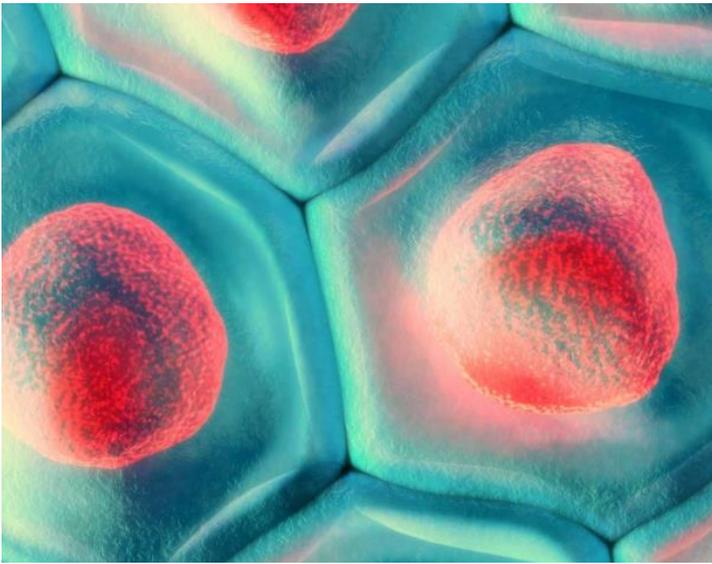
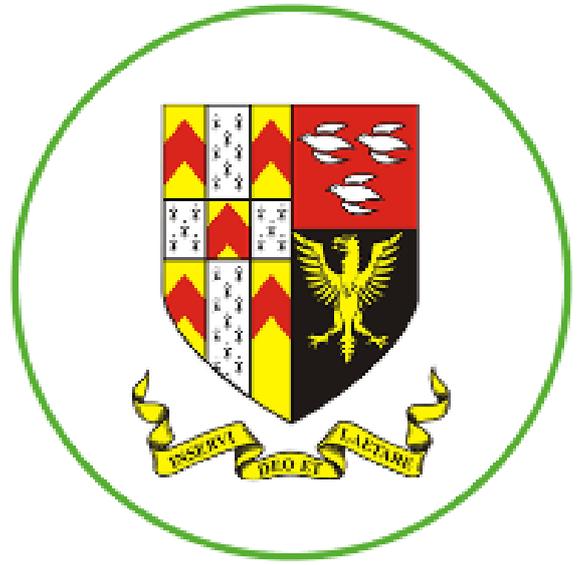


The Friary Sixth Form



Biology Bridging Pack 2025

Course Expectations



As part of your AS/A Level studies you will have nine hours of timetabled lessons across the school's two week timetable. In these lessons you will cover all the theory and practical work required for the course.

To support your learning you will be provided with a textbook for the current AS/A Level course. Your teachers are, of course, an excellent source of support both in and out of lessons. Additional texts are available in the school library and a full copy of the specification, past papers etc. can be accessed via the AQA website.

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

Required Equipment

Pen, pencil, sharpener, rubber, highlighters, 30cm ruler, calculator, A4 lever-arch folder with dividers.

Staff

Mr Awbery (sawbery@friaryschool.co.uk)

Mrs Garner-Thorpe (agthorpe@friaryschool.co.uk)

Mrs Jones (njones@friaryschool.co.uk)

Course Overview



AQA A Level Biology (7402) – Topic List

In the first year of study we will cover:

1. Biological molecules - All life on Earth shares a common chemistry.
2. Cells - All life on Earth exists as cells.
3. Organisms exchange substances with their environment - The exchange of substances between the internal and external environments of organisms takes place at exchange surfaces.
4. Genetic information, variation and relationships between organisms - Biological diversity – biodiversity – is reflected in the vast number of species of organisms, in the variation of individual characteristics within a single species and in the variation of cell types within a single multicellular organism.

In the second year of study we will cover:

5. Energy transfers in and between organisms - Life depends on continuous transfers of energy. In photosynthesis, light is absorbed by chlorophyll. In respiration, various substances are used as respiratory substrates.
6. Organisms respond to changes in their internal and external environments - A stimulus is a change in the internal or external environment. Receptors detect stimuli, coordinators formulate responses and effectors produce responses.
7. Genetics, populations, evolution and ecosystems - The theory of evolution underpins modern Biology. All new species arise from an existing species.
8. The control of gene expression - Cells are able to control their activities by regulating the reading and use of their genes. Although the cells within an organism carry the same coded genetic information, they each use only part of it.

Link to full specification: <https://www.aqa.org.uk/subjects/science/as-and-a-level/biology-7401-7402>

Tasks



Section A (1 hour)

A Level Biology Transition Baseline Assessment.

The following 60-minute test is designed to test your recall, analysis and evaluative skills and knowledge.

Remember to use your exam technique: look at the command words and the number of marks each question is worth.

Question 1

- a) What are the four base pairs found in DNA?

_____ (2)

- b) What does DNA code for?

_____ (1)

- c) Which organelle contains DNA within a cell?

_____ (1)

Question 2

- a) What theory did Charles Darwin propose?

_____ (1)

- b) Why did many people not believe Darwin at the time?

_____ (1)

- c) Describe how fossils are formed.

_____ (3)

d) The fossil record shows us that there have been some species that have formed and some that have become extinct.

a) What is meant by the term species?

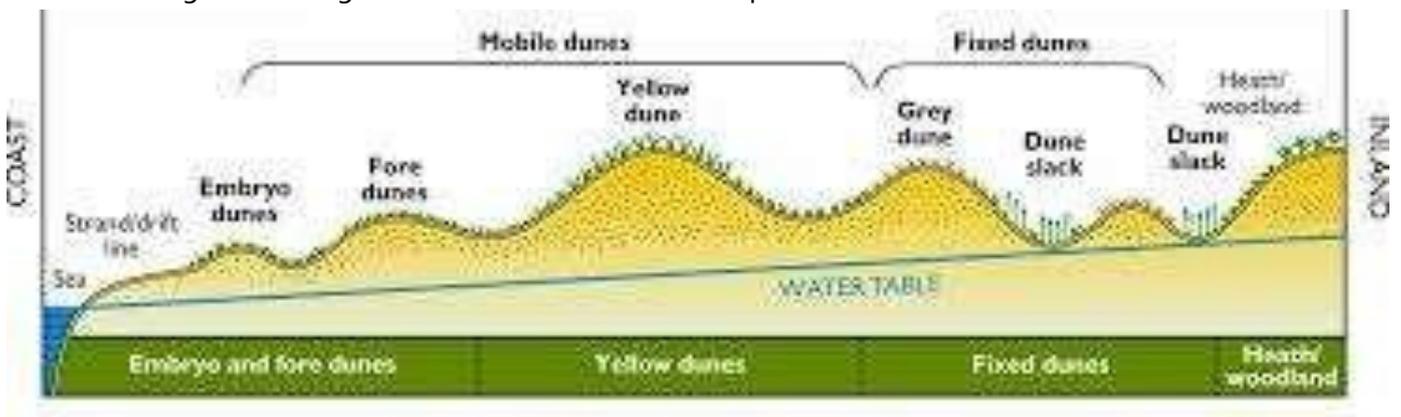
(2)

b) Describe how a new species may arise:

(3)

Question 3

Ecologists regularly study habitats to measure the species present and the effect of any changes. One team of ecologists investigated the habitat shown in the picture below:



b) Define the following keywords:

I. Population

II. Community

(2)

Question 4

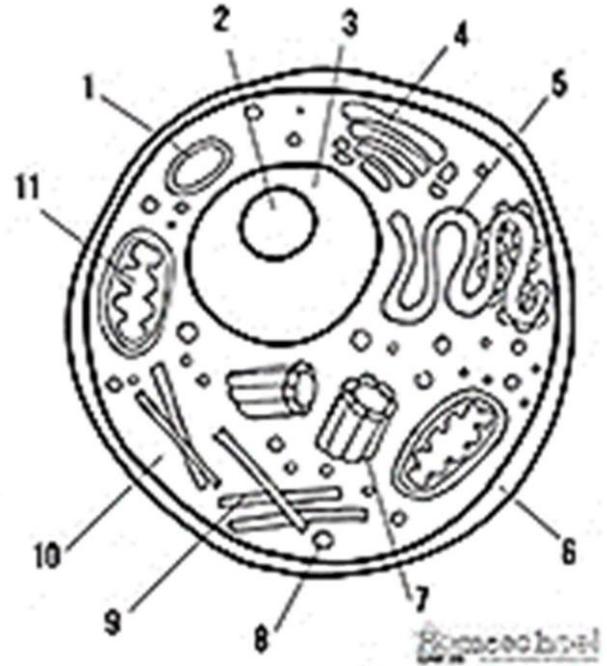
Every living organism is made of cells.

a) Name the following parts of the animal cell:

2 _____

5 _____

8 _____



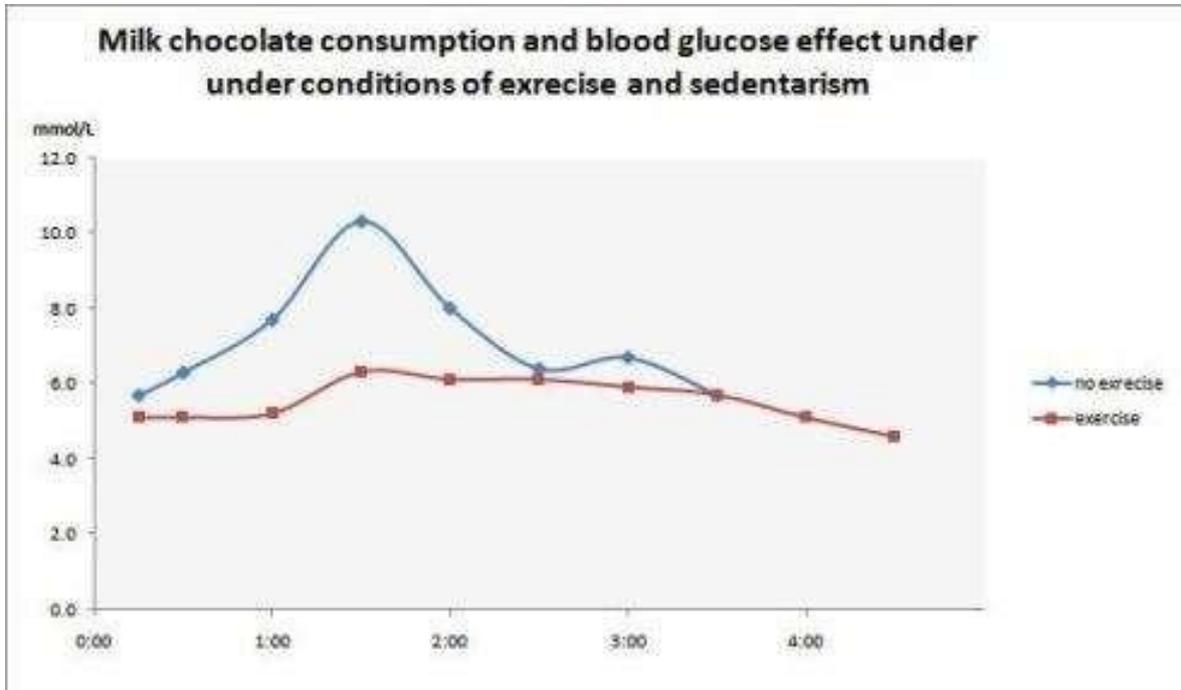
b) Describe how the structure of the cell membrane is related to its function.

_____ (3)

Question 5

A medical research team investigated how quickly the body deals with glucose after a meal. They studied the blood glucose concentration of people who exercised versus those who did not.

Here are their results:



a) What organ in the body regulates blood glucose concentration?

_____ (1)

b) Explain the stages that would bring about a return to normal blood glucose concentration.

_____ (4)

c) Name one variable the researchers will have controlled.

_____ (1)

d) The researchers made the following conclusion:

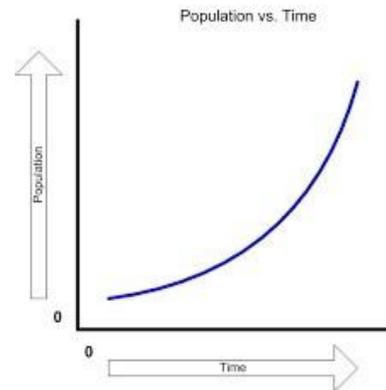
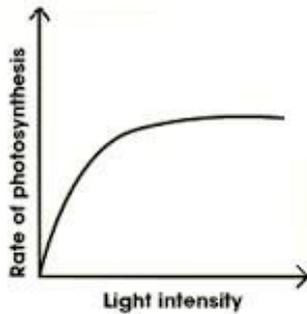
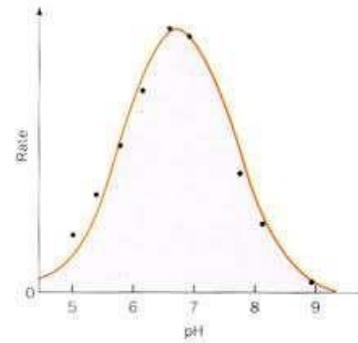
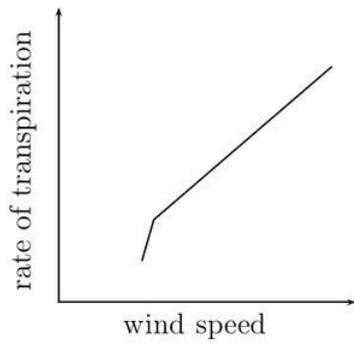
“Blood glucose returns to normal values for all people after 4 hours” To what extent do you agree with this conclusion.

(3)

Question 6

Scientists need to be able to interpret data in graphs to decide if there are trends in the results.

For each graph bellow, describe the trend.



Section B (6 hours)

Research:

Click on the links below and read each of the articles.

Summarise the main points of each article in no more than half a side of A4.

https://www.sciencejournalforkids.org/wp-content/uploads/2022/10/geladas_article.pdf

<https://www.nationalgeographic.com/animals/article/extreme-animals-that-live-in-mountains>

<https://www.theguardian.com/science/2010/jul/02/mutation-gene-tibetans-altitude>

Application of the Research:

Write an explanation of how the articles you have read might be used to improve athletic performance.

If you are unsure how altitude training can improve performance read the information in the link below.

<https://senecalearning.com/en-GB/revision-notes/gcse/physical-education/aqa/4-2-2-altitude-and-seasonal-training>

Create a scientific research poster:

Watch the videos below to learn what makes an effective scientific research poster and how to use AI to help you create your design.

<https://www.youtube.com/watch?v=ZwiTqrVfDFU>

<https://www.youtube.com/watch?v=yVSJP6GrLto>

Use the information you have summarised from each article to create a scientific poster with the title "How Nature Can Help Improve Athletic Performance".

This is most easily done in PowerPoint as 1 single slide.

Section D (5 hours) Research activities

Use your online searching abilities to see if you can find out as much about the topic as you can. Remember you are a prospective A level biologist, you should aim to push **your** knowledge.

You can make a 1-page summary for each one you research using Cornell notes:

<http://coe.jmu.edu/learningtoolbox/cornellnotes.html>

Task 1: Regenerative medicine

How can stem cells be directed to differentiate into specific cell types for tissue regeneration, and what factors influence this process?

Task 2: Disease transmission

What strategies could be used to prevent another global pandemic?

Task 3: Personalised medicine

Why might different people get different treatments for the same diseases in future?

Task 4: De-extinction science

Is it still too far-fetched to think that scientists might be able to bring back dinosaurs from extinction?

Task 5: AI and disease screening

Trials have shown that AI may be better at detecting cancer in medical scans and images better than humans. Is it time for computers to interpret x-rays, CT and MRI scans?

Glossary



Topic 1 - Biological Molecules

Adenosine triphosphate (ATP): A molecule that acts as the energy currency of cells formed from a molecule of ribose, a molecule of adenine and three phosphate groups.

Amino acid: The monomers containing an amino group (NH_2), a carboxyl group (COOH) and a variable R group that make up proteins.

Cellulose: A polysaccharide made of beta glucose monomers that is used as a structural polysaccharide which provides strength to plant cell walls.

Condensation reaction: A type of reaction that joins two molecules together with the formation of a chemical bond involving the elimination of a molecule of water.

Deoxyribonucleic acid (DNA): An information storing molecule made up of deoxyribonucleotide monomers joined by phosphodiester bonds to form a double helix.

Disaccharide: Molecules formed by the condensation of two monosaccharides.

Enzyme: A protein molecule that acts as a biological catalyst and increases the rate of biochemical reactions.

Hydrolysis: Breaking a chemical bond between two molecules involving the use of a water molecule.

Lactose: A disaccharide formed by condensation of a glucose molecule and a galactose molecule.

Lipid emulsion test: A biochemical test that produces a cloudy emulsion when performed on lipids.

Maltose: A disaccharide formed by condensation of two glucose molecules.

Monomers: The smaller units from which larger molecules are made

Monosaccharide: The individual sugar monomers from which larger carbohydrates are made.

Phospholipid: A type of lipid formed by the condensation of one molecule of glycerol, two molecules of fatty acid and a phosphate group.

Polymers: Molecules made from a large number of monomers joined together. **Polypeptide:** Molecules formed by the condensation of many amino acids. **Polysaccharide:** Molecules formed by the condensation of many monosaccharides.

Primary structure: The individual sequence of amino acids in a protein.

Quaternary structure: A structure only applicable to proteins with multiple polypeptide chains that describes the interactions of the different chains.

Solvent: A substance which other solutes are dissolved in.

Starch: A polysaccharide made of alpha glucose monomers that is used as the main storage of energy in plants. **Sucrose:** A disaccharide formed by condensation of a glucose molecule and a fructose molecule.

Tertiary structure: The way that the whole protein folds to make a three-dimensional structure.

Triglyceride: A type of lipid formed by the condensation of one molecule of glycerol and three molecules of fatty acid.

Topic 2 - Cells

Active transport: The active movement of substances from a low concentration to a higher concentration (up their concentration gradient) with the use of energy in the form of ATP.

Binary fission: The method of cell division used by prokaryotes involving replication of the circular DNA and plasmids followed by cytoplasmic division.

Cell cycle: The series of stages preparing the cell for division consisting of interphase and mitosis.

Cell-surface membrane: A phospholipid bilayer studded with proteins that surrounds cells and separates them from their environment.

Cell vacuole: A membrane bound structure found in plant cells that contains cell sap.

Cell wall: A permeable layer that surrounds plant, algae and fungi cells made of polysaccharides which provides strength to the cell.

Chloroplast: An organelle found in plants and algae that is the site of photosynthesis.

Co-transport: A method of membrane transport where two substances are both transported across a membrane at the same time either in the same direction or opposite directions.

Cytokinesis: Division of the cytoplasm to produce two new cells.

Facilitated diffusion: The passive movement of substances from a high concentration to a lower concentration (down their concentration gradient) through transport proteins without the use of energy.

Flagella: A whip-like structure found on bacterial cells that is used for cell movement.

Fluid-mosaic model: A model that describes membrane structure as a sea of mobile phospholipids studded with various proteins.

Golgi apparatus: An organelle found in eukaryotic cells that is involved in the modification and packaging of proteins.

Lysosomes: Membrane-bound vesicles found in the cytoplasm that contain a hydrolytic enzyme called lysozyme.

Mitochondrion: An organelle found in eukaryotic cells that is the site of aerobic respiration.

Mitosis: The part of the cell cycle in which a eukaryotic cell divides to produce two daughter cells, each with identical copies of DNA.

Nucleus: An organelle found in eukaryotic cells that stores the genetic information of the cell as chromosomes and is surrounded by a membrane called the nuclear envelope.

Osmosis: The passive diffusion of water molecules from a region of high water potential to a region of lower water potential (down a water potential gradient) through a selectively permeable membrane without the use of energy.

Resolution: The ability to distinguish two different points in a specimen.

Ribosomes: Organelles found either free in the cytoplasm or membrane bound that are involved in the synthesis of proteins.

Rough endoplasmic reticulum (RER): A membrane-bound organelle that is involved in the synthesis and packaging of proteins.

Simple diffusion: The passive spreading out of substances from a high concentration to a lower concentration (down their concentration gradient) without the use of energy.

Smooth endoplasmic reticulum (SER): A membrane-bound organelle involved in lipid synthesis.

Vaccine: The introduction of dead or inactive pathogens to stimulate an immune response and provide long term immunity.

Topic 3 - Exchange

Aorta: The main artery that carries oxygenated blood away from the heart at high pressure.

Arteriole: A smaller type of blood vessel that connects arteries with capillaries.

Artery: A type of blood vessel that carries blood away from the heart.

Atrium: A type of chamber in the heart which receives blood directly from a vein and passes it on to a ventricle.

Bronchi: The two airways branching out from the trachea and lead to the smaller bronchioles.

Bronchioles: Small airways which branch out from the bronchi and end at the alveoli.

Capillary: A very small blood vessel with thin walls and a small diameter used for substance exchange in tissues.

Coronary artery: The main artery that supplies the heart tissue with blood.

Diaphragm: A large sheet of muscle below the lungs used to reduce and increase the lung capacity to create pressure changes necessary for ventilation.

External intercostal muscles - A set of muscles found between the ribs on the outside that are involved in forced and quiet inhalation.

Gill filaments: Small divisions of the gills in fish that extend off the gill arch.

Gill lamellae: Small protrusions on the gill filaments designed to increase the surface area available for gas exchange.

Haemoglobin: A protein found in red blood cells that has a quaternary structure and is specialised to carry oxygen to the tissues.

Internal intercostal muscles - A set of muscles found between the ribs on the inside that are involved in forced exhalation.

Left atrium: The chamber in the heart that receives oxygenated blood from the pulmonary vein and passes it on to the left ventricle.

Left ventricle: The chamber in the heart that receives oxygenated blood from the left atrium and pumps it out of the heart to the rest of the body.

Pulmonary artery: The main artery that carries deoxygenated blood from the heart to the lungs for reoxygenation.

Pulmonary vein: The main vein that carries oxygenated blood away from the lungs and back to the heart.

Right atrium: The chamber in the heart that receives deoxygenated blood directly from the vena cava and passes it on to the right ventricle.

Right ventricle: The chamber in the heart that receives deoxygenated blood from the right atrium and pumps it out of the heart to the lungs for reoxygenation.

Trachea: The main airway that acts as a passage for air to pass to and from the bronchi.

Trachea (mammals): A tube reinforced with cartilage that allows for the movement of air between the larynx and bronchi.

Tracheae (insects): Tubes leading from the spiracles to the tracheoles that are part of the gaseous exchange system.

Tracheoles: Very small tubes that make up the respiratory system of insects and carry gases from the tracheae to the cells.

Vein: A type of blood vessel that carries blood into the heart from other parts of the body.

Vena cava: The main vein that carries deoxygenated blood into the right atrium of the heart.

Ventricle: A type of chamber in the heart which receives blood from the atrium above it and pumps it out of the heart.

Topic 4 - Genetic Information, Variation and Relationships between Organisms

Allele: A version of a gene.

Binomial system: A universal system of naming organisms that consists of two parts: the generic name and the specific name, e.g. Homo sapiens.

Biodiversity: The variety of genes, species and habitats within a particular area.

Chromosome: A structure consisting of a long, coiled molecule of DNA and its associated proteins, by which genetic information is passed from generation to generation.

Chromosome mutation: A change to the number or structure of chromosomes that can occur spontaneously.

Classification: The organisation of organisms into groups. There are two types of classification: artificial and phylogenetic.

Conservation: The maintenance of ecosystems and biodiversity by humans in order to preserve the Earth's resources.

Courtship: The behaviour by which members of a species select reproductive partners. It enables organisms to recognise their own species, identify a mate with a capacity to breed, form a pair bond, synchronise mating and become able to breed themselves.

Ecosystem diversity: A measure of the range of different habitats in a particular area.

Eukaryotic DNA: Linear molecules of DNA which, together with histones, form chromosomes. DNA in the mitochondria and chloroplasts of eukaryotic cells is circular and does not have associated proteins.

Fertilisation: The random fusion of haploid gametes during fertilisation to produce a diploid zygote. Genetic information is mixed, creating genetic variation.

Gene: A length of DNA on a chromosome that codes for the production of one or more polypeptide chains and functional RNA.

Gene mutation: A change to at least one nucleotide base in DNA or the arrangement of bases. Gene mutations can occur spontaneously during DNA replication.

Genetic code: The rules by which triplets in a DNA base sequence code for the sequence of amino acids in a polypeptide chain. The genetic code is degenerate, universal and non-overlapping.

Genetic diversity: The number of different alleles in a population. Genetic diversity between organisms can be investigated by comparing observable characteristics, DNA and mRNA base sequences and amino acid sequences.

Genome: The entire set of genes in a cell.

Meiosis: A type of cell division that produces four genetically different daughter cells (gametes) with a haploid number of chromosomes. It involves two divisions.

Prokaryotic DNA: Circular pieces of DNA that do not have associated proteins.

Random sampling: A sampling technique used to avoid bias e.g. creating a square grid and generating random coordinates.

Species: A group of similar organisms that are able to breed with one another to produce living, fertile offspring.

Species diversity: A measure of the number of different species and the abundance of individuals in each of these species within a community.

Species richness: A measure of the number of different species in a community at a given time. It is a measure of species diversity.

Taxon: Each group within a phylogenetic classification system.

Triplet: A sequence of three bases that codes for an amino acid.

Universal: A feature of the genetic code; the code is the same in almost all organisms. This is evidence for evolution.

Additional Reading



Below are a number of books which you can read to support your learning before starting your A-level.

Please record all your additional reading on the attached additional reading log.

Genetics

The Immortal Life of Henrietta Lacks. Skloot, R.

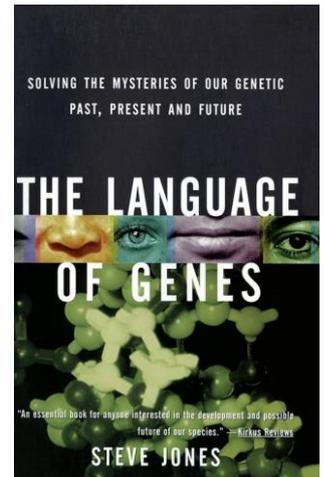
The Language of the genes. Jones, S.

The Serpent's Promise. Jones, S

In the blood. Jones, S.

Y: the Descent of Men. Jones, S.

Genome. Ridley, M.



Evolution

The Beak of the Finch. Weiner, J

Almost Like a Whale. Jones, S.

A Devil's Chaplain. Dawkins, R.

The Selfish Gene. Dawkins, R.

The Blind Watchmaker. Dawkins, R.

Wonderful Life. Gould, SJ.

Dinosaur in a Haystack. Gould,

Trilobite. Fortey, RA.

The Rise and fall of the Third Chimpanzee. Diamond, J.

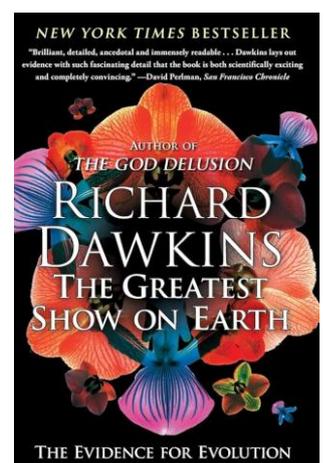
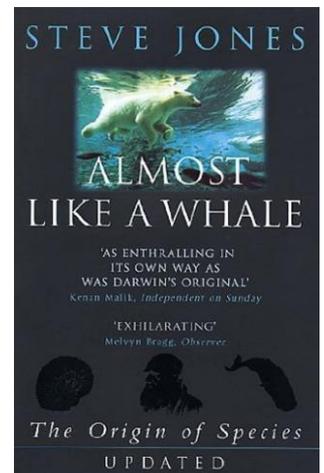
The Ancestor's Tale. Dawkins, R.

The Thinking Ape: Evolutionary Origins of Intelligence. Byrne, R.

The Kiwi's Egg; Charles Darwin and Natural Selection. Quammen, D.

The Greatest Show on Earth. Dawkins, R.

The Seven Daughters of Eve. Sykes B.



Physiology

Why Elephants Have Big Ears. Lavers, C.

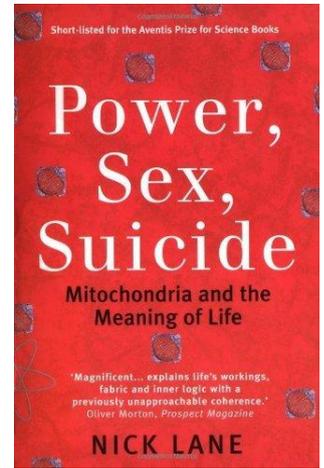
The Energy of Life. Brown, G.

Keep on Running. Newcastle Leech Dueter

Power, sex, suicide: mitochondria and the meaning of life. Lane, N.

Oxygen. Lane, N.

Life at the Extremes. Frances Ashcroft



Immunology

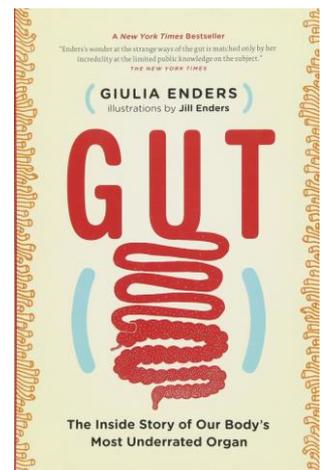
Immunology: A Comparative Approach. Turner RJ

Friendly Fire: Explaining Auto-immune disease. Isenerg, E.

Microbiology

Missing microbes: Martin Blaser

Gut: The inside story of the body's most underrated organ: Guilia Enders



Additional Reading Log:

Additional Reading Title	Dates?	Points of interest	How does it link to the course?

Supporting Resources



There are a number of websites that will be useful to you now and throughout your time studying A-level Biology.

These include:

Physics and Maths Tutor

<https://www.physicsandmathstutor.com/biology-revision/a-level-aqa/>

This website allows you to access a range of resources, from course notes, flashcards and tutorial videos to exam question packs and mark schemes for every topic covered at A-level.

Seneca Learning

<https://senecalearning.com/en-GB/>

This website has many subjects linked to the specific exam boards which you can use to support your knowledge. It allows you to study and then test the information you have learnt.

Save My Exams

<https://www.savemyexams.com/a-level/biology/aqa/17/revision-notes/>

This website is useful for learning and revising content.

Miss Estruch

<https://www.missestruch.co.uk/>

Some free resources to help you study.

Most importantly, a YouTube channel, with videos explaining content tailored specifically to the AQA A Level Biology course.