Cheshire College
South & West

Pearson Level 3 Alternative Academic Qualification
BTEC National in

Medical Science (Extended Certificate)

L3

Transition Guide

GCSE to A-level progression: Student transition activities – Pearson AAQ Medical Science

Aim of the booklet

This booklet will support your transition from GCSE science to A-level. At first, you may find the jump in demand a little daunting, but if you follow the tips and advice in this guide, you'll soon adapt. As you follow the course you will see how the skills and content you learnt at GCSE will be developed and your knowledge and understanding of all these elements will progress.

We have organised the guide into three sections:

1. Understanding the specification and the assessment
2. Transition activities to bridge the move from GCSE to start of the A-level course
3. Progression of key ideas from GCSE to A-level.

Understanding the Specification and the assessments

Specification at a glance:

The specification is a useful reference document for you. You can download a copy from our website: L3 AAQ BTEhttps://qualifications.pearson.com/content/dam/pdf/btec-aaqs/medical-science/2025/specification-and-sample-assessments/btec-l3-medical-science-aaq-spec.pdfC Nat Med Sci Ext Cert Spec

First Year:

1. **Unit 4** - Diseases, Disorder, Treatments and Therapies:
   Assignment-based unit. Consists of 3 tasks. (60GLH)

2. **Unit 1** – Principles of Human Physiology, Anatomy and Pathology

   Examined Unit 1-hour 30 minutes exam worth 80 marks. (90GLH)

Second Year:

3. **Unit 2** – Health Issues and Scientific Reporting
   Examined Unit 2-hour exam worth 80 marks (120GLH)

4. **Unit 3** – Practical Microbiology and Infectious Diseases

   Assignment-based unit. Consists of 4 tasks. (90GLH)

Pearson Level 3 Alternative Academic Qualification BTEC National in Medical Science (Extended Certificate)			
Unit number	**Unit title**	**GLH**	**How assessed**
Mandatory Units, learners complete all units			
1	Principles of Human Physiology, Anatomy and Pathology	90	External
2	Health Issues and Scientific Reporting	120	External
3	Practical Microbiology and Infectious Diseases	90	Internal
Optional units – learners complete one unit			
4	Diseases, Disorders, Treatments and Therapies	60	Internal

Assessment objectives and Learning Aims

As you know from GCSE, we must write exam questions that address the Assessment objectives (AOs). It is important you understand what these AOs are, so you are well prepared. In Medical Science there are three AOs for Unit 1, four AOs for Unit 2.

Additionally, there are Learning Aims within the Assignment units. Below you can see both the Assessment objectives and learning aims for each Unit.

Unit 1: Principles of Human Physiology, Anatomy and Pathology (90 GLH) External	Unit 2 Health Issues and Scientific Reporting (120 GLH) External	Unit 3 Practical Microbiology and Infectious Diseases (90 GLH) Internal	Unit 4 Diseases, Disorders, Treatments and Therapies (60 GLH) Internal
Assessment Outcomes:: **AO1** Demonstrate knowledge and understanding of scientific concepts and theories, terminology, definitions and scientific formulae used in human physiology, anatomy and pathology **AO2** Apply knowledge and understanding of scientific concepts and theories, procedures, processes and techniques relating to human physiology, anatomy and pathology in given contexts **AO3** Analyse and interpret scientific information relating to human physiology, anatomy and pathology.	**Assessment Outcomes:** **AO1** Demonstrate knowledge and understanding of scientific concept and theories, terminology, definitions and scientific formulae used in health issues and scientific reporting **AO2** Apply knowledge and understanding of scientific concepts and theories, procedures, processes and techniques relating to health issues and scientific reporting in given contexts **AO3** Analyse and interpret scientific information relating to health issues and scientific reporting **AO4** Make judgements or conclusions using scientific concepts, procedures, processes and techniques relating to health issues and scientific reporting.	**Learning Aims:** **A** Understand the classification and nature of microorganisms. **B** Examine the transmission and treatments of infectious diseases. **C** Explore the application of techniques to culture and identify microorganisms. **D** Investigate the effects of antimicrobial agents on the growth of microorganisms.	**Learning Aims:** **A** Understand biological molecules and pathways and their effect on the body. **B** Understand the effects of physiological diseases and disorders and associated treatments. **C** Examine the development of innovative and future types of treatment for physiological diseases and disorders.

Transition activities

The following activities cover some of the key skills from GCSE science that will be relevant at A-level. They include the vocabulary used when working scientifically and some maths and practical skills.

The activities are **not a test**. Try the activities first and see what you remember and then use textbooks or other resources to answer the questions. **Don't** just go to Google for the answers, as actively engaging with your notes and resources from GCSE will make this learning experience much more worthwhile.

Understanding and using scientific vocabulary

Understanding and applying the correct terms are key for practical science. Much of the vocabulary you have used at GCSE for practical work will not change but some terms are dealt with in more detail at A-level so are more complex.

Activity 1 Scientific vocabulary: Designing an investigation

Link each term on the left to the correct definition on the right.

Hypothesis	The maximum and minimum values of the independent or dependent variable
Dependent variable	A variable that is kept constant during an experiment
Independent variable	The quantity between readings, eg a set of 11 readings equally spaced over a distance of 1 metre would give an interval of 10 centimetres
Control variable	A proposal intended to explain certain facts or observations
Range	A variable that is measured as the outcome of an experiment
Interval	A variable selected by the investigator and whose values are changed during the investigation

Activity 2 Scientific vocabulary: Making measurements

Link each term on the left to the correct definition on the right.

True value	The range within which you would expect the true value to lie
Accurate	A measurement that is close to the true value
Resolution	Repeated measurements that are very similar to the calculated mean value
Precise	The value that would be obtained in an ideal measurement where there were no errors of any kind
Uncertainty	The smallest change that can be measured using the measuring instrument that gives a readable change in the reading

Activity 3 Scientific vocabulary: Errors

Link each term on the left to the correct definition on the right

Random error	Causes readings to differ from the true value by a consistent amount each time a measurement is made
Systematic error	When there is an indication that a measuring system gives a false reading when the true value of a measured quantity is zero
Zero error	Causes readings to be spread about the true value, due to results varying in an unpredictable way from one measurement to the next

Atherosclerosis develops slowly with a build-up of cholesterol, fat, foam cells and other substances in the blood forming ..... in the wall, under the endothelium.

The build-up causes the lumen to narrow.

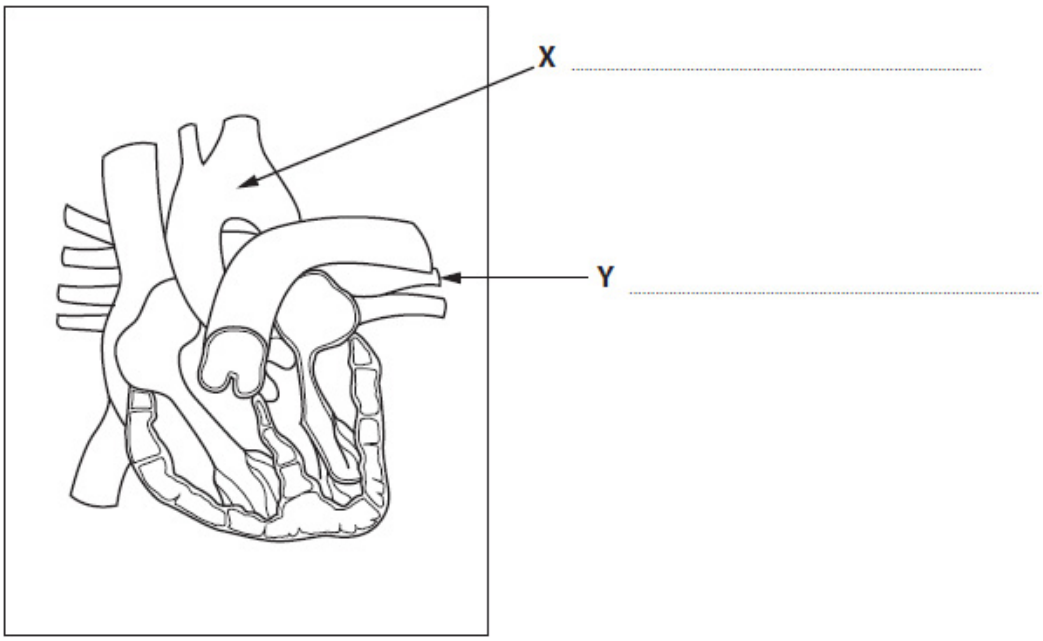
The narrowing of the lumen increases the blood .....

This can cause more damage. This can lead to atherosclerosis.

Lifestyle choices, such as a poor diet, ... or lack of exercise can increase the risk of developing atherosclerosis.

Paragraph 1

human heart



Complete the missing labels, **X** and **Y**, on the poster.

(Total for question = 2 marks)

Paragraph 1 partially describes cell specialisation in animals.

Complete Paragraph 1 by adding the missing words.

(2)

Cells that have the ability to develop into many different cell types are

called ..... cells.

Cells become specialised for a particular function by a process known as

.....

(Total for question = 2 marks)

Practical skills

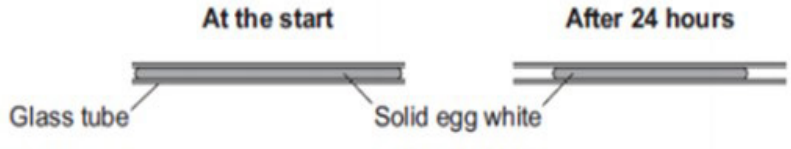
Activity 4 Investigating how temperature and pH affect enzymes

Egg white is made of protein. The students were investigating how temperature and pH affect the digestion of protein

The students carried out the following procedure:

- Filled six narrow glass tubes with fresh egg white
- Boiled the tubes so the egg white became solid
- Placed each tube into a different beaker containing human protease enzyme at different pH values at room temperature and 3 in neutral pH but at different temperatures for 24 hours
- Measured the length of solid egg white in each tube after 24 hours

The diagram shows the investigation.



The results were recorded in the tables below:

pH	Original length of solid egg white (cm)	Final length of solid egg white (cm)	% change
4	6.0	5.6	
7	6.0	3.8	
9	6.0	5.8	

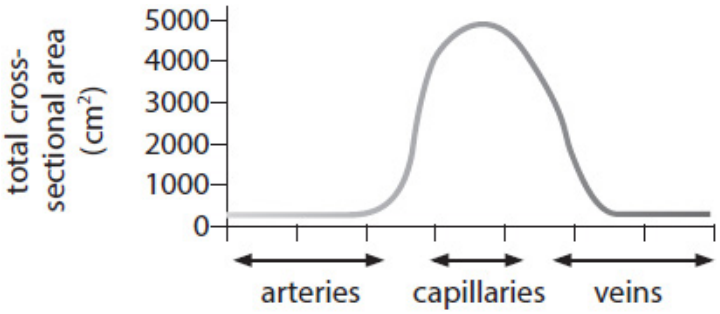


Figure 3a

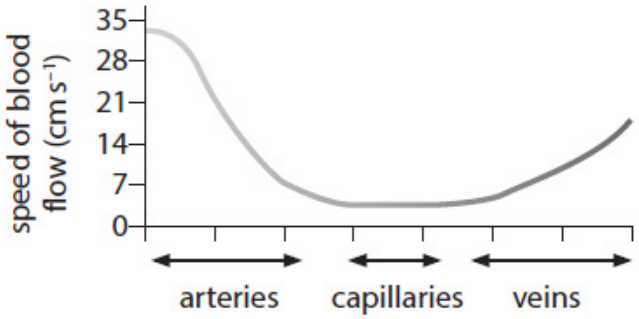


Figure 3b

State the relationship between the total cross-sectional area of the capillaries and the speed of blood flow in the capillaries, shown in Figures 3a and 3b.

(1)

.....

.....

(ii) The total cross-sectional area of the arteries is 300 cm^2.

The total cross-sectional area of the capillaries is 5 000 cm^2.

Calculate the percentage increase in cross-sectional area when comparing arteries with capillaries.

(3)

Show your working.

percentage increase = ... %

(iii) Give **three** functions of capillaries.

(3)

1 .....

.....

2 .....

.....

3 .....

.....

A microbiologist measures an electron micrograph image of a bacterium to be 4.5 cm in length.

The magnification used to view the bacterium was 22 500×.

Calculate the actual size of the bacterium.

Show your working.

..... µm

Progression of content

What you learnt at GCSE forms the foundation to your further study at A-level. Ideas will be developed and refined, new concepts and skills will be introduced. The follow are some **optional** questions which you might like to have a go at. They are designed to help refresh your memory of some of the important concepts you will use during your study of Medical Science.

Use the questions in each section to help to identify where your knowledge and understanding is secure and which areas you may need to revisit.

Activity 5 Cell structure and magnification

Drawing images from microscope observations must be done carefully, including careful measurements for magnification calculations.
Make sure that you are clear on the organelles within different cells and their functions.
You must also be secure in the method used to make observations using a light microscope and the purpose of each method step.

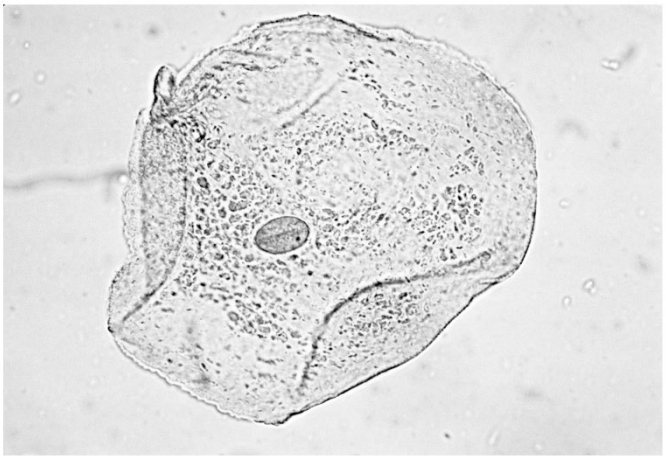


Figure 1
shows an animal cell viewed using a microscope

The cell contains a nucleus.

1. State the function of the nucleus.

   ……

2. Name **one** type of cell that does **not** contain a nucleus.

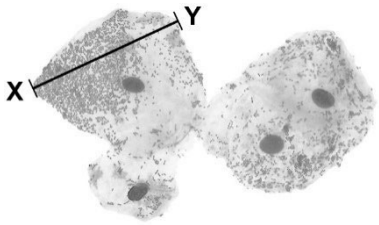
   ……

3. On the diagram label three parts of the cell.

4. Name **one** structure found in a plant cell but **not** found in an animal cell.

   ……..

The figure below shows some different cells.



The real length from point **X** to point **Y** s 0.06 mm.

5. Calculate the magnification.

The cells shown above were viewed using a light microscope.

6. Give **two** advantages of using an electron microscope instead of a light microscope.

   ……

   ……

   ……

Activity 7: Transport across cell membranes

In Medical Science, many processes involve moving substances across boundaries. Ensure that you know what each of diffusion, osmosis and active transport are and where each takes place. Questions on transport across cell membranes often involve data and applying knowledge and understanding to unfamiliar contexts.

One of the required practicals at GCSE is on osmosis, make sure that you can interpret the graph used to show the results.

A student carried out an investigation using chicken eggs. This is the method used.

1. Place 5 eggs in acid for 24 hours to dissolve the egg shell.
2. Measure and record the mass of each egg.
3. Place each egg into a separate beaker containing 200 cm 3 of distilled water.
4. After 20 minutes, remove the eggs from the beakers and dry them gently with a paper towel.
5. Measure and record the mass of each egg. **Table 4** shows the results.

Table 4

Egg	Mass of egg without shell in grams	Mass of egg after 20 minutes in grams
1	73.5	77.0
2	70.3	73.9
3	72.4	75.7
4	71.6	73.1
5	70.5	73.8

Another student suggested that the result for egg **4** was anomalous.

1. Do you agree with the student? Give a reason for your answer.
2. Calculate the percentage change in mass of egg **3.**

Molecules can move across a cell surface membrane by diffusion, facilitated diffusion or active transport.

Table 1 compares some facts about diffusion, facilitated diffusion and active transport.

Complete Table 1 by circling Yes or No in each box.

(3)

	diffusion	facilitated diffusion	active transport
Are protein carriers involved?	Yes / No	Yes / No	Yes / No
Is ATP needed?	Yes / No	Yes / No	Yes / No

Table 1

(Total for question = 3 marks)

Activity 6 Cell division

There is sometimes confusion between how and cells divide by mitosis and meiosis. You need to understand the purpose and features of each process and the role of mitosis in the cell cycle.

Cell division is needed for growth and for reproduction.

Table 3 contains three statements about cell division.
Complete **Table 3** by ticking **one** box for each statement.

Table 3

	Statement is true for		
Statement	**Mitosis only**	**Meiosis only**	**Both mitosis and meiosis**
All cells produced are genetically identical			
In humans, at the end of cell division each cell contains 23 chromosomes			
Involves DNA replication			

Activity 8 Circulatory system and gas exchange

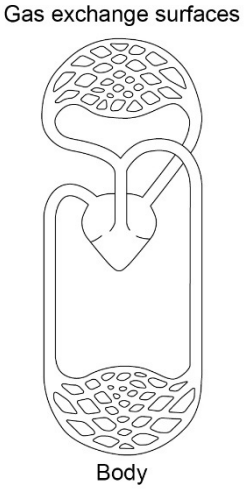
Application of your knowledge and understanding of these key concepts to unfamiliar context is a way examiners can assess the depth of your understanding.

A small animal called an axolotl lives in water.

The axolotl has a double circulatory system.

1. Explain what is meant by the term double circulatory system.

The diagram below shows the double circulatory system of the axolotl.



2. The heart of the axolotl has only one ventricle. Label the ventricle on the diagram.

3. Explain why having only one ventricle makes the circulatory system less efficient than having two ventricles.

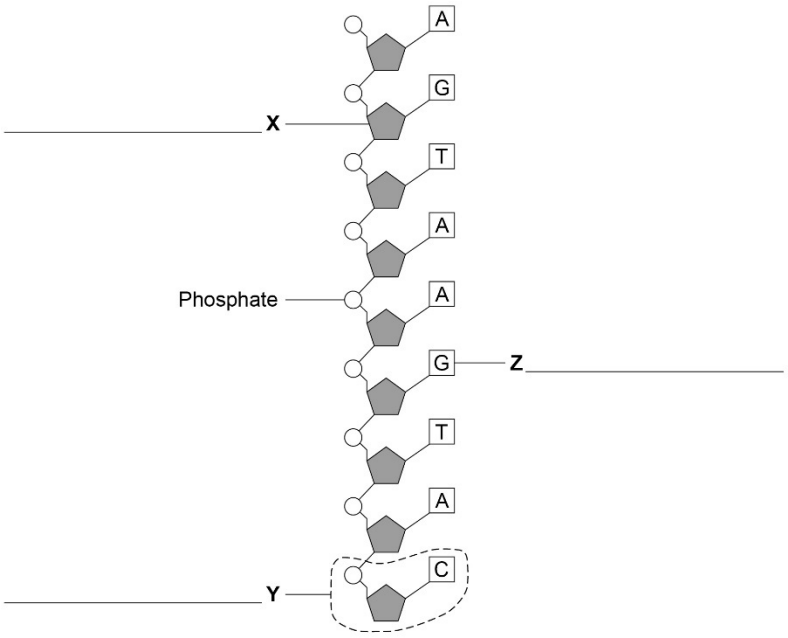
4. Explain why an axolotl may die in water with a low concentration of oxygen. Use the diagram above to help you, remember about surface area: volume ratio in gas exchange.

Activity 9 DNA and genetics

Genetic material is made of DNA.

1. Name the structures in the nucleus of a human cell which contain DNA.

The figure below shows part of one strand of a DNA molecule.



2. Label parts **X**, **Y** and **Z** with the correct word from the list below **:**

   base fatty acid nucleotide sugar glycerol

3. A complete DNA molecule is made of two strands twisted around each other. What scientific term describes this structure?

DNA codes for the production of proteins.
A protein molecule is a long chain of amino acids.

4. How many amino acids could be coded for by the piece of DNA shown in the figure above?