A Level Biology

Year 11 Transition Research Pack

Are thinking of studying Biology?

This pack contains a programme of activities and resources to prepare you to start A level in Biology in September. It is aimed to be used to give you an insight into some of the topics covered at A Level in the first year. There are also a few book and movie recommendations you may find interesting.

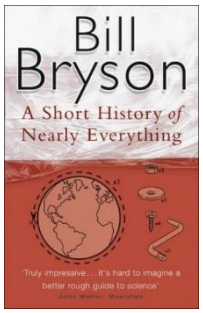
Part A of the booklet is primarily research based. You will be expected to research the suggested topics with a focus on the key areas.
Part B will ask you to take that research a little further and produce some simple but effective resources that will help to consolidate what you have been learning.

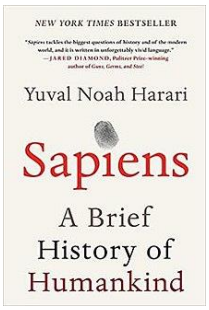
There is also an extension task which you may wish to complete regarding the Biological viability of colonising another planet.

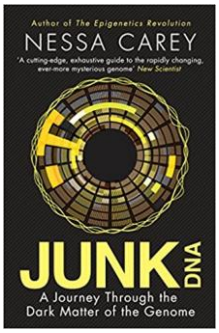
There is also a quiz at the end of the booklet you can use to self-assess if you have correctly acquired A Level quality knowledge.

Book recommendations

These are some interesting books on Science and Biology. They are not course texts and there is no expectation you must buy them however, if you are interested in A level Biology you may be interested in their content.

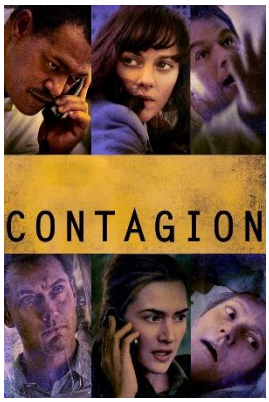




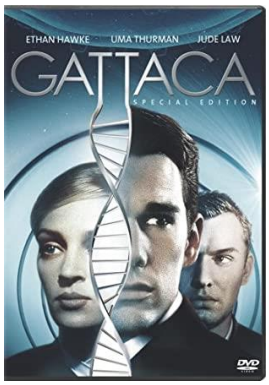


Movie recommendations

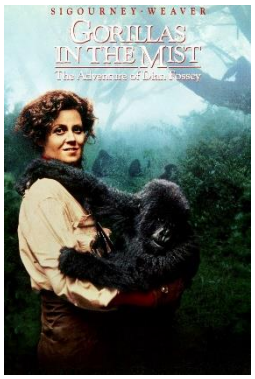
Interesting films that look at the some of the biological concepts you may study in A Level Biology



A film about the discovery of a new virus and the global pandemic that follow. **Very relevant in current times**. With good scientific background used in the writing.



A film about a future where there is a genetic hierarchy established based on people with superior DNA. A warning for a future where eugenics is common. Can you think where the name comes from?



A film based on the real-life work of Diane Fossey. This film focuses on her role in helping to protect Gorillas from poaching and extinction.

A science-fiction film based on a facility that grows clones. Although not intended to be a true 'Science' film it does allow the viewer to consider the ethics of cloning.

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. *Lets face it…anything else you find that's involved David Attenborough is definitely worth your time!*

Ted Talk recommendations

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.

Other websites

You may find some useful information/research at the links below.

1. http://www.ibiblio.org/virtualcell/index.htm – An interactive cell biology site
2. http://www.accessexcellence.org/RC/VL/GG – A web site showing illustrations of many processes of biotechnology
3. http://www.uq.oz.au/nanoworld – Visit the world of electron-microscopy
4. http://www.dnai.org/a/index.html – Explore the genetic code
5. http://nobelprize.org – Details of the history of the best scientific discoveries
6. http://nature.com – The site of the scientific journal
7. http://royalsociety.org – Podcasts, news and interviews with scientists about recent scientific developments
8. http://www.nhm.ac.uk – The London Natural History Museum's website with lots of interesting educational material
9. http://www.bmj.com – The website of the British Medical Journal

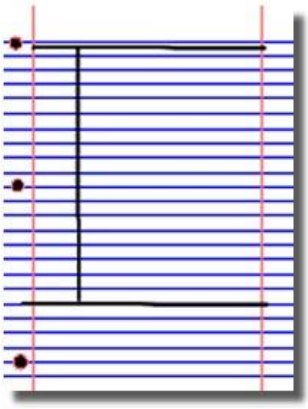
10.http://www.bbc.co.uk/news/science_and_environment - The BBC news page for Science and the Environment

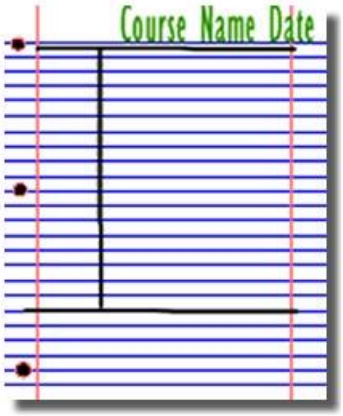
Part A-Research Activities

How to make notes from research

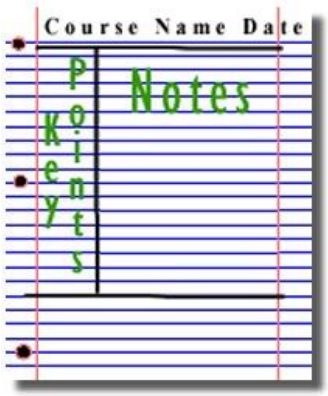
Research, reading and note making are essential skills for A level Biology study. For the following task you are going to produce 'Cornell Notes' to summarise your reading.

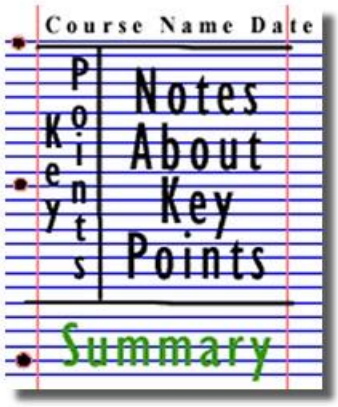
1. Divide your page into 2. three sections
Write the name, topic at the
like this date and top of the page



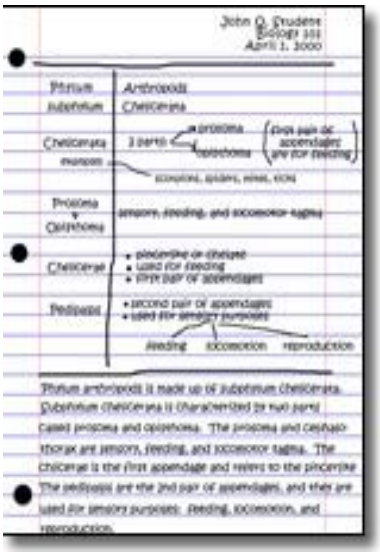


3. Use the large box 4.
Review and to make notes.
Leave identify the key a space
between points in the left hand
separate idea. box
Abbreviate
where possible.





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



Part-A

https://www.stem.org.uk/big-picture/resource-collection

The Big picture

Task

For each of the sections below, using the link to the Pig picture publication and any other sources you can find, research and make Cornell notes for the following topics. In the first instance use the links provided. For any **key areas** you have not been able to find enough information on then do your own research.

You may find it useful to begin with, to look at your GCSE revision guides to recap what you should already know.

If you did double Science at GCSE you might find it useful to look at the GCSE level information for the below topics that are taught only to Triple students. You can find this on bitesize in the Separate Science section.

Topic	Links	Key areas to research
The cell	https://www.stem.org.uk/resources/elibrary/resource/34589/cell	Cell Structure (A Level) Prokaryotic Cells Life Cycle of Cells Stem Cells
Proteins	https://www.stem.org.uk/resources/elibrary/resource/34569/proteins	Protein Structure Protein Function -Transport -Catalysis -Defence -Structure/Movement Protein Synthesis
DNA-Genes, Genomes and Health	https://www.stem.org.uk/resources/elibrary/resource/26570/genes-genomes-and-health	DNA Structure RNA Structure Genetic disorders How Genes lead to proteins(link to previous topic) DNA replication
The immune System	https://www.stem.org.uk/resources/elibrary/resource/35694/immune-system	Specific and Non-specific immune response T cells and B cells Autoimmune disease and allergic responses • Long term immunity and vaccination

Once you have researched the following areas and made your research notes you can then move on to the tasks outlines below.

Part B

Part B of the intro booklet is getting to you engage with more specific details within the topics outlined above. The tasks will help prepare you for AS Biology and look at some of the key differences between GCSE and A Level.

Task 1

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

Using the research from the big picture you did for the previous task and the below links

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

Task:

Produce a one-page revision guide to share with your class in September summarising one of the following topics: Cells and Cell Ultrastructure or Prokaryotes vs Eukaryotes, Whichever topic you choose, your revision guide should include:

Key words and definitions

Clearly labelled diagrams

Short explanations of key ideas or processes.

Information which is A LEVEL not just what you know from GCSE

Task 2

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 foetuses such as Downs Syndrome.

Using the research from the big picture you did for the previous task and the below links

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

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

And 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

Task: Produce a wall display to put up in your classroom in September. 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.

Task 3

Biological Molecules-Proteins

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.

Using the research from the big picture you did for the previous task and the below links

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=H8WJ2KENlK0 http://ed.ted.com/lessons/activation-energy-kickstarting-chemical-reactions-vance-kite

Task:

Produce a short booklet (e.g. A5 booklet = one A4 sheet folded) to show the structure and roles of 4 proteins NOT studied at GCSE. This could include proteins like Haemoglobin, An enzymes not covered at GCSE, a protein found in cell membranes, defensive proteins like Anti-bodies or even structural proteins like collagen.

Your booklet should include an introduction into protein structure.

Your 4 chosen Proteins and their roles.

Extension= You could add detail about what happens to some of the proteins you pick about what happens when they don't work or if there are any known diseases associated with these.

Task 4

Immunity

Each day your body meets potentially harmful substances and pathogens. However, it is rare that we become ill from many of these pathogens. This is due to our immune system. Even when we do manage to get ill our immune system is on hand to fighting these pathogens. This can sometimes lead to long lasting immunity. The ability of our body to develop immunity is of key importance when it comes to developing vaccines.

Using your research from before and the links below
https://www.s-cool.co.uk/a-level/biology/immunity
https://www.youtube.com/watch?v=PzunOgYHeyg
https://www.youtube.com/watch?v=sYjtMP67vyk

Task:
Create a comparison table that considers the difference between what we call our specific and our non-specific defences. Include examples of when they are used, the cells involved (where involved) and how they work to destroy pathogens.

Extension Task:

This section is not compulsory and takes you beyond the A Level specification however you might find this an interesting project. Using the big picture link : https://www.stem.org.uk/resources/elibrary/resource/460012/space-biology and any other sources on this subject complete the tasks below.

Space biology looks at life in space from several perspectives: how it began, where it might be, and the effects of space as a rather extreme habitat on humans and other life. Using research from the link above. And any of your own research.

Task: Produce a plan of actions that would need to be taken in order for humans to travel to and survive on mars.

You may find the film 'The Martian' interesting with this extension task.

In your plan include:
Suggestions of what we would need to survive
How the environment would need to be adapted.
Whether the environment could be adapted and if not what solutions we could use to overcome this.
The effects of living on Mars e.g. gravity differences
How the environment of Mars may affect the ability to grow crops

Quiz

1) What is the role of Golgi body?

2) What is different about the cell wall in plant cells compared to bacterial cells?

3) What is different about the ribosomes in eukaryotic and prokaryotic cells?

4) What is the name given to the region of the nucleus where ribosomes are made in eukaryotes?

5) Name the 4 DNA bases

6) How is this different in RNA?

7) When DNA is used to make mRNA which bases pair up together?

8) Name an enzyme involved in DNA replication.

9) What is the primary structure of a protein?

10) What does Haemoglobin contain that allows it to carry out its function?

11) Give the specific name of the protein used in antibodies

12) Are phagocytes part of the specific or non-specific immune defence?
13) Why do you think this?

14) Are lymphocytes part of the specific or non-specific immune defence?
15) Why do you think this?

The answers are at the end of the document. This is page gap to stop cheating

Quiz-ANSWERS DON'T CHEAT

1) What is the role of Golgi body?
   modifies and then transports protein around/out of the cell
2) What is different about the cell wall in plant cells compared to bacterial cells?
   Plant cell is made of cellulose, Bacteria is made of murein/peptidoglycan
3) What is different about the ribosomes in eukaryotic and prokaryotic cells?
   Eukaryotes are heavier=80s Prok=smaller=70s

4) What is the name given to the region of the nucleus where ribosomes are made in eukaryotes?
   Nucleolus
5) Name the 4 DNA bases
   adenine (A) and guanine (G) are the larger purines. Cytosine (C) and thymine (T)
6) How is this different in RNA?
   No Thymine it has Uracil instead (U)
7) When DNA is used to make mRNA which bases pair up together?

If DNA is	Then RNA is
A	U
T	A
C	G
G	C

8) Name an enzyme involved in DNA replication.
   DNA Helicase/DNA Polymerase/DNA Ligase
9) What is the primary structure of a protein?
   The chain/order of amino acids
10) What does Haemoglobin contain that allows it to carry out its function?
    Fe2+ ion (Iron ion)

11) Give the specific name of the proteins used as antibodies
Immunoglobulin
12) Are phagocytes part of the specific or non-specific immune defence?
Non-specific
13) Why do you think this?
They can engulf a wide range of foreign objects so not based on any 1 specific antigen/substance
14) Are lymphocytes part of the specific or non-specific immune defence?
15) Specific
16) Why do you think this?
Respond to specific antigens. One Lymphocyte produces one type of antibody which is specific to one type of antigen/pathogen.