ETONBURY ACADEMY

A Level Biology

Summer Bridging Work

A-level Biology

Biology is a fantastic subject to have, offering access to a huge variety of options from both university courses and careers. Enhance your knowledge of life and living organisms and gain a fascinating insight into evolution, gene expression and biological molecules. Whether you're interested in the biochemical workings of a cell, the physiology of the human body, or perhaps the stranger world of plants and extremophile organisms, A level biology has something for you.

What are the main differences between GCSE and A level Biology?

Although there is much overlap in topics and terms, there is quite a lot of new material that you won't have met before. Also, you need to go into more detail regarding the topics you are already familiar with and your level of thinking and explaining has to be deeper.

New material

There will be many more facts and unfamiliar terms to learn and recall in exams than there were at GCSE. Examples of new areas include the structure of cell membranes, the immune response and classification. Don't be put off by all the complex terms you will start to come across, they are important for scientists to communicate precisely what they mean, and as your A level course progresses you will become more comfortable and confident with using them.

Detail

You must be prepared to go into much more detail than at GCSE. This means using specific examples to back up your answers. Another good example is mitosis – if you can't remember what it is, have a quick look at your GCSE notes! For A level biology you need to name and explain what happens in each stage of mitosis and show an understanding of why these things happen.

Thinking and explaining

As well as going into more detail and giving examples wherever you can, you need to *justify* your statements and *apply* your knowledge and skills to unfamiliar examples. Justifying what you are saying in A level biology often involves relating structure to function, i.e. explaining why something looks the way it does or why a particular structure allows it to function. For example, knowing the detailed structure of the cell membrane allows you to explain its many functions. Now you can apply this knowledge to discuss how an unfamiliar medical drug might work by changing the structure of the membrane.

Examination papers

Exam questions are created by the OCR awarding body very carefully to test your knowledge and understanding of the specification. You should plan to *practise exam questions as you go along*, not just before you sit an exam. However, once a whole unit is nearing completion, you need to practise whole papers to get a feel of what it is like in a real exam. You will be used to this from GCSE, including mock exams arranged by your school. Do as many of your own *mocks* as you can.

Past papers, mark schemes and examiners' comments are all available. Your textbook has valuable past questions, tips and comments from examiners throughout – take note of these as you go along. The OCR website (http://www.ocr.org.uk) has the specification and sample mark schemes/examiners'

comments. Be careful to use only *OCR* materials for exam preparation because different awarding bodies have slightly different definitions and content. Your textbook has been written especially for the OCR specification. It uses all the right terms and exam requirements, so make it your first point of reference.

Subject content for the course can be found here:
https://www.ocr.org.uk/qualifications/as-and-a-level/biology-a-h020-h420-from-2015/specification-at-a-glance/

Course prerequisite
In order to ensure you have the required work ethos necessary to succeed on the A-level biology course, you must complete the tasks below and bring your completed answers to the first biology lesson in September.

Before starting in September, you should read an article about biology or a popular science book and come ready to discuss this in your first lesson.

Below you will find a vast list of books, magazines, journals and websites that would be great for expanding your knowledge of biology.

Books

- Richard Dawkins:
    - The Selfish Gene
    - The Blind Watchmaker.

- Steve Jones:
    - Y: The Descent of Men
    - In the Blood: God, Genes and Destiny

- Matt Ridley:
    - Genome: The Autobiography of a Species in 23 Chapters
    - The Red Queen: Sex and the Evolution of Human Nature
    - The Language of Genes

- Francis Crick:
    - Discoverer of the Genetic Code
    - Nature Via Nurture: Genes, Experience and What Makes Us Human

- James Watson:
    - DNA: The Secret of Life
    - The Double Helix: Personal Account of the Discovery of the Structure of DNA
- Charles Darwin:
    - The origin of species

- Richard Leaky:
    - The Origin of Humankind

- Yuval Noah Harari:
    - Sapiens

Magazines/journals/podcasts

- Nature Journal
- British Medical Journal
- New Scientist

Places of Interest

- Welcome Sanger Centre, Cambridge
- Natural History Museum, London

Websites

1) http://www.ibiblio.org/virtualcell/index.htm – An interactive cell biology site

2) http://www.accessexcellence.org/RC/VL/GG – A web site showing illustrations of many processes of biotechnology

3) http://www.uq.oz.au/nanoworld – Visit the world of electron-microscopy

4) http://nobelprize.org – Details of the history of the best scientific discoveries

5) http://nature.com – The site of the scientific journal

6) http://royalsociety.org – Podcasts, news and interviews with scientists about recent scientific developments

7) http://www.nhm.ac.uk – The London Natural History Museum's website with lots of interesting educational material

8) http://www.bmj.com – The website of the British Medical Journal

9) http://www.bbc.co.uk/news/science_and_environment - The BBC news page for Science and the Environment

Task 1 – About the A-level course

Go to the exam board website and find out about the course you will be studying (I recommend the 'specification at a glance' page.)

1. What are the different modules in the course?

2. Looking at the content overview of each module, which topics are you most excited to learn about?

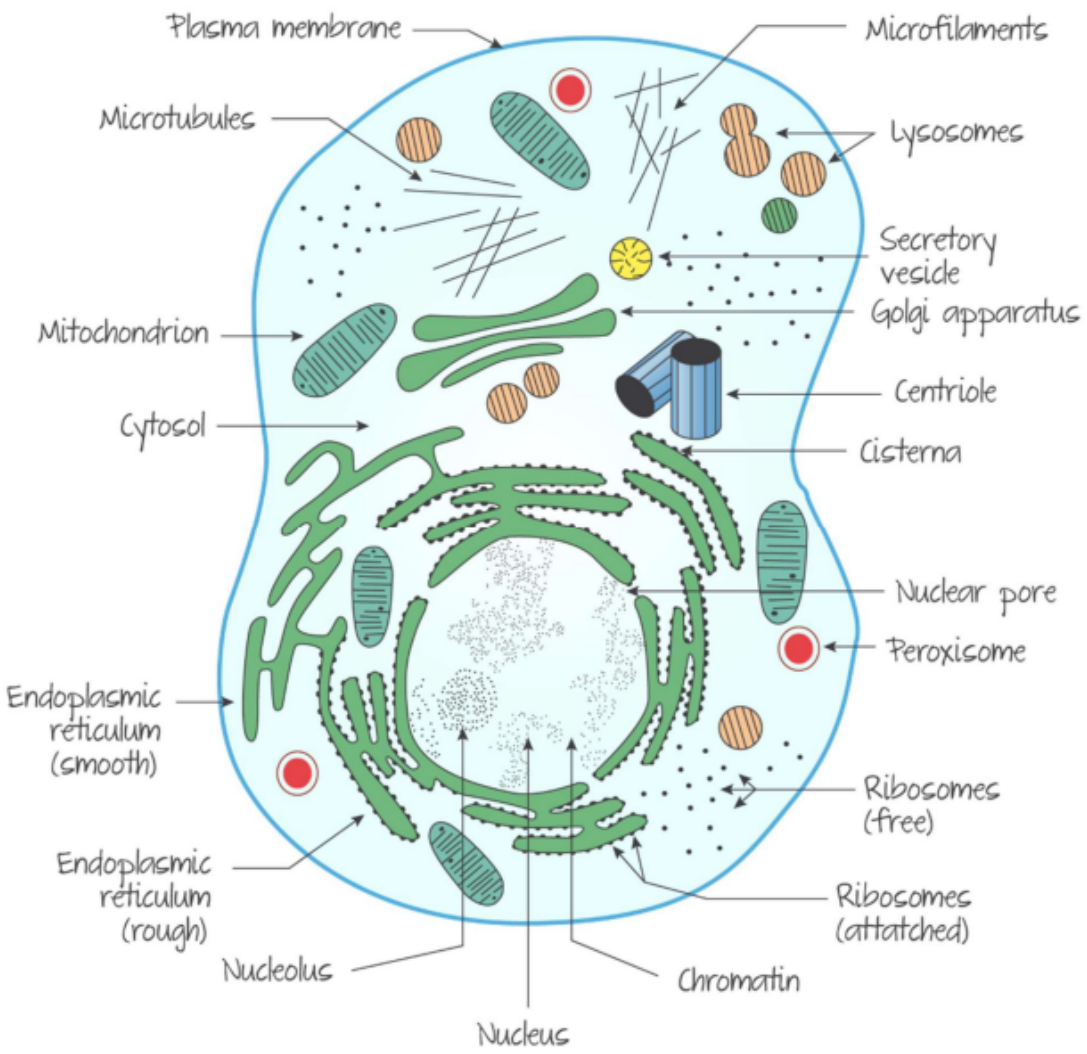
3. Which topics are you most nervous about?

4. How many exams will you sit at the end of year 13, and what percentage is each worth?

5. How is practical work assessed?

Task 2 - Cell Ultra Structure

The Diagram below shows the Ultra structure of a Eukaryotic cell. You will need to learn the labels.

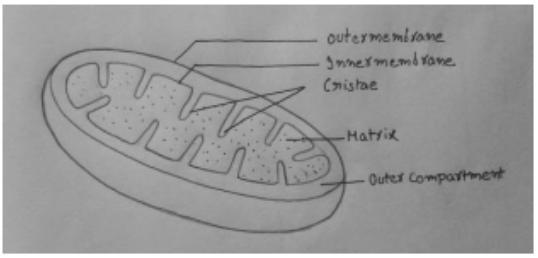


Construct a table for each of the organelles listed below, showing the structure of the organelle (draw and label a diagram) and the function of the organelle (1 or 2 bullet points)

- Nucleus
- Nucleolus
- Nuclear membrane
- Plasma membrane
- Mitochondria
- Ribosomes
- Centrioles
- Lysosome

- Golgi apparatus
- Rough endoplasmic reticulum
- Smooth endoplasmic reticulum
- Chloroplast
- Cell Wall
- Flagella
- Cilia

For Example

Organelle	Structure	Function
Mitochondria	Draw a picture 	Site of Aerobic respiration. Production of ATP

Task 3 – Biological Molecules

1. Produce diagrams for the molecules listed below and clearly label the following:
   - Chemical elements the molecule is composed of e.g. Carbon, Oxygen…
   - Subunits that make the molecule e.g amino acids, glucose…
   - Name of the bonds between the subunits eg glycosidic bonds…

<u>Molecules</u>

Carbohydrates – glucose, ribose, sucrose, lactose, maltose, glycogen, starch (amylopectin and amylose) and cellulose.

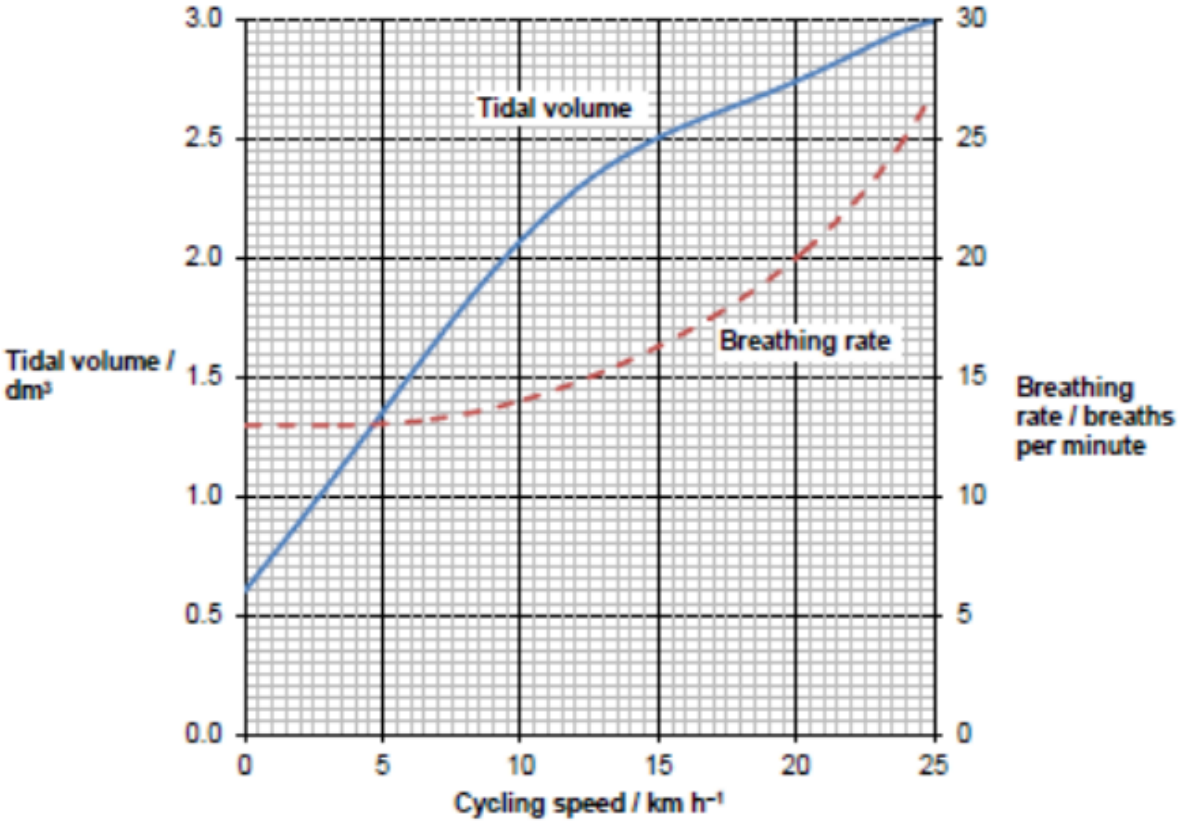
Protein

Lipids – triglyceride and phospholipid

2. Show how 2 glucose molecules join to form maltose and can be broken apart again. Key terms Condensation and Hydrolysis reaction. Get creative with this task, video, stop motion…

Task 4 – Analysing data

The volume of air breathed in and out of the lungs during each breath is called the tidal volume. The breathing rate and tidal volume were measured for a cyclist pedalling at different speeds. The graph shows the results.



1. What was the tidal volume when the cycling speed was 17 km h^{-1}?
2. What was the breathing rate when the cycling speed was 8 km h^{-1}?
3. What was the change in breathing rate when the cyclist changed from 10 to 20 km h^{-1}? Express this as a percentage.
4. At what speed did the breathing rate start to increase?
5. The tidal volume increased linearly with cycling speed up to about 10 km h^{-1}. Calculate the increase in volume for each increase of speed of 1 km h^{-1}.
6. For this initial linear section, what is the equation of the tidal volume line?

   Hint - use y = mc + c