



# Learning to Fly in Science

These are the skills and habits which outstanding students of Science develop. Do as many of these as possible to become completely independent in the subject and to develop the skills and knowledge needed to attain 8/9 at GCSE and A\* at A Level. **Remember, whilst your teachers are here to support your progression, to achieve your very best, you should broaden your science experience outside the classroom.**

## In your lessons

- Get involved, and have a go. Don't be afraid of making mistakes. Scientists learn just as much from their experiments that don't go as planned and from results which don't fit a pattern.
- Ask and answer questions in lessons to develop your science literacy and address misconceptions. Think 'how can I make that even better'. Develop your answers and include full use of scientific vocabulary and explanations.
- Listen carefully to other students and the teacher, as this will help. Reflect on other students answers and think about how you would develop it.
- Thinking critically about your own work and finding ways to improve it.
- Think about ways in which new knowledge you encounter in the lesson fits in with what you already know. Science is made up of many interlinking concepts and ideas.
- Make use of your checklists to ensure that you are progressing. At KS4, look at how to content develops between grade 4 to 6, and from 6 to 8.

## Between your lessons

- Ensure that all of your classwork is complete. Use your checklists to make sure details are included for maximum marks.
- Look back over your notes and activities from the last lesson. Doing this 'little and often' soon adds up. Don't just read it passively though. Make revision cards, vocabulary lists and mind maps. Then try exam questions or the end of chapter questions in your textbook.
- Read ahead to familiarise yourself with upcoming topics.
- Try all work on your own, go to see your teacher to ask for clarification and guidance if needed.

### Try using three colours of pen when you answer exam style questions.

1. Use the first colour by yourself.
2. Add to your answer using a second colour with the help of the textbook or a website.
3. Check your answer with the mark scheme and add to your answer with a third colour.

You now just need to revise the second colour, and learn the third colour.

## Beyond your lessons

Try to engage in Science outside the classroom in a way that interest you. You might try:-

- Listening to podcasts from the BBC <https://www.bbc.co.uk/podcasts/category/scienceandnature> 'The Life Scientific' is a superb show to listen to.
- Follow @NWSGScience on Twitter and engage with the content and follow up on news stories
- Attend free lectures at Universities (eg UCL Friday lecture)
- Read a newspaper. Looking for Science developments. Download the BBC News App on your phone and add all the science topics to 'My News' so they come up automatically.
- Watching documentaries eg Horizon specials. Use the I player to see a selection of Science and Nature shows.

- Reading a Science magazine eg New Scientist, BBC Focus, Catalyst. You don't need to read them every week or month, or from cover to cover. Dip in and out when you feel like it.
- Visiting museums. We are so lucky to have so much around us living in London eg Science Museum, Natural History Museum, Wellcome Collection, Crick Institute. Look online to see when they have specific exhibitions on.
- Talking to your friends and family about Science. Start a debate. Discuss an issue.
- Keeping a log of scientific key terms you encounter and look up their definitions.

In Science, you may find some topics more difficult than others, but by attempting some of these you might find that it gets more interesting or easier.

## In Biology

- Carry out OPAL surveys in the conservation area [www.opalexplornature.org](http://www.opalexplornature.org)
- Join your local Wildlife Trust and carry out conservation work [www.wildlifetrusts.org](http://www.wildlifetrusts.org)
- Take part in the Biology Olympiad (Y13)
- Enter an essay competition when details are emailed
- Take an OU short course (A level)
- Join BioEco Society

Want to do some reading? Thinking of doing Biology at University? A reading list is available from both Biology and library staff that gives relevant library books for the different biological degrees.

## In Chemistry

### Websites:

- <http://www.compoundchem.com/> - great source for interesting articles (and printable posters on chemistry).
- <https://www.youtube.com/user/scishow/videos> - American YouTube channel on science.
- <https://www.youtube.com/playlist?list=PL8dPuuaLjXtPHzzYuWy6fYEaX9mQQ8oGr> - as above but specifically for Chemistry
- <http://pipeline.corante.com/> - a very technical site about drug development. Ignore all of this and find the 'things I won't work with section'. This contains information and stories about the most unpleasant chemicals in the world ...

### Interesting Books

Lots available from the School Library. Speak to the Librarian.

Many by John Emsley

- Molecules at an Exhibition
- Vanity, Vitality and Virility
- The Elements of Murder
- The Molecules of Murder

Also, the brilliant 'Molecules That Amaze Us' by Simon Cotton – highly recommended.

### Years 12 and 13

#### Websites

Cambridge Chemistry Challenge – past papers and mark schemes can be found here <http://c3i6.com/>

Chemistry Olympiad – past papers and mark schemes are available from the RSC learn chemistry site. <http://www.chemguide.co.uk/> - the best chemistry site on the web for A level

## Oxbridge

Cambridge – New tests are being introduced for Natural Science at Cambridge. Specification is here [http://www.undergraduate.study.cam.ac.uk/files/publications/nsaa\\_specification.pdf](http://www.undergraduate.study.cam.ac.uk/files/publications/nsaa_specification.pdf) These are books we recommend to those students who want to go beyond what they are taught at A level. They are also particularly useful texts for prospective Oxbridge Natural Scientists and Chemists to read.

- **Why Chemical Reactions Happen** – Keeler and Wothers
- **Chemical Structure and Reactivity** – Keeler and Wothers
- **Oxford Chemistry Primers** – Various titles in this series

## In Physics

KS4 top books to read on Physics (although there are many more in the library):

- **A short History of nearly everything** - Bill Bryson
- **Why the Toast Always Lands Butter Side Down: The Science of Murphy's Law** - Richard Robinson
- **Stargazing 2011** - Heather Couper

Consider going on a Smallpiece trust residential trip <http://www.smallpeicetrust.org.uk/>

Come along to Science Club at lunchtime

Subscribe to New Scientist – See the library for more details

KS5 top books to read on Physics (although there are many more in the library):

- **Relativity: The Special and General Theory** - Albert Einstein
- **Quantum Theory: A Very Short Introduction** - John Polkinghorne
- **The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory** - Brian Greene
- **12 Books that Changed the World** - Melvyn Bragg

Also:

- Consider undertaking a Headstart Work Experience placement <http://www.etrust.org.uk/headstart.cfm>
- Consider subscribing to Physics Review – See the library for more details
- Come along to Physics masterclasses at lunchtime in the Physics department
- Compete in the Physics Olympiad at either AS or A2
- Ask for a mock university interview with one of the department
- Consider an EPQ in a physics related area
- Consider taking on an Open University module in your own time