Transition Pack for BTEC Applied Science

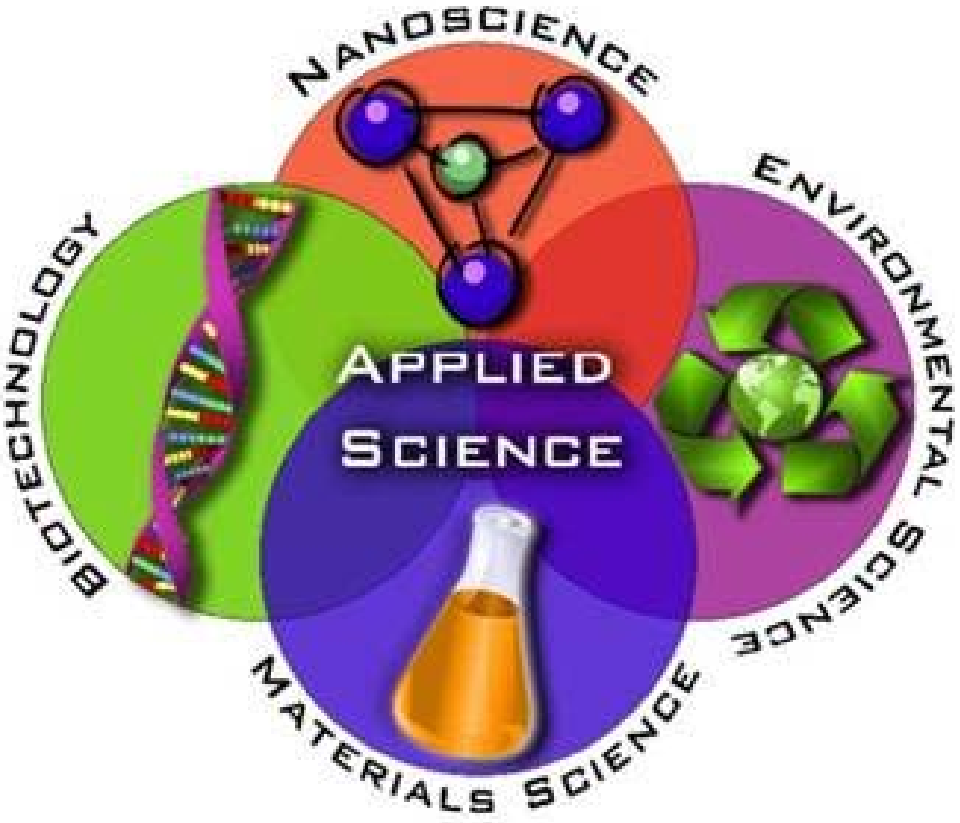
Get ready for BTEC!
A guide to help you get ready for Applied Science, including everything from topic guides to days out and online learning courses.

Beckfoot School

Enjoy • Learn • Succeed

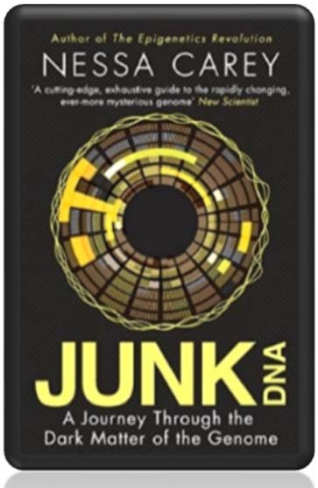
So you are considering BTEC Applied Science?

This pack contains a programme of activities and resources to prepare you to start Applied Science in September. It is aimed to be used after you complete your GCSE throughout the remainder of the Summer term and over the Summer Holidays to ensure you are ready to start your course in September. **Transition work to be completed prior to September is described on page 13.**



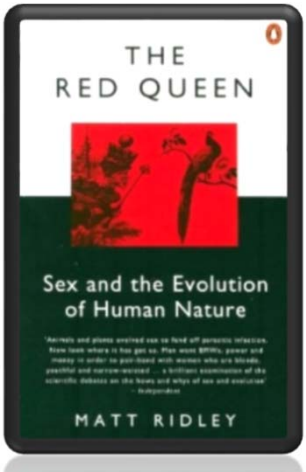
Book Recommendations

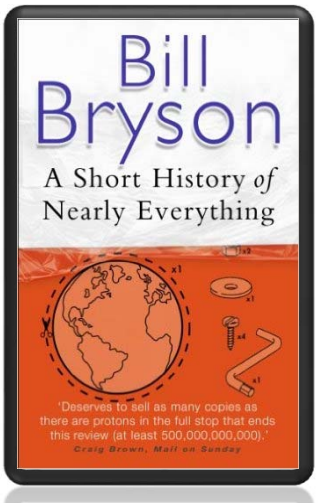
Kick back this summer with a good read. The books below are all popular science books and great for extending your understanding of Biology



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

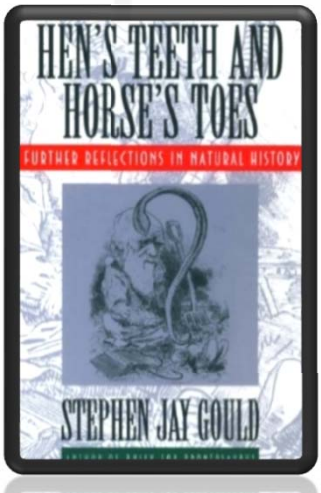
The Red Queen
Its all about sex. Or sexual selection at least. This book will really help your understanding of evolution and particularly the fascinating role of sex in evolution. Available at amazon.co.uk

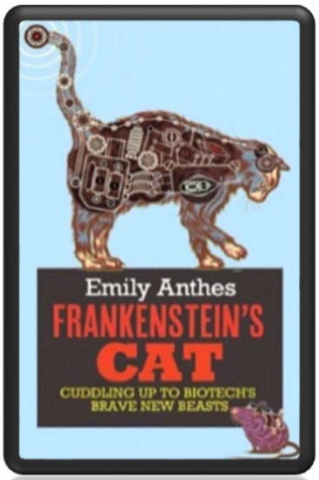




A Short History of Nearly Everything
A whistle-stop tour through many aspects of history from the Big Bang to now. This is a really accessible read that will re-familiarise you with common concepts and introduce you to some of the more colourful characters from the history of science! Available at amazon.co.uk

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

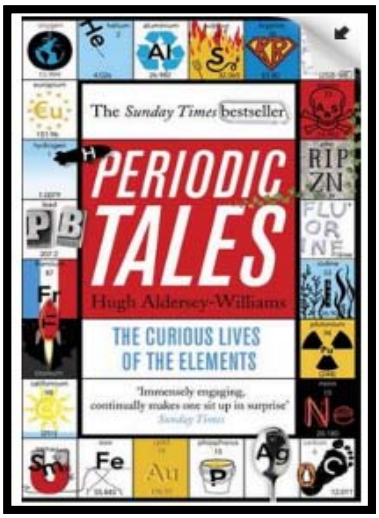




An easy read..
Frankenstein's cat
Discover how glow in the dark fish are made and more great Biotechnology breakthroughs. Available at amazon.co.uk

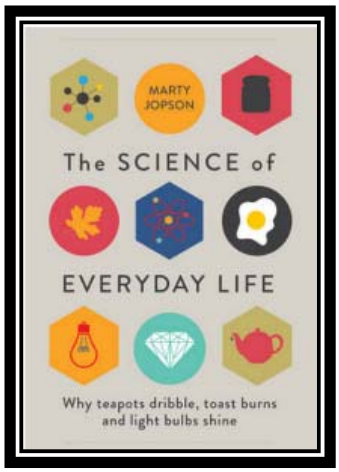
Book Recommendations

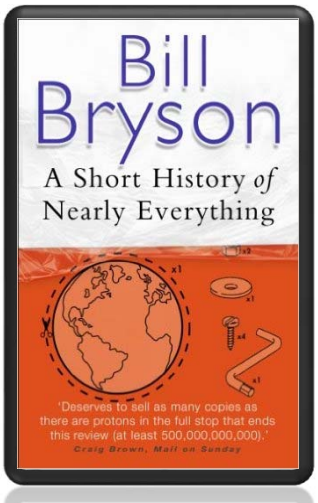
Kick back this summer with a good read. The books below are all popular science books and great for extending your understanding of Chemistry.



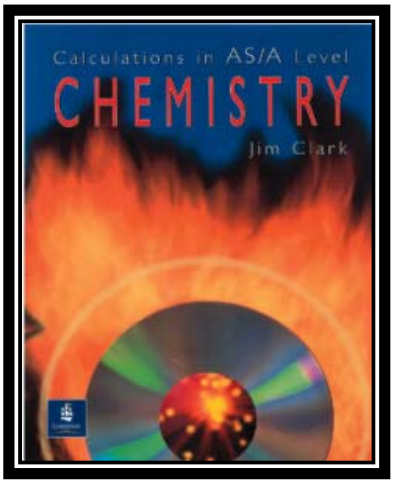
Periodic Tales: The Curious Lives of the Elements
This book covers the chemical elements, where they come from and how they are used. There are loads of fascinating insights into uses for chemicals you would have never even thought about.

The Science of Everyday Life: Why Teapots Dribble, Toast Burns and Light Bulbs Shine
The title says it all really, lots of interesting stuff about the things around you home!

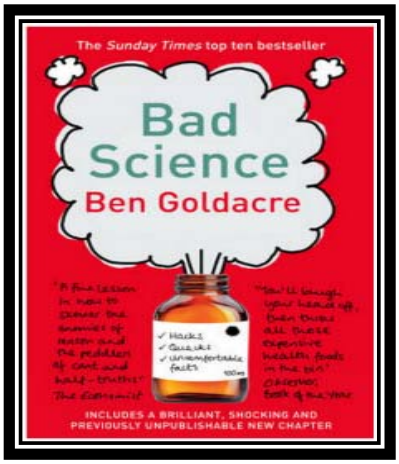




A Short History of Nearly Everything
A whistle-stop tour through many aspects of history from the Big Bang to now. This is a really accessible read that will re-familiarise you with common concepts and introduce you to some of the more colourful characters from the history of science! Available at amazon.co.uk



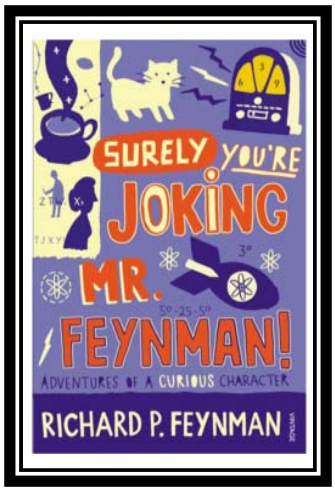
Calculations in AS/A Level Chemistry
If you struggle with the calculations side of chemistry, this is the book for you. Covers all the possible calculations you are ever likely to come across. Brought to you by the same guy who wrote the excellent chemguide.co.uk website.



Bad Science
Here Ben Goldacre takes apart anyone who published bad / misleading or dodgy science – this book will make you think about everything the advertising industry tries to sell you by making it sound 'sciency'.

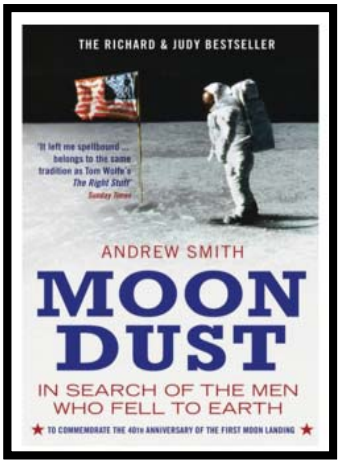
Book Recommendations

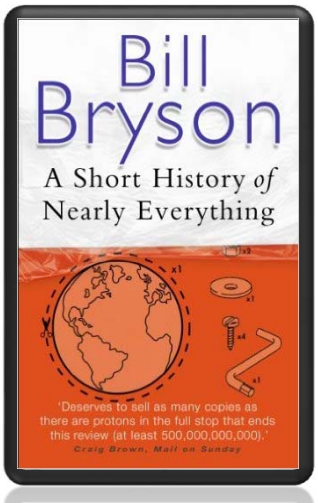
Kick back this summer with a good read. The books below are all popular science books and great for extending your understanding of Physics.



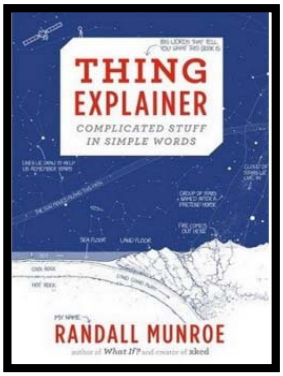
Surely You're Joking Mr Feynman: Adventures of a Curious Character
Richard Feynman was a Nobel Prize winning Physicist. In my opinion he epitomises what a Physicist is. By reading this books you will get insight into his life's work including the creation of the first atomic bomb and his bongo playing adventures and his work in the field of particle physics.

Moondust: In Search of the Men Who Fell to Earth
One of the greatest scientific achievements of all time was putting mankind on the surface of the moon. Only 12 men made the trip to the surface, at the time of writing the book only 9 are still with us. The book does an excellent job of using the personal accounts of the 9 remaining astronauts and many others involved in the space program.



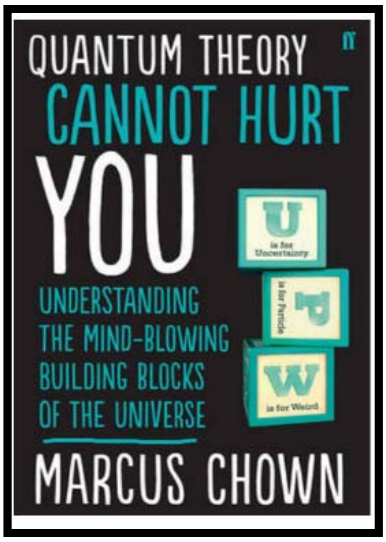


A Short History of Nearly Everything
A whistle-stop tour through many aspects of history from the Big Bang to now. This is a really accessible read that will re-familiarise you with common concepts and introduce you to some of the more colourful characters from the history of science! Available at amazon.co.uk



An easy read..
Thing Explainer: Complicated Stuff in Simple Words
This final recommendation is a bit of a wild-card – a book of illustrated cartoon diagrams that should appeal to the scientific side of everyone. Written by the creator of online comic XTCD (a great source of science humour) is a book of blueprints from everyday objects such as a biro to the Saturn V rocket and an atom bomb, each one meticulously explained BUT only with the most common 1000 words in the English Language.

Quantum Theory Cannot Hurt You: Understanding the Mind-Blowing Building Blocks of the Universe
Any Physics book by Marcus Chown is an excellent insight into some of the more exotic areas of Physics that require no prior knowledge. In your first year of A-Level study you will meet the quantum world for the first time. This book will fill you with interesting facts and handy analogies to whip out to impress your peers!

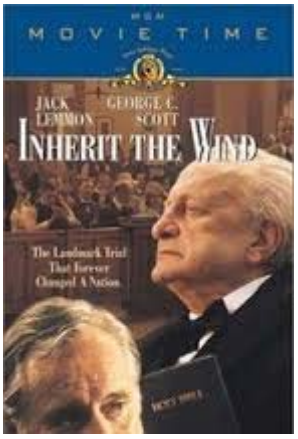


Movie Recommendations

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.

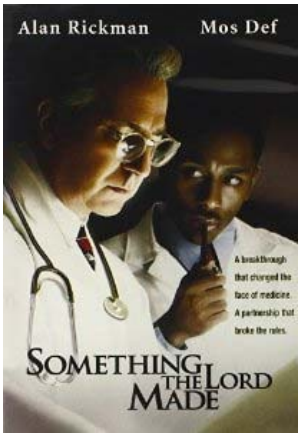
Gorillas in the Mist (1988)
An absolute classic that retells the true story of the life and work of Dian Fossey and her work studying and protecting mountain gorillas from poachers and habitat loss. A tear jerker.

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 (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.

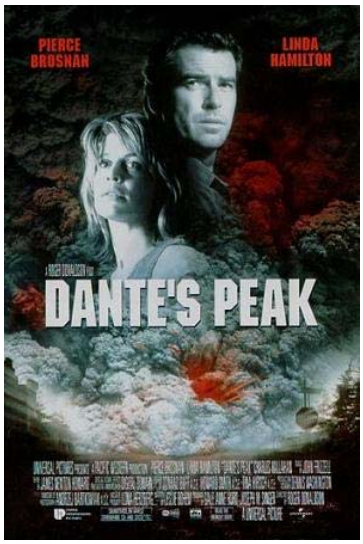


Something the Lord Made (2004)
Professor Snape (the late great Alan Rickman) in a very different role. The film tells the story of the scientists at the cutting edge of early heart surgery as well as issues surrounding racism at the time.

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.

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.



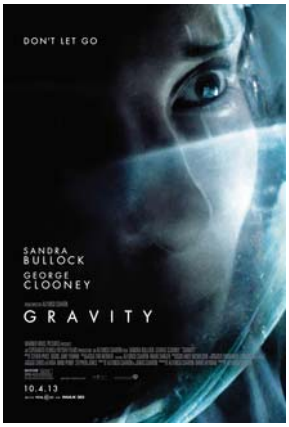
Dante's Peak 1997:

Use the link to look at the Science of acids and how this links to the movie.
http://www.open.edu/openlearn/science-maths-technology/science/chemistry/dantes-peak
http://www.flickclip.com/flicks/dantespeak1.html
http://www.flickclip.com/flicks/dantespeak5.html

Fantastic 4 2005:
Michio Kaku explains the "real" science behind fantastic four
http://nerdist.com/michio-kaku-explains-the-real-science-behind-fantastic-four/
http://www.flickclip.com/flicks/fantastic4.html

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 20 years to give you our top 5 films you might not have seen before. Great watching for a rainy day.



Gravity (2013)
A science fiction adventure film directed, co-written, co-edited and co-produced by Alfonso Cuarón. It stars Sandra Bullock and George Clooney as astronauts who are stranded in space after the mid-orbit destruction of their space shuttle, and their subsequent attempt to return to Earth.

Interstellar (2014)
Set in a dystopian future where humanity is struggling to survive, it follows a group of astronauts who travel through a wormhole in search of a new home for humanity

The Big Bang Theory
Not strictly a film but an (often uncomfortably) accurate portrait of the life of a post-doc physicist. Embrace your inner geek!

The Core (2003)
The film focuses on a team whose mission is to drill to the center of the Earth and set off a series of nuclear explosions in order to restart the rotation of the Earth's core.

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?

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_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.

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:

Rough science – the Open University – 34 episodes available
Real scientists are 'stranded' on an island and are given scientific problems to solve using only what they can find on the island. Great fun if you like to see how science is used in solving problems.
There are six series in total
http://bit.ly/pixlchemvid1a
http://bit.ly/pixlchemvid1b

A thread of quicksilver – The Open University
A brilliant history of the most mysterious of elements – mercury. This program shows you how a single substance led to empires and war, as well as showing you come of the cooler properties of mercury.
https://youtu.be/_MBgg0g8iGM

Why Doctors Don't Know About the Drugs They Prescribe
Available at : 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.
http://www.ted.com/talks/ben_goldacre_what_doctors_don_t_know_about_the_drugs_they_prescribe?language=en

10 weird and wonderful chemical reactions

10 good demonstration reactions, can you work out the chemistry of …. any… of them?

https://www.youtube.com/watch?v=0Bt6RPP2ANI

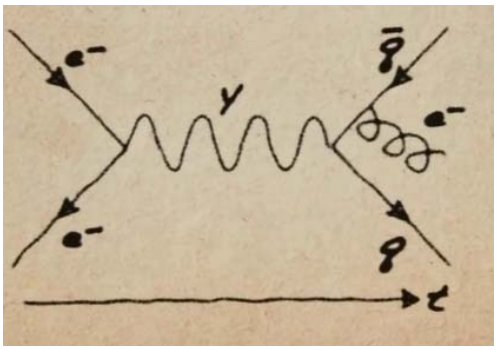
Movie Recommendations

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:

Shock and Awe, The Story of Electricity
In this three-part documentary physicist and science communicator Jim Al-Khalili takes the viewer on a journey exploring the most important historical developments in electricity and magnetism. This documentary discusses how the physics and the people behind the physics changed the world forever.
https://youtu.be/Gtp51eZkwoI

Brian Cox Life Of A Universe
Professor Brian Cox tells the biggest story of them all. Inspired by the night sky as he travels, Brian reveals our very latest understanding about how the Universe began and how it will end.
https://youtu.be/udefAsZem98

The Fantastic Mr Feynman
Richard Feynman is one of the most iconic, influential and inspiring scientists of the 20th century. He helped design the atomic bomb, solved the mystery of the Challenger Shuttle catastrophe and won a Nobel Prize. This is the story of the most captivating communicator in the history of science
https://youtu.be/LyqleIxXTpw

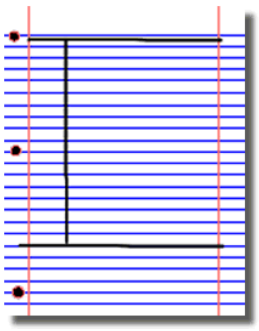


NASA TV
Online coverage of launches, missions, testing and the ISS. Plenty of clips and links to explore to find out more about applications of Physics in Space technology.

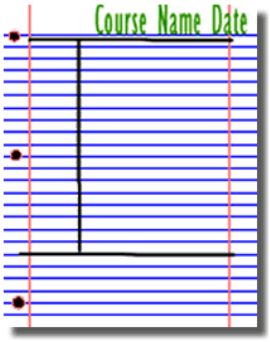
Research activities

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

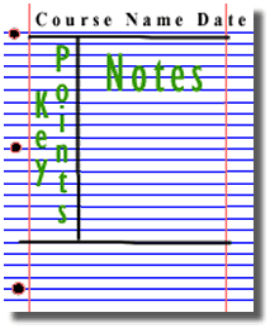
1. Divide your page into three sections like this



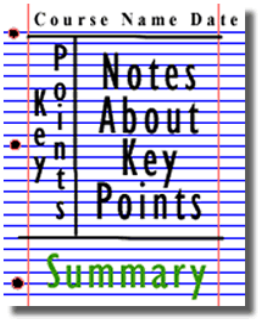
2. Write the name, date and topic at the top of the page



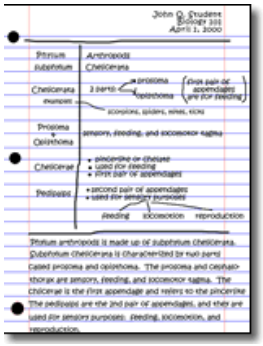
3. Use the large box to make notes. Leave a space between separate idea. Abbreviate where possible.



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

Pre-Knowledge Topics

BTEC will use your knowledge from GCSE and build on this to help you understand new and more demanding ideas.

1. Choose and complete 2 of the tasks described on pages 14 to 20.
2. Complete **Scientific and Investigative Skills** assignment described below.

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 current), use appropriate instrumentation to record quantitative measurements, such as a colorimeter or photometer, use physics apparatus for a variety of experimental techniques to include micrometres.

Task:
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,

Pre-Knowledge Topics

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.

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 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.

Evolution

Transfer of genetic information from one generation to the next can ensure continuity of species or lead to variation within a species and possible formation of new species. Reproductive isolation can lead to accumulation of different genetic information in populations potentially leading to formation of new species (speciation). Sequencing projects have read the genomes of organisms ranging from microbes and plants to humans. This allows the sequences of the proteins that derive from the genetic code to be predicted. Gene technologies allow study and alteration of gene function in order to better understand organism function and to design new industrial and medical processes.

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

http://www.bbc.co.uk/education/guides/z237hyc/revision/4

http://www.s-cool.co.uk/a-level/biology/evolution

And take a look at these videos:

http://ed.ted.com/lessons/how-to-sequence-the-human-genome-mark-j-kiel

http://ed.ted.com/lessons/the-race-to-sequence-the-human-genome-tien-nguyen

Task:

Produce a one page revision guide for an AS Biology student that recaps the key words and concepts in this topic. Your revision guide should:

Describe speciation

Explain what a genome is

Give examples of how this information has already been used to develop new treatments and technologies.

Pre-Knowledge Topics

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

Task:

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.

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

Task:

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.

Pre-Knowledge Topics

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

Task:
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

Control Systems

Homeostasis is the maintenance of a constant internal environment. Negative feedback helps maintain an optimal internal state in the context of a dynamic equilibrium. Positive feedback also occurs. Stimuli, both internal and external, are detected leading to responses. The genome is regulated by a number of factors. Coordination may be chemical or electrical in nature

Read the information on these websites (you could make more Cornell notes if you wish):
http://www.s-cool.co.uk/a-level/biology/homeostasis
http://www.bbc.co.uk/education/topics/z8kxpv4

And take a look at these videos:
https://www.youtube.com/watch?v=x4PPZCLnVkA
https://www.youtube.com/watch?v=x4PPZCLnVkA

Task:
Produce a poster to display in your classroom in September summarising one of the following topics: Temperature Control, Water and the Kidneys, Glucose, or The Liver.
Whichever topic you choose, your poster or display should include:
Key words and definitions
Clearly labelled diagrams
Short explanations of key ideas or processes.

Pre-Knowledge Topics

The chemistry of fireworks
What are the component parts of fireworks? What chemical compounds cause fireworks to explode? What chemical compounds are responsible for the colour of fireworks?

Professor Chris Bishop, presenter of the 2008 Royal Institution Christmas Lectures, gives a family lecture on the history of the modern firework. Through demonstrations of pyrotechnic chemistry hear how Chinese incendiaries made from honey led to the development of gunpowder; discover how the loud bangs of fireworks are routed in the origins of photography; and find out how an accident in a nineteenth-century kitchen sparked a new chemistry for firework making.
https://youtu.be/rmtK2BgmGCw

The art of pyrotechnics is an ancient one, dating back to ancient China. However most of the effects seen in a typical display today are the results of what has now been centuries of skilled craftsmanship and development.
This site is designed to provide readers with an insight into the fascinating world of fireworks, taking the chemistry of fireworks as a focal point.The development of colour, light, shape and construction will each be explored in turn; and it is the culmination of these four factors which illustrates the science that lies behind fireworks.
http://www.ch.ic.ac.uk/local/projects/gondhia/

Task:
Produce a poster to display in your classroom in September summarising you research
Your poster or display should include:
Key words and definitions
Clearly labelled diagrams
Short explanations of key ideas or processes.

Aspirin
What was the history of the discovery of aspirin, how do we manufacture aspirin in a modern chemical process?

In this series, I talk about all you need to know to have a basic understanding of Aspirin. Although I don't mention this in the video, it is important to know that you might hear some people call Aspirin as "just a prodrug for salicylic acid." This is not entirely accurate. While salicylic acid has its own effect (it is thought to stop the production of COX enzymes), Aspirin has its effect by rendering the enzymes useless....

So acetylsalicylic acid (ASA) has its effect by blocking the enzymes and once it has transferred the acetyl group (I talk about this in the video), the remaining molecule is now salicylic acid which is thought to stop the COX enzymes being produced in the first place....good way to think about this is that ASA wrecks the machines while salicylic acid destroys the blueprints for the machines, so that the machines can't be made.

https://youtu.be/W58soJ8szUM
https://youtu.be/MWO6j1QhOD8

Produce a one page revision guide to share with your class in September summarising your research
Your revision guide should include:
Key words and definitions
Clearly labelled diagrams
Short explanations of key ideas or processes.

Pre-Knowledge Topics

The hole in the ozone layer
Why did we get a hole in the ozone layer? What chemicals were responsible for it? Why were we producing so many of these chemicals? What is the chemistry behind the ozone destruction?

An interesting documentary from 1995 which provides a fascinating into into the discovery of the ozone hole and how researchers found out the chemistry behind it.

https://youtu.be/Ll_TR7C4xr4

This quick video discusses the role of the ozone layer and how CFCs can cause ozone depletion.

https://youtu.be/Bz9sc5Jgsvc

Write a persuasive letter to an MP, organisation or pressure group promoting the control of ozone depleting chemicals.
Your letter should:
Define what is ozone and the ozone layer.
Describe how the ozone layer protects us
Explain the chemistry behind"ozone depletion"
Explain and describe some of the alternatives to CFC's

Pre-Knowledge Topics

Our Solar System

The solar system is massive and its scale and age is hard to comprehend. The formation of the Solar System began 4.6 billion years ago with the gravitational collapse of a small part of a giant molecular cloud. Most of the collapsing mass collected in the centre, forming the Sun, while the rest flattened into a protoplanetary disk out of which the planets, moons, asteroids, and other small Solar System bodies formed.

This model, known as the nebular hypothesis, was first developed in the 18th century by Emanuel Swedenborg, Immanuel Kant, and Pierre-Simon Laplace. Its subsequent development has interwoven a variety of scientific disciplines including astronomy, physics, geology, and planetary science. Since the dawn of the space age in the 1950s and the discovery of extrasolar planets in the 1990s, the model has been both challenged and refined to account for new observations.

https://youtu.be/Uhy1fucSRQI
https://youtu.be/B1AXbpYndGc
http://joshworth.com/dev/pixelspace/pixelspace_solarsystem.html

Task:

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:

Describe the processes leading to the formation of our solar system.

Describe the structure and scale of the solar system.

Explain the key processes that effect the development and eventual end of our soar system.

Climate Engineering

Climate engineering, commonly referred to as geoengineering, also known as climate intervention is the deliberate and large-scale intervention in the Earth's climatic system with the aim of affecting adverse global warming. Climate engineering is an umbrella term for measures that mainly fall into two types: carbon dioxide removal and solar radiation management. Carbon dioxide removal addresses the cause of global warming by removing one of the greenhouse gases (carbon dioxide) from the atmosphere. Solar radiation management attempts to offset effects of greenhouse gases by causing the Earth to absorb less solar radiation.

Climate engineering approaches are sometimes viewed as additional potential options for limiting global warming, alongside mitigation and adaptation. There is substantial agreement among scientists that climate engineering cannot substitute for climate change mitigation. Some approaches might be used as accompanying measures to sharp cuts in greenhouse gas emissions. Given that all types of measures for addressing climate change have economic, political, or physical limitations, some climate engineering approaches might eventually be used as part of an ensemble of measures. Research on costs, benefits, and various types of risks of most climate engineering approaches is at an early stage and their understanding needs to improve to judge their adequacy and feasibility.

https://youtu.be/LV1DQK7tJbo
http://www.ce-conference.org/what-climate-engineering
http://climate.nasa.gov/

Task:

Write a persuasive letter to an MP, organisation or pressure group advocating an engineering solution to climate change.

Your letter should:

Define what is meant by climate engineering.

Describe the two main approaches that can be taken to mitigate climate change.

Evaluate the current state of knowledge regarding both carbon capture and solar management.

Pre-Knowledge Topics

Newtons's Laws

Newton's Laws of Motion are fundamental laws for the motion of all the object we can see around us. Newton's laws of motion are three physical laws that, together, laid the foundation for classical mechanics. They describe the relationship between a body and the forces acting upon it, and its motion in response to those forces. More precisely, the first law defines the force qualitatively, the second law offers a quantitative measure of the force, and the third asserts that a single isolated force doesn't exist.

https://youtu.be/Ixf9ZyZaE9Q
http://www.livescience.com/46558-laws-of-motion.html

Task:

Produce a one page revision guide to share with your class in September summarising your research.

Whichever topic you choose, your revision guide should include:

Key words and definitions

Clearly labelled diagrams

Short explanations of key ideas or processes.

Ideas for Day Trips

If you are on holiday in the UK, or on a staycation at home, why not plan a day trip to one of these :

There are also hundreds of nature reserves (some of which are free) located all over the country including:
RSPB sites at Lochwinnoch, Saltholme, Fairburn Ings, Old Moor, Conwy, Minsmere, Rainham Marshes, Pulborough Brooks, Radipole Lake, Newport Wetlands.
Wildlife Trust Reserves and others at Rutland Water, Pensthorpe, Insh Marshes, Attenborough Centre, Inversnaid, Skomer, Loch Garten, Donna Nook, Chapmans Well, Woodwalton Fen, London Wetland Centre, Martin Down and Woolston Eyes Reserve.

Places to visit
Go outdoors!
Have you actually spent any time observing the geology of the area you live in? What rocks or minerals are found in your area? Does your area have a history of extracting minerals? If so what were they, what were they used for, how did they obtain them? Are there any working or remains of mineral extraction industries?

Are there any chemical or chemistry based businesses in your area? A big ask, but one that could be really beneficial to you, write them a letter explaining that you are taking A level chemistry and you want to see how chemistry is used in industry and you would like to visit / have some work experience. You never know this could lead to great things!!!!

You could also try writing to / searching for your nearest university to see if they are running any summer schools for chemistry – they are usually free and give you the opportunity to experience the laboratories in a university.

Science museums.
You could visit your nearest science museum. They often have special exhibitions that may be of interest to you.
https://en.wikipedia.org/wiki/List_of_science_museums#United_Kingdom

Somerset Earth Science Centre:
http://www.earthsciencecentre.org.uk

The UK Association for Science and Discovery Centres (ASDC)
This association brings together over 60 major science engagement organisations in the UK.
http://sciencecentres.org.uk/centres/weblinks.php

Royal Observatory – London - Visit the Royal Observatory Greenwich to stand on the historic Prime Meridian of the World, see the home of Greenwich Mean Time (GMT), and explore your place in the universe at London's only planetarium.

Herschel Museum of Astronomy – Bath – As you walk around the picturesque Roman city – take an hour or two out at the home of one of the great scientists – discoverer of Infra-red radiation and Uranus.

@Bristol – Bristol - home to the UK's only 3D Planetarium and one of the biggest science centres.

The Royal Institution – London – The birthplace of many important ideas of modern physics, including Michael Faraday's lectures on electricity. Now home to the RI Christmas lectures and many exhibits of science history.

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 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

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.