Biology

Part 1 : Download a Specification

Download a specification from the AQA website using the following link. You need to print a copy and store it at the front of your folder.

http://www.aqa.org.uk/subjects/science/as-and-a-level/biology-7401-7402

Part 2 : Download **New Head Start to A-level Biology (CGP A-Level Biology) FREE on Kindle App**

https://www.amazon.co.uk/Head-Start-level-Biology-Level-ebook/dp/B00VE2NIOI/ref=sr_1_1?keywords=headstart&qid=1585580927&sr=8-1

Part 3 : Making Notes to prepare for our first topic

3.1.1 Monomers and polymers

Content

The variety of life, both past and present, is extensive, but the biochemical basis of life is similar for all living things.

Monomers are the smaller units from which larger molecules are made.

Polymers are molecules made from a large number of monomers joined together.

Monosaccharides, amino acids and nucleotides are examples of monomers.

A condensation reaction joins two molecules together with the formation of a chemical bond and involves the elimination of a molecule of water.

A hydrolysis reaction breaks a chemical bond between two molecules and involves the use of a water molecule.

3.1.2 Carbohydrates

Content

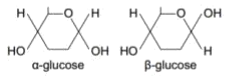
Monosaccharides are the monomers from which larger carbohydrates are made. Glucose, galactose and fructose are common monosaccharides.

A condensation reaction between two monosaccharides forms a glycosidic bond.

Disaccharides are formed by the condensation of two monosaccharides:

- maltose is a disaccharide formed by condensation of two glucose molecules
- sucrose is a disaccharide formed by condensation of a glucose molecule and a fructose molecule
- lactose is a disaccharide formed by condensation of a glucose molecule and a galactose molecule.

Glucose has two isomers, α-glucose and β-glucose, with structures:



Polysaccharides are formed by the condensation of many glucose units.

- Glycogen and starch are formed by the condensation of α-glucose.
- Cellulose is formed by the condensation of β-glucose.

The basic structure and functions of glycogen, starch and cellulose. The relationship of structure to function of these substances in animal cells and plant cells.

Biochemical tests using Benedict's solution for reducing sugars and non-reducing sugars and iodine/potassium iodide for starch.

Make notes on the following:

- ✓ Define the terms monomer and polymer
- ✓ Draw and describe a condensation reaction to form a polymer
- ✓ Draw and describe a hydrolysis reaction to form monomers
- ✓ Draw the structure of α-glucose and β-glucose
- ✓ Explain the structure and function of starch (including details of both amylose and amylopectin)
- ✓ Explain the structure and function of cellulose
- ✓ Explain the structure and function of glycogen

As well as the Head Start to Biology book, these websites will help you to complete this task, as well as serve as useful revision websites throughout the course:

http://www.s-cool.co.uk/a-level/biology/biological-molecules-and-enzymes/revise-it/carbohydrates http://www.revisionworld.com/a2-level-level-revision/biology/biological-molecules/carbohydrates http://alevelnotes.com/carbohydrate-polymers/65

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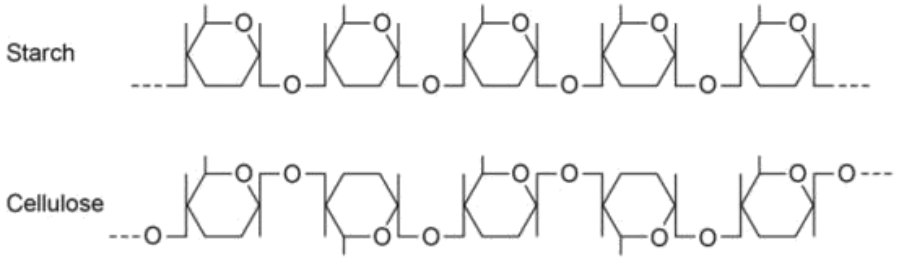
Part 2 : Exam Style Questions- to bring when you register onto the course in September

Q1. Starch and cellulose are two important plant polysaccharides.

The following diagram shows part of a starch molecule and part of a cellulose molecule.



(a) Explain the difference in the structure of the starch molecule and the cellulose molecule shown in the diagram above.

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.....**(2)**

(b) Starch molecules and cellulose molecules have different functions in plant cells. Each molecule is adapted for its function.

Explain **one** way in which starch molecules are adapted for their function in plant cells.

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.....**(2)**

(c) Explain how cellulose molecules are adapted for their function in plant cells.

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.....**(3)**

(Total 7 marks)

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Q2. Read the following passage.

Straw consists of three main organic substances – cellulose, hemicellulose and lignin. Cellulose molecules form chains which pack together into fibres. Hemicellulose is a small molecule formed mainly from five-carbon (pentose) sugar monomers. It acts as a cement holding cellulose fibres together. Like hemicellulose, lignin is a polymer, but it is not a carbohydrate. It covers the cellulose in the cell wall and supplies additional strength. In addition to these three substances, there are small amounts of other biologically important polymers present. **5**

The other main component of straw is water. Water content is variable but may be determined by heating a known mass of straw at between 80 and 90°C until it reaches a constant mass. The loss in mass is the water content. **10**

Since straw is plentiful, it is possible that it could be used for the production of a range of organic substances. The first step is the conversion of cellulose to glucose. It has been suggested that an enzyme could be used for this process. There is a difficulty here, however. The lignin which covers the cellulose protects the cellulose from enzyme attack.

Use information from the passage and your own knowledge to answer the following questions.

(a) (i) Give **one** way in which the structure of a hemicellulose molecule is similar to the structure of a cellulose molecule.

.....

..... **(1)**

(ii) Complete the table to show **two** ways in which the structure of a hemicellulose molecule differs from the structure of a cellulose molecule.

Hemicellulose	Cellulose
.....	.....
.....	.....
.....	.....
.....	.....

(2)

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(b) Name **one** biologically important polymer, other than those mentioned in the passage, which would be found in straw.

.....**(1)**

(c) Explain why the following steps were necessary in finding the water content of straw:

(i) heating the straw *until it reaches constant mass* (line 9);

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.....**(1)**

(ii) not heating the straw above 90°C (line 9).

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.....**(2)**

(d) A covering of lignin protects cellulose from enzyme attack (line 14). Use your knowledge of the way in which enzymes work to explain why cellulose-digesting enzymes do not digest lignin.

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.....**(2)**

(e) Describe the structure of a cellulose molecule and explain how cellulose is adapted for its function in cells.

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.....**(Total 15 marks)**

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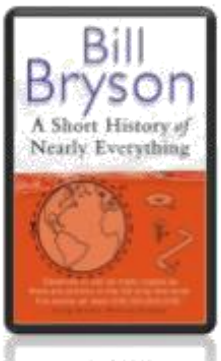
Part 5: Recommendations from the PiXL transition pack for Biology

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.

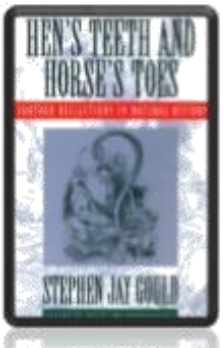
Junk DNA
Our DNA is so much more complex than you probably realize, this book will really deepen your understanding of all the work you will do on genetics. Available at amazon.co.uk

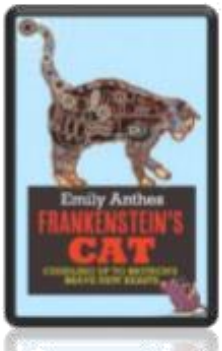
The Red Queen
Its all about sex. Or sexual selection at least. This book will really help your understanding of evolution and particularly the fascinating role of sex in evolution. Available at amazon.co.uk



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 Horse's 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

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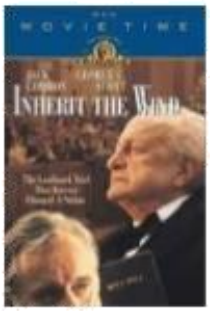
Part 5: Recommendations from the PiXL transition pack for Biology

Movie Recommendations

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 wont 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.

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.

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?



Andromeda Strain (1971)
Science fiction by the great thriller writer Michael Cricthon (most famous for writing Jurassic Park). 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 I and II,, Icarus, Blackfish, The Ascent of Man, Catastrophe, Frozen Planet, Life Story, The Hunt and Monsoon.

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Part 5: Recommendations from the PiXL transition pack for Biology

Movie Recommendations

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?

What 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_atala_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.

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Part 5: Recommendations from the PiXL transition pack for Biology

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:
A level Biology – A hub for GCSE and A level biology students
@flagellum_bio

A Level Biology – alevelbiology.co.uk provides resources for AQA, OCR and Edexcel A-Level Biology.
@alevelbiologyuk

David Chalk –daily revision tips for AS and A2 Biology
@teacherchalky1

Understand Biology – news stories relating to A level knowledge and understanding
@a_level_biology

Sci Curious – feed from writer and Bethany Brookshire tweeting about good, bad and weird neuroscience
@scicurious

Carl Zimmer – Science writer Carl blogs about the life sciences
@carlzimmer

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

Molecular Biology - latest news, research, books and journals in molecular biology, cell biology, genetics, stem cells, cancer and biotechnology
@molecular

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

Marine 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.

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Part 5: Recommendations from the PiXL transition pack for Biology

Science Websites

These websites all offer an amazing collection of resources that you should use again and again throughout 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/

ZSL
LIVING CONSERVATION

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/

'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.dnaftb.org/

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/xqh0kb_the-hidden-life-of-the-cell_shortfilms
If this link expires – google "BBC hidden life of the cell"