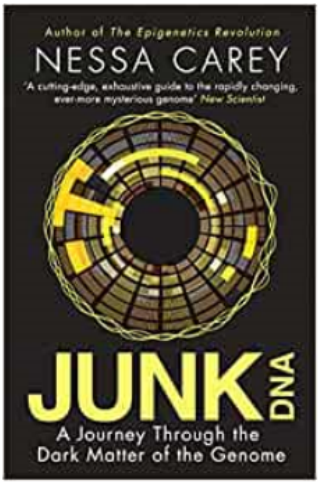
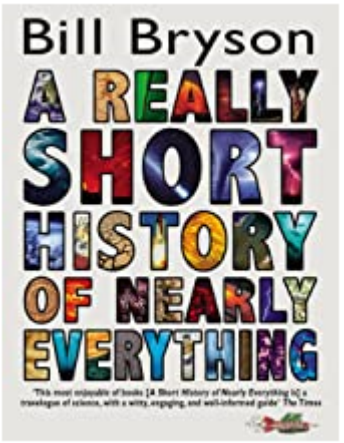
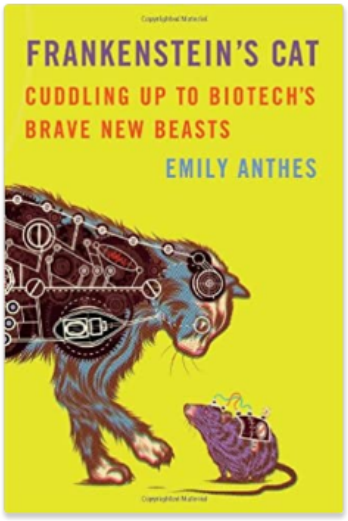
BTEC Science

A guide to help you prepare yourself for studying BTEC Science

Book Recommendations

	**Junk DNA** Our DNA is so much more complex than you probably realise; this book will really deepen your understanding of the work you will do on Genetics.
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!	
	An easy read.. **Frankenstein's cat** Discover how glow in the dark fish are made and more great Biotechnology breakthroughs.

Movie Recommendations

Here are some films based on real life scientists and discoveries - great watching for a rainy day!

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<td>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.</td>
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<td>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.</td>
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<td>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.</td>
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TED Talks

How the gut microbes you're born with affect your lifelong health	Your lifelong health may have been decided the day you were born, says microbiome researcher Henna-Maria Uusitupa. In this fascinating talk, she shows how the gut microbes you acquire during birth and as an infant impact your health into adulthood -- and discusses new microbiome research that could help tackle problems like obesity and diabetes.	
How a long-forgotten virus could help us solve the antibiotics crisis	Viruses have a bad reputation -- but some of them could one day save your life, says biotech entrepreneur Alexander Belcredi. In this fascinating talk, he introduces us to phages, naturally-occurring viruses that hunt and kill harmful bacteria with deadly precision, and shows how these once-forgotten organisms could provide new hope against the growing threat of antibiotic-resistant superbugs.	
5 challenges we could solve by designing new proteins	Proteins are remarkable molecular machines: they digest your food, fire your neurons, power your immune system and so much more. What if we could design new ones, with functions never before seen in nature? In this remarkable glimpse of the future, David Baker shares how his team at the Institute for Protein Design is creating entirely new proteins from scratch -- and shows how they could help us tackle five massive challenges facing humanity.	
Can we cure genetic diseases by rewriting DNA?	In a story of scientific discovery, chemical biologist David R. Liu shares a breakthrough: his lab's development of base editors that can rewrite DNA. This crucial step in genome editing takes the promise of CRISPR to the next level: if CRISPR proteins are molecular scissors, programmed to cut specific DNA sequences, then base editors are pencils, capable of directly rewriting one DNA letter into another. Learn more about how these molecular machines work -- and their potential to treat or even cure genetic diseases.	

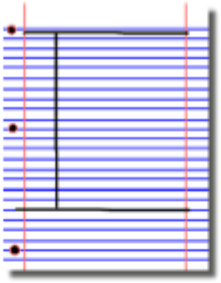
Blogs/Soundbites and more

	The Curious case of Rutherford and Fry Dr Adam Rutherford and Dr Hannah Fry investigate everyday mysteries sent in by listeners BBC Radio 4 - The Curious Cases of Rutherford & Fry - Downloads
	Looking at the world through a scientists eyes BBC - Search results for The Infinite Monkey Cage
	An incredible mix of breaking science news and deep analysis, this podcast is science journalism at its best. The Guardian's science team bring you the current topics and fascinating interviews from the worlds of science and technology — all wrapped into a magazine style format. Science Weekly | Science | The Guardian

Research Activities

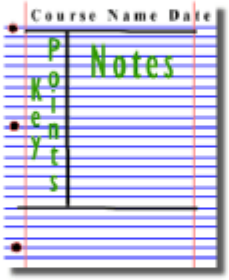
Research, reading and note making are essential skills for science study. For the following tasks you are going to produce 'Cornell Notes' to summarise your reading. There is a video on this under study skills in Teams or through this link https://youtu.be/cLtM3pa9_SQ

1. Divide your page into three sections like this

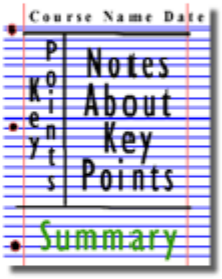


2. Write the name, date and topic at the top of the page

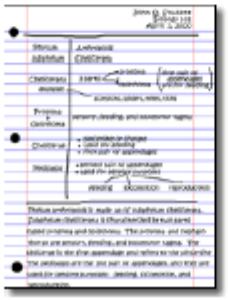
3. Use the large box to make notes. Leave a space between separate idea. Abbreviate where possible.



4. Review and identify the key points in the left hand box



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



Images taken from http://coe.jmu.edu/learningtoolbox/cornellnotes.html

Getting ready to study…..

BTEC Science 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. You don't need to do them all, (though you can if you like), these are designed to help you prepare for your new year studying science

DNA and the Genetic Code (Unit 11)

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.

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

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 poster or PowerPoint presentation using 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.

The cell is a unifying concept in biology, you will come across it many times during your two years of science 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

Cell measurement - Cell structure - AQA - GCSE Biology (Single Science) Revision - AQA - BBC Bitesize
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 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

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. You will also revisit these in Unit 8

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

And take a look at these videos:
https://www.youtube.com/watch?v=H8WJ2KENlK0

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

Social Media

Suggestions of people to follow on Twitter:

- @wncBiology1 – our college Twitter page, where Melanie posts updates, photos from the lesson, links to useful information
- 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 dGrasse 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