Sixth Form Preparation for Success

Welcome to Biology

AQA Biology 7401

Introduction: During your GCSE studies, you will already have grasped some of the fundamental details and knowledge required to study the subject of Biology. You will have had the opportunity to learn about a variety of biological functions including the human body, organisms, evolution and the environment, all taught with everyday relevance so that that you were able to draw much more from the content. Hopefully, by now, you will have some idea of just how much Biology affects our everyday lives and will be eager to learn more. The A Level course that you are about to embark on offers an array of fascinating and useful information about our bodies and the world around us. The main difference from your GCSE, however, is the level of detail at which you will explore these biological concepts. As a result, by opting to study Biology at A Level, you will be up-skilling your existing knowledge and becoming much more aware of the ins and outs of our bodies as well as how we fit in to the world around us. With many fascinating experiments ahead, Biology students will benefit from acquiring a wide range of practical skills through hands on work, with tests being more sophisticated than in previous years. You will be encouraged to not only study how Biology works, but how elements of the Science can be used to solve problems. As such, a number of other skills play a big part in the process of studying Biology, like Mathematics, Physics and Technology.

Biology is a great subject to study if you are looking into a career in any aspect of Medical Science, but is not limited to this field of expertise. Many Biology students go on to professions in areas like Marine Biology, Zoology, Teaching, and much, much more.

Part I – Y11 into 12 Biology Specific Bridging Work

Remember prizes will be awarded for 'exceptional' work that demonstrates effort above expected!

TASK 1 – Investigate Places of Interest

Due to current restrictions, it is not possible to visit venues but many organisations have released videos of performances, have live webcams and video tours of museums.

i) **Whilst the National Science museums are currently closed, their collections and the inspirational stories they contain, remains open to you online. Follow the link 'explore our museums at home' to discover the many ways you can ignite your curiosity wherever you are. https://www.sciencemuseum.org.uk/home**

ii) **You could contact our nearest universities to see if they are running any summer schools for Biology/Medical Science based degrees – they are usually free and give you the opportunity to experience the resources of a University faculty.**

iii) **Take a virtual tour of the natural history museum https://www.nhm.ac.uk/ or view the online collections and highlights of the Oxford University Museum of Natural History https://www.oumnh.ox.ac.uk/**

iv) **Visit the 'Centre of the Cell' at https://www.centreofthecell.org/. This is the first science education centre in the world to be located within working biomedical research laboratories.**

v) **Visit the Royal Botanical Gardens at Kew and Wakehurst by taking a virtual visit at https://www.kew.org/about-us/virtual-kew-wakehurst**

TASK 2 – Wider Reading

Below is a selection of books that should appeal to a Biologist – someone with an enquiring mind who wants to understand the living world around us. None of the selections are textbooks, instead each provides insight to either an application of Biology or a new area of study that you will be meeting at A Level for the first time.

Big Picture. This is a free magazine produced by the Wellcome Trust. It is written for post 16 Biology students and explores the innovations and implications of cutting edge biomedical science. Visit the website to access previous issues. **https://www.stem.org.uk/big-picture**

Hodder Education magazines are subject-specific publications aimed at A Level students. Free trails are available as well as subscriptions. **https://www.hoddereducation.co.uk/magazines**

Reading Richard Dawkins: The Selfish Gene
Steve Jones: Y: The Descent of Men
Matt Ridley Genome: The Autobiography of a Species in 23 Chapters
Francis Crick: Genes, Experience and What Makes Us Human
James Watson: DNA: The Secret of Life The Double Helix

Movie recommendations: In addition to reading, there are also many different category of film which introduce biological themes. Too often, these can be extremely 'non-scientific', however there are also numerous films which are worth a watch. Some have solid scientific theory, whilst others deal with the ethics of genetics.
Gattaca (15) 1997 Directed by Andrew Niccol
Blueprint (15) 2003 Directed by Rolf Schubel
Autopsy: Life and Death – Documentary /TV series
Mimic (15) 1997 Directed by Guillermo del Toro
The Madness of King George (PG) 1994 Directed by Nicholas Hytne

Documentaries/Non-fiction:
"The English Surgeon" (2007)
This film follows English neurosurgeon Henry Marsh to Ukraine, where he works with a local doctor to care for patients. "It depicts interesting dilemmas that arise when a doctor has to make choices about providing medical care when there's not enough resources, and it explores what [a physician's] responsibility is to patients,".

TASK 3 – Compulsory tasks

Below are three topics that you will study in more detail for A-Level Biology. You are to complete the task set for each of them.

1. Cell structure.

You will study cell structure in more detail at A-level covering the topics of cell ultrastructure (the fine detail inside the cell) and cell fractionation (separating the organelles). In order to explain what happens in numerous sections of the specification, you need to have a good understanding of the model of the cell. You need to know how the internal environment of the eukaryotic cell is arranged, linking the structure of the individual organelles with their function.
The following animation explains the detail of the interior cell structure. https://learn.genetics.utah.edu/content/cells/insideacell/

Task: Describe the structure and functions of the internal organelles of the eukaryotic cell
You may wish to include a scientifically accurate, labelled diagram of an animal cell.

2. Types of Microscope

At GCSE you briefly looked at the function of an electron microscope. These machines have been essential in gaining an understanding of the internal ultrastructure of the cell and much, much more.

Task: Explain how the electron microscope works and give advantages and disadvantages.

3. DNA and protein synthesis

Nucleic acids are a group of the most important molecules of which the best known is DNA. The double helix structure makes it immediately recognisable. Despite its complex structure, DNA is made up of nucleotides that have just three basic components.

Task: Describe, in detail, the structure of DNA and the nucleotide. Explain how DNA is used to synthesise proteins.

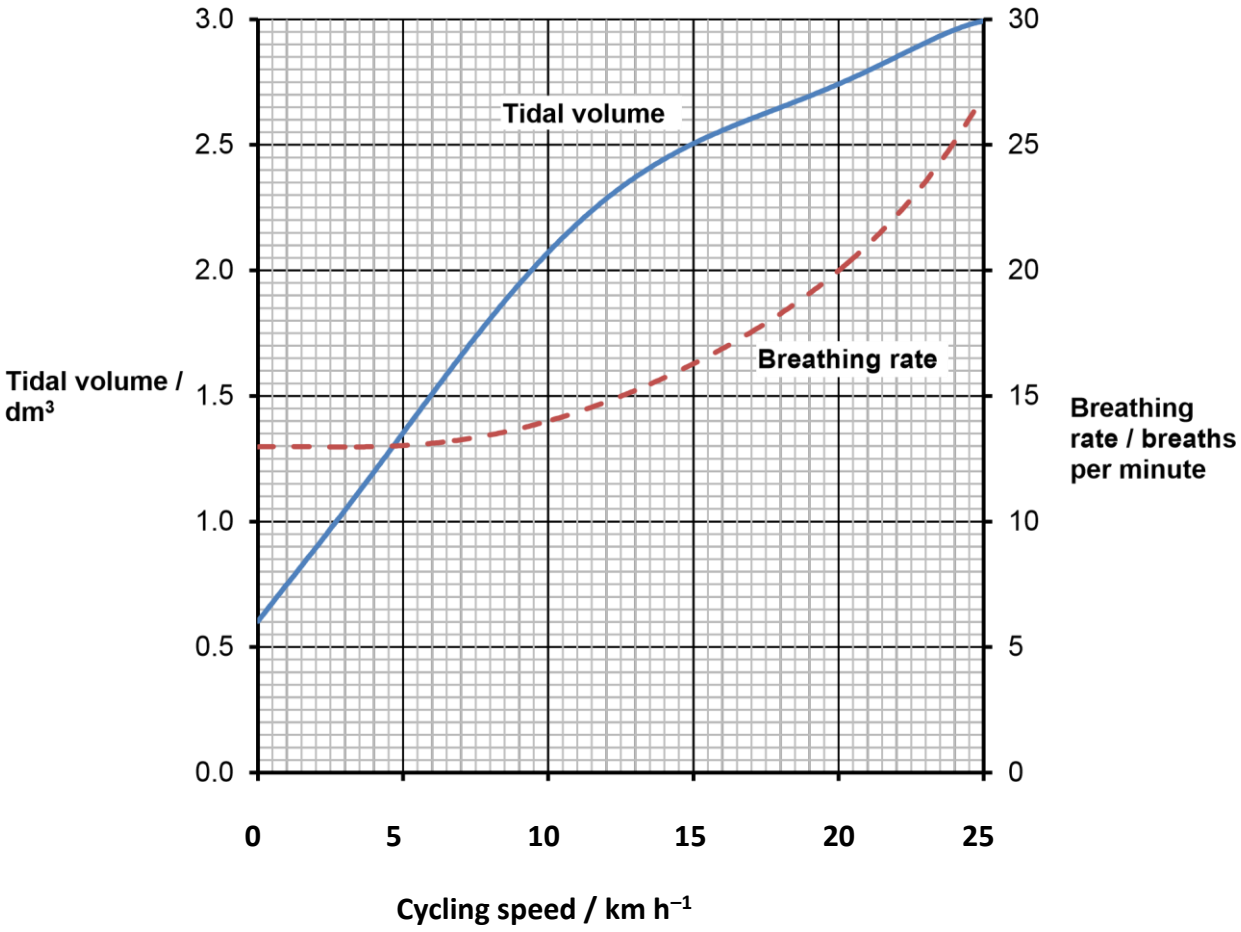
TASK 4 – Stretch!

DNA carries genetic information. The identification of this extraordinary molecule as the material that passes on the features of organisms from one generation to the next is one of the most remarkable feats of experimental biology. The discovery of the precise molecular arrangement of DNA was no less remarkable. In 1953, James Watson and Francis Crick worked out the structure of DNA, following pioneering work by Rosalind Franklin on the X-ray diffraction patterns of DNA. This opened the door for many of the major developments in biology over the next half-century.

Task 1 – create a document discussing the contributions of different scientists to understanding of the structure of DNA.

Task 2: Analysing complex graphs

The volume of air breathed in and out of the lungs during each breath is called the tidal volume. The breathing rate and tidal volume were measured for a cyclist pedaling at different speeds. The graph shows the results.



1. What was the tidal volume when the cycling speed was 17 km h^{-1}?
2. What was the breathing rate when the cycling speed was 8 km h^{-1}?
3. What was the change in breathing rate when the cyclist changed from 10 to 20 km h^{-1}? Express this as a percentage.
4. At what speed did the breathing rate start to increase?
5. The tidal volume increased linearly with cycling speed up to about 10 km h^{-1}. Calculate the increase in volume for each increase in speed of 1 km h^{-1}.
6. For this initial linear section, what is the equation of the tidal volume line? Hint: use $y=mx + c$

Part II - Year 12 Head Start! for completion June – September

This section contains a bank of resources that will allow you to literally get a 'head start' on the work that will be covered in the Autumn term of Year 12.

a) Below is a link to our AQA course specification. Over the next two years, you will become really familiar with this document. Don't worry if it seems a little overwhelming at the moment, I would read from page 8 (2. Specification at a glance) to get an overview of the content and assessments we will be covering: https://www.aqa.org.uk/subjects/science/as-and-a-level/biology-7401-7402

b) In the Autumn term next year, you will have two teachers working together to cover the key concepts of A-Level Biology. These are Biological Molecules and Cells. You can read over the content that will be taught using the link above (sections 3.1 and 3.2).

c) Below is a link to the FREE kindle version of 'Head Start to A-Level Biology'. This is an ideal way to bridge the gap between GCSE and A-Level. As the description says: 'The guide recaps all the crucial topics you'll need to remember from GCSE, with crystal-clear study notes and examples, plus practice questions to test your understanding. We've also included introductions to some of the key topics you'll meet at A-Level. It's the perfect way to hit the ground running at the start of the course, whichever exam board you're studying!"

https://www.amazon.co.uk/Head-Start-level-Biology-Level-ebook/dp/B00VE2NIOI

d) Watch these 4 tips for preparing for A-Level Biology.

https://www.youtube.com/watch?v=RMpBNZhgN44

e) The textbook that we will be using in class is the AQA Biology A-Level Oxford 2nd Edition by Glenn Toole and Susan Toole. As with GCSE, you will have access to the A-Level Biology textbook via your Kerboodle log ons. These will be organised in September. This means that you will not have to purchase a copy for home, but if you are the kind of person who prefers a paper read, the link to the book is below (shop around!) or you may have to opportunity to 'borrow' one from the department with a £5 deposit, returnable after the course is over.

https://www.amazon.co.uk/AQA-Biology-Level-Student-Book/dp/0198351771

f) There are many different recorded lessons and YouTube channels to help with A-Level biology. I suggest that you have a look around to find a couple that you happy with in terms of presentation and style, rather than waiting for the course to begin. I like home school study – snap revise but there are many, many others.
https://www.youtube.com/channel/UC8pOYw9kw8z9uOKgAZ7ki8w

g) If you are considering studying medicine, dentistry or other Medical Sciences, Atousa's channel is full of videos of how she survived A-Level Biology, ideas about careers in Biomedical sciences, writing her personal statement and tips for passing the BMAT exams.

https://www.youtube.com/channel/UCkBmQUsfuCU3tGwjZvX0xCg

h) Finally, we hope that you are all managing to stay safe and keep busy during this period of lock down. You should all know that this is not how any of us wanted to end your KS4 learning experience. We are all missing out on so much together. However, try to turn this time into a positive by really preparing as best as you can for next year… it'll be worth it, I promise. We are really looking forward to seeing you in our classrooms next year to start on this new, exciting adventure together. If you have any questions, feel free to email me on sgiannini@mcauley.org.uk. See you soon….