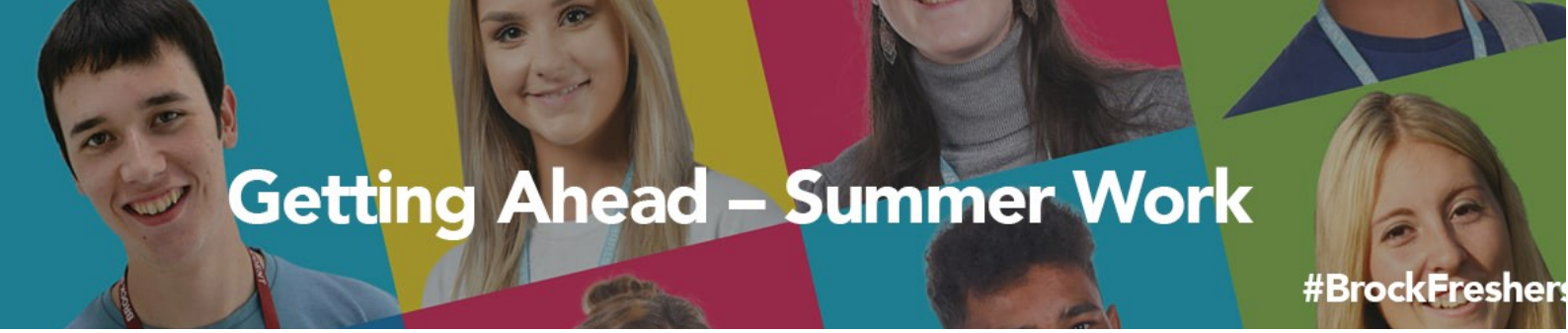
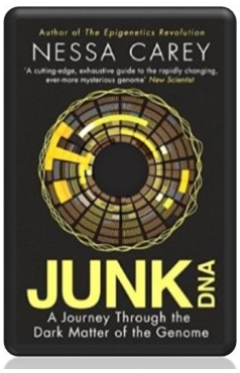


Applied Science (equivalent to one A Level)

This is a programme of activities and resources to prepare you to start BTEC Applied Science in September. It is aimed to be used throughout the remainder of the Summer term and over the Summer Holidays to ensure you are ready to start your course in September.

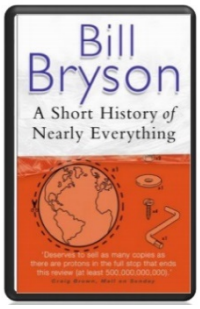
Book Recommendations

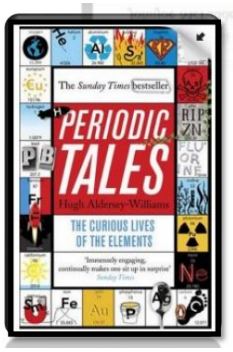
The books below are all popular science books and great for extending your understanding of Science. Bryson and Goldacre are available as ebooks from Hampshire library service.
https://www.hants.gov.uk/librariesandarchives/library/whatyoucanborrow/ebooksaudiobooks



Junk DNA

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



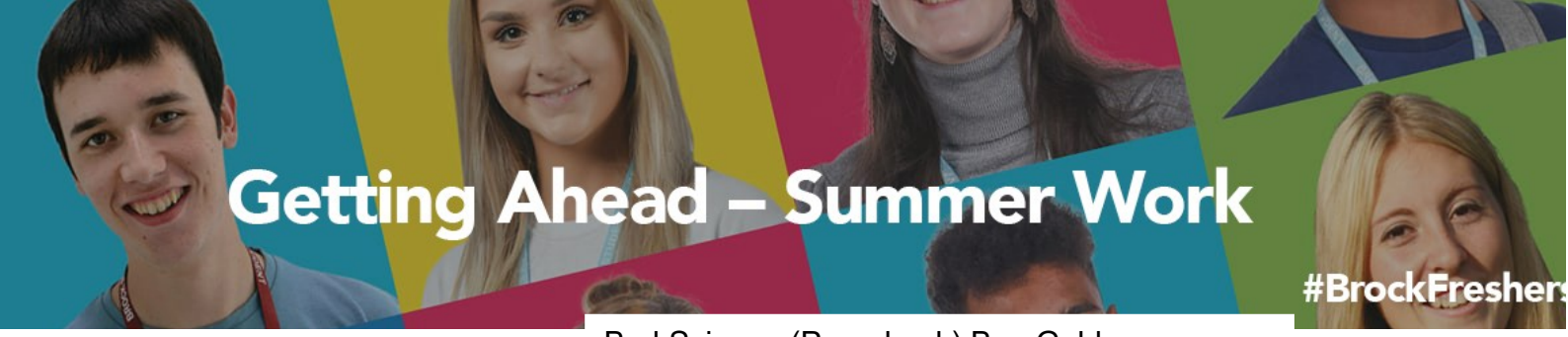


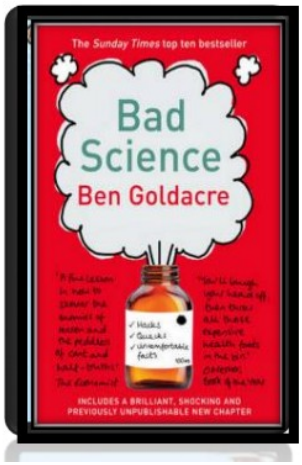
A Short History of Nearly Everything

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

Periodic Tales: The Curious Lives of the Elements (Paperback) Hugh Aldersey Williams ISBN-10: 0141041455 http://bit.ly/pixlchembook1

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.





Bad Science (Paperback) Ben Goldacre

ISBN-10: 000728487X
http://bit.ly/pixlchembook3

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'.

TV and film Recommendations

You won't find Jurassic Park on this list, but they are all great watching for a rainy day.

Cosmos: A **Spacetime Odyssey** (TV Series) An excellent Science documentary which tries to cover a huge chunk of our Scientific discoveries throughout history. It's presented by Neil deGrasse Tyson, produced by Seth MacFarlane and it's on Netflix; Watch this now!

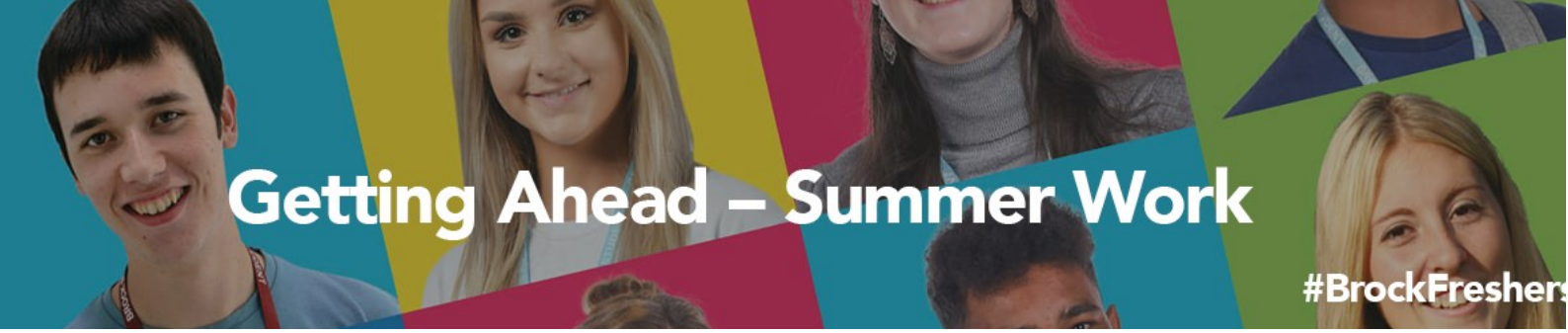
Chemistry: A volatile History (Series 2010) a fascinating three-part series by theoretical physicist Jim Al-Khalili, exploring everything from the history of the elements to the rivalries and controversies that bedevilled scientific progress to the latest bleeding-edge attempts to split matter.

The Martian (2015) Great to watch or read; it depicts an astronaut's lone struggle to survive on Mars after being left behind, and efforts to rescue him, and bring him home to Earth. Available on Netflix

Icarus (2017) This is the only documentary on the list but is definitely worth a watch. It won an Oscar for best documentary. It follows film director and writer Brian Fogel and his growing friendship with Russian scientist, Grigory Rodchenkov, the director of Russia's national anti-doping laboratory. The film tracks Fogel's investigation into doping in sport that famously led to the uncovering of a state-sponsored Olympic doping program in Russia and Rodchenkov's escape to the US.

Podcasts

Find via the BBC Sounds app

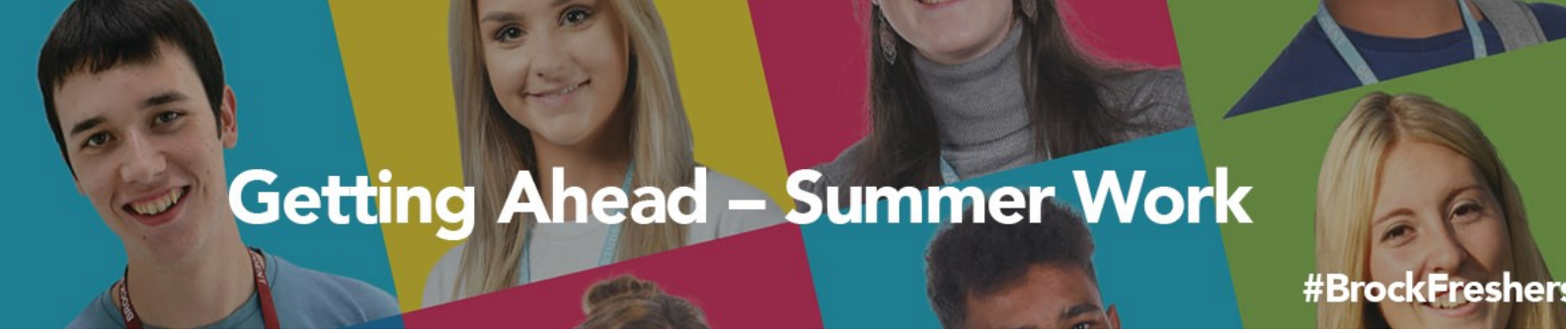


Science betrayed with Dr Adam Rutherford .... topical science stories
https://www.bbc.co.uk/programmes/b00zf4ns

Inside Science - Dr Adam Rutherford and guests illuminate the mysteries and challenge the controversies behind the science that's changing our world.
https://www.bbc.co.uk/programmes/m000jxvp

Interactive activities:

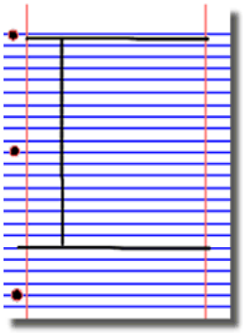
Go to the University of Southampton , Science and Engineering Festival page and interact with some of the activities.
* Recommend, Engineering healthcare , the Young Doctor project -interactive and The science of skin- quiz
https://www.sotsef.co.uk/science_&_engineering_day/?zone=humans_and_health



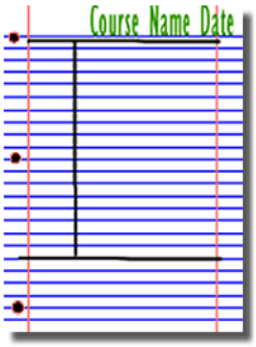
Research and note taking activities

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

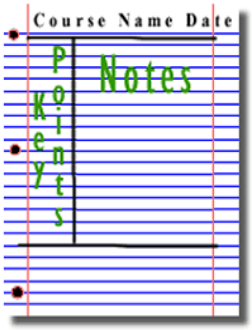
1. Divide your page into three sections like this



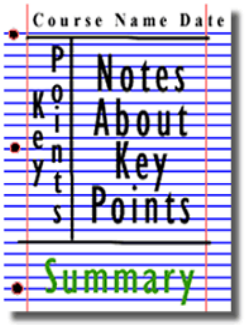
2. Write the name, date and topic at the top of the page



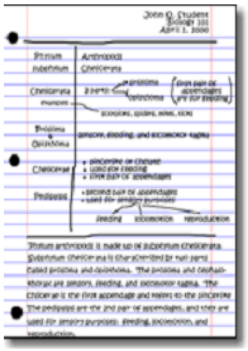
3. Use the large box to make notes. Leave a space between separate idea. Abbreviate where possible.

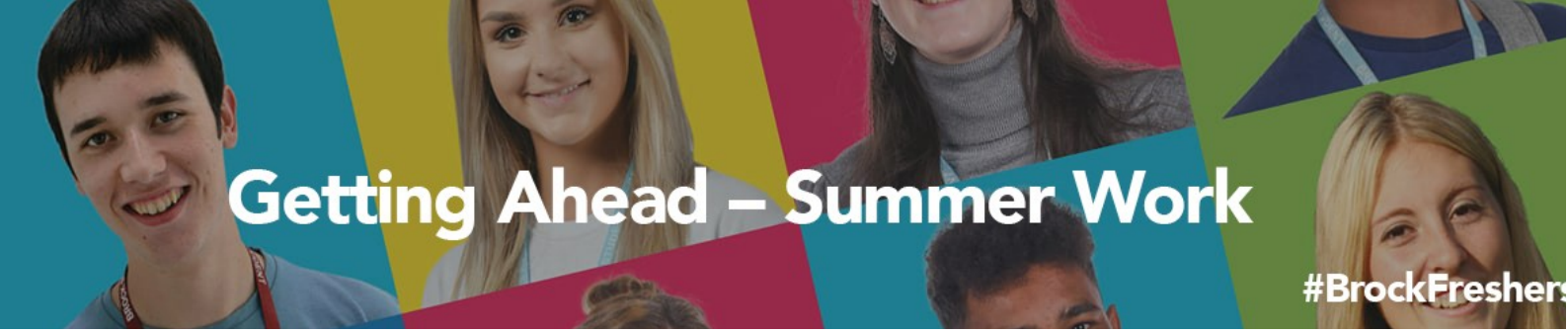


4. Review and identify the key points in the left hand box



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





Research Activities

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

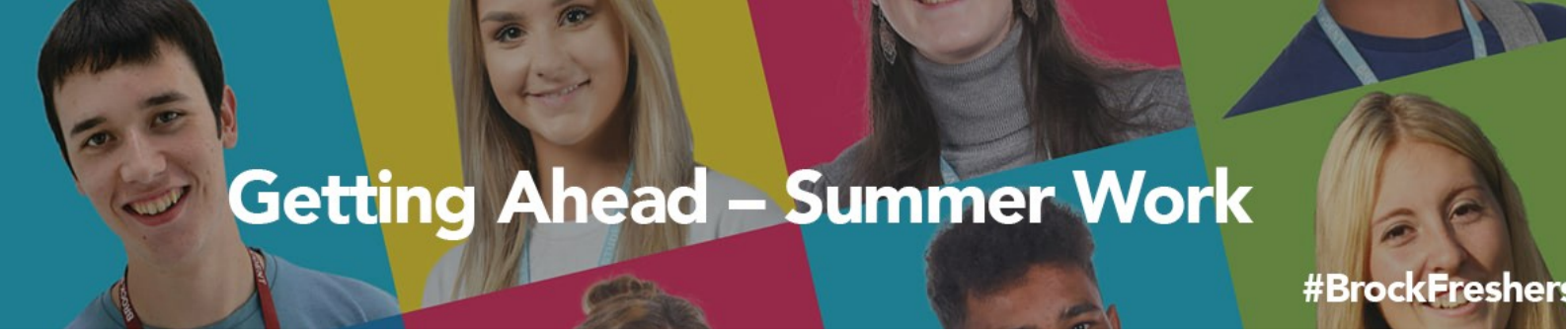
Topic 1: The Cell. Go to cells alive website and watch the video "The inner life of the cell",familiarise yourself with cell ultrastructure, practise saying the words out loud, tackle the memory games and solve the jigsaws.

https://www.cellsalive.com/cells/cell_model.htm

Topic 2: http://home.cern/about CERN encompasses the Large Hadron Collider (LHC) and is the largest collaborative science experiment ever undertaken. Find out about it here and make a page of suitable notes on the accelerator.

Topic 3: Why is copper sulfate blue?
http://www.docbrown.info/page04/4_75trans.htm

Copper compounds like many of the transition metal compounds have got vivid and distinctive colours, but why?



Pre-knowledge Topics

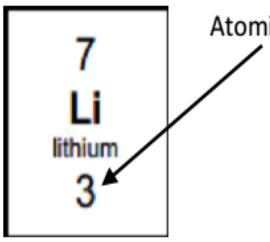
BTEC Applied Science will use your knowledge from GCSE and build on this to help you understand new and more demanding ideas. Complete the following task to make sure your knowledge is up to date and you are ready to start studying:

Electronic structure, hoe electrons are arranged around the nucleus

A periodic table can give you the proton / atomic number of an element, this also tells you how many electrons are in the atom.

You will have used the rule of electrons shell filling, where:

The first shell holds up to 2 electrons, the second up to 8, the third up to 8 and the fourth up to 18 (or you may have been told 8).



Atomic number =3, electrons = 3, arrangement 2 in the first shell and 1 in the second or

At A level you will learn that the electron structure is more complex than this, and can be used to explain a lot of the chemical properties of elements.

The 'shells' can be broken down into 'orbitals', which are given letters: 's' orbitals, 'p' orbitals and 'd' orbitals.

You can read about orbitals here:

http://bit.ly/pixlchem1

http://www.chemguide.co.uk/atoms/properties/atomorbs.html#top

Now that you are familiar with s, p and d orbitals try these problems, write your answer in the format:

$1s^2$, $2s^2$, $2p^6$ etc.

Q1.1 Write out the electron configuration of:

a) Ca b) Al c) S d) Cl e) Ar f) Fe g) V h) Ni i) Cu j) Zn k) As

Q1.2 Extension question, can you write out the electron arrangement of the following ***ions***:

a) K^+ b) O^{2-} c) Zn^{2+} d) V^{5+} e) Co^{2+}