A-LEVEL BIOLOGY BRIDGING UNIT - SHSB

INTRODUCTION

The transition between GCSE and AS-level is large.
This summer homework is compulsory and will need to be handed in to your biology teacher on your first lesson.
Therefore, the objective of this booklet and the first few weeks of your studies is to help you make the transition to A-level biology more easily.

THE SPECIFICATION AT A GLANCE

AS (year 12)	A2 (year 13)
1. Biological molecules 2. Cells 3. Organisms exchange substances with their environment 4. Genetic information, variation & relationships between organisms	5. Energy transfers in & between organisms 6. Organisms respond to changes in their internal & external environments 7. Genetic, population, evolution & ecosystems 8. The control of gene expression
Required practical assessment 1-6	Required practical assessment 7-12
2 X AS written exams Each paper to include: • any content from topics 1-4 & relevant practical skills questions • last 1 hour 30 minutes • 75 marks	3 x A2 written exams Each paper also includes relevant practical skills questions • paper 1 topics 1-4 (91 marks) • paper 2 topics 5-8 (91 marks) • paper 3 topics 1-8 & an essay (78 marks) • 2 hours

For further detail on the specification please go to:

https://www.aqa.org.uk/subjects/science/as-and-a-level/biology-7401-7402

EXPECTATIONS

During the summer, you will be expected to complete a number of tasks to help you with the transition from GCSE to AS-level, these will need to be completed and brought to your first biology lesson along with any questions. This will help prepare for a short test that you will take in the few weeks of year 12. The purpose of the test is to allow us to recognise those in need of further support (which will be provided during lunchtimes). In our experience, students who plan and start the course prepared find the transition less challenging.

During your A-level you will be required to complete at least 4 hours of independent study time per week, this could include recapping relevant material, reading ahead, practising maths and comprehension questions or engaging in wider reading around the subject to allow you to develop your understanding beyond the specification.

INSTRUCTIONS

- Task 1 is compulsory for students that did not study biology as a single science at GCSE.
- Task 2-3 are compulsory for all students.
- Task 4 is an optional A-level question.
- Task 5 is compulsory, (there are two pathways to complete it - *pathway B is more challenging than pathway A).*
- Task 6 is an optional research and extended writing task.

Task 1 – only compulsory for Trilogy *(approximately 45-60 minutes).*

Read the information on the following pages of BBC Bitesize:

Culturing microorganisms - https://www.bbc.com/bitesize/guides/z8pssbk/revision/2

Monoclonal antibodies – https://www.bbc.com/bitesize/guides/zt8t3k7/revision/1

DNA structure - https://www.bbc.com/bitesize/guides/z36mmp3/revision/1

Produce a summary, in your own words, detailing the extra knowledge and understanding you have gained from this reading. This could be presented in whatever form – as long as it is accurate and detailed – for instance, as handwritten paragraphs, a detailed mind map, or a series of flash cards

Task 2 – **compulsory** *(approximately 10-15 minutes).*

Important vocabulary for practical work

Important vocabulary for practical work. You will have come across most of the words used in practical work in your GCSE studies. It is important that you use the right definition for each word.

Join the boxes to link the word to its definition.

Accurate	A statement suggesting what may happen in the future.
Data	An experiment that gives the same results when a different person carries it out, or a different set of equipment or technique is used.
Precise	A measurement that is close to the true value.
Prediction	An experiment that gives the same results when the same experimenter uses the same method and equipment.
Range	Physical, chemical or biological quantities or characteristics.
Repeatable	A variable that is kept constant during an experiment.
Reproducible	A variable that is measured as the outcome of an experiment.
Resolution	This is the smallest change in the quantity being measured (input) of a measuring instrument that gives a perceptible change in the reading.
Uncertainty	The interval within the true value can be expected to lie.
Variable	The spread of data, showing the maximum and minimum values of the data.
Control variable	Measurements where repeated measurements show very little spread.
Dependent variable	Information, in any form, that has been collected.

Task 3 – **compulsory** *(approximately 30 minutes).*

Knowledge and understanding

a) Lipids are oils and fats. Plant oils and animal fats are mostly made up of a group of lipids called triglycerides. Cell membranes are made up of a special type of lipids called phospholipids to form a double layer. Draw/ find an image of a triglyceride and a phospholipid. Compare and contrast the structure of each lipid.

b) Triglycerides are mainly used as storage molecules, they are non-polar and hydrophobic which means they are insoluble in water. Suggest at least one advantage for them not being able to dissolve in water.

c) Lipase enzymes catalyse the breakdown of lipids into monoglycerides and fatty acids. What is a monoglyceride?

d) Bile salts emulsify lipids – this means they cause the lipids to form small droplets. Although bile salts are not enzymes they are really important in the process of lipid digestion.

i) Explain why.
ii) Name the organ that produces bile salts.
iii) Where in the body does lipid digestion take place?

The information at:

https://alevelnotes.com/notes/biology/biological-molecules/biological-molecules/lipids

Task 4 – optional *(approximately 7-10 minutes)*

Applying biological knowledge and understanding.

Print off and complete question 5 from the specimen paper 2 that can be accessed at:

https://filestore.aqa.org.uk/resources/biology/AQA-74012-SQP.PDF

the mark scheme can be accessed at:

https://filestore.aqa.org.uk/resources/biology/AQA-74012-SMS.PDF

Task 5 – **compulsory** *(approximately 20-30 minutes)*

Extended understanding

Pathway A – complete the table below using examples from the image on the next page:

Function of protein.	Examples of protein.	Explanation of protein function and importance in organism.
Transport		
Catalyst		
Protection		
Storage		
Sensitivity		
Structure		
Co-ordination		

Pathway B – using Internet research to help you, explain the role of each of the proteins mentioned in the image in ensuring survival and healthy functioning of plants and animals.

The following website may be helpful:

http://www.mrothery.co.uk/

Task 6 – optional *(approximately 30 minutes)*

All students who complete the second year of the A-level course will need to write one essay from a choice of two, as part of one of the three written exams at the end of Year 13. Write an essay plan for one of the following topics.

You should aim to spend 30 minutes on this –15 minutes researching/planning, and 15 minutes planning (a mind map/ spider diagram/ list of ideas is sufficient!):

i. The role of micelles in the absorption of lipids.
ii. Enzymes and their importance in plants and animals.

Functions of proteins include transport, catalysis, protection, storage, sensitivity, structure and co-ordination.

Proteins play an important part in transport across membranes, e.g.Na/K pump transports ions across nerve cell membranes in preparation for transmission of an action potential.

Opsin is a part of the light sensitive pigment rhodopsin found in rod cells of the retina.

Collagen is fibrous structural protein found in connective tissue of the skin, tendons and ligaments.

Haemoglobin transports oxygen n blood and myoglobin stores oxygen in muscles.

Keratin is fibrous structural protein found in scales, horns and nails.

Pepsin and lipases are hydrolytic enzymes of the gut.

Fibrinogen and prothrombin are protective proteins essential for the clotting of blood.

Ferritin is a storage protein, which holds iron in eggs, spleen and liver.

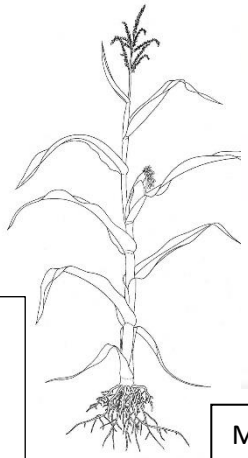
RuBisCo catalyses the fixation of CO_2 in the Calvin cycle and is the most abundant enzyme on Earth.

Phytochrome is a conjugated protein that is light sensitive and responsible for photoperiodic responses in plants.

Cobra venom is a toxic protein, which kills by blocking nerve function.

Vasopressin is a hormone that controls blood pressure.

Cytochrome e is a transport protein, which plays a part in electron transfer chain during respiration.



Antibodies are protective proteins that are part of the immune response to reduce the harmful effects of foreign proteins (antigens).

RuBisCo catalyses the fixation of CO_2 in the Calvin cycle and is the most abundant enzyme on Earth.

Many diseases that are passed by viruses enclosed in viral coat proteins.

Locomotion depends on the activity of two contractive proteins, actin and myosin in muscle tissue.

USEFUL WEBSITES AND ADDITIONAL READING

USEFUL WEBSITES:

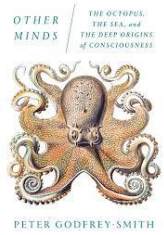
- AQA https://www.aqa.org.uk/subjects/science/as-and-a-level/biology-7401-7402
  Specification, key words and past papers.
- S-cool https://www.s-cool.co.uk/a-level/biology
  Revision guides and question banks.
- Studywise https://studywise.co.uk/a-level-revision/biology/
  Notes, revision, videos, quizzes, forums and links to other websites.
- Biologymad http://www.biologymad.com/
  Notes and revision.
- Learngeneticshttps://learn.genetics.utah.edu/
  Up to date information, videos and virtual labs.
- Yourgenome https://www.yourgenome.org/
  Facts, videos and interactive activities.
- Youtube https://www.youtube.co.uk/
  Thousands of biology videos. But beware to look who produced it and why as many distort the facts.

ADDITIONAL READING

Magazines can provide interesting and relevant articles on the most up to date research:

- The Biologist
- New Scientist
- Biological Sciences Review
- Focus

There are many great biologists and reading their work is not only interesting but also useful in understanding the relevance of the course to everyday life.

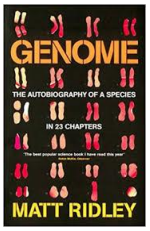


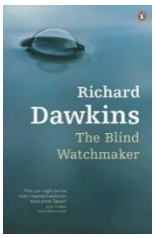
Other Minds: The Octopus and the Evolution of Intelligent Life

News paper reviews say: 'Brilliant' Guardian 'Fascinating and often delightful' The Times What if intelligent life on Earth evolved not once, but twice? The octopus is the closest we will come to meeting an intelligent alien. What can we learn from the encounter?

Genome

Probably the BEST popular introduction to modern genetics. Ridley's structure is wonderfully simple – 23 chapters to cover the 23 human chromosomes – but he uses it brilliantly. We start with Chromosome number 1 and a gene that we share with every other life form, including, probably, the very first living organism.



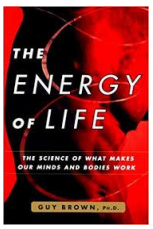


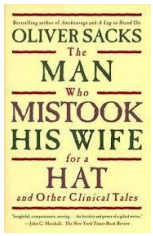
The Blind Watchmaker

Every A-level Biology student should read at least one of Dawkins' books, and this may be the best place to start. Readable and provocative, you can accuse Dawkins of many things, but he is never dull.

The Energy of Life

An enthralling account of the electricity that keeps you alive and one of the best popular science books ever written. It complements the A2 Respiration topic perfectly and makes all kinds of complex issues immediately accessible.



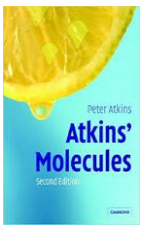


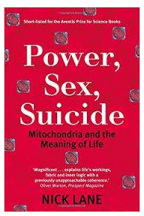
The Man Who Mistook His Wife for a Hat

Sack's case studies make fascinating reading and this is the most famous, and probably the most accessible, of his books. The chapters are interesting for what they reveal about the human brain and how it works, but the stories are so much more than just dry case histories. Sachs never loses sight of the fact that his patients, for all their bizarre symptoms, are human beings, and his compassion is evident throughout. Extraordinary and moving, this book may change the way you view the world.

Atkin's Molecules

This sounds terribly dry. A book about molecules? Ugh. But try this extract from the section of pheromones: "Another component of male underarm sweat provides an engaging story. This component is a hormone molecule that closely resembles one secreted by a male pig encouraging mating behaviour in a sow. The same pheromone is also secreted by the fungus we know as the truffle. Because truffles do not appear above ground, they must be sought out by pigs, who end up frustrated. Whether our enjoyment of truffles is related to our perhaps unconscious enjoyment of our own underarm sweat is a matter of conjecture." Could make you fall in love with Biochemistry…





Power, sex suicide: mitochondria and the meaning of life

Not an easy read, but awesome in scope and mind-boggling in its implications. From the very origins of mitochondria in the murky bacterial soup, to the dangers of keeping DNA next to this bubbling furnace of free radicals, and the role of mitochondria in apoptosis. Includes all the latest research and ideas in the field, and is essential reading for anyone who's serious about Oxbridge

Some examples of books we have in our library, which are also good read:

• This is Going to Hurt	Adam Kay
• Gulp	Mary Roach
• Contented Dementia	Oliver James
• Humankind	Timothy Morton
• Creation – The origin of Life	Adam Rutherford
• The Language of the genes	Steve Jones
• Elephant on the Edge	G A Bradshaw
• To be a Machine	Mark O'Connell
• Selfish Gene	Richard Dawkins
• The Immortal Life of Henrietta Lacks	Rebecca Skloot
• Interiors of the Earth	Chris D Thomas
• The Incredible Unlikeliness of Being	Alice Roberts
• Tamed	Alice Roberts
• Nature via Nurture	Matt Ridley
• The Case Against Sugar	Gary Taubes
• Why We Sleep	Matthew Walker

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.