

# BTEC Applied Science

A complete guide to prepare you for BTEC Applied Science including pre-reading, useful online resources, topic guides and extracurricular information



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# Course Overview

Unit	Content	Assessment
1 – Principles & Applications of Science	Biology – Cell Structure, cell specialisation, tissue structure Chemistry – Periodicity & properties, production and uses of substances Physics – Waves in Communication	External Assessment - 3 x 30min exams
2 – Practical Scientific Procedures and Techniques	Chemistry – Titration and colorimetry Physics – Calorimetry Biology – Chromatography Scientific Skills Development	Internal Assessment - 4 assignments
3 – Science Investigation Skills	Planning investigations, data collection, processing and analysis, drawing conclusions and evaluation Key content: Enzymes, diffusion, plants, energy content of fuels, electrical circuits,	Practical investigation used for 1 x 90 minute written exam
Optional Unit	Dependent on unit carried out	Internal Assessment (Unit dependent)

# Gearing you up for Sixth Form Study

This pack contains a programme of activities and resources to prepare you to start BTEC Applied Science in September.

## What you need in order to do well in BTEC Applied Science

- Enthusiasm for the subject
- Hard-work & Organisation
- Strong independent working
- Ability to write in proper sentences using scientific language correctly and appropriately
- Ability to critically analyse and evaluate scientific sources

## What we expect of you

- Be organised with your independent work and meet all deadlines for assignments
- During taught lessons, take notes and engage in the class
- Consolidate and reinforce your understanding through further reading

## What you can expect of us

- To provide support and guidance on independent assignments
- To teach high level, engaging lessons
- To prepare you thoroughly for all external assessment

# Week commencing 7<sup>th</sup> June 2021

Anticipated duration – 180 minutes maximum

The big question:

*How did life begin?*

Four billion years ago, something started stirring in the primordial soup. A few simple chemicals got together and made biology – the first molecules capable of replicating themselves appeared. We humans are linked by evolution to those early biological molecules. But how did the basic chemicals present on early Earth spontaneously arrange themselves into something resembling life? How did we get DNA? What did the first cells look like? More than half a century after the chemist Stanley Miller proposed his “primordial soup” theory, we still can’t agree about what happened. Some say life began in hot pools near volcanoes, others that it was kick-started by meteorites hitting the sea.

## **Your task**

Imagine the evidence of how life began on earth has just been uncovered and you are about to break the story. Use the following research articles and video clips to produce a lead article for the New Scientist Journal. You need to make a persuasive argument for your point of view based on the best evidence available in order to draw your readers in.

Read:

<http://www.bbc.com/earth/story/20161026-the-secret-of-how-life-on-earth-began>

<https://www.scientificamerican.com/article/how-did-life-begin1/>

<https://www.sciencemag.org/news/2019/01/how-ancient-cataclysm-may-have-jump-started-life-earth>

<https://www.nature.com/articles/d41586-018-05098-w>

<https://www.newscientist.com/question/how-did-life-begin/>

<https://science.nasa.gov/solar-system/big-questions/how-did-life-begin-and-evolve-earth-and-has-it-evolved-elsewhere-solar-system>

Watch:

<https://www.quantamagazine.org/videos/how-did-life-begin-on-earth/>

[https://www.ted.com/talks/luka\\_seamus\\_wright\\_the\\_mysterious\\_origins\\_of\\_life\\_on\\_earth?language=en](https://www.ted.com/talks/luka_seamus_wright_the_mysterious_origins_of_life_on_earth?language=en)

Please submit your completed article to [ahleinrich@samuelward.co.uk](mailto:ahleinrich@samuelward.co.uk) on Friday 11<sup>th</sup> June 2021

# Week commencing 14<sup>th</sup> June 2021

Anticipated duration – 180 minutes maximum

The big question:

*Where do we put all the carbon?*

For the past couple of hundred years, we've been filling the atmosphere with carbon dioxide – unleashing it by burning fossil fuels that once locked away carbon below the Earth's surface. Now we have to put all that carbon back, or risk the consequences of a warming climate. But how do we do it? One idea is to bury it in old oil and gas fields. Another is to hide it away at the bottom of the sea. But we don't know how long it will stay there, or what the risks might be. Meanwhile, we have to protect natural, long-lasting stores of carbon, such as forests and peat bogs, and start making energy in a way that doesn't belch out even more.

## **Your Task**

Make a pitch! You are in front of a panel of multi-millionaires ready to invest their own money. You are going to sell them your idea for a novel method for Carbon capture that is going to revolutionise our approach to climate change. Choose a method and sell it in order to win the investment. You can produce a video or powerpoint pitch but make it clear and informative.

Read:

<https://oceanservice.noaa.gov/facts/carbon-cycle.html#:~:text=On%20Earth%2C%20most%20carbon%20is,sinks%2C%20through%20which%20carbon%20cycles>

[https://energyfactor.exxonmobil.eu/science-technology/co2-capture/?gclid=CjoKCOjw2NyFBhDoARIsAMtHtZ68pujkWer3138QeyroQXsvF7oubEsRrN4fVjkMcjW-e7mBnnbwm9IaAkqfEALw\\_wcB](https://energyfactor.exxonmobil.eu/science-technology/co2-capture/?gclid=CjoKCOjw2NyFBhDoARIsAMtHtZ68pujkWer3138QeyroQXsvF7oubEsRrN4fVjkMcjW-e7mBnnbwm9IaAkqfEALw_wcB)

[https://www.sciencemuseum.org.uk/see-and-do/our-future-planet?gclid=CjoKCOjw2NyFBhDoARIsAMtHtZ7ovdIE3mjloEH4IUghAvlggLTC8V2kucvjEHFVwdqPl7KmECHj7jIaAgesEALw\\_wcB](https://www.sciencemuseum.org.uk/see-and-do/our-future-planet?gclid=CjoKCOjw2NyFBhDoARIsAMtHtZ7ovdIE3mjloEH4IUghAvlggLTC8V2kucvjEHFVwdqPl7KmECHj7jIaAgesEALw_wcB)

<https://www.carbonbrief.org/around-the-world-in-22-carbon-capture-projects>

<https://www.gov.uk/government/news/uks-largest-carbon-capture-project-to-prevent-equivalent-of-22000-cars-emissions-from-polluting-the-atmosphere-from-2021>

Watch:

<https://youtu.be/kigGiWQw8E8>

[https://www.ted.com/talks/jennifer\\_wilcox\\_a\\_new\\_way\\_to\\_remove\\_co2\\_from\\_the\\_atmosphere?utm\\_campaign=tedsread&utm\\_medium=referral&utm\\_source=tedcomshare](https://www.ted.com/talks/jennifer_wilcox_a_new_way_to_remove_co2_from_the_atmosphere?utm_campaign=tedsread&utm_medium=referral&utm_source=tedcomshare)

Please submit your completed pitch to [ahenrich@samuelward.co.uk](mailto:ahenrich@samuelward.co.uk) on Friday 18<sup>th</sup> June 2021

# Week commencing 21<sup>st</sup> June 2021

Anticipated duration – 180 minutes maximum

The big question:

*Why is there stuff?*

You really shouldn't be here. The "stuff" you're made of is matter, which has a counterpart called antimatter differing only in electrical charge. When they meet, both disappear in a flash of energy. Our best theories suggest that the big bang created equal amounts of the two, meaning all matter should have since encountered its antimatter counterpart, scuppering them both and leaving the universe awash with only energy. Clearly nature has a subtle bias for matter otherwise you wouldn't exist. Researchers are sifting data from experiments like the Large Hadron Collider trying to understand why, with supersymmetry and neutrinos the two leading contenders.

## **Your task**

You have been employed as an Education Officer at the Large Hadron Collider in Switzerland. You are being asked to produce an information leaflet for 6<sup>th</sup> form students visiting the facility which describes some of the work being done at CERN. Use the links below to help you research some of the information and draw together the relevant information required.

Read:

<https://home.cern/>

<https://home.cern/science/accelerators/large-hadron-collider>

<https://www.bbc.co.uk/news/science-environment-57244708>

<https://www.scientificamerican.com/article/maybe-dark-matter-is-more-than-one-thing/>

<https://www.newscientist.com/definition/dark-matter/>

Watch:

[https://www.ted.com/talks/rolf\\_landua\\_what\\_happened\\_to\\_antimatter?utm\\_campaign=tedsread&utm\\_medium=referral&utm\\_source=tedcomshare](https://www.ted.com/talks/rolf_landua_what_happened_to_antimatter?utm_campaign=tedsread&utm_medium=referral&utm_source=tedcomshare)

<https://youtu.be/Lo8NmoDL9T8>

Please submit your completed leaflet to [ahleinrich@samuelward.co.uk](mailto:ahleinrich@samuelward.co.uk) on Friday 25<sup>th</sup> June 2021

# Week commencing 28<sup>th</sup> June 2021

Anticipated duration – 180 minutes maximum

The big question:

## *What's at the bottom of the ocean?*

Ninety-five per cent of the ocean is unexplored. What's down there? In 1960, Don Walsh and Jacques Piccard travelled seven miles down, to the deepest part of the ocean, in search of answers. Their voyage pushed the boundaries of human endeavour but gave them only a glimpse of life on the seafloor. It's so difficult getting to the bottom of the ocean that for the most part we have to resort to sending unmanned vehicles as scouts. The discoveries we've made so far – from bizarre fish such as the barreleye, with its transparent head, to a potential treatment for Alzheimer's made by crustaceans – are a tiny fraction of the strange world hidden below the waves.

### **Your Task**

The year is 2061. Huge progress has been made in the last 40 years in our knowledge and understanding of the deep oceans. Exploration is now a regular and accessible activity and tourist trips to the bottom of the sea are an affordable holiday option. You are a recognised children's author and illustrator and have been asked to produce a scientific book about the world's extreme environments for pupils in years 5 and 6. One of the chapters will include the deepest oceans. Use the information in the links below, your own understanding of biological organisms and your imagination to produce an informative, colourful and descriptive page in your book explaining the sorts of creatures that live miles below the surface.

Read:

<https://oceana.org/blog/why-does-so-much-ocean-remain-unexplored-and-unprotected>

<https://www.nationalgeographic.org/activity/ocean-exploration/>

<https://science.nasa.gov/earth-science/oceanography/ocean-exploration>

<https://www.livescience.com/16231-creepy-deep-sea-creatures-gallery.html#:~:text=From%20frightful%20fangtooth%20fish%20and,brave%20and%20diverse%20in!>

Watch:

<https://youtu.be/9EzPhrrSegc>

[https://www.ted.com/talks/david\\_gallo\\_deep\\_ocean\\_mysteries\\_and\\_wonders?utm\\_campaign=tedsread&utm\\_medium=referral&utm\\_source=tedcomshare](https://www.ted.com/talks/david_gallo_deep_ocean_mysteries_and_wonders?utm_campaign=tedsread&utm_medium=referral&utm_source=tedcomshare)

Please submit your completed book page to [ahleinrich@samuelward.co.uk](mailto:ahleinrich@samuelward.co.uk) on Friday 2<sup>nd</sup> July 2021