•Transition Pack for A Level Biology

•Get ready for A-level!

•A guide to help you get ready for A-level Biology.

•You DO NOT have to complete everything here! It is a guide of some great and varied resources to get you back up to speed.

Year 12 Biology Transition Activities

Look back through some of the archive Biological Sciences Review magazines here:

https://www.hoddereducation.co.uk/magazines/magazines-extras/biological-sciences-review-extras

Work through some of the activities here to review and enhance your understanding of cell structure:

https://www.cellsalive.com/

Have a go at some of the games here, especially DNA, The cell and it's organelle and ECG:

http://educationalgames.nobelprize.org/educational/

It's really worth getting the CGP Headstart to Biology book. Available on Amazon for under £5 or less if you buy a used copy:

https://www.amazon.co.uk/Head-Start-level-Biology-Level/dp/1782942793/ref=asc_df_1782942793/?tag=googshopuk-21&linkCode=df0&hvadid=310867999190&hvpos=&hvnetw=g&hvrand=14246655881692959363&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=1006653&hvtargid=pla-564535130349&psc=1&th=1&psc=1

Lots of interesting podcasts here:

https://www.thenakedscientists.com/

Listen to Podcast 23 on coronavirus immunity
https://www.newscientist.com/podcasts/

Maths for Biology

In order to develop your skills, knowledge and understanding in A-level Biology you need to have acquired competency in a number of areas of mathematics.

Your external assessment will include at least 10% maths.

Using the convention *r* for radius, *h* for height, *b* for base and *l* for length, give equations for the following:

Circumference of a circle:

Area of a circle:

Surface area of a cuboid:

Volume of a cuboid:

Mean:

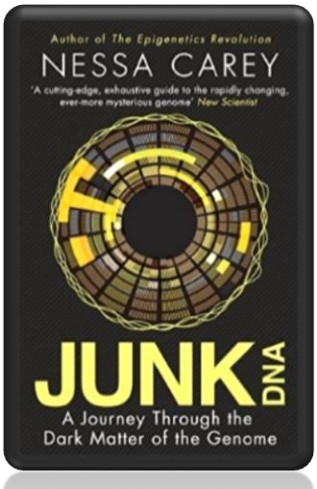
Percentage change:

Percentage yield:

Percentage error (uncertainty):

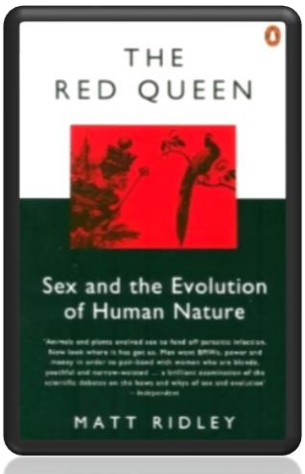
Book Recommendations

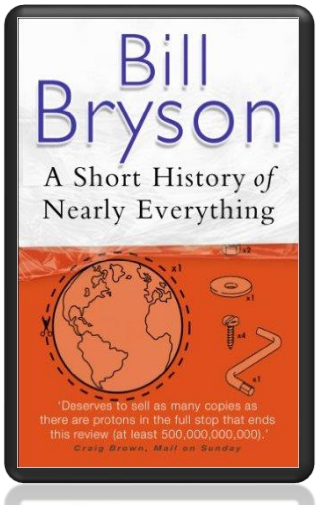
Kick back this summer with a good read. The books below are all popular science books and great for extending your understanding of Biology



Junk DNA
Our DNA is so much more complex than you probably realize, this book will really deepen your understanding of all the work you will do on Genetics. Available at amazon.co.uk

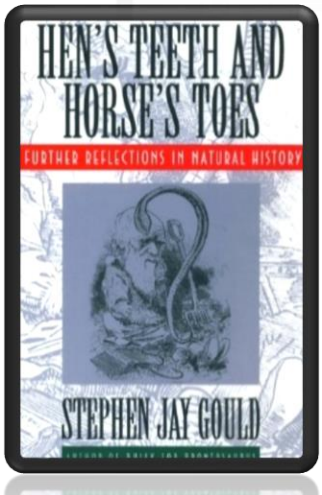
The Red Queen
Its all about sex. Or sexual selection at least. This book will really help your understanding of evolution and particularly the fascinating role of sex in evolution. Available at amazon.co.uk

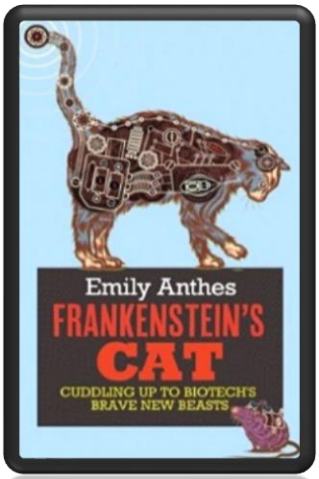




A Short History of Nearly Everything
A whistle-stop tour through many aspects of history from the Big Bang to now. This is a really accessible read that will re-familiarise you with common concepts and introduce you to some of the more colourful characters from the history of science! Available at amazon.co.uk

Studying Geography as well?
Hen's teeth and horses toes
Stephen Jay Gould is a great Evolution writer and this book discusses lots of fascinating stories about Geology and evolution. Available at amazon.co.uk

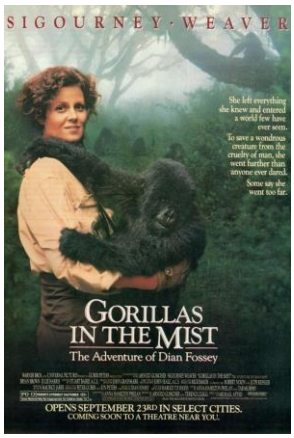




An easy read..
Frankenstein's cat
Discover how glow in the dark fish are made and more great Biotechnology breakthroughs. Available at amazon.co.uk

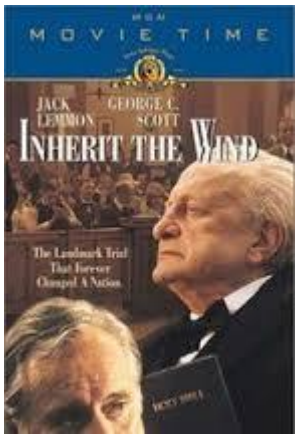
Movie Recommendations

Everyone loves a good story and everyone loves some great science. Here are some of the picks of the best films based on real life scientists and discoveries. You wont find Jurassic Park on this list, we've looked back over the last 50 years to give you our top 5 films you might not have seen before. Great watching for a rainy day.



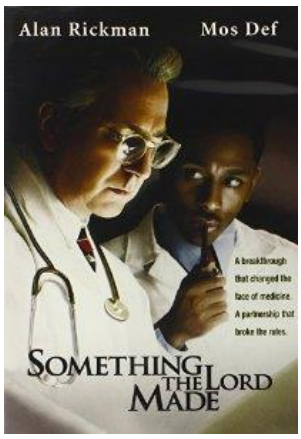
Gorillas in the Mist (1988)
An absolute classic that retells the true story of the life and work of Dian Fossey and her work studying and protecting mountain gorillas from poachers and habitat loss. A tear jerker.

Inherit The Wind (1960)
Great if you can find it. Based on a real life trial of a teacher accused of the crime of teaching Darwinian evolution in school in America. Does the debate rumble on today?



Andromeda Strain (1971)
Science fiction by the great thriller writer Michael Cricthon (he of Jurassic Park fame). Humans begin dying when an alien microbe arrives on Earth.

Lorenzo's Oil (1992)
Based on a true story. A young child suffers from an autoimmune disease. The parents research and challenge doctors to develop a new cure for his disease.



Something the Lord Made (2004)
Professor Snape (the late great Alan Rickman) in a very different role. The film tells the story of the scientists at the cutting edge of early heart surgery as well as issues surrounding racism at the time.

There are some great TV series and box sets available too, you might want to check out: Blue Planet, Planet Earth, The Ascent of Man, Catastrophe, Frozen Planet, Life Story, The Hunt and Monsoon.

Movie Recommendations

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?

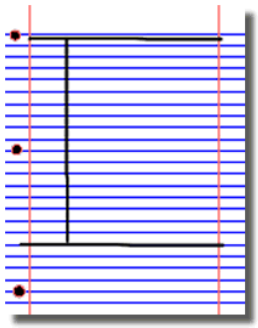
Why Doctors Don't Know About the Drugs They Prescribe
Available at :
http://www.ted.com/talks/ben_goldacre_what_doctors_don_t_know_about_the_drugs_they_prescribe?language=en
When a new drug gets tested, the results of the trials should be published for the rest of the medical world — except much of the 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.

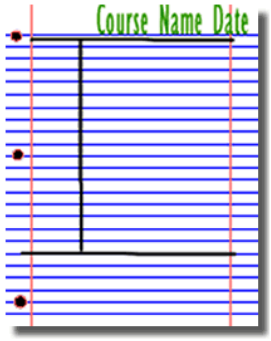
Research activities

Research, reading and note making are essential skills for A level Biology study. For the following task you are going to produce 'Cornell Notes' to summarise your reading.

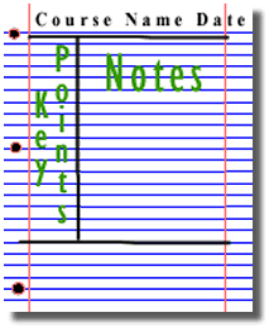
1. Divide your page into three sections like this



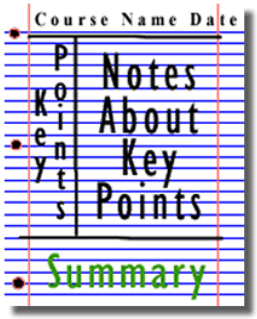
2. Write the name, date and topic at the top of the page



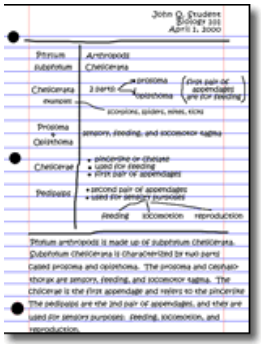
3. Use the large box to make notes. Leave a space between separate idea. Abbreviate where possible.



4. Review and identify the key points in the left hand box



5. Write a summary of the main ideas in the bottom space



Images taken from http://coe.jmu.edu/learningtoolbox/cornellnotes.html

Research activities

The Big Picture is an excellent publication from the Wellcome Trust. Along with the magazine, the company produces posters, videos and other resources aimed at students studying for GCSEs and A level.
For each of the following topics, you are going to use the resources to produce one page of Cornell style notes.
Use the links of scan the QR code to take you to the resources.

Topic 1: The Cell
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.

Topic 2: The Immune System
Available at:
http://bigpictureeducation.com/immune
The immune system is what keeps us healthy in spite of the many organisms and substances that can do us harm. In this issue, explore how our bodies are designed to prevent potentially harmful objects from getting inside, and what happens when bacteria, viruses, fungi or other foreign organisms or substances breach these barriers.

Pre-Knowledge Topics

A level Biology will use your knowledge from GCSE and build on this to help you understand new and more demanding ideas. These are the first topics you will cover next year and your baseline tests will focus mainly (but not solely!) on these areas. Complete the following tasks to make sure your knowledge is up to date and you are ready to start studying:

Exchange and Transport

Organisms need to exchange substances selectively with their environment and this takes place at exchange surfaces. Factors such as size or metabolic rate affect the requirements of organisms and this gives rise to adaptations such as specialised exchange surfaces and mass transport systems. Substances are exchanged by passive or active transport across exchange surfaces. The structure of the plasma membrane enables control of the passage of substances into and out of cells

Read the information on these websites (you could make more Cornell notes if you wish):
http://www.s-cool.co.uk/a-level/biology/gas-exchange
http://www.s-cool.co.uk/a-level/biology/nutrition-and-digestion/revise-it/human-digestive-system

And take a look at these videos:
http://ed.ted.com/lessons/insights-into-cell-membranes-via-dish-detergent-ethan-perlstein
http://ed.ted.com/lessons/what-do-the-lungs-do-emma-bryce

Task:

Create a poster or display to go in your classroom in September. Your poster should either: compare exchange surfaces in mammals and fish or compare exchange surfaces in the lungs and the intestines. You could use a Venn diagram to do this. Your poster should:
Describe diffusion, osmosis and active transport
Explain why oxygen and glucose need to be absorbed and waste products removed
Compare and contrast your chosen focus.

Cells

The cell is a unifying concept in biology, you will come across it many times during your two years of A level study. Prokaryotic and eukaryotic cells can be distinguished on the basis of their structure and ultrastructure. In complex multicellular organisms cells are organised into tissues, tissues into organs and organs into systems. During the cell cycle genetic information is copied and passed to daughter cells. Daughter cells formed during mitosis have identical copies of genes while cells formed during meiosis are not genetically identical

Read the information on these websites (you could make more Cornell notes if you wish):
http://www.s-cool.co.uk/a-level/biology/cells-and-organelles
http://www.bbc.co.uk/education/guides/zvjycdm/revision

And take a look at these videos:
https://www.youtube.com/watch?v=gcTuQpuJyD8
https://www.youtube.com/watch?v=L0k-enzoeOM
https://www.youtube.com/watch?v=qCLmR9-YY7o

Task:

Produce a one page revision guide to share with your class in September summarising one of the following topics: Cells and Cell Ultrastructure, Prokaryotes and Eukaryotes, or Mitosis and Meiosis.
Whichever topic you choose, your revision guide should include:
Key words and definitions
Clearly labelled diagrams
Short explanations of key ideas or processes.

- **<u>Scientific and Investigative Skills</u>**
- As part of your A level you will complete a practical assessment. This will require you to carry out a series of practical activities as well as planning how to do them, analysing the results and evaluating the methods. This will require you to: use appropriate apparatus to record a range of quantitative measurements (to include mass, time, volume, temperature, length and pH), use appropriate instrumentation to record quantitative measurements, such as a colorimeter or photometer, use laboratory glassware apparatus for a variety of experimental techniques to include serial dilutions, use of light microscope at high power and low power, including use of a graticule, produce scientific drawing from observation with annotations, use qualitative reagents to identify biological molecules, separate biological compounds using thin layer/paper chromatography or electrophoresis, safely and ethically use organisms, use microbiological aseptic techniques, including the use of agar plates and broth, safely use instruments for dissection of an animal organ, or plant organ, use sampling techniques in fieldwork.

- **Task:**
- **Produce a glossary for the following key words:**
- accuracy, anomaly, calibration, causal link, chance, confounding variable, control experiment, control group, control variable, correlation, dependent variable, errors, evidence, fair test, hypothesis, independent, null hypothesis, precision, probability, protocol, random distribution, random error, raw data, reliability, systematic error, true value, validity, zero error,

Science on Social Media

Science communication is essential in the modern world and all the big scientific companies, researchers and institutions have their own social media accounts. Here are some of our top tips to keep up to date with developing news or interesting stories:

Follow on Twitter:
Commander Chris Hadfield – former resident aboard the International Space Station @cmdrhadfield

Tiktaalik roseae – a 375 million year old fossil fish with its own Twitter account!
@tiktaalikroseae

NASA's Voyager 2 – a satellite launched nearly 40 years ago that is now travelling beyond our Solar System
@NSFVoyager2

Neil dGrasse Tyson – Director of the Hayden Planetarium in New York
@neiltyson

Sci Curious – feed from writer and Bethany Brookshire tweeting about good, bad and weird neuroscience
@scicurious

The SETI Institute – The Search for Extra Terrestrial Intelligence, be the first to know what they find!
@setiinstitute

Carl Zimmer – Science writer Carl blogs about the life sciences
@carlzimmer

Phil Plait – tweets about astronomy and bad science
@badastronomer

Virginia Hughes – science journalist and blogger for National Geographic, keep up to date with neuroscience, genetics and behaviour
@virginiahughes

Maryn McKenna – science journalist who writes about antibiotic resistance
@marynmck

Find on Facebook:
Nature - the profile page for nature.com for news, features, research and events from Nature Publishing Group

Marin Conservation Institute – publishes the latest science to identify important marine ecosystems around the world.

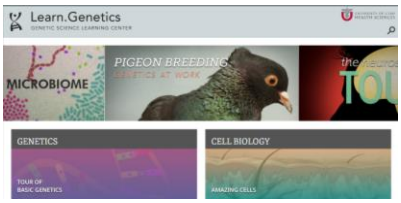
National Geographic - since 1888, National Geographic has travelled the Earth, sharing its amazing stories in pictures and words.

Science News Magazine - Science covers important and emerging research in all fields of science.

BBC Science News - The latest BBC Science and Environment News: breaking news, analysis and debate on science and nature around the world.

Science websites

These websites all offer an amazing collection of resources that you should use again and again through out your course.



Probably the best website on Biology….
Learn Genetics from Utah University has so much that is pitched at an appropriate level for you and has lots of interactive resources to explore, everything from why some people can taste bitter berries to how we clone mice or make glow in the dark jelly fish.
http://learn.genetics.utah.edu/

ZSL
LIVING CONSERVATION

In the summer you will most likely start to learn about Biodiversity and Evolution. Many Zoos have great websites, especially London Zoo. Read about some of the case studies on conservation, such as the Giant Pangolin, the only mammal with scales.
https://www.zsl.org/conservation

At GCSE you learnt how genetic diseases are inherited. In this virtual fly lab you get to breed fruit flies to investigate how different features are passed on.
http://sciencecourseware.org/vcise/drosophila/

DNA from the beginning is full of interactive animations that tell the story of DNA from its discovery through to advanced year 13 concepts. One to book mark!
http://www.dnaftb.org/

Especially important for the start of the course!

Ok, so not a website, but a video you definitely want to watch. One of the first topics you will learn about is the amazing structure of the cell. This BBC film shows the fascinating workings of a cell… a touch more detailed than the "fried egg" model you might have seen.
http://www.dailymotion.com/video/xzh0kb_the-hidden-life-of-the-cell_shortfilms
If this link expires – google "BBC hidden life of the cell"

Science: Things to do!

Day 4 of the holidays and boredom has set in?
There are loads of citizen science projects you can take part in either from the comfort of your bedroom, out and about, or when on holiday. Wikipedia does a comprehensive list of all the current projects taking place. Google 'citizen science project'

Bumblebee Conservation Trust

AgeGuess

OPAL EXPLORE NATURE

big butterfly count
15th July - 7th August

THE SHORE THING GET INVOLVED!

eoceans
www.eoceans.org

WildlifeLog
SPOT IT - SHARE IT - SAVE IT

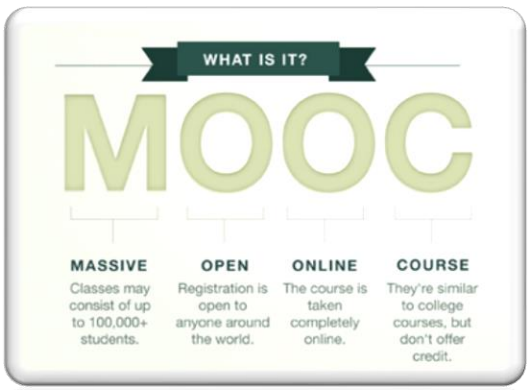
The Big Moss Map

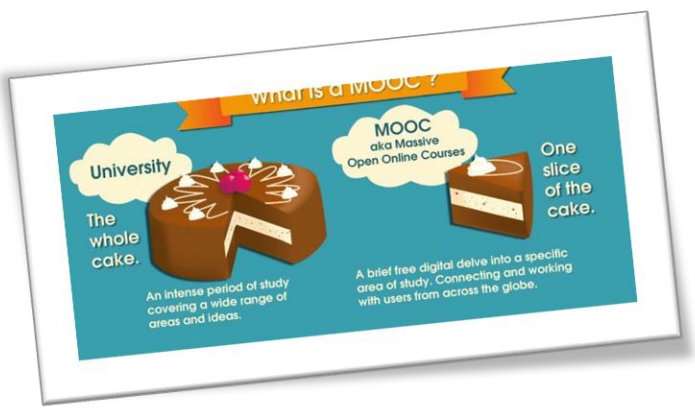
MOOC

Want to stand above the rest when it comes to UCAS? Now is the time to act.
MOOCs are online courses run by nearly all Universities. They are short FREE courses that you take part in. They are usually quite specialist, but aimed at the public, not the genius!
There are lots of websites that help you find a course, such as edX and Future learn.
You can take part in any course, but there are usually start and finish dates. They mostly involve taking part in web chats, watching videos and interactives.

canvas NETWORK
edX
coursera
OPEN 2 STUDY
UDACITY udacity.com
FUTURELEARN
KHAN ACADEMY
ed2go

Completing a MOOC will look great on your Personal statement and they are dead easy to take part in!





A Level Biology Transition Baseline Assessment

The following 40 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.
A suggested mark scheme is provided for you to check your answers.

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

……

(2)

b) What does DNA code for?

……

(1)

c) Which organelle in a cell carries out this function?

……

(1)

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.
i) What is meant by the term 'species'?

……

(2)

ii) Describe how a new species may arise:

……

……

……(3)

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:

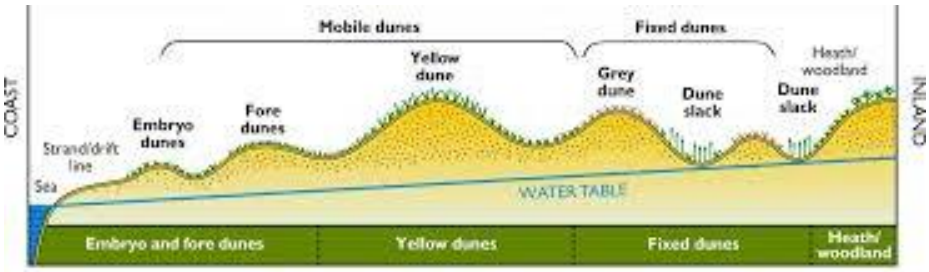


Image taken from http://www.macaulay.ac.uk/soilquality/Dune%20Succession.pdf

a) Define the following keywords:

i) Population

……

ii) Community

……

(2)

b) Give an example of one biotic factor and one abiotic factor that would be present in this habitat

Biotic: ……

Abiotic: ……

(2)

c) Describe how the ecologists would go about measuring the species present between the coast and the inland.

……

……

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……

……

……

(6)

4. Every living organism is made of cells.

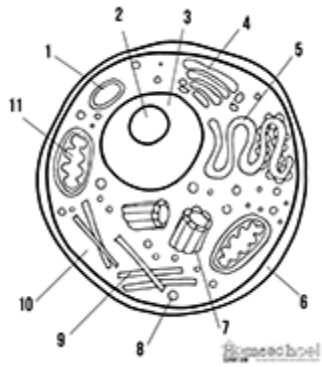


Image taken from http://prestigebux.com/worksheet/label-an-animal-cell-worksheet

a) Label the following parts of the animal cell:

2 .....

5 .....

8 .....

(3)

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

.....

.....

.....

(3)

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:

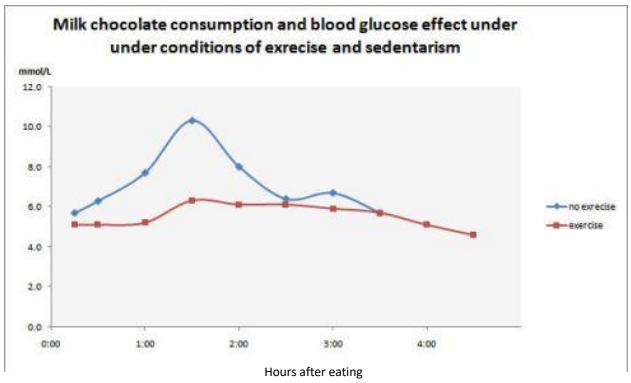


Image taken from https://memoirsofanamnesic.wordpress.com/category/blood-glucose/

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

.....

(1)

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

……

……

……

……

(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.

……

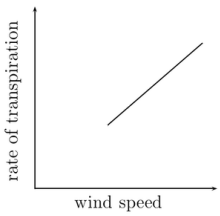
……

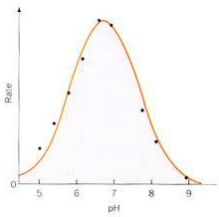
……

……

(3)

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.





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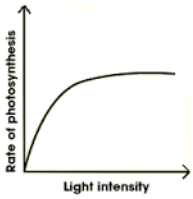

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……(4)

Images taken from: http://www.everythingmaths.co.za/science/lifesciences/grade-10/05-support-and-transport-systems-in-plants/images/56aff2f9b6c5b041688f745ca928990c.png
http://www.bbc.co.uk/staticarchive/afa3f2b16b4d58d077943c96929c9a4020fea83a.gif
http://www.rpi.edu/dept/chem-eng/Biotech-Environ/Projects00/temph/enzyme.html
http://www.myearthwatchexperience.com/Essential%20Ecology.htm

Suggested Mark Scheme:

Question			Answer	Marks
1	a		Adenine-Thymine Cytosine-Guanine	1 1
	b		Protein/enzymes	1
	c		Ribosomes	1
2	a		Evolution (by natural selection)	1
	b		Not enough evidence	1
	c		(Plant/animal dies) and is quickly buried in sediment Not all conditions for decay are present Hard parts of the body are replaced by minerals	1 1 1
	d	i	Organisms that can reproduce to produce viable offspring/offspring that can also reproduce (fertile)	1
		ii	3 from Geographical isolation/named example Mutation of genes Natural Selection/selective advantage Species can no longer interbreed (not produce fertile offspring)	 1 1 1 1
3	a	i	A group of organisms, all of the same species, and all of whom live together in a particular habitat.	1
		ii	The total of all populations living together in a particular habitat.	1
	b		Biotic – one from: Predators, prey, plant, microbes Abiotic – one from: Availability of water, temperature, mineral concentration, reference to climate/weather	 1 1
	c		Measure out a transect Using a tape measure Use a quadrat At regular (named) intervals Identify species present Using a key/guide	1 1 1 1 1 1
4	A		2 Nucleolus 5 Smooth Endoplasmic Reticulum 8 Golgi body	1 1 1

Question			Answer	Marks
4	b		Any 3 from the following structure **and** function must be given. Lipid bilayer - has a hydrophobic inside and hydrophilic outside, allowing for selective permeability Proteins - allow for specific substances to come or some molecules to pass through, Cholesterol - allows for fluidity of the membrane, Glycoproteins - for cell identification they serve as markers	 1 1 1 1
5	a		Pancreas	1
	b		3 from Pancreas detects change Insulin secreted By alpha cells Respiration increased Uptake of glucose increased Liver increases storage of glucose as glycogen	 1 1 1 1 1 1
	c		Any one from: Amount of chocolate, time taken to eat, other food/drink consumed, age, gender, weight, fitness level/metabolic rate, health/pre existing conditions, use of medicines/drugs	1
	d		Any three from Data suggests that blood glucose returns to normal Doesn't show how much exercise has been done Doesn't say age/gender/other named variable May only be true for chocolate/only one type of food investigated	 1 1 1 1
6			Top left: transpiration increases when wind speed increases/there is a positive correlation Top right: rate increases with pH until the optimum is reached, after the optimum, rate decreases Bottom left: Increasing light initially increases the rate of photosynthesis, but after a while remains constant Bottom right: Population increases slowly at first and then increases at a greater rate/increases exponentially	1 1 1 1