



Biology A Level Transition work

Summer 2021

Within this transition guide you will find some key topics you have studied at GCSE. By revisiting them before you start your A Level course you will be giving yourself the best possible chance of success when term starts.

Welcome to **Biology** A Level!

Please complete the tasks within the booklet, then use the answer pages at the back to correct and mark your work. **Please bring your marked work to your first lesson of biology.**

There are 4 sections:

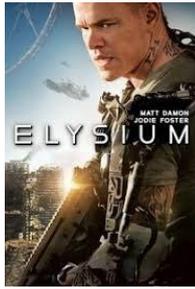
- 1. Cells**
- 2. Life Processes**
- 3. Moving across Boundaries**
- 4. Genetic Inheritance**

Within each section there are **compulsory tasks** which are shown by the symbol.  The other information and links are there to help you and give you some wider knowledge of Biology!

What can I use to help me prepare for A-level?

- GCSE revision guides - use to ensure you have the foundation knowledge needed.
- CGP 'Head Start to Biology' book – perfect for bridging the gap between GCSE and A-level knowledge. Can be bought online for approximately £5.
- OCR Website <https://ocr.org.uk/qualifications/as-and-a-level/biology-a-h020-h420-from-2015/> if you want to find out more about the course you will be studying

Lots of time on your hands... have a look at some of these



Film – Elysium (2013) – is set in the year 2154. Biotechnology allows society to cure every disease, but only the wealthy, who live on a space station, have access to it. Meanwhile, people on an overpopulated Earth suffer poverty and famine. Matt Damon saves the world again, but there is some biology in there too!



Film – The Amazing Spider-man (2012) – It follows the well-known spider man story, that is, boy (Peter Parker) gets bitten by a genetically engineered spider and develops unexpected spider-like abilities, falls for the girl and fights the bad guys, but has some original twists. For example, there is a cool subplot focusing on limb regeneration and lizard DNA.



Documentary – March of the Penguins (2005) – This depicts the lives of Emperor Penguins in Antarctica over the course of a year. Narrated by Morgan Freeman (a selling point in itself) it gives a captivating view into what the penguins need to do to survive...and the sometimes heartbreaking choices they make.



Netflix series – Altered Carbon (2018) – I have heard good things about this one, although I've not watched it yet, it's on my list! Based on a novel by Richard K Morgan, the series is set over 360 years in the future. A person's memories and identity can be stored on a 'cortical stack', which can then be inserted into a new body or 'sleeve' after death. The first series looks at how science could change our futures and how we need to be wary about the potential elitist nature of high-cost inventions.



Film - Contagion (2011) – If you aren't done with hearing about a global pandemic then this is worth a watch. It follows the events of a novel virus that originates in Hong Kong and then spreads across the world. Or you could just switch on the news!

There are some great TV series and other box sets available too: Blue Planet I and II, Planet Earth, The Ascent of Man, Catastrophe, Frozen Planet, Life Story, The Hunt, Monsoon, Dynasty, Can science make me perfect with Alice Roberts, Life and the Truth About on BBC iplayer.

To do: Below are a series of tasks for you to complete and bring to school when we start back for the new term. They are organised into topics; the little cell icon  shows you the compulsory content/tasks within each topic!

1. Cells Cells are the foundation to all Biology, so it's one of the first things you study in Year 7, and at GCSE and again when you start A Level. There are a lot of new names to learn when it comes to A Level so getting a head start by looking at these will help you a lot! Below is a link to an A Level magazine called the Big Picture. It has some great articles in it, all aimed at A level students. Use the link below to have a read!

Available at: <http://bigpictureeducation.com/cell>

The cell is the building block of life. Each of us starts from a single cell, a zygote, and grows into a complex organism made of trillions of cells. In this issue, we explore what we know – and what we don't yet know – about the cells that are the basis of us all and how they reproduce, grow, move, communicate and die.



<https://www.youtube.com/watch?v=wJyUtbn005Y> – This is an amazing animation from Harvard University. It shows how all the organelles within a cell can work together, something that can be hard to visualise, this animation really brings it all to life and shows you how much we oversimplified at GCSE.

Task 1 – Cells



Complete the table below (you should know all of this from GCSE!)

Structure	Function
Cell-surface membrane	
Chloroplast	
Cell vacuole	
Mitochondria	
Nucleus	
Cell wall	
Chromosomes	
Ribosomes	



Draw the structure of a plant cell and an animal cell. On each cell, add labels showing each of the structures in the table (above), if they exist.

A Plant Cell

An Animal Cell

Challenge Task: Can you research any other cell organelles, what are their names, what do they do?

2. Life Processes Photosynthesis and Respiration are two of the most important reactions that take place in living things. They both involve energy transfer.



Complete the table.

	Photosynthesis	Aerobic respiration
Which organisms carry out this process?		
Where in the organisms does the process take place?		
Energy store at the beginning of the process	Sun	
Energy store at the end of the process		In cells
Reactants needed for the process		
Products of the process		
Overall word equation		
Balanced symbol equation for the overall process		



Which of the answers for aerobic respiration would be different for anaerobic respiration? Add these answers to the table in another colour.

3. Moving across boundaries In biology, many processes involve moving substances across boundaries.

Here are a few short Ted talks to help you:

<https://ed.ted.com/lessons/insights-into-cell-membranes-via-dish-detergent-ethan-perlstein>

<https://ed.ted.com/lessons/what-do-the-lungs-do-emma-bryce>



Match the examples to the principle(s) involved. For each, can you give a brief description of why it is relevant.

Osmosis	Examples Drinking a sports drink after exercise Gas exchange in the lungs Absorbing nutrients from food into the body Moving ions into cells The effect of salt on slugs Penguins huddling together to keep warm Potato pieces get heavier when put in pure water Potato pieces get lighter when put in very salty water Cacti do not have thin, large leaves
Diffusion	
Active transport	
Changing surface area or length	

4. Genetic Inheritance Another very large topic within biology. Here we are just reminding you of what you should already know from GCSE using genetic crosses!

Here are a few short Ted talk videos to help:

<https://ed.ted.com/lessons/the-twisting-tale-of-dna-judith-hauck>

<https://ed.ted.com/lessons/where-do-genes-come-from-carl-zimmer>



Use the information to complete the genetic crosses below, then answer the questions:

Huntington's disease is an example of a disease where the mutation causing the disease is dominant.

h: normal (recessive)

H: mutation (dominant)

		Paternal alleles	
		H	h
Maternal alleles	h		
	h		

Cystic fibrosis is an example of a disease where the mutation causing the disease is recessive.

F: normal (recessive)

f: mutation (dominant)

		Paternal alleles	
		F	f
Maternal alleles	F		
	f		

For each of the Punnett squares:

- Complete the diagrams to show the alleles for each child.
- State which parent and child is:
 - healthy
 - has the disease
 - a carrier.

ANSWERS!

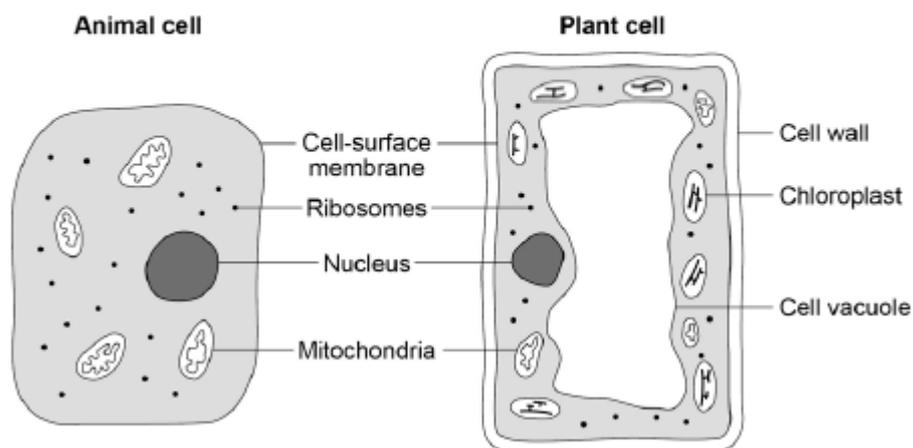
Once you've had a go, check your work against the following pages and add in anything you missed. *Please bring your marked work in to school for your first lesson of Biology.*

1. Cells

Structure	Function
Cell-surface membrane	Provide a selectively permeable membrane for the control of passage of substances and protect the cell contents from the surroundings
Chloroplast	Photosynthesis
Cell vacuole	To hold materials and wastes and help maintain turgor pressure
Mitochondria	Aerobic respiration
Nucleus	Contains genetic material to regulate all cell activities
Cell wall	Provide rigidity, tensile strength, structural support, protection against mechanical stress and infection
Chromosomes	Contain genes and ensure accurate replication during cell division
Ribosomes	Translation of mRNA

Draw the structure of a plant cell and an animal cell.

On each cell, add labels showing each of the structures in the table, if they exist.



2 Life Processes

Complete the table.

	Photosynthesis	Aerobic respiration
Which organisms carry out this process	Plants, algae and some bacteria	All living organisms
Where in the organisms does the process take place?	Chloroplasts (cytoplasm in bacteria)	Cytoplasm (glycolysis) and mitochondria. <i>Anaerobic cytoplasm only</i>
Energy store at the beginning of the process	Sun	Glucose
Energy store at the end of the process	Glucose	In cells
Reactants needed for the process	Carbon dioxide and water/hydrogen sulfide	Glucose and oxygen/sulfur <i>Anaerobic glucose only</i>
Products of the process	Glucose and oxygen	Carbon dioxide, water and ATP <i>Anaerobic in humans, lactic acid and ATP, in plants/fungi, ethanol, carbon dioxide and ATP</i>
Overall word equation	carbon dioxide + water → glucose + oxygen	glucose + oxygen → carbon dioxide (+energy) <i>Anaerobic; In humans,</i>

		<p>Glucose → Lactic acid (+ energy)</p> <p>In plants/fungi, glucose → ethanol + carbon dioxide (+ energy)</p>
Balanced symbol equation	$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow$ $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$	<p>$\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2$ + $6\text{H}_2\text{O}$ (+ 38 ATP)</p> <p>Anaerobic:</p> <p>In humans: $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{C}_3\text{H}_6\text{O}_3$ (+ energy)</p> <p>In plants/fungi, In humans: $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2\text{C}_2\text{H}_5\text{OH} +$ 2CO_2 (+ energy)</p>

3. Moving across boundaries

Osmosis

- Drinking a sports drink after exercise needs to ensure rapid rehydration.
- The effect of salt on slugs, salt causes water to leave slugs by osmosis, killing them.
- Potato pieces get heavier when put in pure water as they take up water by osmosis due to the water potential of potato cell cytoplasm being more negative than water.

Diffusion

- Gas exchange in the lungs – oxygen into blood down a diffusion gradient and carbon dioxide out down a diffusion gradient.
- Absorbing nutrients from food into the body down a concentration gradient when possible.
- Moving ions into cells by diffusion through channel/carrier proteins.

Active transport

- Drinking a sports drink after exercise contains glucose and amino acids that will be absorbed by active transport.
- Absorbing nutrients from food into the body against a concentration gradient if needed.
- Moving ions into cells by active transport, for example the Na⁺K⁺ ATPase pump to maintain the resting potential.

Changing surface area or length

- Penguins huddling together to keep warm
- Cacti do not have thin, large leaves

4. Genetic Inheritance

		Paternal alleles	
		H	h
Maternal alleles	h	hH	hh
	h	hH	hh

- Hh father has the disease
- hh mother is healthy
- hH children have the disease
- hh children do not have the disease
- As the disease is dominant, no individual can be a carrier.

		Paternal alleles	
		F	f
Maternal alleles	F	FF	Ff
	f	fF	ff

- Both parents are carriers
- FF child is healthy
- Ff and fF children are carriers
- ff child has the disease