
9. The lid was taped so...	
10. The plate was put in the incubator with the lid side down because...	
11. The plate was incubated at 25°c ....	

## 6. Analysing zones of inhibition

The photos below show agar plates that have been inoculated with a pink bacterium. Into each well, a different antibiotic solution was placed. Where the bacteria have been killed, the agar is now yellow. Use a ruler to measure the inhibition zone radii.



Results

### Person A- flu

Flu (Influenza virus)	Zone of Inhibition Radius (mm)	Zone of inhibition area (mm <sup>2</sup> )
Penicillin		
Methicillin		
Erythromycin		
Vancomycin		
Amoxicillin		

Recommended antibiotic:

### Person B- Strep throat

Strep throat (Streptococcus bacterium)	Zone of Inhibition Radius (mm)	Zone of inhibition area (mm <sup>2</sup> )
Penicillin		
Methicillin		
Erythromycin		
Vancomycin		
Amoxicillin		

Recommended antibiotic:

**Person C- MRSA**

<b>MRSA (Methicillin Resistant Staphylococcus aureus bacterium)</b>	<b>Zone of Inhibition Radius (mm)</b>	<b>Zone of inhibition area (mm<sup>2</sup>)</b>
Penicillin		
Methicillin		
Erythromycin		
Vancomycin		
Amoxicillin		

Recommended antibiotic:

**Person D- Staph wound infection**

<b>Staph infection (Staphylococcus bacterium)</b>	<b>Zone of Inhibition Radius (mm)</b>	<b>Zone of inhibition area (mm<sup>2</sup>)</b>
Penicillin		
Methicillin		
Erythromycin		
Vancomycin		
Amoxicillin		

Recommended antibiotic:

Now answer these questions:

What treatment would you recommend for person A and why?

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Methicillin is usually used for treating Staph infections. What would happen if you gave it to person C?

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**7. Dilutions**

You may be asked to make dilutions as part of a practical. How would you make the following?

- 100ml of 50% bleach solution from 100% bleach and water?

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- 5 ml of 20% virkon solution from 40% virkon solution and water?

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- 20ml of 0.5M acid from 1M acid and water?

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- A 1 gram/litre solution from a 10g/litre solution and water?

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