

West Coventry Academy

SIXTH FORM

Biology Transition Book

2024-26



Student Name:



This booklet has been prepared by Science staff for you to read. The idea being that this will help you be sure that you get off to the best possible start in this subject. It is very important that you read this booklet carefully over the summer. You must seriously attempt to complete the work and submit it at the start of the year to your subject teacher in the very first lesson. This will be the first real indicator of how seriously you are prepared to be in your A' Level studies.

A-Level Biology

The key staff are:

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Course Details

Course Title: A-level Biology A

Exam board: OCR

Exam Code: A2 – H420

Exam Board web site: <http://www.ocr.org.uk/>



Assessment method: **Biology A level** is assessed by 3 examinations.

Practical assessment group:

PAGs are an essential part of the assessment. Class teachers will award a pass in this area of the course, Students must take a full and active part in this aspect of their Biology A'level study. Biology is a practical subject which is taught using a variety of methods including laboratory-based work, analytical skills, and sometimes requires students to get their hands dirty! We do dissections and field-based studies, as well as trips to Coventry and Warwick University.

About the A Level Biology course

Biology is a popular academic course that is often linked with studying other sciences but equally is popular with students who want to continue with one science, and these often choose biology. As a subject it combines well with Humanities subjects, Arts and Sports-based A level studies, as well as with students who choose to study Health and Social Care.

Biology is a wide-ranging discipline and to do well in biology. You need to be literate, numerate and articulate. In addition you need to be committed to spending as much time outside of the classroom working on your biology as you spend in the actual class. You have to put in a lot of work in Biology but if you do it is so much more enjoyable as you will achieve more in the end.

Year 12:

Module 1 – Development of practical skills in biology 1.1 Practical skills assessed in a written examination and in the practical endorsement

Module 2 – Foundations in biology 2.1.1 Cell structure 2.1.2 Biological molecules 2.1.3 Nucleotides and nucleic acids 2.1.4 Enzymes 2.1.5 Biological membranes 2.1.6 Cell division, cell diversity and cellular organisation

Module 3 – Exchange and transport 3.1.1 Exchange surfaces 3.1.2 Transport in animals 3.1.3 Transport in plants

Module 4 – Biodiversity, evolution and disease 4.1.1 Communicable diseases, disease prevention and the immune system 4.2.1 Biodiversity 4.2.2 Classification and evolution

Year 13:

Module 1 – Development of practical skills in biology 1.1 Practical skills assessed in a written examination and in the practical endorsement

Module 5 – Communication, homeostasis and energy 5.1.1 Communication and homeostasis 5.1.2 Excretion as an example of homeostatic control 5.1.3 Neuronal communication 5.1.4 Hormonal communication 5.1.5 Plant and animal responses 5.2.1 Photosynthesis 5.2.2 Respiration

Module 6 – Genetics, evolution and ecosystems 6.1.1 Cellular control 6.1.2 Patterns of inheritance 6.1.3 Manipulating genomes 6.2.1 Cloning and biotechnology 6.3.1 Ecosystems 6.3.2 Populations and sustainability.

Career Pathways

“Biology opens up exciting career possibilities. From conservation to cancer research, biologists are tackling important 21st century challenges, and we need skilled young people to be part of this. It is also important to remember that biology is excellent preparation for non-scientific careers, thanks to the skills it provides – everything from analytical thinking to writing reports.”

Biology provides you with opportunities to develop the skills required to study sciences at a higher level. The subject is wide-ranging, goes from cellular to global biology and incorporates analytical and evaluative skills that are much sought after in industry and employment.

Some of the pathways for our past students include studying biological sciences, applied biology, medical sciences, environmental sciences, volcanology, forensics, sports-related courses, psychology, education, analytical biochemistry, pharmacy, pharmacology, biomedical sciences and medicine. We have contact with previous students who have not only followed biology to degree or Masters Level, but continued to study for PhD. Other students have gone on to study more applied subjects or apply the skills from Biology, in a diverse array of situations using their team working and analytical skills, including to play rugby for England and experience success in dance and the performance arts.

What equipment will be needed for the subject?

An A4 ring binder.

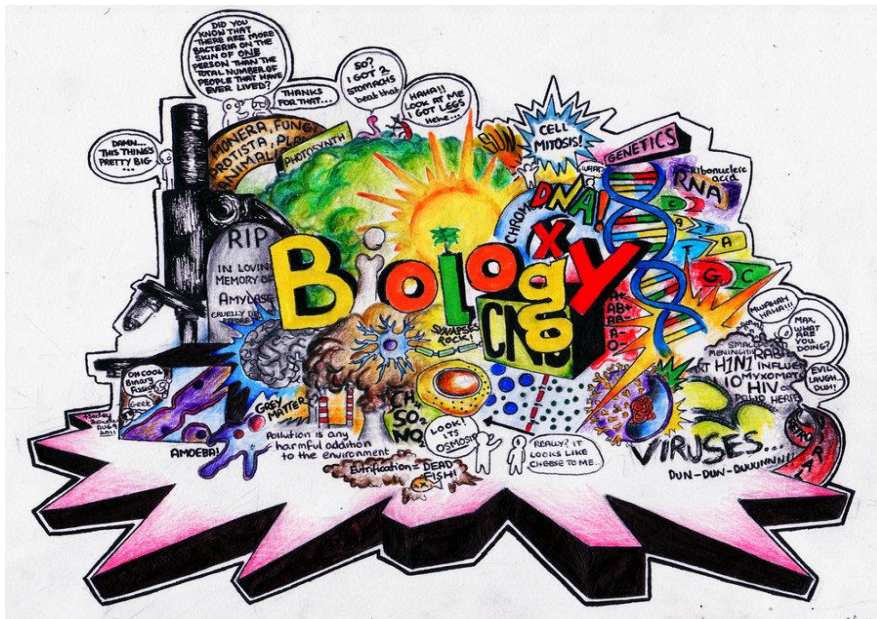
Dividers

Lined paper

Highlighter pens

Pens, pencils, ruler

A calculator



The activities on the following pages are designed to give you some practice in the core knowledge and skills you need to bring to the course in September. You are expected to complete all of these activities, and bring your completed work to your first biology lesson in September. **There will be an assessment as part of your first lesson based upon this preparation work.**

Just as important are the sections about **study skills** (below) and the **suggested reading** section at the end. **To really succeed on this challenging A level course you need to be organised and efficient with your study, and you need to read around the subject to extend your understanding beyond what is covered in class.** There are also a couple of books we recommend you **all** buy before you start the course.

Study Skills

You will have worked hard throughout your GCSE course, your effort and work ethic has been recognised by your teachers at GCSE, you have therefore been awarded the required grades to study A'level biology, well done. Those study skills will need refining and new skills will need to be learnt. The good news is that we do have some suggestions, and that we will not be spoon feeding you all the answers and writing all the notes for you! The Learning toolbox website has lots of tips and strategies to help you study better.

<http://coe.jmu.edu/learningtoolbox/studentst art.htm>

This website has further ideas to help you to **learn faster & smarter** <http://oedb.org/library/collegebasics/hacking-knowledge>



Beatrice the Biologist

Course preparation resources

You need to download the course **specifications**:

<http://www.ocr.org.uk/Images/171736-specification-accredited-a-level-gce-biology-a-h420.pdf>

This is the syllabus for the whole two year course, written by the exam board.

It is not essential but will undoubtedly help you to be successful for you to purchase the following texts:

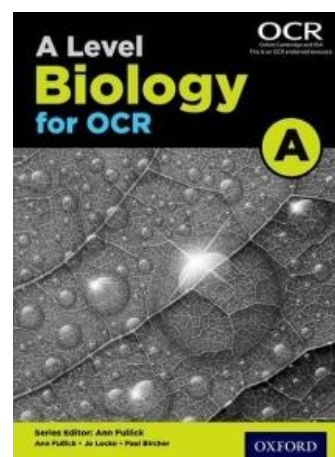
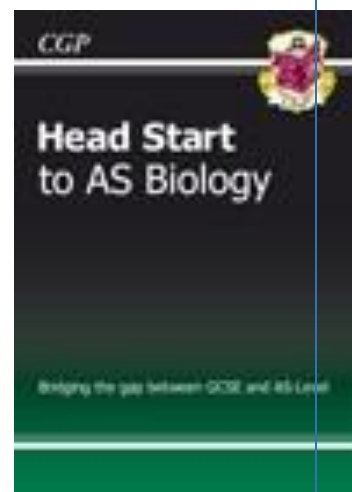
1. A copy of the **Head Start to AS Biology** revision guide from CGP that covers topics linking GCSE to A Level biology. You will be tested on similar content in September. (This is currently free to download from Amazon)

- Publisher: CGP
- Price: Around £5
- ISBN: 978 1 78294 279 5

2. A copy of the course book: **A Level Biology for OCR.**

There are several options of publishers (Pearson/ OUP). This is the book you will use throughout Year 12 & 13, with all of the core knowledge needed. (we will offer the opportunity to purchase core text through the department at the start of the course, we can often get a reduced rate when we bulk buy)

- *A Level biology for OCR*
- Publisher: OUP
- Price: Around £35
- ISBN 13: 978-0198351924



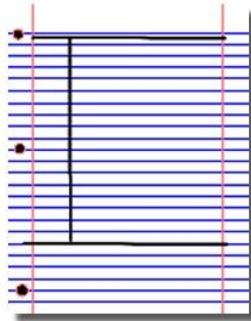
Obviously there are many other publications that you may like to purchase, such as a quality revision guide.

As well as these text books it is imperative to read around the subject from a variety of sources including text books, scientific journals, articles in the newspaper and the plethora of online sources available, many of which will be sign posted in the recommended reading section later on.

Research Activities

Research, reading and note making are essential skills for A level Biology study. For the following task you are going to produce 'Cornell Notes' to summarise your reading.

1. Divide your page into 2 sections like this date and top of the page

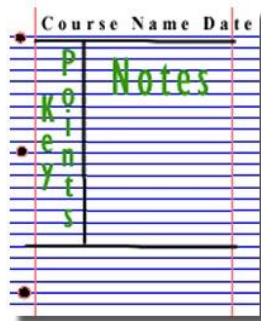


Write the name, the topic at the



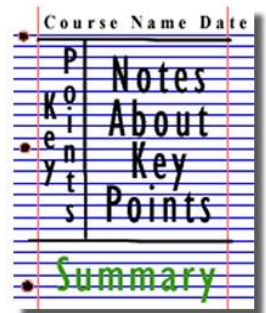
3. Use the large box to

4. Use the margin to bullet Abbreviate where possible.

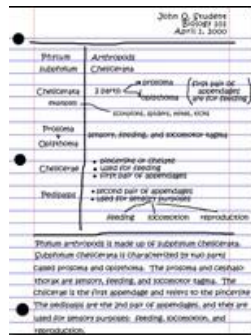


make notes

point key words and points



5. Write a summary of the main ideas in the bottom space



The Big Picture is an excellent publication from the Wellcome Trust. Along with the magazine, the company produces posters, videos and other resources aimed at students studying for GCSEs and A level.

For each of the following topics, you are going to use the resources to **produce** one page of **Cornell** style notes.

Use the links of scan the QR code to take you to the resources.

BigPicture



Topic 1: The Cell

Available at: <http://bigpictureeducation.com/cell>

The cell is the building block of life. Each of us starts from a single cell, a zygote, and grows into a complex organism made of trillions of cells. In this issue, we explore what we know – and what we don't yet know – about the cells that are the basis of us all and how they reproduce, grow, move, communicate and die.



Topic 2: The Immune System

Available at:

<http://bigpictureeducation.com/immune>

The immune system is what keeps us healthy in spite of the many organisms and substances that can do us harm. In this issue, explore how our bodies are designed to prevent potentially harmful objects from getting inside, and what happens when bacteria, viruses, fungi or other foreign organisms or substances breach these barriers.



Topic 3: Exercise, Energy and Movement

Available at:

<http://bigpictureeducation.com/exercise-energy-and-movement>

All living things move. Whether it's a plant growing towards the sun, bacteria swimming away from a toxin or you walking home, anything alive must move to survive. For humans though, movement is more than just survival – we move for fun, to compete and to be healthy. In this issue we look at the biological systems that keep us moving and consider some of the psychological, social and ethical aspects of exercise and sport.



Topic 4: Populations Available at:

<http://bigpictureeducation.com/populations> What's the first thing that pops into your mind when you read the word population? Most likely it's the ever-increasing human population on earth. You're a member of that population, which is the term for all the members of a single species living together in the same location. The term population isn't just used to describe humans; it includes other animals, plants and microbes too. In this issue, we learn more about how populations grow, change and move, and why understanding them is so important.



Topic 4: Populations

Available at: <http://bigpictureeducation.com/health-and-climate-change>

The Earth's climate is changing. In fact, it has always been changing. What is different now is the speed of change and the main cause of change – human activities. This issue asks: What are the biggest threats to human health? Who will suffer as the climate changes? What can be done to minimise harm? And how do we cope with uncertainty?



Pre-Knowledge Topics

A level Biology will use your knowledge from GCSE and build on this to help you understand new and more demanding ideas. Complete the following tasks to make sure your knowledge is up to date and you are ready to start studying:

Topic 1: Biological Molecules

Biological molecules are often polymers and are based on a small number of chemical elements. In living organisms carbohydrates, proteins, lipids, inorganic ions and water all have important roles and functions related to their properties. DNA determines the structure of proteins, including enzymes. Enzymes catalyse the reactions that determine structures and functions from cellular to whole-organism level. Enzymes are proteins with a mechanism of action and other properties determined by their tertiary structure. ATP provides the immediate source of energy for biological processes.

Read the information on these websites (you could make more Cornell notes if you wish):

<http://www.s-cool.co.uk/a-level/biology/biological-molecules-and-enzymes>

<http://www.bbc.co.uk/education/guides/zb739j6/revision>

And take a look at these videos:

<https://www.youtube.com/watch?v=H8WJ2KENIK0>

<http://ed.ted.com/lessons/activation-energy-kickstarting-chemical-reactions-vance-kite>

Activity 6:

Krabbe disease occurs when a person doesn't have a certain enzyme in their body. The disease effects the nervous system. Write a letter to a GP or a sufferer to explain what an enzyme is.

Your poster should:

- Describe the structure of an enzyme
- Explain what enzymes do inside the body

Topic 2: Cells

The cell is a unifying concept in biology, you will come across it many times during your two years of A level study. Prokaryotic and eukaryotic cells can be distinguished on the basis of their structure and ultrastructure. In complex multicellular organisms cells are organised into tissues, tissues into organs and organs into systems. During the cell cycle genetic information is copied and passed to daughter cells. Daughter cells formed during mitosis have identical copies of genes while cells formed during meiosis are not genetically identical

Read the information on these websites (you could make more Cornell notes if you wish):

<http://www.s-cool.co.uk/a-level/biology/cells-and-organelles>

<http://www.bbc.co.uk/education/guides/zvjycdm/revision>

And take a look at these videos:

<https://www.youtube.com/watch?v=gcTuQpuJyD8>

<https://www.youtube.com/watch?v=L0k-enzoeOM>

<https://www.youtube.com/watch?v=qCLmR9-YY7o>

Activity 5:

Produce a one page revision guide to share with your class in September summarising one of the following topics: Cells and Cell Ultrastructure, Prokaryotes and Eukaryotes, or Mitosis and Meiosis.

Whichever topic you choose, your revision guide should include:

- Key words and definitions
- Clearly labelled diagrams
- Short explanations of key ideas or processes.

Topic 3: DNA and the Genetic Code

In living organisms nucleic acids (DNA and RNA) have important roles and functions related to their properties. The sequence of bases in the DNA molecule determines the structure of proteins, including enzymes.

The double helix and its four bases store the information that is passed from generation to generation. The sequence of the base pairs adenine, thymine, cytosine and guanine tell ribosomes in the cytoplasm how to construct amino acids into polypeptides and produce every characteristic we see. DNA can mutate leading to diseases including cancer and sometimes anomalies in the genetic code are passed from parents to babies in disease such as cystic fibrosis, or can be developed in unborn fetuses such as Down's Syndrome.

Read the information on these websites (you could make more Cornell notes if you wish):

<http://www.bbc.co.uk/education/guides/z36mmp3/revision>

<http://www.s-cool.co.uk/a-level/biology/dna-and-genetic-code>

Take a look at these videos:

<http://ed.ted.com/lessons/the-twisting-tale-of-dna-judith-hauck>

<http://ed.ted.com/lessons/where-do-genes-come-from-carl-zimmer>

Activity 1:

Produce a wall display to put up in your classroom in September. You might make a poster or do this using PowerPoint or similar. Your display should use images, keywords and simple explanations to:

- Define gene, chromosome, DNA and base pair
- Describe the structure and function of DNA and RNA. Explain how DNA is copied in the body
- Outline some of the problems that occur with DNA replication and what the consequences of this might be.

Topic 4: Exchange and Transport

Organisms need to exchange substances selectively with their environment and this takes place at exchange surfaces. Factors such as size or metabolic rate affect the requirements of organisms and this gives rise to adaptations such as specialised exchange surfaces and mass transport systems. Substances are exchanged by passive or active transport across exchange surfaces. The structure of the plasma membrane enables control of the passage of substances into and out of cells.

Read the information on these websites (you could make more Cornell notes if you wish):

<http://www.s-cool.co.uk/a-level/biology/gas-exchange>

<http://www.s-cool.co.uk/a-level/biology/nutrition-and-digestion/revise-it/human-digestive-system>

And take a look at these videos:

<http://ed.ted.com/lessons/insights-into-cell-membranes-via-dish-detergent-ethan-perlstein>

<http://ed.ted.com/lessons/what-do-the-lungs-do-emma-bryce>

Activity 4:

Create a poster or display to go in your classroom in September. Your poster should either: compare exchange surfaces in mammals and fish or compare exchange surfaces in the lungs and the intestines. You could use a Venn diagram to do this. Your poster should:

- Describe diffusion, osmosis and active transport

Explain why oxygen and glucose need to be absorbed and waste products removed. Compare and contrast your chosen focus.

Topic 5: Scientific and Investigative Skills

As part of your A level you will complete a practical assessment. This will require you to carry out a series of practical activities as well as planning how to do them, analysing the results and evaluating the methods. This will require you to: use appropriate apparatus to record a range of quantitative measurements (to include mass, time, volume, temperature, length and pH), use appropriate instrumentation to record quantitative measurements, such as a colorimeter or photometer, use laboratory glassware apparatus for a variety of experimental techniques to include serial dilutions, use of light microscope at high power and low power, including use of a graticule, produce scientific drawing from observation with annotations, use qualitative reagents to identify biological molecules, separate biological compounds using thin layer/paper chromatography or electrophoresis, safely and ethically use organisms, use microbiological aseptic techniques, including the use of agar plates and broth, safely use instruments for dissection of an animal organ, or plant organ, use sampling techniques in fieldwork.

Activity 10:

Produce a glossary for the following key words:

accuracy, anomaly, calibration, causal link, chance, confounding variable, control experiment, control group, control variable, correlation, dependent variable, errors, evidence, fair test, hypothesis, independent, null hypothesis, precision, probability, protocol, random distribution, random error, raw data, reliability, systematic error, true value, validity, zero error.

For further support with basic principles in working scientifically I have a set of 5 power point lessons which can also be completed. Please email me if you would like these. (StaffJVS@westcoventryacademy.org)

Further recommended viewing if you have the time to spare:

If you have 30 minutes to spare, here are some great presentations (and free!) from world leading scientists and researchers on a variety of topics. They provide some interesting answers and ask some thought-provoking questions. Use the link or scan the QR code to view:

A New Superweapon in the Fight Against Cancer

Available at :

http://www.ted.com/talks/paula_hammond_a_new_superweapon_in_the_fight_against_cancer?language=en

Cancer is a very clever, adaptable disease. To defeat it, says medical researcher and educator Paula Hammond, we need a new and powerful mode of attack.



Why Bees are Disappearing

Available at :

http://www.ted.com/talks/marla_spivak_why_bees_are_disappearing?language=en

Honeybees have thrived for 50 million years, each colony 40 to 50,000 individuals coordinated in amazing harmony. So why, seven years ago, did colonies start dying en-masse?

Why Doctors Don't Know About the Drugs They Prescribe

Available at :

http://www.ted.com/talks/ben_goldacre_what_doctors_don_t_know_about_the_drugs_they_prescribe?language=en

When a new drug gets tested, the results of the trials should be published for the rest of the medical world — except much of the time, negative or inconclusive findings go unreported, leaving doctors and researchers in the dark.



Growing New Organs

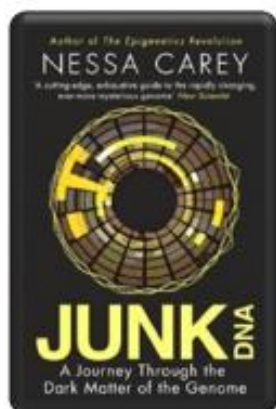
Available at :

http://www.ted.com/talks/anthony_atalla_growing_organs_engineering_tissue?language=en

Anthony Atalla's state-of-the-art lab grows human organs — from muscles to blood vessels to bladders, and more.

Book Recommendations

Kick back this summer with a good read. The books below are all popular science books and great for extending your understanding of Biology

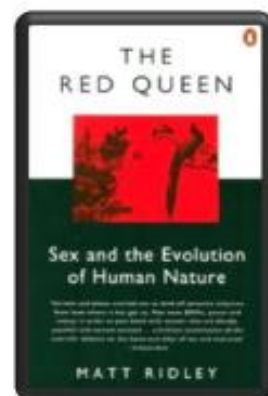


Junk DNA

Our DNA is so much more complex than you probably realize, this book will really deepen your understanding of all the work you will do on Genetics. Available at amazon.co.uk

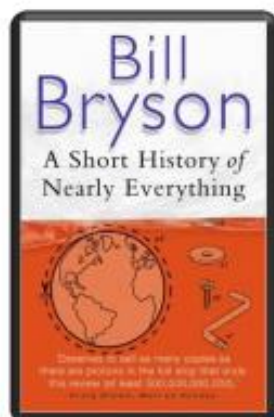
The Red Queen

Its all about sex. Or sexual selection at least. This book will really help your understanding of evolution and particularly the fascinating role of sex in evolution. Available at amazon.co.uk



A Short History of Nearly Everything

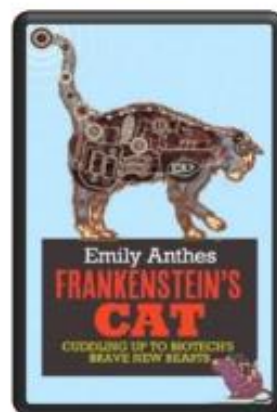
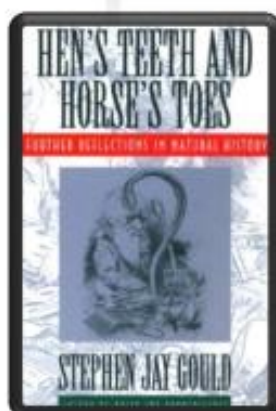
A whistle-stop tour through many aspects of history from the Big Bang to now. This is a really accessible read that will re-familiarise you with common concepts and introduce you to some of the more colourful characters from the history of science! Available at amazon.co.uk



Studying Geography as well?

Hen's teeth and horses toes

Stephen Jay Gould is a great Evolution writer and this book discusses lots of fascinating stories about Geology and evolution. Available at amazon.co.uk



An easy read..

Frankenstein's cat

Discover how glow in the dark fish are made and more great Biotechnology breakthroughs. Available at amazon.co.uk

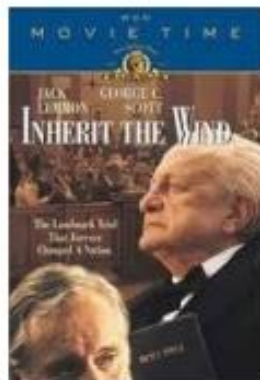
Movie Recommendations

2023-2025 111 CALENDAR

Everyone loves a good story and everyone loves some great science. Here are some of the picks of the best films based on real life scientists and discoveries. You won't find Jurassic Park on this list, we've looked back over the last 50 years to give you our top 5 films you might not have seen before. Great watching for a rainy day.



Inherit The Wind (1960)
Great if you can find it. Based on a real life trial of a teacher accused of the crime of teaching Darwinian evolution in school in America. Does the debate rumble on today?



Gorillas in the Mist (1988)
An absolute classic that retells the true story of the life and work of Dian Fossey and her work studying and protecting mountain gorillas from poachers and habitat loss. A tear jerker.

Andromeda Strain (1971)
Science fiction by the great thriller writer Michael Crichton (he of Jurassic Park fame). Humans begin dying when an alien microbe arrives on Earth.



Lorenzo's Oil (1992)
Based on a true story. A young child suffers from an autoimmune disease. The parents research and challenge doctors to develop a new cure for his disease.



Something the Lord Made (2004)
Professor Snape (the late great Alan Rickman) in a very different role. The film tells the story of the scientists at the cutting edge of early heart surgery as well as issues surrounding racism at the time.

There are some great TV series and box sets available too, you might want to check out: Blue Planet, Planet Earth, The Ascent of Man, Catastrophe, Frozen Planet, Life Story, The Hunt and Monsoon.

... And if you want to watch something very topical take a look at 'Pandemic' on Netflix

Science on Social Media

Science communication is essential in the modern world and all the big scientific companies, researchers and institutions have their own social media accounts. Here are some of our top tips to keep up to date with developing news or interesting stories:

Follow on Twitter:

Commander Chris Hadfield – former resident aboard the International Space Station
[@cmdrhadfield](#)

Tiktaalik roseae – a 375 million year old fossil fish with its own Twitter account! [@tiktaalikroseae](#)

NASA's Voyager 2 – a satellite launched nearly 40 years ago that is now travelling beyond our Solar System
[@NSFVoyager2](#)

Neil deGrasse Tyson – Director of the Hayden Planetarium in New York [@neiltyson](#)

Sci Curious – feed from writer and Bethany Brookshire tweeting about good, bad and weird neuroscience
[@scicurious](#)

The SETI Institute – The Search for Extra Terrestrial Intelligence, be the first to know what they find!
[@setiinstitute](#)

Carl Zimmer – Science writer Carl blogs about the life sciences [@carlzimmer](#)

Phil Plait – tweets about astronomy and bad science
[@badastronomer](#)

Virginia Hughes – science journalist and blogger for National Geographic, keep up to date with neuroscience, genetics and behaviour
[@virginiahughes](#)

Maryn McKenna – science journalist who writes about antibiotic resistance [@marynmck](#)

Find on Facebook:

Nature - the profile page for nature.com for news, features, research and events from Nature Publishing Group

Marin Conservation Institute – publishes the latest science to identify important marine ecosystems around the world.

National Geographic - since 1888, National Geographic has travelled the Earth, sharing its amazing stories in pictures and words.

Science News Magazine - Science covers important and emerging research in all fields of science.

BBC Science News - The latest BBC Science and Environment News: breaking news, analysis and debate on science and nature around the world.



Science websites

partners in excellence

These websites all offer an amazing collection of resources that you should use again and again through out your course.



Probably the best website on Biology.... Learn Genetics from Utah University has so much that is pitched at an appropriate level for you and has lots of interactive resources to explore, everything from why some people can taste bitter berries to how we clone mice or make glow in the dark jelly fish.
<http://learn.genetics.utah.edu/>



DNA from the beginning is full of interactive animations that tell the story of DNA from its discovery through to advanced year 13 concepts. One to book mark!
<http://www.dnafb.org/>



In the summer you will most likely start to learn about Biodiversity and Evolution. Many Zoos have great websites, especially London Zoo. Read about some of the case studies on conservation, such as the Giant Pangolin, the only mammal with scales.
<https://www.zsl.org/conservation>



At GCSE you learnt how genetic diseases are inherited. In this virtual fly lab you get to breed fruit flies to investigate how different features are passed on.
<http://sciencecourseware.org/vcise/drosophila/>



Ok, so not a website, but a video you definitely want to watch. One of the first topics you will learn about is the amazing structure of the cell. This BBC film shows the fascinating workings of a cell... a touch more detailed than the "fried egg" model you might have seen.
http://www.dailymotion.com/video/xzh0kb_the-hidden-life-of-the-cell_shortfilms
If this link expires – google "BBC hidden life of the cell"

Science: Things to do!

the **PiXL** club
partners in excellence

Day 4 of the holidays and boredom has set in? There are loads of citizen science projects you can take part in either from the comfort of your bedroom, out and about, or when on holiday. Wikipedia does a comprehensive list of all the current projects taking place. Google 'citizen science project'



AgeGuess



MOOC

Want to stand above the rest when it comes to UCAS? Now is the time to act.

MOOCs are online courses run by nearly all Universities. They are short FREE courses that you take part in. They are usually quite specialist, but aimed at the public, not the genius!

There are lots of websites that help you find a course, such as edX and Future learn.

You can take part in any course, but there are usually start and finish dates. They mostly involve taking part in web chats, watching videos and interactives.



Completing a MOOC will look great on your Personal statement and they are dead easy to take part in!

WHAT IS IT?

MOOC

MASSIVE	OPEN	ONLINE	COURSE
Classes may consist of up to 100,000+ students.	Registration is open to anyone around the world.	The course is taken completely online.	They're similar to college courses, but don't offer credit.

WHY IS IT MOOC?

University
The whole cake.
A whole lot of study covering a wide range of areas and dates.

MOOC
One slice of the cake.
One slice of the cake.
A host has sliced it into a specific area of study. Concentrating and working with peers from across the globe.

There we go that should keep you busy and out of mischief over the summer.

Please remember to bring your work in to the first lesson in September, I look forward to adorning my walls with your efforts. You will also sit a baseline test at the start of the course so it is wise to be prepared for this assessment.

Thank you for choosing to study A'level Biology. If you have any further questions with regard to the course then please do not hesitate to contact me or one of the other Biology teachers.

I look forward to seeing you in September

Take care Mrs Shelton

'Seen in the light of evolution, biology is, perhaps, intellectually the most satisfying and inspiring science. Without that light it becomes a pile of sundry facts -- some of them interesting or curious but making no meaningful picture as a whole.'

Theodosius Dobzhansky (1972) "Nothing in Biology Makes Sense Except in the Light of Evolution"

