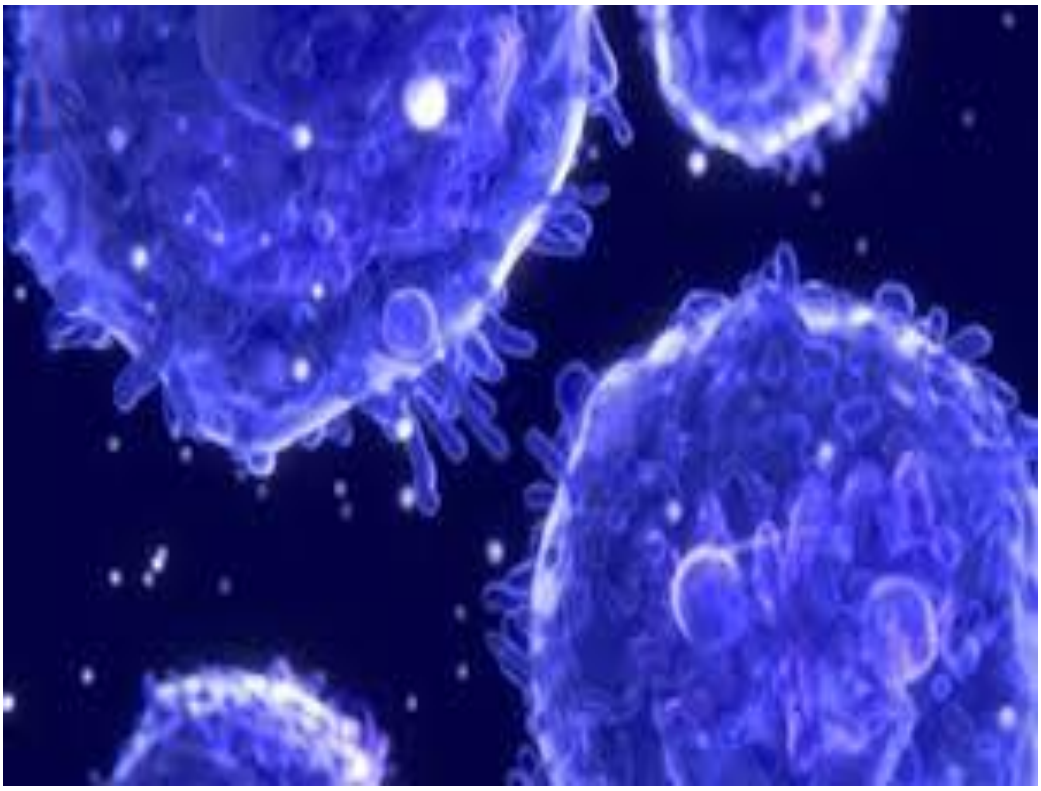


Year 11 > 12 Bridging Work
Summer Term 2025

Subject	**Biology**
Course	**A-Level**
Awarding Body	**OCR**

Contents:

Course/specification overview

To all our prospective, new A level Biology Students,

We look forward to welcoming you on to the A level Biology course in September!

The new A level Biology course is a 2 year course with 3 exams at the end of year 13.

Our exam board is **OCR Biology A**

The A Level Biology course is made up of 6 modules:

- **Module 1: Development of Practical Skills in Biology**
- **Module 2: Foundations in Biology**
- **Module 3: Exchange and Transport**
- **Module 4: Biodiversity, Evolution and Disease**
- **Module 5: Communication, homeostasis and energy**
- **Module 6: Genetics and ecosystems**

You can find a bit more about what is included in each of these units below….

Module 1: Practical skills in Biology

- Skills of planning, implementing, analysis and evaluation – covered by the completion of 2 practical projects and numerous practicals within the content of modules 2-4

Module 2: Foundations in Biology

- Cell structure
- Biological molecules
- Nucleotides and nucleic acids
- Enzymes
- Biological membranes
- Cell division
- Cell diversity
- Cellular organisation

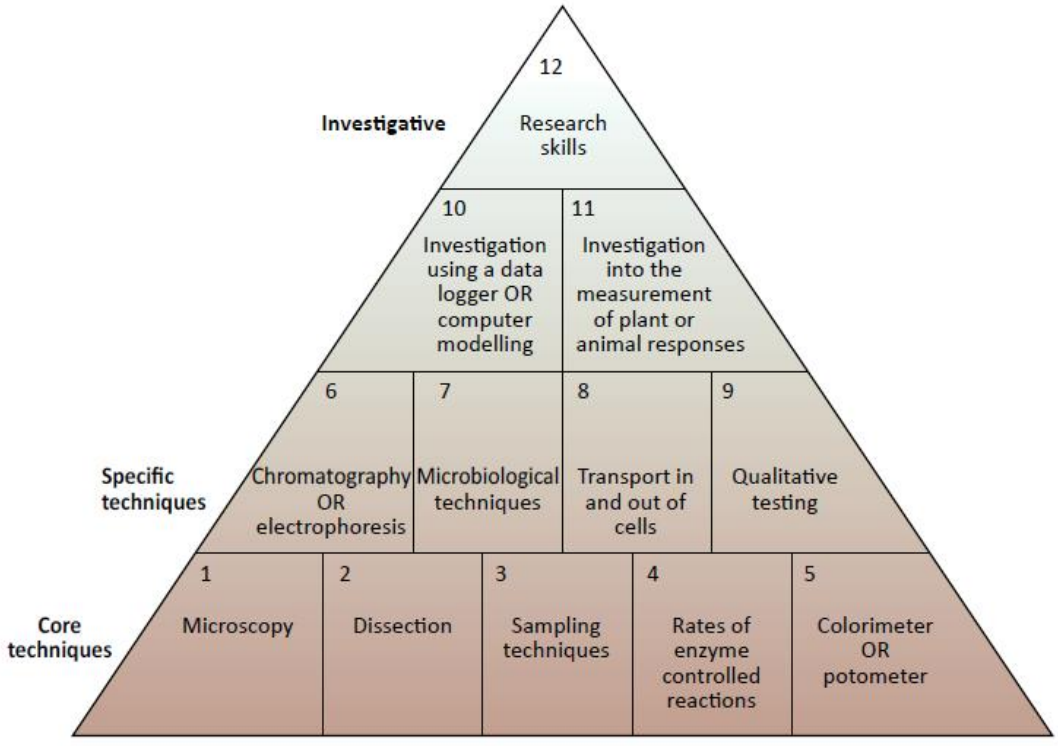
Module 3: Exchange and Transport

- Exchange surfaces
- Transport in animals
- Transport in plants

Module 4: Biodiversity, evolution and disease

- Communicable diseases
- Disease prevention
- Immune system
- Biodiversity
- Classification
- Evolution

Practical Skills: **You will complete the following 12 core practical techniques:**



There is no coursework now, but you must complete these set practicals, have a record of the skills learnt from these practicals as you will be tested in your exams. You have to complete a full write up of each practical in your LAB book – we will give you this in September.

Opportunities and trips:

***Trip to Cambridge University for potential medics (March, year 12)**

***Science live lectures (January, year 12)**

Exams- May 2027: There are 3 official exams at the end of year 13 that together will make up your A level grade. They are structured as follows…

- A Level Paper 1 assesses the content from Modules 1, 2, 3 and 5.
- A Level Paper 2 assesses the content from Modules 1, 2, 4 and 6.
- A Level Paper 3 assesses the content from Modules 1 to 6.

10% of the marks available within written examinations will be for assessment of mathematics.

Each of these exams will also assess the Module 1 (practical skills)

Note: There will also be end of year **exams** at the end of year 12- these will assess the progress you have made in year 12 and will check to ensure that you can come back in to year 13 (minimum of a D grade) – these are done in all subjects.

Our department expectations

Our A level Biology Teaching Department is made up of the following staff:

Mrs Adduono and Mrs Fornear (Joint Heads of Biology)

Miss Vuong

Mr Mitchell

We all agree that Biology is a fantastic subject to take at A level- it is interesting and relevant to everyone. However, it is rated as one of the hardest subjects due to massive subject content (which is hard to remember!), analytical and evaluative skills; and now some quite challenging Maths content.

- Because of this, we say (and you might have seen on the prospectus) that, in order to do Biology at A level, you require **at least**…
- *Four Grade 5s at GCSE level including Maths with*
- *Combined Science grades 6-6 or*
- *Separate Science grades 6-6-5 (with grade 6 required in Biology and Chemistry)*

How your lessons are structured:

- You will have 10 hours of Biology in a fortnight, and 2 teachers.
- You will also have a 'period 11' lesson (an independent study timetabled lesson in Hut 5/6- your teachers will send you suitable work to complete in this additional study lesson)
- 1 teacher x 5 lessons
  - Studying one topic
- 1 teacher x 5 lessons
  - Studying another topic
- Before each lesson, you are expected to have done pre reading – this means that you will need to read the relevant pages in the textbook before you come to each lesson and summarise them in note form. You can then add to your notes throughout each lesson, but you shouldn't need to be taking extensive notes during the lesson, which means that lessons can be more activity based. Your teacher will check that you have done your pre-reading each lesson.
- Every lesson will start with a quiz (on last lesson's work, and on some previous chapters, to support your ongoing revision and preparation for paper 3)
- Lessons focus on applying key Biology understanding
- There will be regular end of chapter tests on what you have learnt in lessons, that will enable you to track your progress and identify areas for development

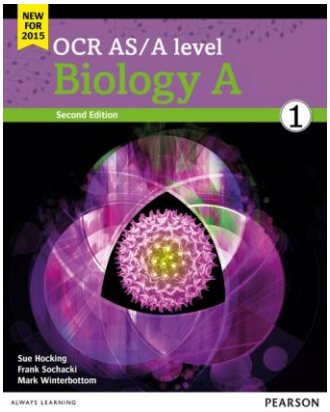
- There will also be a series of mock exams, which will help to prepare you for the real thing!
- As mentioned above, there is regular practical work that must be recorded (so good attendance is vital!)
- You will complete regular core practicals which are written up in full into your LAB book (we will give you this in September)
- We as your teachers will be monitoring your progress through homework and exam tracking documents
- We also offer after school support on Wednesdays ('Biology Clinic') – this is a drop in session that is run every week by at least two members of our department, where you can come and ask for help with any of your areas for development.
- You will need to bring an A4 folder with dividers to lesson to organise your work and have printed off your Personalised Learning Check lists (PLCs) to keep in your folder too.
- You will need to save / print off the specification document, practical handbook and maths handbook, all to be kept in your folder to refer to at all time.
- You will need to regularly check your email and Satchel 1 for information and tasks sent by your teachers
- Equipment: You will need a lab coat (can be ordered from the internet for around £15) for all practical lessons -these can be left in the department for when they are needed- or we do have some second hand ones that you can borrow
- You will also need a calculator for all lessons
- It is important that you understand the importance of independent study in years 12 and 13.
- *You will need to...*
- Catch up on missed work due to absences
- Use *non-contact study periods* (timetabled) for pre-reading, structured reviewing of learned material and practise questions on topics
- Revision for tests and exams
- Use study skills and revision skills that have been taught to you
- If you are below your target grade, you must attend study sessions for support with your teachers, and complete practise questions on topics taught (to check your understanding)

Your text book:

We also suggest purchasing the following textbook as soon as possible (it will be really helpful when you are completing the work in this bridging unit and of course, for ensuring that you are doing your pre-reading as soon as you start the A level course). There are a few copies of this textbook in A Level teaching classrooms.

Details:

- Publication Date: April 2015
- ISBN: 9781447990796
- Approximately £24



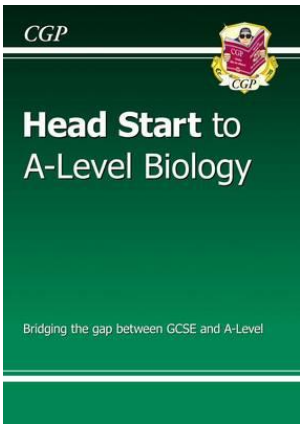
We also suggest purchasing the following Head Start book - especially as we have the opportunity now for you to complete some extra work in advance of starting your A levels (this could really help to give you a 'boost' at the start of the course, especially if you did not take separate science at GCSE)

Details:

- New Head Start to A-Level Biology (Paperback)

***Publisher**: Coordination Group Publications Ltd (CGP)*
***ISBN**: 9781782942795*

- Approximately £4.95
- If you read this over the summer, and answer the questions, you will be very well prepared for the challenges of the new A level course

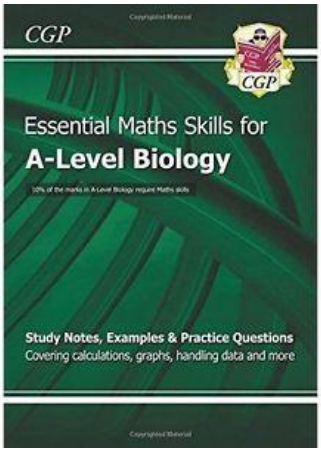


Finally, the following Maths Skills book will be really helpful throughout the course...

Details:

- New Essential Maths Skills for A level Biology

***Publisher**: Coordination Group Publications Ltd (CGP)*
***ISBN**:* 978 1 84762 323 2 Approximately £7.50



The Course Specification:

You are expected to have printed off and read through the specification before starting the A level course. This should be kept in your folders at all times, and can be used throughout the course for revision and RAG of key concepts.

The link is below...

http://www.ocr.org.uk/qualifications/as-a-level-gce-biology-a-h020-h420-from-2015/

- (Click on A level GCE Biology A H420)
- *NB: Note in particular section 5d- this lists all of the maths skills that you will be expected to use throughout the course*

Review/revise

(Section A)

The topics below are key ideas from your GCSE that you will build on throughout the A Level Biology course.

Task: Produce a knowledge organiser for these key topics in *italics* (there are bullet points to include in each section)

You may like to use your exercise books, revision guides, BBC Bitesize, SENECA learn, freesciencelesson videos and other resources to help you complete this.

Cells

- Animal, plant, prokaryotic
- Specialised cells (differentiation and specialisation)
- Stem cells
- Diffusion, osmosis and active transport
- Exchange surface examples
- Mitosis

Organisation

- Cell – organism organisation

- Enzyme action
- The respiratory system
- The circulatory system (including heart, blood vessels and blood)
- Transpiration and translocation

Infection and response

- Communicable disease
- Examples of viral, fungal, bacterial and protist diseases
- Primary defences
- Secondary defences - (WBC)
- Vaccination
- Developing drugs
- Antibiotics and pain killers

Bioenergetics

- Photosynthesis
- Rate of photosynthesis
- Aerobic respiration
- Anaerobic respiration
- Exercise
- Metabolism

Homeostasis and response

- The nervous system
- The endocrine system

Inheritance, variation and evolution

- Meiosis
- Sexual and asexual reproduction
- Inheritance : sex chromosomes, punnet squares, inherited disorders
- Evolution
- Selective breeding
- Fossils
- Classification

Ecology

- Food chains and food webs
- Competition
- Abiotic and biotic factors
- Investigating population sizes – sampling
- Carbon cycle
- Global warming, deforestation, peat bogs

(Section B)

The topics below are key ideas from the **Biology only section**. **If you studied Trilogy science you will not have covered them.**

Task: If you studied *trilogy* science you need to use online GCSE resources to briefly research the key ideas and add these to your knowledge organisers

- Aseptic technique to culture bacteria
- Binary fission in bacteria (i.e what this means)
- The Brain
- Control of body temperature
- DNA structure
- Plant hormones
- Trophic levels (including pyramids of biomass)
- Fermenters and fermentation

(Section C)

Complete the review of Maths in Biology skills over the next few pages – RAG

The sections you've identified as Red or Amber you will need to use your GCSE maths resources to remind you. There are some sections that we will teach you in Biology. These are clearly stated in the table below

General Maths skill	Maths A Level Biology learning objective	Skills needed	R	A	G
M0 – Arithmetic and numerical computation	M0.1 Recognise and make use of appropriate **units** in calculations	- convert between units - work out e.g. rate - measure gradients to work out rates			
	M0.2 Recognise and use expressions in **decimal** and **standard form**	- use appropriate numbers of decimal places in a calculation (processed data given in 1 more decimal place than raw data) -calculations in standard and ordinary form -convert numbers between standard and ordinary form -maintain significant figures when converting between standard and ordinary form			
	M0.3 Use **ratios**, **fractions** and **percentages**	- calculate percentage yields -calculate percentage change - calculate surface area to volume ratio - use scales for measuring - represent phenotypic ratios (monohybrid and dihybrid crosses- we will teach you this in yr 13)			
	M0.4 **Estimate** Results	-estimates results to sense check that the calculated values are appropriate.			
	M0.5 Use calculators to find and use **power**, **exponential** and **logarithm** functions	- estimate the number of bacteria grown over a certain **length of time**.			

M1 – Handling data	M1.1 Use an appropriate number of **significant figures**	-report **calculations** to an appropriate number of significant figures given raw data quoted to varying numbers of significant figures -understand that calculated results can only be reported to the limits of the **least accurate measurement**			
	M1.2 Find arithmetic **means**	-find the mean of a range of data			
	M1.3 Construct and interpret **frequency tables** and **diagrams**, **bar charts** and **histograms**	-**represent** a range of data in a table with clear headings, units and consistent decimal places -interpret data from a variety of tables, -**plot** a range of data in an appropriate format -**interpret** data for a variety of graphs			
	M1.4 Understand simple **probability**	- use the terms ***probability*** and ***chance*** appropriately -understand the probability associated with genetic inheritance. (Hardy-Weinberg law: A Level)			
	M1.5 Understand the principles of **sampling** as applied to scientific data	-analyse random data collected by an appropriate means, e.g. use **Simpson's index** of diversity to calculate the biodiversity of a habitat.			
	M1.6 Understand the terms **mean**, **median** and **mode**	-calculate or compare the mean, median and mode of a set of data,			
	M1.7 Use a **scatter diagram** to identify a **correlation** between two **variables**	-interpret a scattergram,.			
	M1.8 Make order of **magnitude** calculations	-use and manipulate the **magnification formula,** Magnification = size of object / Size of real object			
	M1.9 Select and use a **statistical test** (A level)	- use the **chi squared** test (χ^2) to test the significance of the difference between observed and expected results - use the Student's ***t*-test** - use the **Spearman's rank** correlation coefficient.			
	M1.10 Understand measures of **dispersion**, including **standard deviation** and **range**	-calculate the **standard deviation** -understand why standard deviation might be a more useful measure of dispersion for a given set of data e.g. where there is an outlying result.			

	M1.11 Identify **uncertainties** in measurements and use simple techniques to determine uncertainty when data are combined	- calculate **percentage error** where there are uncertainties in measurement.			
M2 – Algebra	M2.1 Understand and use the symbols: =, <, <<, >>, >, ∝	*-use these **symbols** appropriately and correctly in their given contexts* *-understand these symbols in the contexts of formulae given.*			
	M2.2 Change the **subject** of an equation	-use and manipulate **equations**, e.g. magnification.			
	M2.3 Substitute numerical values into algebraic equations using appropriate units for physical quantities	-**Use a given equation** (adhere to BIDMAS laws)			
	M2.4 Solve **algebraic** equations	-solve equations in a biological context			
	M2.5 Use **logarithms** in relation to quantities that range over several orders of magnitude	-use a logarithmic scale in the context of **microbiology**, e.g. growth rate of a microorganism such as yeast.			
M3 – Graphs	M3.1 **Translate** information between graphical, numerical and algebraic forms	-understand that data may be presented in a number of **formats** and be able to use these data, e.g. dissociation curves.			
	M3.2 **Plot** two variables from experimental or other data	-select an appropriate format for presenting data, e.g. **bar charts, histograms, line graphs** and **scattergrams.**			
	M3.3 Understand that ***y = mx + c*** represents a linear relationship	-be able to predict/sketch the shape of a graph with a linear relationship			
	M3.4 Determine the **intercept** of a graph	- Read off an intercept point from a **graph**,			
	M3.5 Calculate **rate of change** from a graph	-calculate a **rate** from a graph,			

	showing a linear relationship				
	M3.6 Draw and use the slope of a **tangent** to a curve as a measure of rate of change	- use this method to measure the **gradient** of a point on a curve,			
M4 – Geometry and trigonometry	M4.1 Calculate the **circumferences**, **surface areas** and **volumes** of regular shapes	-calculate the circumference and area of a circle -calculate the surface area and volume of rectangular prisms, of cylindrical prisms and of spheres e.g. calculate the surface area or volume of a **cell**.			

(Section D)

Investigation skills review

In A Level Biology you will do a lot of practical work and need to demonstrate competency in key skills. You will complete a series of 12 core practicals and write up these practicals.

General write up of a science investigation

Aim: What you are investigating

Hypothesis: Your expected results due to your science understanding – you often out lots of research and scientific knowledge in this section

Variables: Independent (change) Dependent (measure) Control (keep the same)

Method: Step by step instructions how to carry out a practical

Accuracy: How you will measure the true value- how your practical does good measuring – use of accurate equipment

Validity: How you know the dependent variable is changing because you are changing the independent variable (all other control variables are kept the same), you have a good spread of data so you can see a pattern in the results that allows you to draw a conclusion

Repeatability: Repeating your results to check for the same pattern- this also allows you to check you have precise results (that are very close the mean value for each repeat)

Reproducibility: Checking your pattern of results with another group/ previous research/ practical

Results: Clear results table (at A LEVEL you have success criteria for what a table looks like). You may also have to manipulate your data (further calculations)

Graph: Line or bar graphs (at A LEVEL you have success criteria for what good graphs look like)

Conclusion: Describing the results (pattern seen – use of data to back up pattern) and explaining the results (science to explain why you saw your results. Anomalous results? And how do you know this?

Evaluation: Did you have confidence in the conclusion you drew? Was your experiment valid? Accurate? Precise? How do you know this? How could you improve your experiment (e.g. more valid? Better equipment to be more accurate?

Task: Choose a required practical you did in your GCSE Biology course and try to write it up using the sections above

Watch

Below are suggested videos/ films/ ted talks that may be useful to prepare you for Biology A Level.

Some are linked to topics at GCSE and those you will learn about at A Level, some are to give you a wider understanding.

You are not expected to watch them all - you can choose those that are most interesting to you!

- https://www.ted.com/topics/biology

These ones are particularly interesting...

- http://www.ted.com/talks/paula_hammon d_a_new_superweapon_in_the_fight_agai nst_cancer?language=en
- http://www.ted.com/talks/marla_spivak_ why_bees_are_disappearing?language=en
- http://www.ted.com/talks/ben_goldacre_ what_doctors_don_t_know_about_the_dr ugs_they_prescribe?language=en
- http://www.ted.com/talks/anthony_atala_ growing_organs_engineering_tissue?langu age=en
- http://ed.ted.com/lessons/the-twisting-tale-of-dna-judith-hauck
- http://ed.ted.com/lessons/where-do-genes-come-from-carl-zimmer
- http://ed.ted.com/lessons/how-to-sequence-the-human-genome-mark-j-kiel http://ed.ted.com/lessons/the-race-to-sequence-the-human-genome-tien-nguyen
- http://ed.ted.com/lessons/why-is-biodiversity-so-important-kim-preshoff http://ed.ted.com/lessons/can-wildlife-adapt-to-climate-change-erin-eastwood
- 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
- https://www.ted.com/talks/robert_sapolsky_the_biology_of_our_best_and_worst_selves

Follow on Twitter

- A level Biology – A hub for GCSE and A level biology students @flagellum_bio
- A Level Biology – alevelbiology.co.uk provides resources for AQA, OCR and Edexcel A-Level Biology. @alevelbiologyuk
- David Chalk –daily revision tips for AS and A2 Biology @teacherchalky1
- Understand Biology – news stories relating to A level knowledge and understanding @a_level_biology

- Sci Curious – feed from writer and Bethany Brookshire tweeting about good, bad and weird neuroscience @scicurious
- Carl Zimmer – Science writer Carl blogs about the life sciences @carlzimmer
- 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
- Molecular Biology - latest news, research, books and journals in molecular biology, cell biology, genetics, stem cells, cancer and biotechnology @molecular

Listen to

Below are suggested podcasts that may be useful to prepare you for Biology A Level.

Some are linked to topics at GCSE and those you will learn about at A Level, some are to give you a wider understanding.

You are not expected to listen them all- you can choose those that are most interesting to you!

- http://www.nakedscientists.com
- https://thefoodmedic.co.uk/about/dr-hazel-wallace/
- https://www.bbc.co.uk/programmes/p07012sf/episodes/downloads
- https://www.bbc.co.uk/programmes/p087bfyk 5 live science podcasts
- https://samharris.org/podcast/
- https://www.bbc.co.uk/programmes/b015sqc7 The life scientific
- https://www.nature.com/nature/articles?type=nature-podcast
- https://www.microbe.tv/
- https://www.thelancet.com/podcasts

Cell Structure

- https://www.bbc.co.uk/programmes/m000h0vn
- https://www.khanacademy.org/science/biology/structure-of-a-cell/introduction-to-cells/v/cell-theory?modal=1

DNA and RNA

- http://www.sumanasinc.com/webcontent/animations/content/meselson.html
- https://www.yourgenome.org/video/zoom-in-on-your-genome
- http://highered.mheducation.com/sites/9834092339/student_view0/chapter15/stages_of_transcription.html

The Stem Cell Hard Sell

- https://www.bbc.co.uk/programmes/p04wyzk9

Read

Below are suggested resources to read that may be useful to prepare you for Biology A Level.

Some are linked to topics at GCSE and those you will learn about at A Level, some are to give you a wider understanding.

You are not expected to read them all- you can choose those that are most interesting to you!

Web articles:

- Biological Sciences Review
- Big picture: Welcome trust- choose some articles to read over
- New Scientist
- BBC Science and Environment news
- BBC Health news
- https://www.rsb.org.uk/ (Royal Society of Biology)

Humans aren't the only ones that help out their adult kids
Oddballs with high-level intelligence: a Q & A with Roger Hanlon about the amazing octopus

Popular science reading books:

1. *The Incredible Unlikeliness of Being*, Alice Roberts. Alice Roberts combines embryology, genetics, anatomy, evolution and zoology to tell the incredible story of the human body
2. *The Epigenetics Revolution*, Nessa Carey. A fascinating introduction to epigenetics. If you enjoy this, follow up with *Seed to Seed* (see below).
3. *The Immortal Life of Henrietta Lacks*, Rebecca Skloot. How one woman's cancer cells changed the medical world forever, and because a multi-million dollar industry.
4. *Bad Science*, Ben Goldacre. Looking objectively at popular science reporting.
5. *The Botany of Desire*, Michael Pollan. A very different approach to science writing, Michael Pollan turns our normal perspective on its head to consider how plants manipulate humans.
6. *Almost Like A Whale*, Steve Jones. Using contemporary science to update Charles Darwin's "The Origin of the Species".
7. *Blood Work: A Tale of Medicine and Murder in the Scientific Revolution*, Holly Tucker. The dramatic history of blood transfusions, from 17th century France onwards.
8. *Seed to Seed*, Nicholas Harberd. A research scientist tells the story of ten years of discovery in his own laboratory. A very valuable insight into contemporary genetics and epigenetics research, and what it means to be a scientist.
9. *Calculus Diaries*, Jennifer Ouellette. A non-mathematician finds out how maths can help you tackle anything – even a zombie apocalypse.
10. *Life Ascending*, Nick Lane. Where does DNA come from? How did the eye evolve? A reconstruction of evolutionary history through ten of its greatest landmarks.
11. *Genome*, Matt Ridley. 23 human chromosomes in 23 chapters.
12. *The Energy of Life*, Guy Brown. Introduction to the cutting-edge science of Bioenergetics

Research

You could do some of your own research on the internet to find out …..

(again, we are not expecting you to complete all of these!)

- *Why does it take a long time to produce a vaccine?*
- *Why was south Korea able to 'slow the spread' so much better than other countries (Including the UK and America)*
- *Has the Coronavius had a real impact on climate change?*
- *How can our phones help and hinder fighting coronavirus?*

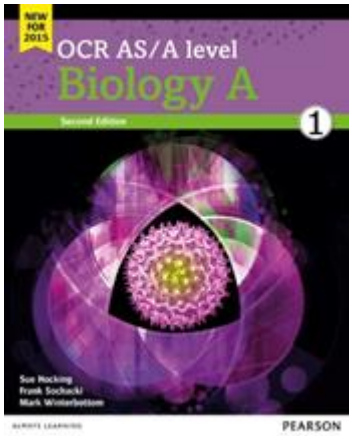
Non virus related Qs!

- *Britain's insect and bird populations are declining. What are the main reasons for this?*
- *"Climate change is the biggest threat to humanity"- do you agree?*
- *"People live healthier lifestyles today than ever before in history"- do you agree?*

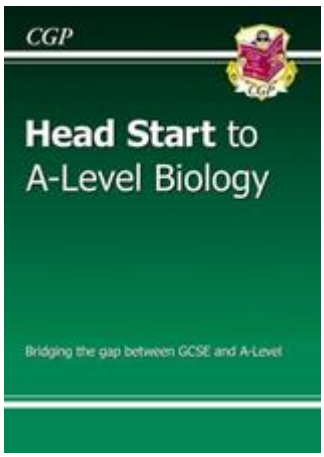
Tasks you must complete

You may like to purchase the year 12 textbook or the download/ buy the CGP Head start to Biology books to help with these tasks

You will be able to find resources online such as http://www.a-levelnotes.co.uk/ocr-biology-notes.html and https://www.physicsandmathstutor.com/biology-revision/a-level-ocr-a/ that can also be used to help with completion of these tasks



ISBN: 9781447990796



ISBN: 9781782942795

In this section to complete there are three main parts:

(Section A)

- Questions for you to answer

- Read over these notes

(Section B)

- Complete the Assessment in exam conditions 1 hour to complete

(Section C)

- Use the mark scheme to self-assess your work

- Review any sections/ ideas you got wrong

- You may like to re complete the questions relating to the sections you got wrong again

Section A

2.1.1. Cell Structure

1. What are the main differences between light microscopes and electron microscopes?

   _____

   _____

2. In microscopy, what do the abbreviations SEM and TEM stand for?

SEM: _____

TEM: _____

3. Name one advantage of using an SEM.

   _____

4. Name one advantage of using an TEM.

   _____

5. Name one disadvantage of using SEM.

   _____

6. Name one disadvantage of using TEM.

   _____

7. What is the formula used to calculate magnification?

   _____

8. What is a eukaryotic cell and give an example:

   _____

9. What is a prokaryotic cell and give an example:

10. Name 3 similarities between prokaryotic and eukaryotic cells.

i: _____

ii: _____

iii: _____

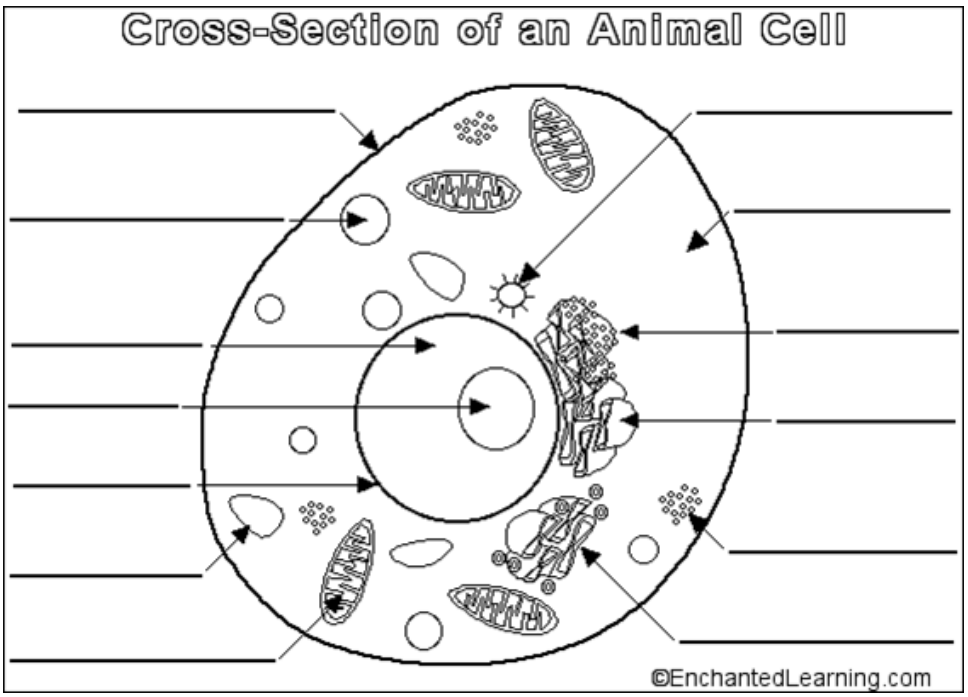
11. Name 3 differences between prokaryotic and eukaryotic cells.

i: _____

ii: _____

iii: _____

12. Label the following organelles (cell parts) on the diagram of the animal cell below:



-Nucleus

-Nucleolus

-Nuclear membrane

-Cytoplasm

-Plasma membrane

-Mitochondria

-Ribosomes

-Centrioles

-Lysosome

-Golgi apparatus

-Rough endoplasmic reticulum

-Smooth endoplasmic reticulum

-Temporary vacuole (only plants have permanent vacuoles)

13. Explain the function of the following organelles:

-Nucleus:

_____

-Nucleolus:

_____

-Nuclear membrane:

_____

-Cytoplasm:

_____

-Plasma membrane:

_____

-Mitochondria:

_____

-Ribosomes:

_____

-Centrioles:

_____

-Lysosome:

_____

-Golgi apparatus:

_____

-Rough endoplasmic reticulum:

_____

-Smooth endoplasmic reticulum:

_____

_____

-Temporary vacuole (only plants have permanent vacuoles):

_____

2.1.2 Biological Molecules

14. What is meant by the terms 'monomer' and 'polymer'?

_____

_____

15. What is the difference between a hydrolysis and condensation reaction?

16. What chemical elements are found in:
a. Carbohydrates?
b. Lipids?
c. Proteins?
d. Nucleic acids?

17. Draw below in this box the general structure of an amino acid. Make sure that you label the ***amine group, R group and carboxyl group***:

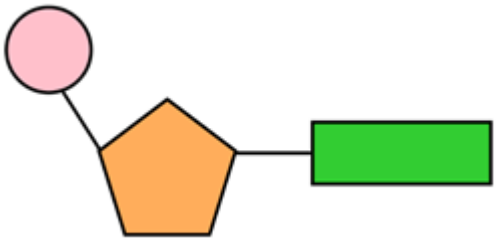
18. Fill in the table below to give the colour change that takes place for the following food tests:

Food Test	**Molecule being tested for**	**Colour change if present (state the original colour and the colour it changes to)**

Biuret Test	Protein	
Benedict's solution	Reducing sugar	
Ethanol and water	Lipid	
Iodine solution	Starch	

2.1.3 Nucleotides and Nucleic Acids (DNA and RNA)

19. Label the 3 components of a DNA nucleotide below:



20. What are the 4 options of the organic base in a DNA nucleotide? (Give their full name)

_____

21. Describe the structure of a DNA molecule. Use the following words/terms: polynucleotide, double helix, hydrogen bonding, complementary base pairing,

_____

_____

_____

2.1.4 Enzymes

22. Enzymes are described as biological catalysts. What does this mean?

_____

_____

23. What is meant by an 'intracellular enzyme', and given an example:

_____

_____

24. What is meant by an 'extracellular enzyme' and give an example:

_____

_____

25. Can you describe how an enzyme works? Use the words: specificity, substrate, active site, lock and key hypothesis, enzyme substrate complex, product

_____

_____

_____

_____

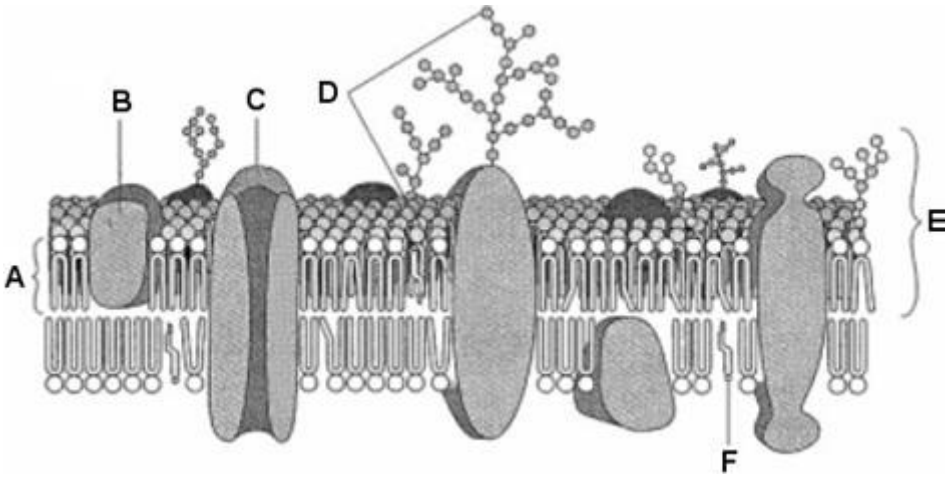
26. Can you name 4 factors that affect the level of enzyme activity?

_____

_____

2.1.5 Biological Membranes

27. Name the parts of the plasma membrane (cell surface membrane) A-F on the diagram below and explain the function of each:



A:_____

B:_____

C:_____

D:_____

E:_____

F:_____

28. There are 4 main ways in which molecules can pass through the plasma membrane. Define each one:

Diffusion:

_____

_____

Facilitated diffusion:

_____

_____

Active Transport:

_____

_____

Osmosis:

_____

_____

29. What is 'water potential'?

_____

_____

30. Write a definition of osmosis using the term water potential.

_____

_____

31. What happens to animal and plant cells when they are placed in a concentrated solution, such as salty water? (NB: use key words and diagrams are useful here!)

32. What happens to animal and plant cells when they are placed in a dilute solution, such as distilled water? (NB: use key words and diagrams are useful here!)

2.1.6 Cell Division, Cell Diversity and Cellular Organisation

33. Describe and explain the differences in structure and function between a cell, tissue, an organ and an organ system.

    _____

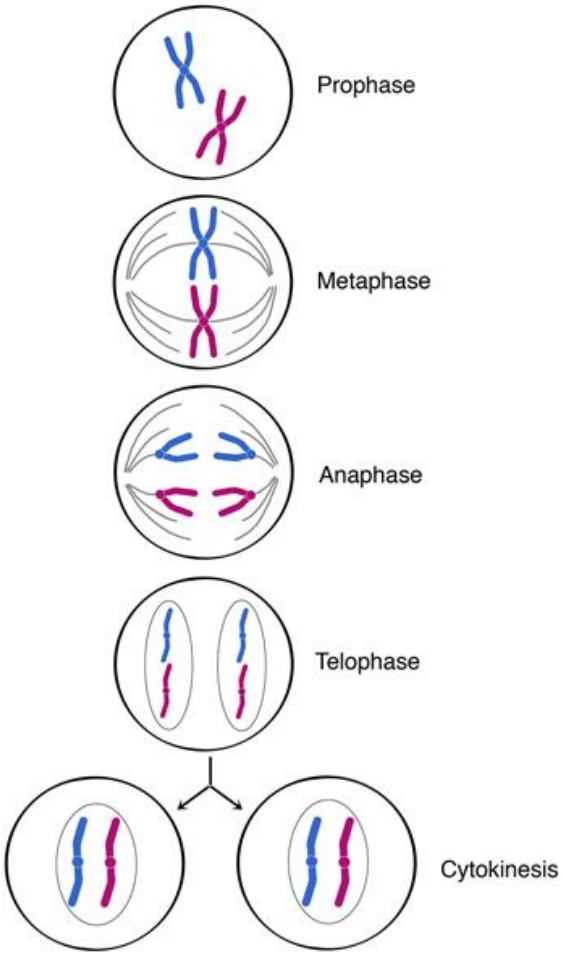
    _____

34. What is mitosis and why does it take place?

    _____

    _____

35. Complete the table to describe what is happening in each of the stages of mitosis in detail:



Prophase	
Metaphase	
Anaphase	
Telophase	
Cytokinesis	

36. What is interphase? When does it occur and what happens during it?

_____

_____

37. What is meiosis and why does it take place?

_____

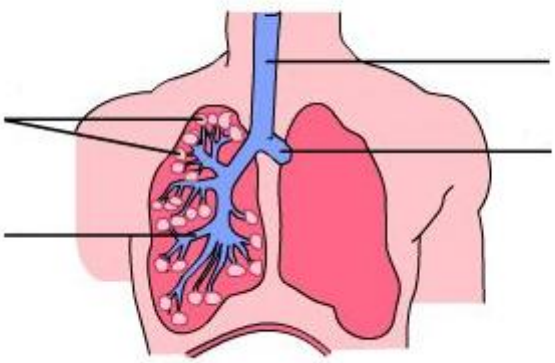
_____

38. Complete the following table:

Specialised Cell	Structure	Function
Erythrocyte		
Neutrophil		
Root hair cell		
Ciliated epithelial cell		
Palisade cell		

3.1.1 Exchange Surfaces

39. Label the parts of the respiratory system on the diagram below:



40. State the function of the following in the mammalian gas exchange system:

Trachea:

_____

_____

Bronchi:

_____

_____

Bronchioles:

_____

_____

Alveoli:

_____

_____

Capillaries:

_____

_____

C-shaped rings of cartilage in the trachea:

_____

_____

Smooth muscle in the trachea, bronchi, bronchioles and alveoli:

_____

_____

Elastic fibres in the trachea, bronchi, bronchioles and alveoli:

_____

_____

Ciliated epithelium:

_____

_____

Goblet cells:

_____

_____

3.1.2 Transport in Animals

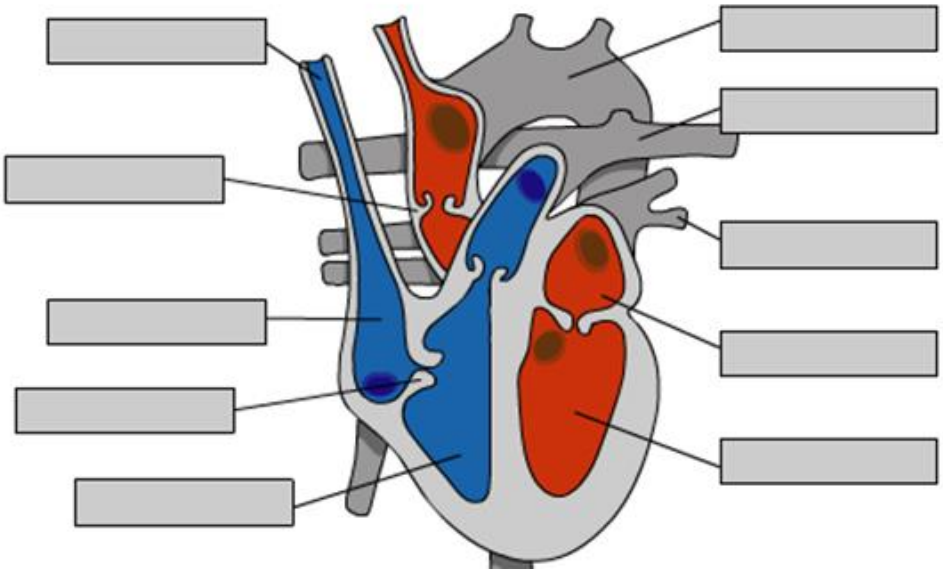
41. Describe the structural differences between arteries, veins and capillaries. You might like to draw a diagram to help to show this.

Arteries	
Veins	
Capillaries	

42. Describe the functional differences between arteries, veins and capillaries.

Arteries	
Veins	
Capillaries	

43. Label the following diagram of the heart.



44. Explain the function of the following parts of the heart:

Right atrium:

_____

_____

Right ventricle:

_____

_____

Left atrium:

_____

_____

Left ventricle:

_____

_____

Vena cava:

_____

_____

Aorta:_____

_____

Pulmonary artery:

_____

_____

Pulmonary vein:

_____

_____

Atrioventricular valve:

_____

_____

Semilunar valve:

_____

_____

SAN:

_____

_____

AVN:_____

_____

Purkyne tissue:

_____

_____

45. What is the wall of the right ventricle thicker than the wall of the left atrium?

_____

_____

46. What is the function of the coronary arteries? What might the consequence be if a coronary artery becomes blocked?

_____

_____

_____

Section B

Mark = /55

Question 1:

1 **(a)** Name the type of nuclear division that produces two genetically identical nuclei.

..... **[1]**

(b) There are a number of stages during cell division.

The list, **J** to **N**, describes some processes that occur during the division of an animal cell.

J	the cell surface membrane is constricted
K	the nuclear envelope reforms
L	sister chromatids are pulled apart
M	the chromosomes condense
N	the chromosomes move to the equator

Match each letter, **J** to **N**, with a stage of cell division in the list below.

The first one has been done for you.

prophase ..... M .....

metaphase .....

anaphase .....

telophase .....

(3)

(c) During interphase the genetic material is copied.

State **two** other processes that occur during interphase.

.....

.....

.....

..... **[2]**

Question 2

2 Fig. 2.1 shows a drawing of a part of the lung.

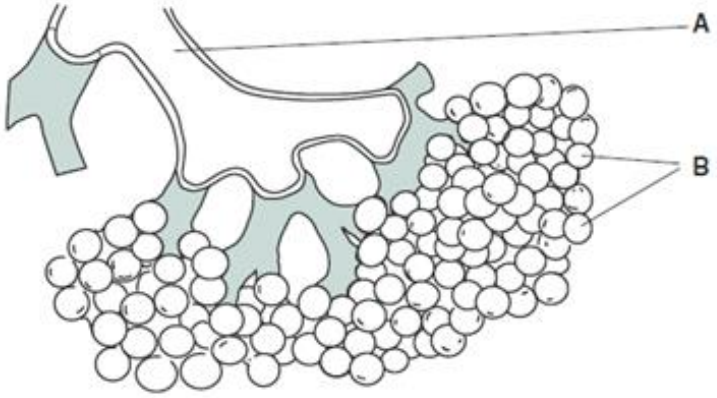


Fig. 2.1

(a) Name the structures labelled **A** and **B**.

A .....

B ..... [2]

(b) The structures labelled **B** enable efficient gaseous exchange.

State **two** features of the structures.

.....

.....

.....

..... [2]

Question 3

(a) Amino acids are the basic building blocks for proteins. Fig. 4.1 shows the amino acid cysteine.

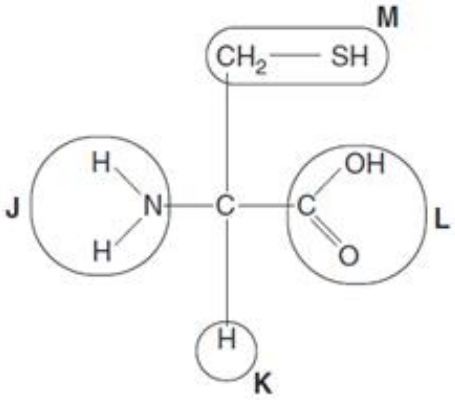


Fig. 4.1

(i) Complete the table by selecting the letter, **J**, **K**, **L** or **M**, that represents the following groups in cysteine.

group	letter
carboxyl	
R group	
amine group	

[3]

Question 4

DNA and RNA are nucleic acids.

(a) **(i)** State the components of a **DNA** nucleotide.

.....

.....

.....

..... **[3]**

Question 5

(a) Enzymes are biological catalysts.

Explain the term *biological catalyst*.

.....

.....

.....

.....

..... **[2]**

(b) When the enzyme catalase is added to hydrogen peroxide, the following reaction occurs:

$$\underset{\text{hydrogen peroxide}}{H_2O_{2(l)}} \xrightarrow{\text{catalase}} 2\,H_2O_{(l)} + O_{2(g)}$$

In an investigation into the effect of temperature on the rate of this reaction, a student set up apparatus as shown in Fig. 2.1, using liquidised celery as a source of catalase.

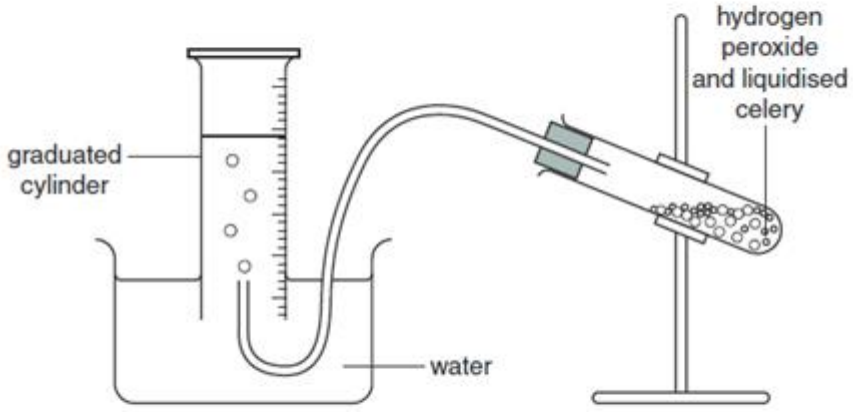


Fig. 2.1

The student measured the volume of oxygen produced at five different temperatures using samples of the liquidised celery.

(i) State the other variable that needs to be measured in order to calculate the **rate** of reaction.

..... **[1]**

(iii) In the conclusion to this experiment, the student wrote the following:

> *As the heat increased, the reaction went faster until it got to its highest. After this, the rate of reaction fell. This happened because the enzyme was killed and the hydrogen peroxide could not fit into the enzyme's key site.*

Suggest a more appropriate word to replace each of the underlined words.

heat should be replaced with .....

highest should be replaced with .....

killed should be replaced with .....

key should be replaced with ..... [4]

Question 6

(i) Complete Table 1.1 by

- naming the molecule being tested for
- stating whether this molecule is present or absent.

The first row has been completed for you.

Table 1.1

reagent	observation	molecule being tested for	present or absent
ethanol and water	white emulsion	lipid	present
Benedict's solution	brick-red precipitate		
biuret I and II	lilac colour		
iodine solution	yellow / brown		

(3)

Question 7

5 **(a)** Fig. 5.1 shows part of a DNA molecule.

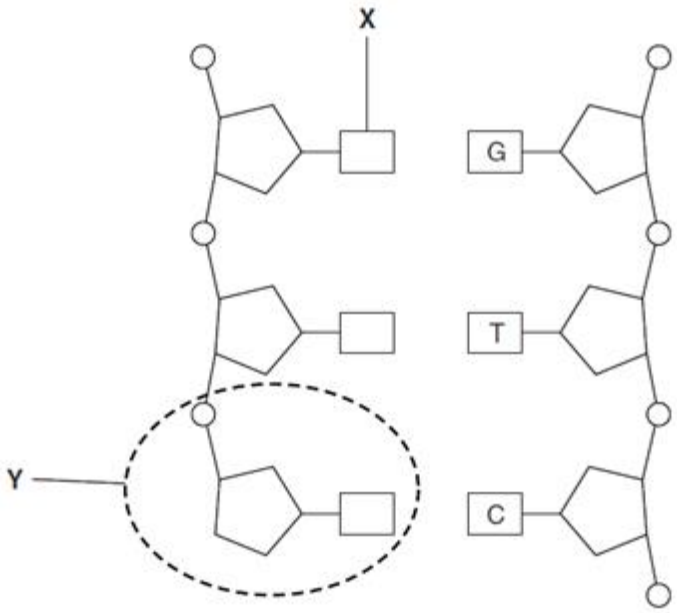


Fig. 5.1

(i) Name the parts of the molecule represented by the letters **X** and **Y**.

X .....

Y .....

[2]

Question 8

The cell surface membrane allows different substances to enter and leave the cell.

(a) List **three** components of a cell surface membrane.

.....

.....

..... **[3]**

(b) **(i)** Explain what is meant by the term *active transport*.

.....

.....

.....

.....

..... **[2]**

Question 9

2 Fig. 2.1 shows the structure of a plasma (cell surface) membrane.

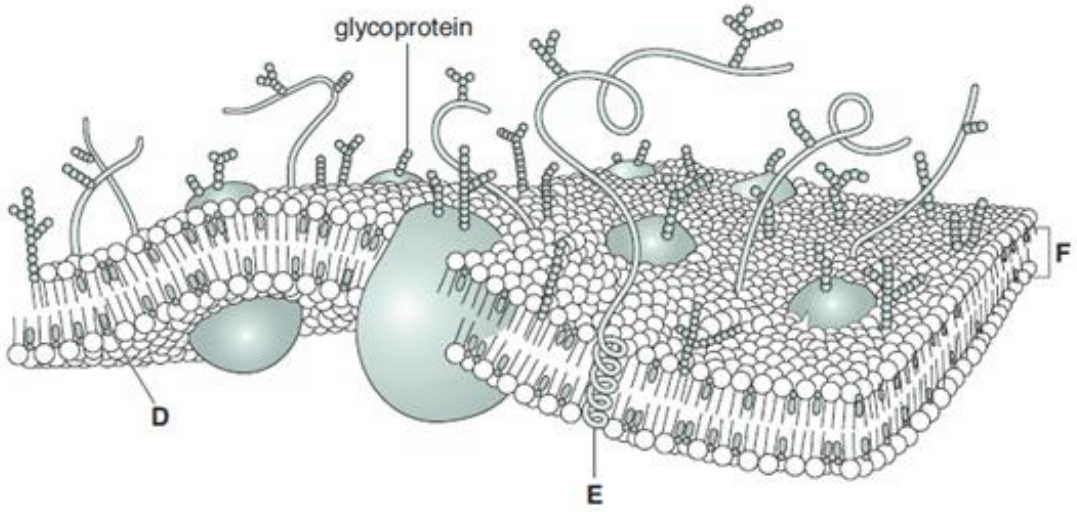


Fig. 2.1

(a) (i) Name the components of the plasma (cell surface) membrane labelled **D**, **E** and **F**.

D .....

E .....

F ..... [3]

(ii) State **one** function for each of the components **D**, **E** and **F**.

D .....

.....

E .....

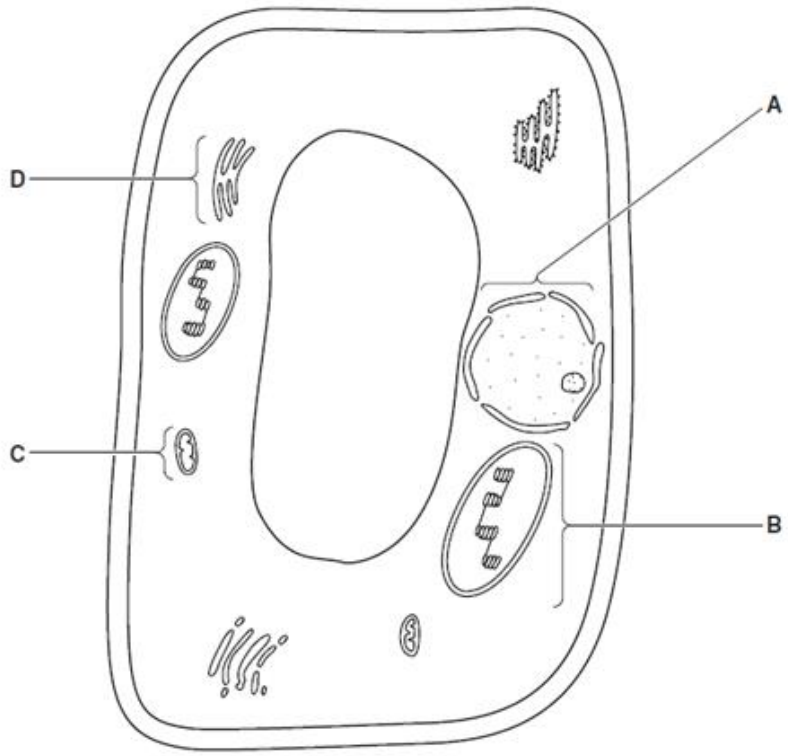
.....

F .....

..... [3]

Question 10

1 Fig. 1.1 is a diagram of a plant cell.



(a) (i) Name the cell components labelled **A** and **B**.

A .....

B .....

[2]

(ii) State the **functions** of the components labelled **C** and **D**.

C .....

.....

.....

D .....

.....

.....

[2]

Question 11

3 Large animals, such as mammals, need efficient transport systems.

(a) Fig. 3.1 shows a section through the mammalian heart.

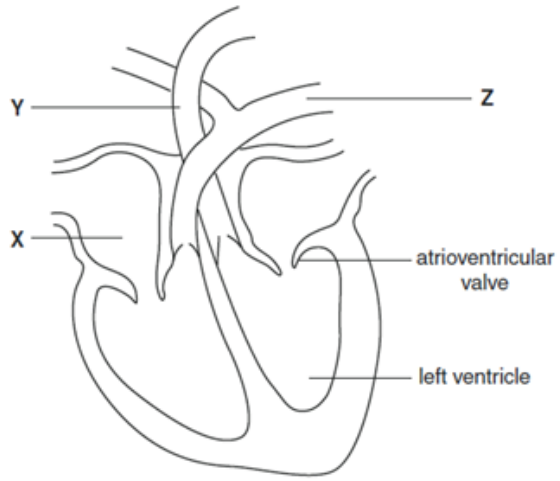


Fig. 3.1

(i) Name the parts labelled **X**, **Y** and **Z**.

X .....

Y .....

Z ..... [3]

(ii) Explain why the wall of the left ventricle is thicker than the wall of the left atrium.

.....

.....

.....

.....

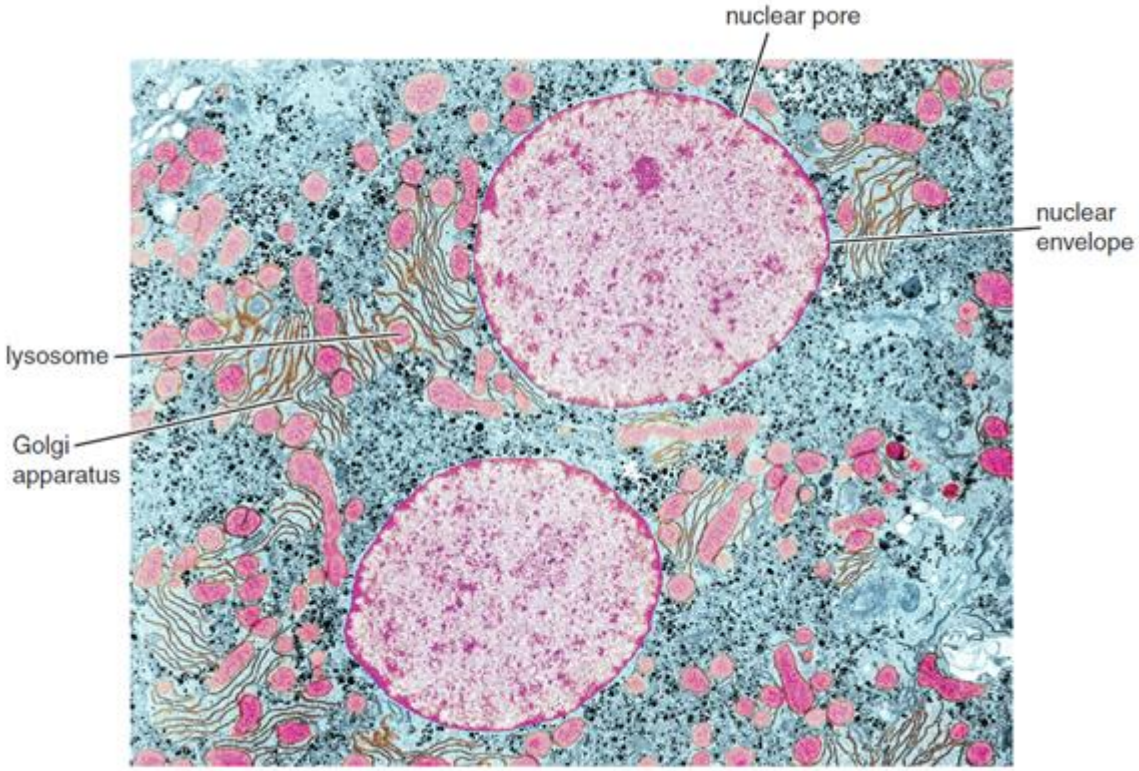
.....

.....

.....

..... [3]

Question 12



(a) Fig. 1.1, **on the insert**, shows an electron micrograph of cells from the liver.

(i) Some cells, such as liver cells, contain a lot of Golgi apparatus.

State **one** function of the Golgi apparatus.

.....

.....

..... **[1]**

(ii) Suggest why the nuclear envelope contains pores.

.....

.....

.....

.....

..... **[2]**

(iii) State the function of the lysosomes.

.....

.....

..... **[1]**

(b) The liver is an organ.

Explain what is meant by the term *organ*.

.....

.....

.....

.....

..... **[2]**

Section C Mark scheme

Question 1

Question			Expected Answers	Marks	Additional Guidance
1	(a)		mitosis / mitotic division ;	1	**DO NOT CREDIT** meitosis, miosis **ACCEPT** mytosis
	(b)		**N** ; **L** ; **K** ; **J** ;	4	**Mark the first answer for each stage**. If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks**.
	(c)		**1** checking, genetic material / DNA / chromatin / chromosome(s) / genes, (for errors) ; **2** protein synthesis ; **3** synthesis / replication / increase in number of, organelles / named organelle ; **4** ATP production / respiration ; **5** cell growth / increase in cell, volume / size ;	2 max	**Mark the first two suggestions only.** **IGNORE** DNA , replication / synthesis **ACCEPT** checking for mutations **DO NOT CREDIT** check for *cell* mutations **ACCEPT** named step e.g. transcription / translation / described **CREDIT** one named organelle only **ACCEPT** centriole as organelle **IGNORE** organelle growth **IGNORE** release energy **DO NOT CREDIT** produce / create, energy (in form of ATP) **IGNORE** cytoplasm replicates

Question 2

Question			Expected Answers	Marks	Additional Guidance
2	(a)		A = bronchiole ; B = alveolus / alveoli ;	2	**Mark the first answer for each letter.** If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks**. **DO NOT CREDIT** bronchus **ACCEPT** phonetic spelling of alveolus and bronchiole e.g. aveoli
	(b)		**1** large, surface area / SA :VOL ; **2** (alveolar) wall / epithelium, one cell thick ; **3** (made of) squamous, cells / epithelium ; **4** ref to surfactant ; *idea of:* **5** (very) close to, capillaries / blood supply **OR** rich blood supply / many capillaries ;	**2 max**	**Mark the first <u>two</u> suggestions only. Read as prose unless candidate has indicated two points by bullets or numbers – in this case mark the first comment in each bullet.** **ACCEPT** large SA / VOL, (alveoli) are small **and** in large number **DO NOT CREDIT** large amounts of tiny alveoli **ACCEPT** thin wall / thin barrier **DO NOT CREDIT** ref to cell wall / lining **IGNORE** alveolus one cell thick **ACCEPT** correct description of squamous cells (e.g. thin flat cell layer) **ACCEPT** pavement epithelium **IGNORE** reference to moist **DO NOT CREDIT** endothelium **IGNORE** ref to elastic fibres

Question 3

Question			Expected Answers	Marks	Additional Guidance
4	(a)	(i)	L ; M ; J ;	3	If 2nd letter given, no mark

Question 4

Question			Expected Answers	Marks	Additional Guidance
6	(a)	(i)	<u>de</u>oxyribo<u>se</u> (sugar) ; phosphate (group) ; (nitrogenous / purine or pyrimidine) base / one correctly named base ;	3	**DO NOT CREDIT** dioxyribose **DO NOT CREDIT** phosphate head or phosphate backbone **DO NOT CREDIT** letter instead of named base **DO NOT CREDIT** uracil **DO NOT CREDIT** incorrect spelling of thymine with 'a'

Question 5

Question			Expected Answers	Mark	Additional Guidance
2	(a)		(enzymes are) proteins / used in metabolism / used in named metabolic pathway ; alter rate of (chemical) reaction / lowers activation energy / provides alternative route for reaction / is not changed / is not used up ;	2	**ACCEPT** 'used in reactions , in organisms / in the body' **IGNORE** 'biological / enzyme / in nature' **ACCEPT** does not take part in reaction **Note** 'speed up metabolic reactions' **= 2 marks**
2	(b)	(i)	time ;	1	**Mark the first answer.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **IGNORE** 'how long' **IGNORE** correct units

2	(c)	(iii)	temperature ; maximum / peak / V_{max} ; denatured ; active ;	4	**Mark the first answer for each letter.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **ACCEPT** kinetic energy / KE **ACCEPT** optimum / optimum temperature **IGNORE** descriptions

Question 6

Question			Expected Answer	Mark
1	(a)	(i)		3

reagent	observation	molecule	present or absent	
ethanol and water	white emulsion	lipid	present	
Benedict's solution	brick-red precipitate	reducing sugar / lactose / glucose / galactose / monosaccharides	present	;
biuret I and II	lilac colour	protein / named milk protein	present	;
iodine solution	yellow / brown	starch / amylose	absent	;

Question 7

Question			Answer	Marks	Guidance
5	(a)	(i)	X cytosine / pyrimidine ; Y nucleotide ;	2	**Mark the first answer on each prompt line.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** X **ACCEPT** nitrogenous base / organic base X **IGNORE** C

Question 8

Question			Expected Answer	Mark	Additional Guidance
2	(a)		phospholipids ; proteins ; glycoproteins ; cholesterol ; glycolipids ;	max 3	**Mark the first <u>three</u> components in continuous prose or first suggestion in bullet point / (numbered) list.** **IGNORE** lipids, bilayer, hydrophilic head, hydrophobic tail, ref to intrinsic / extrinsic Count all refs to different types of protein as one e.g. intrinsic protein ✓ extrinsic protein Ignore pore protein Ignore glycoprotein ✓ phospholipids ✓ **= 3 marks**
2	(b)	(i)	(movement of substances) against / up , concentration gradient **or** from low to high concentration ; using , ATP / (metabolic) energy ; using a , transport / carrier , protein ;	2	**CREDIT** diffusion gradient for concentration gradient **DO NOT CREDIT** along / across , concentration gradient **DO NOT CREDIT** 'diffusion against concentration gradient' **DO NOT CREDIT** pore / channel protein

Question 9

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	D cholesterol ; E protein / glycoprotein / intrinsic protein / protein channel / protein pump / transport protein / carrier protein ; F phospholipid (bilayer) / phospholipid head ;	3	ACCEPT polypeptide chain DO NOT ACCEPT amino acid chain DO NOT ACCEPT extrinsic protein DO NOT ACCEPT lipids / bilayer
2	(a)	(ii)	D stabilise the membrane OR maintain / affect / control / AW, fluidity OR reduces permeability to, polar / charged, particles ; E allow communication across membrane OR allow, polar / charged, particles to pass through membrane ; F to act as a barrier (to, polar / charged, particles) / select what enters or leaves cell ;	3	***mark independently of (a)(i) i.e. NO ecf*** DO NOT ACCEPT refs to rigidity / support / strength ACCEPT reduces / affects, lateral movement of phospholipids ACCEPT cell recognition / receptor site / cell signalling / cell attachment ACCEPT (acts as) selectively permeable or partially permeable membrane ACCEPT allows small / fat soluble molecules to pass through DO NOT ACCEPT separates inside from outside

Question 10

Question			Answer	Marks	Guidance
1	(a)	(i)	A nucleus ; B chloroplast ;	2	**Mark the first answer on each prompt line.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** DO NOT CREDIT nuclear envelope / nucleolus IGNORE chlorophyll
		(ii)	C *mitochondrion* (aerobic) respiration / producing ATP / release energy ; D *SER / smooth endoplasmic reticulum* transport / production / processing, of, fats / lipids / steroids / carbohydrates ;	2	**Mark the first answer on each prompt line.** If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** DO NOT CREDIT Function of organelle if organelle identified / named incorrectly (as this would be an incorrect biological statement. DO NOT CREDIT makes / produces, energy ACCEPT produces ATP for respiration IGNORE ref to transport / modification of proteins DO NOT CREDIT ref production of proteins

Question 11

Question			Expected Answer	Mark	Additional Guidance
3	(a)	(i)	X = right atrium ; Y = aorta ; Z = (left) pulmonary artery ;	3	**Mark the first answer for each letter.** If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **ACCEPT** right atria **IGNORE** RA **IGNORE** PA
3	(a)	(ii)	*left ventricle* 1 (more muscle to create) more force ; 2 (needs to create) higher pressure ; 3 push blood against greater , resistance / friction ; 4 (left ventricle) pumps blood further / pumps blood to all parts of body / supplies systemic circulation ;	3 max	Assume answer refers to left ventricle unless otherwise stated. **ACCEPT ORA** for left atrium throughout 1 **IGNORE** more powerful contraction **ACCEPT** stronger contraction 2 **IGNORE** withstanding or maintaining pressure 4 **ACCEPT** pumps blood , all round body / greater distance **IGNORE** pumps blood to the body **DO NOT CREDIT** references to , right ventricle / lungs

Question 12

Question			Expected Answer	Mark	Additional Guidance
1	(a)	(i)	production of vesicles / packaging proteins ; modification of / processing of / adding carbohydrate to , proteins ; production of lysosomes ;	max 1	**Mark the first answer.** If the first answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = **0 marks** **ACCEPT** lipids **IGNORE** ref to transport / secretion / exocytosis / substances / materials **DO NOT CREDIT** stores proteins **ACCEPT** makes glycoproteins
1	(a)	(ii)	allow movement (of substances) in or out of nucleus ; correctly named substance (entering or leaving nucleus) ; ref to correct destination of substance ;	max 2	**IGNORE** messages / information / communication **IGNORE** name of substance for MP 1 **IGNORE** ref to mechanism of movement e.g. RNA / (m)RNA / (r)RNA (t)RNA / polymerase / nucleotides / ribosomes / helicase / proteins / (steroid) hormones **IGNORE** ref nutrients **DO NOT CREDIT** if incorrect direction of movement described (e.g. RNA into nucleus **or** RNA in and out of nucleus) **DO NOT CREDIT** DNA as named substance ***Note*** 'allows mRNA out of nucleus' = **two marks** e.g. RNA to ribosomes or RER helicase to DNA polymerase to , DNA / gene nucleotides to DNA (steroid) hormones to , DNA / gene / chromosome

Question			Expected Answer	Mark	Additional Guidance
1	(a)	(iii)	contain / release , lysins / lytic enzymes / hydrolytic enzymes / digestive enzymes ; digest / break down , organelles / foreign objects / toxins / cells / pathogens ; apoptosis / autolysis / described ;	max 1	**DO NOT CREDIT** 'engulf' **DO NOT CREDIT** 'lysosomes are digestive enzymes' **ACCEPT** destroy **ACCEPT** ref to digestion of contents of phagocytic vesicle **IGNORE** ref to (unwanted) substances / materials / food **IGNORE** ref to acrosomes
1	(b)		*idea of* more than one (type of) tissue ; working together / performing a function(s) ;	2	**ACCEPT** named examples of tissues **ACCEPT** job or task

Appendices/resources

OCR A BIOLOGY SPECIFICATION:

http://www.ocr.org.uk/qualifications/as-a-level-gce-biology-a-h020-h420-from-2015/

All other necessary links and resources are within this document