



KS5 Science Summer Work

Key Experiments

Task 1: One of the joys of science at key stage five is the increase in the quantity and significance of practical work. Having a strong set of practical skills is essential to all scientists irrelevant of how much practical work they do on a day-to-day basis. Fill in the table below to give the details of what are some of the most important scientific investigations of the last 150 years.

Year of investigation	Scientists involved	Description of experiment and details of discovery
1898	Marie and Pierre Curie	
1911	Ernest Rutherford	
1950-1952	Rosalind Franklin and Maurice Wilkins	
2015	The Laser Interferometer Gravitational-Wave Observatory (LIGO)	

Your Investigation

Task 2: Choose one of the investigation titles below and write a detailed report on what you did. Some investigations involve a large amount of practical work, others are largely research based. In both cases you will benefit from doing some pre-reading on the internet prior to starting the investigation.

Choose one of the investigations below to complete over the summer and write a report on it	Whichever investigation you choose your report must include:
<ul style="list-style-type: none"> • What is entropy and how can it be used to explain certain phenomena? • Can I make cooled water freeze instantly with the addition of an ice cube? (It may help to look up 'water-bending' on the internet?) • Can I separate DNA from a fruit or vegetable at home? • Investigate the structure of lipids and explain their importance in causing and preventing cardiovascular disease • Can I solve 'the monkey and the hunter problem'? • Can I create a 'non-Newtonian' fluid or a magnetic fluid at home? What are the properties of these substances? 	<ul style="list-style-type: none"> • An abstract • An aim (what were you trying to find out) • A hypothesis (what do you think is going to happen and why) • A method (a short description of what you did to get your results) • Your results (think carefully about the most appropriate way to present you findings) • A conclusion (what did you find out and how do you know this. Make sure to include the theory that explains your results) • Evaluate your experiment (what went well and how could you have improved your experiment)

An important skill set for a scientist is being able to make effective decisions about the best way to present their reports, data and findings. To this end, the actual writing of the report can be done in any number of ways. You may wish to do one or several of the following:

- Produce a Powerpoint presentation
- Type your report
- Hand-draw graphs or tables
- Make use of photographs
- Use diagrams or sketches to illustrate what you did

While none of these texts are required reading, making use of this list will help you be as prepared as possible for the start of your course

Suggested Reading

Texts

- Phillip Ball – Critical Mass (2004)
“Philip Ball describes a new physics of society”
- Brian Greene – The Hidden Reality (2011)
“If extraterrestrials landed tomorrow and demanded to know what the human mind is capable of accomplishing, we could do worse than to hand them a copy of this book.”
- John Emsley - The Elements of Murder: A History of Poison (2006)
“...fascinating, wide-ranging and, let's not mince words, macabre new history of poison...a truly guilty pleasure”
- Richard Dawkins – The Selfish Gene (1976)
“As long as we study life, it will be read”
- Ben Goldacre – Bad Science (2008)
“I righteous skewering of all the people doing science the wrong way”

Videos

Brian Cox's Ted talk about CERN:

For anyone who wants to know the details of what is arguably the most significant current science project on the planet

https://www.ted.com/talks/brian_cox_on_cern_s_supercollider

Kurzgesagt Video Channel:

For anyone with a wide interest in science topics. Covering everything from blackholes to the antibiotics crisis. This series of cartoons is a must watch.

<https://www.youtube.com/user/Kurzgesagt>

ACS Chemistry Video Channel:

For anyone who likes their chemistry lessons delivered to them at a fast pace!

<https://www.youtube.com/channel/UCdJ9oJ2GUF8Vmb-G63ldGWg>

Riccardo Sabatini's Ted Talk:

For anyone wanting to find out more about the Human Genome project

https://www.ted.com/talks/riccardo_sabatini_how_to_read_the_genome_and_build_a_human_being

Other Websites

<http://www.compoundchem.com/>

This is an infographics website that uses graphic design to bring chemistry topics to life

<http://www.wired.com/author/gwenpearson/>

Gwen Pearson has a PhD in Entomology (the study of insects). She was a successful blogger for a long time and now writes for Wired

<http://www.einstein-online.info/elementary>

This website aims to explain the works of Einstein with an emphasis on balancing clear explanations with rigorous detail