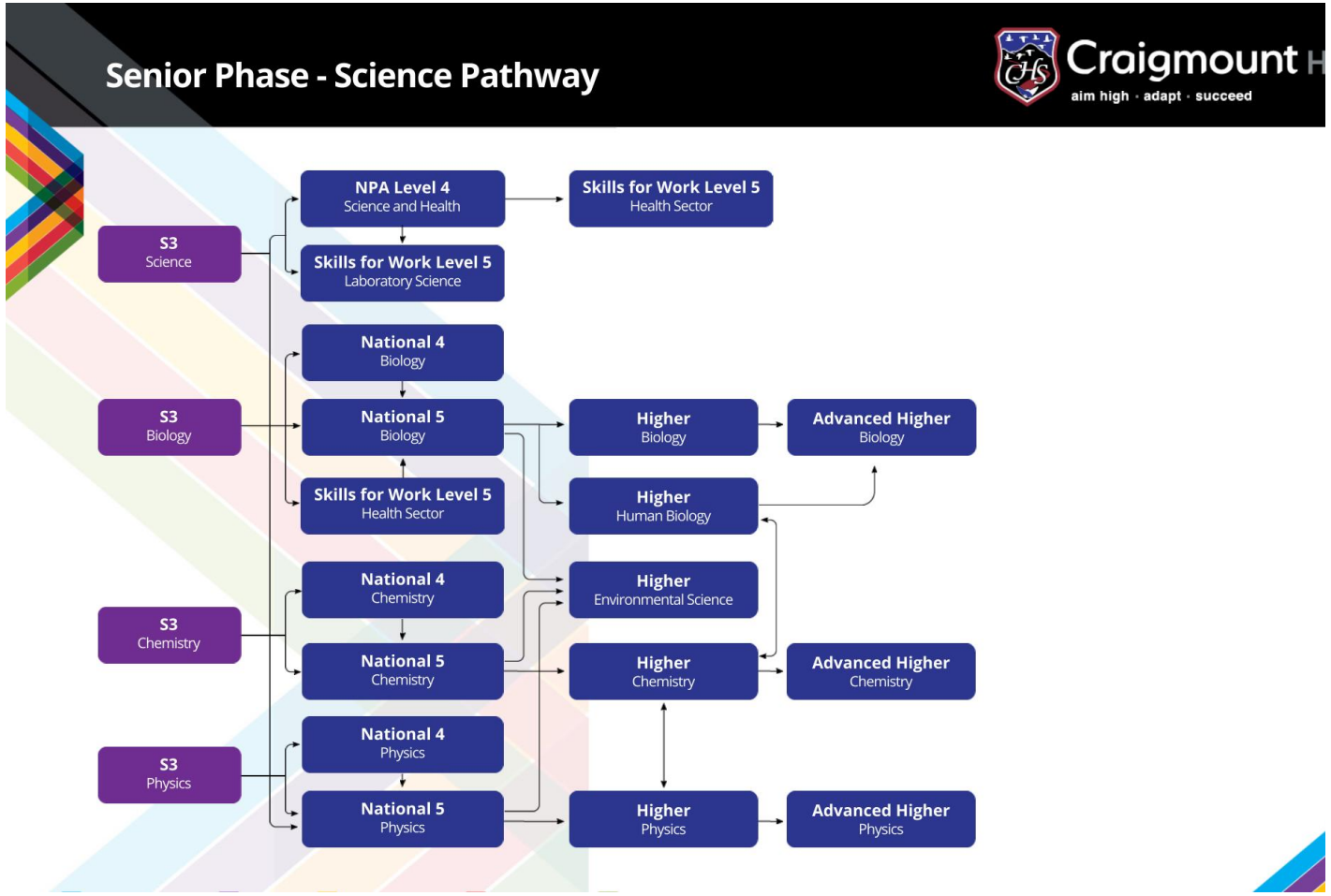
Senior Phase Open Evening

Thursday 25 September

Your Options

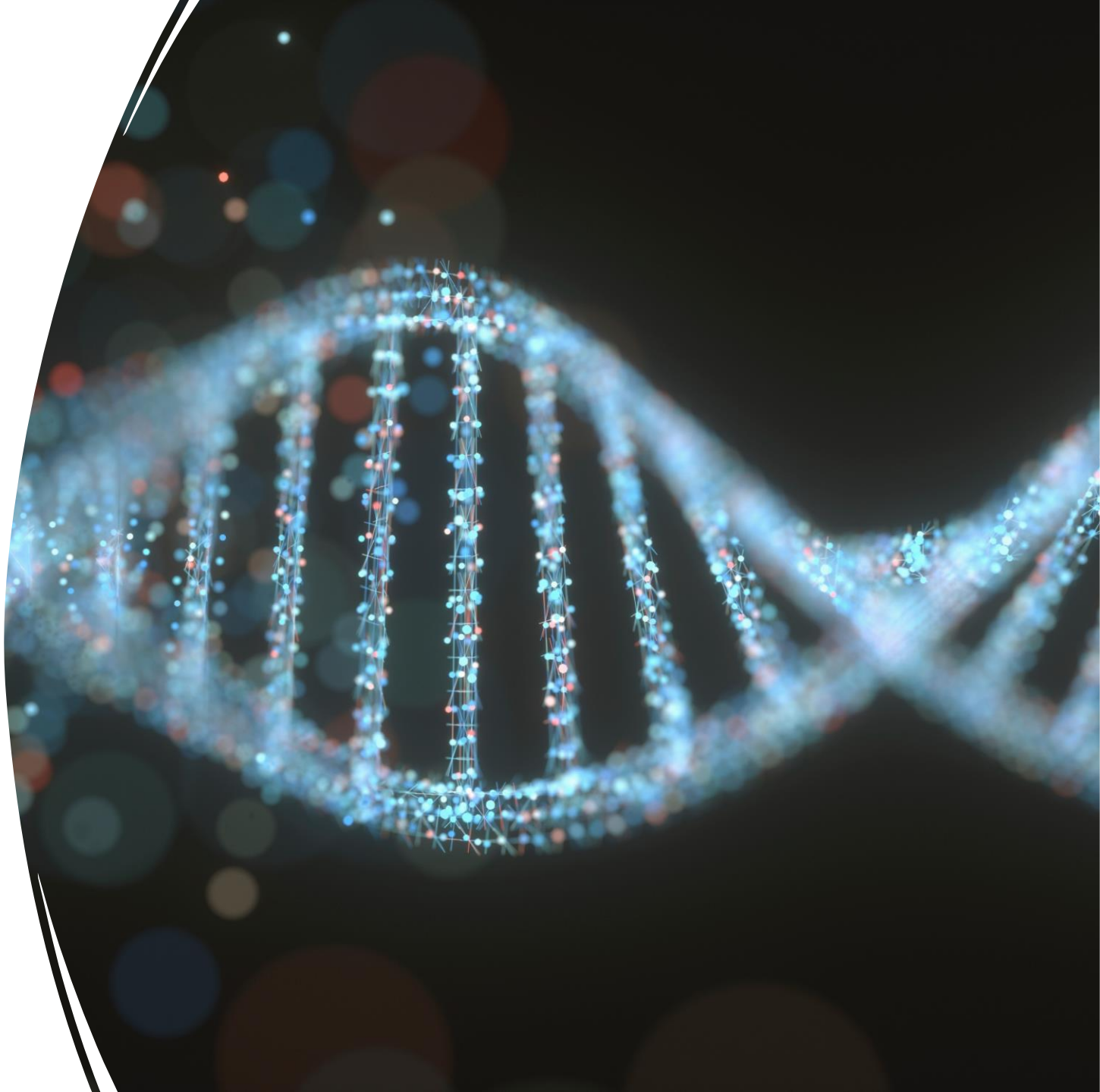


- This document can be found on the Craigmount website under the Curriculum Pathways section:
- https://craigmounthighschool.co.uk/curriculum-pathway/

- Over the next few slides we'll take a more in depth look at the options available

Biology overview

- Biology is a scientific study of life and living cells exploring their structure , function and growth. As the study of living organisms, it plays a crucial role in our everyday existence and is an increasingly important subject in the modern world. Biology affects everyone and aims to find solutions to many of the world's problems. Advances in technologies have made this varied subject more exciting and relevant than ever.
- Some Careers involving biology:
- Biologist
- Medicine – doctor
- Biotechnologist
- Research scientist



National 5 Biology

- There are three units : Cell Biology, Multicellular Organisms, and Life on Earth. Along with this you will develop your problem-solving skills which involves scientific investigation, literacy and numeracy skills.
- This course is split into an exam which is 80% (there are two parts to the exam : multiple choice is 25 marks and extended response is 75 marks) and an assignment is worth 20% .
- The assignment involves carrying out an experiment and then writing a report on it.
- Cell biology unit involves – cell structure including ultrastructure and functions of organelles, role of DNA, protein synthesis, how enzymes functions and processes that take place in living cells such as genetic engineering, photosynthesis, respiration, and transportation across cell membrane, which consists of diffusion and osmosis.
- Second unit is Multicellular organisms - this unit will introduce you to the process of cell division (mitosis) and its importance. It will also teach you the central nervous system process and the structure and function of the brain. This unit also consist of a topic called reproduction which will help you understand what gametes are and the importance of the process, transportation in plants and animals, including the structure which is used to perform the transport, and finally how materials such as nutrients and oxygen can be absorbed into the bloodstream.
- Life on earth unit - this will introduce you to what an ecosystem is, the process of photosynthesis, abiotic and biotic factors which affect an ecosystem, food production and the factors which affect it m energy in ecosystem, process of evolution of species

Higher Biology

- There are 3 units: DNA and the Genome, Metabolism and Survival, and Sustainability and Interdependence. Along with this you will develop your problem-solving skills which involves scientific investigation, literacy and numeracy skills.
- The course is split into an exam which is 80 % (multiple choice is 25 marks and the extended response is 95 marks) and the assignment is 20 % (total marks available for assignment are 20 but then it is scaled up to 30 marks).
- The assignment is the same as National 5, it involves carrying out an experiment and then writing a report on it.
- DNA and genome unit involves structure of DNA, replication, how genes are expressed and control cellular differentiation, the organisation of genomes, the impact of mutations, the evolutionary significance of genomes, and modern applications like genomic sequencing.
- Metabolism and survival unit explores how living organisms manage the chemical reactions necessary for life (metabolism) along with how enzymes are used to regulate the processes inside living cells. Focusing on metabolic pathways, cellular respiration for ATP production, factors affecting metabolic rate, and strategies like regulation, dormancy, and migration for dealing with adverse conditions.
- Sustainability and interdependence unit investigates how humans rely on sustainable food production, focusing on plant productivity and animal welfare, and how all organisms are linked through food webs and symbiotic relationships. Topics include improving crops and livestock through breeding and crop protection, the concept of biodiversity, its threats from human activity.

Advanced Higher Biology

- This course is split into an exam which is 100 marks but scaled up to 120 marks and a project which is worth 30 marks but scaled to 40 marks.
- The project involves an in-depth, independent investigation into a specific biology topic, requiring students to apply knowledge of scientific inquiry to plan, conduct, and analyse an experiment and generate data through experiments, critically evaluate their findings, and present a detailed, evidence-based scientific report .
- There are 3 units: Cells and Proteins, Organisms and Evolution, and Investigative Biology. Along with this you will develop your problem-solving skills which involves scientific investigation, literacy and numeracy skills.
- Cells and protein unit explores the molecular basis of life by exploring protein structure and function, including their role in cell communication and cell division. It also covers advanced cell biology concepts, such as membrane proteins cytoskeleton dynamics, the cell cycle, along with crucial laboratory techniques like microscopy, cell culture, separation techniques and antibody techniques. The unit integrates these topics to explain how cells respond to stimuli, communicate within multicellular organisms.
- organisms and evolution involves studying how biological variation, sexual reproduction, evolution, sex, and parasitism drive the changes in organisms and populations over time. It also covers field techniques , sampling methods, organism classification and the impact of natural selection and genetic drift . The unit also explores sexual behaviour and the biological systems of parasitism.
- investigative biology unit involves a sustained, in-depth, independent biological investigation, from planning and designing a valid experiment, collecting and analysing data, and communicating the results in a comprehensive scientific report. It builds upon the scientific method. requiring learners to develop critical evaluation skills, ethical considerations, and effective communication of biological research through a personal project.

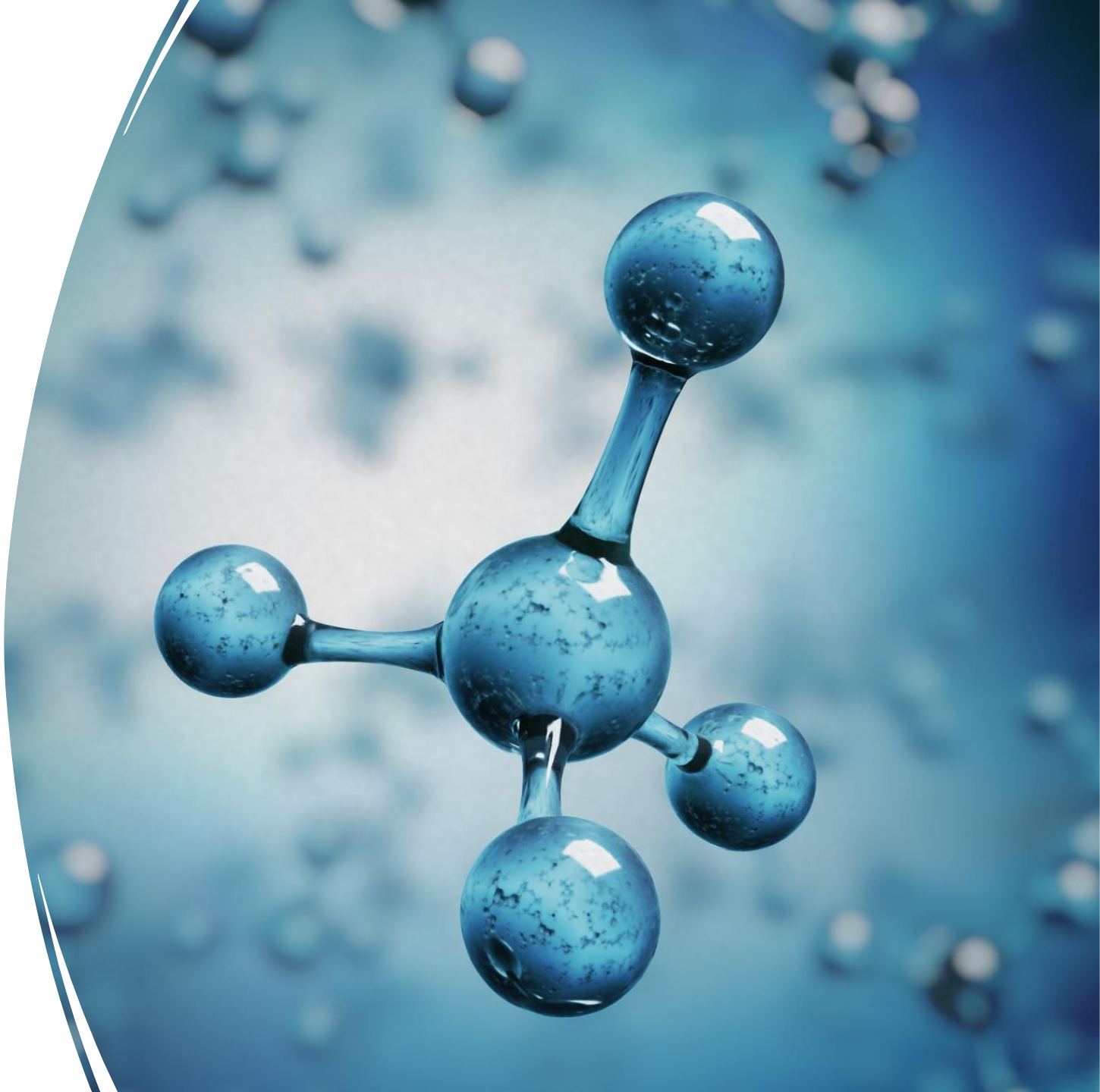
General tips for success in biology

- Study for understanding - biology has a lot of interconnected processes so instead of just memorising the terms focus on how different topics relate to each other.
- Explain the topic to others as it solidifies your knowledge and reveals gaps in understanding.
- Draw diagrams as biology is a visual subject. This active process is more effective than simply reading the process.
- Practice past paper questions, especially with different command words.

Chemistry overview

- Chemistry is a study of arrangement of atoms and molecules and the characteristics they give to materials. How matter changes during chemical reactions, including the energy involved. It also includes different types of chemical reactions like combustion. Exothermic or endothermic reactions.

- Some careers involving and/or related to chemistry include:
- Analytical chemist
- Biotechnologist
- Research scientist
- Medicinal chemist



National 5 Chemistry

- This course involves 3 units : Chemical Changes and Structure, Nature's Chemistry, and Chemistry in Society.
- This course is split into an exam of 100 marks, worth 80% of your final grade, and assignment which is 20 marks but scaled up to 25 marks, making it worth 20% of the final marks.
- The assignment involves carrying out an experiment on a relevant area of chemistry and then writing up a scientific report on it in class which is then sent to the SQA for marking.
- The Chemical Changes and Structure unit covers rates of reaction, atomic structure and bonding related to properties of materials, formulae and reacting quantities, and acids and bases.
- Nature's Chemistry looks at homologous series (including properties, naming, and general formulae), everyday consumer products, and energy from fuels (combustion).
- Chemistry in Society discusses nuclear chemistry, plastics and polymerisation, fertilisers and the Haber process, the properties and uses of metals, and chemical analysis.

Higher Chemistry

- Higher Chemistry is divided into four units: Chemical Changes and Structure, Nature's Chemistry, Chemistry in Society, and Researching Chemistry. The course assessment consists of two question papers (one multiple-choice and one extended answer, of 25 and 95 marks respectively) which together make up 80% of your final grade, as well as an assignment which is worth 20%.
- Similar to National 5, the assignment requires candidates to carry out an experiment and then complete a report write up under supervised conditions which is then sent to the SQA for marking.
- Chemical Changes and Structure looks at periodicity, structure and bonding, and oxidising and reducing agents.
- In Nature's Chemistry, you will cover systematic carbon chemistry, alcohols, carboxylic acids, esters, fats and oils, soaps, detergents and emulsions, proteins, oxidation of food, fragrances, and skin care.
- As part of Chemistry in Society, we cover getting the most from reactants, controlling the rate of a reaction, chemical energy, equilibria, and chemical analysis.
- The topics discussed in Researching Chemistry include common chemical apparatus, general practical techniques, and reporting experimental work.

Advanced Higher Chemistry

- The Advanced Higher Chemistry course has four main units: Inorganic Chemistry, Physical Chemistry, Organic Chemistry and Instrumental Analysis, and Researching Chemistry. The course assessment consists of a question paper which is scaled to represent 75% of your final grade, and a project worth 25%.
- The project involves an in-depth, independent investigation into a specific area of chemistry, requiring students to apply knowledge of scientific inquiry to research, plan and conduct experiments to generate suitable data for analysis. Students must then critically evaluate their findings, and present a detailed, evidence-based scientific report. Unlike at Higher, the project is conducted over an extended period and the write up of this report does not have to be completed in class.
- The topics covered by Inorganic Chemistry include electromagnetic radiation and atomic spectra, atomic orbitals, electronic configurations and the periodic table, and transition metals.
- As part of Physical Chemistry, you will cover chemical equilibrium, reaction feasibility and kinetics.
- In Organic Chemistry and Instrumental Analysis, we discuss molecular orbitals, synthesis, stereo chemistry, experimental determination of structure, and pharmaceutical chemistry.
- The Researching Chemistry unit looks at common chemical apparatus, skills involved in experimental work, stoichiometric calculations, gravimetric analysis, volumetric analysis, and practical skills and techniques.

General tips for success in chemistry

- Practice problem solving questions consistently and apply concepts to new situations
- Use diagrams, mind maps to organise your thoughts and visualise complex concepts .
- Focus on the concepts and understand why things happen not just how they happen to improve your retention.
- Ask as many questions as you can to get a better understanding of the concepts.

Physics Overview

- Physics is the study of matter, energy and the interaction between them. This entails asking fundamental questions and trying to answer them by observing and experimenting. The answers to such questions can lead to advances in our understanding of the world around us and often result in technological improvements which enhance the lives of all.

- Some careers involving and/or related to physics include:
  - Academic researcher
  - Medical Physicist
  - Meteorologist
  - Patent attorney
  - Data Analyst

National 5 Physics

- The National 5 Physics course is divided into 6 units: Dynamics, Space, Waves, Radiation, Properties of Matter, and Electricity. The course assessment consists of an exam which is out of 135 marks and scaled to represent 80% of final marks, and an assignment marked out of 20, which is also scaled, to represent 20% of your final marks.
- The assignment requires you to carry out a practical investigation into an area of physics and then write up a report on your experiment.
- Dynamics covers topics such as vector and scalar quantities, Newton's Laws of Motion and projectile motion
- Space discusses space exploration (including its risks and benefits, and the application of Newton's Laws of Motion to rocket launches) as well as cosmology
- Waves looks at wave parameters and behaviours, the electromagnetic spectrum and refraction of light.
- Radiation covers nuclear fission and fusion, activity and half life, and absorbed and equivalent dose as part of the wider topic of nuclear radiation.
- Properties of matter teaches you about the specific heat capacity of materials, specific latent heat and the kinetic model and gas laws.
- Electricity covers electrical charge carriers, potential difference (voltage), Ohm's Law, practical electrical and electronic circuits, and electrical power

Higher Physics

- The Higher Physics course consists of three main units: Our Dynamic Universe, Particles and Waves, and Electricity. The course assessment consists of two question papers (one multiple-choice and one extended answer) and an assignment. The multiple-choice paper is out of 25 marks, which represents ~17% of the final marks, whilst the extended answer is scaled to represent 63% and the assignment, marked out of 20, is scaled up to represent 20% of your grade.
- Similar to at National 5, the assignment at Higher requires you to carry out a practical investigation and then write up your findings in a report that gets submitted to the SQA.
- The topics covered by Our Dynamic Universe include equations and graphs of motion, forces, energy and power, collisions, explosions and impulse, gravitation, special relativity, and the expanding Universe.
- Particles and waves discusses forces on charged particles, the Standard model, nuclear reactions, inverse square laws, wave-particle duality, interference, spectra and refraction of light.
- Electricity looks at monitoring and measuring alternating current, equations involving current, potential difference, power, and resistance, electrical sources and internal resistance, capacitors, and semiconductors and p-n junctions.

Advanced Higher Physics

- This course is divided into four units: Rotational Motion and Astrophysics, Quanta and Waves, Electromagnetism, and Units, Prefixes and Uncertainties. The course assessment for Advanced Higher Physics consists of a question paper which has 155 marks, scaled to 120 to represent 75% of your final marks, as well as a project that is worth 25% of your grade.
- The project involves an in-depth, independent investigation into a specific area of physics, requiring students to apply knowledge of scientific inquiry to research, plan and conduct experiments to generate suitable data for analysis. Students must then critically evaluate their findings, and present a detailed, evidence-based scientific report. Unlike at Higher, the project is conducted over an extended period and the write up of this report does not have to be completed in class.
- The topics covered by Rotational Motion and Astrophysics include kinematic relationships, angular motion, rotational dynamics, gravitation, general relativity, and stellar physics.
- As part of Quanta and Waves, you will look at an introduction to quantum theory, particles from space, simple harmonic motion, waves, interference, and polarisation.
- Electromagnetism covers electric and magnetic fields, circuits, and electromagnetic radiation.
- Lastly, units, prefixes and uncertainties covers units, prefixes and scientific notation, uncertainties, data analysis, and evaluation and significance of experimental uncertainties.

General tips for success in physics

- Write out the quantities and information that the question gives you – it might help you see which formula you need to use!
- Draw a diagram to help you visualise the situation and mark on the things you know (forces, directions etc.)
- Do a sense check for any numbers you calculate (so you aren't getting speeds faster than light for example)
- Learn why the system is behaving that way, not just how it is behaving to improve your retention and problem-solving skills.

Supporting your Senior Scientist

National 5 Assessment

Learners will sit one exam and complete one coursework assessment:

- Exam
- Coursework: assignment

Both assessments will be marked by SQA. We will grade the course from A to D.

Higher Assessment

Learners will sit one exam and complete one coursework assessment:

- Exam: this contains two question papers:
  - Question paper 1 (multiple choice)
  - Question paper 2
- Coursework: assignment

Both assessments will be marked by SQA. We will grade the course from A to D.

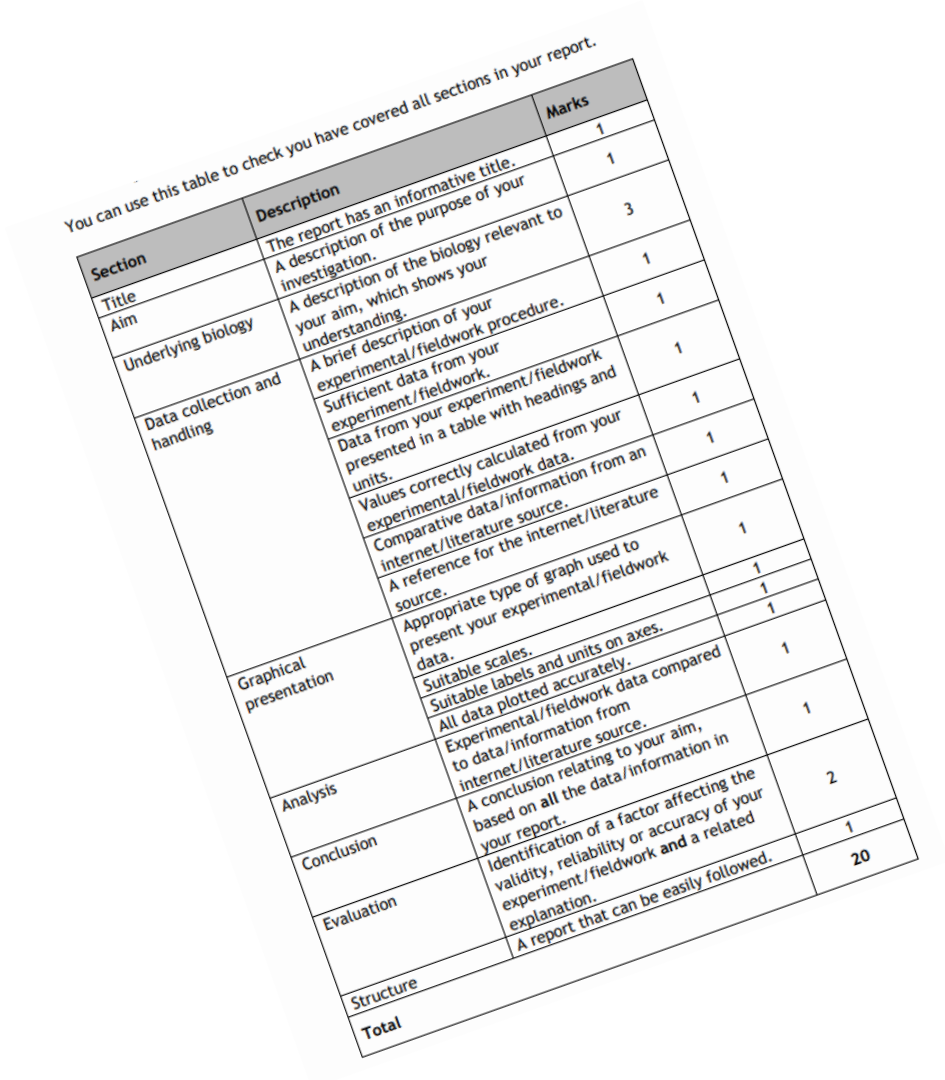
Advanced Higher Assessment

Learners will sit one exam and complete one coursework assessment:

- Exam
- Coursework: project

Both assessments will be marked by SQA. We will grade the course from A to D.

Assignment



You can use this table to check you have covered all sections in your report.

Section	Description	Marks
Title	The report has an informative title.	1
Aim	A description of the purpose of your investigation.	1
Underlying biology	A description of the biology relevant to your aim, which shows your understanding.	3
Data collection and handling	A brief description of your experimental/fieldwork procedure.	1
	Sufficient data from your experiment/fieldwork.	1
	Data from your experiment/fieldwork presented in a table with headings and units.	1
	Values correctly calculated from your experimental/fieldwork data.	1
	Comparative data/information from an internet/literature source.	1
	A reference for the internet/literature source.	1
Graphical presentation	Appropriate type of graph used to present your experimental/fieldwork data.	1
	Suitable scales.	1
	Suitable labels and units on axes.	1
	All data plotted accurately.	1
Analysis	Experimental/fieldwork data compared to data/information from internet/literature source.	1
Conclusion	A conclusion relating to your aim, based on **all** the data/information in your report.	2
Evaluation	Identification of a factor affecting the validity, reliability or accuracy of your experiment/fieldwork **and** a related explanation.	1
Structure	A report that can be easily followed.	1
Total		**20**

Biology

N5 National 5 Assignment Assessment Task (sqa.org.uk)

Higher HigherCATBiology.pdf (sqa.org.uk)

Chemistry

N5 National 5 Chemistry Assignment Assessment Task (sqa.org.uk)

Higher Higher Chemistry Assignment Assessment Task (sqa.org.uk)

Physics

N5 National 5 Physics Assignment Assessment Task (sqa.org.uk)

Higher Higher Physics CAT (sqa.org.uk)

Supporting your Senior Scientist

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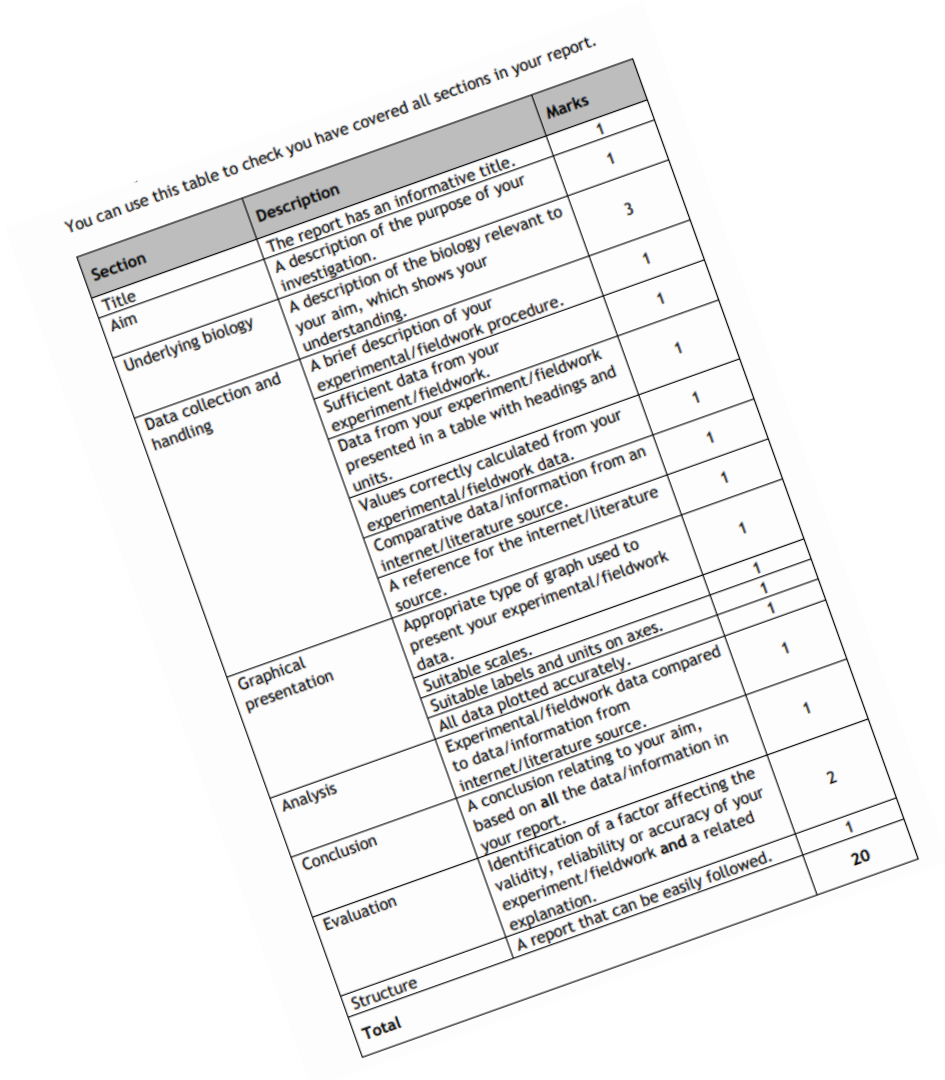
Assignment



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	Values correctly calculated from your experimental/fieldwork data.	1
	Comparative data/information from an internet/literature source.	1
	A reference for the internet/literature source.	1
Graphical presentation	Appropriate type of graph used to present your experimental/fieldwork data.	1
	Suitable scales.	1
	Suitable labels and units on axes.	1
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Total		**20**

Biology

N5 National 5 Assignment Assessment Task (sqa.org.uk)

Higher HigherCATBiology.pdf (sqa.org.uk)

Chemistry

N5 National 5 Chemistry Assignment Assessment Task (sqa.org.uk)

Higher Higher Chemistry Assignment Assessment Task (sqa.org.uk)

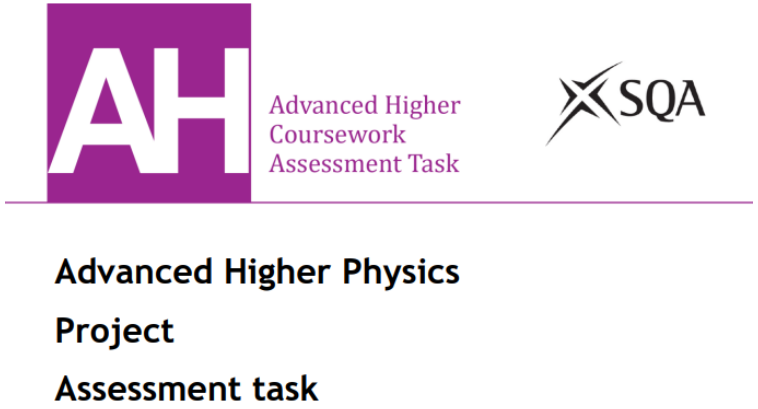
Physics

N5 National 5 Physics Assignment Assessment Task (sqa.org.uk)

Higher Higher Physics CAT (sqa.org.uk)

AH Projects

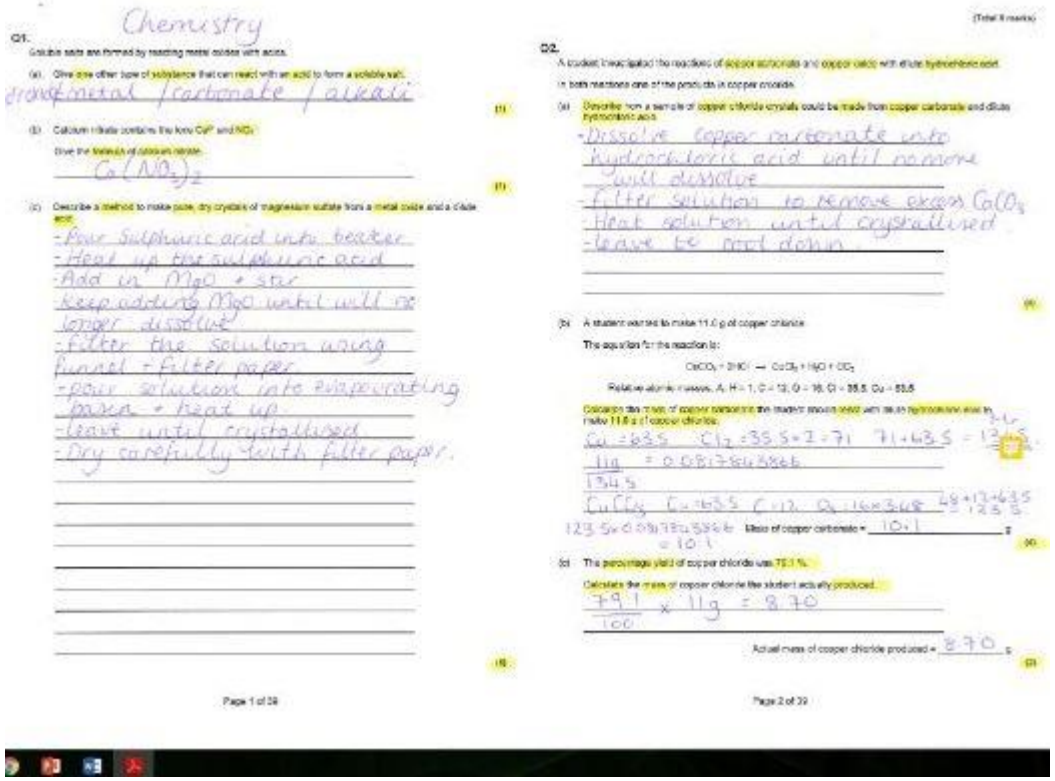
- Practical's completed in class or on fieldtrip
- Regular feedback
- Mentoring
- Marking experience



- Biology Advanced Higher Biology Project Assessment Task (sqa.org.uk)
- Chemistry AHCATChemistry.pdf (sqa.org.uk)
- Physics Advanced Higher Physics CAT (sqa.org.uk)

Master the Science

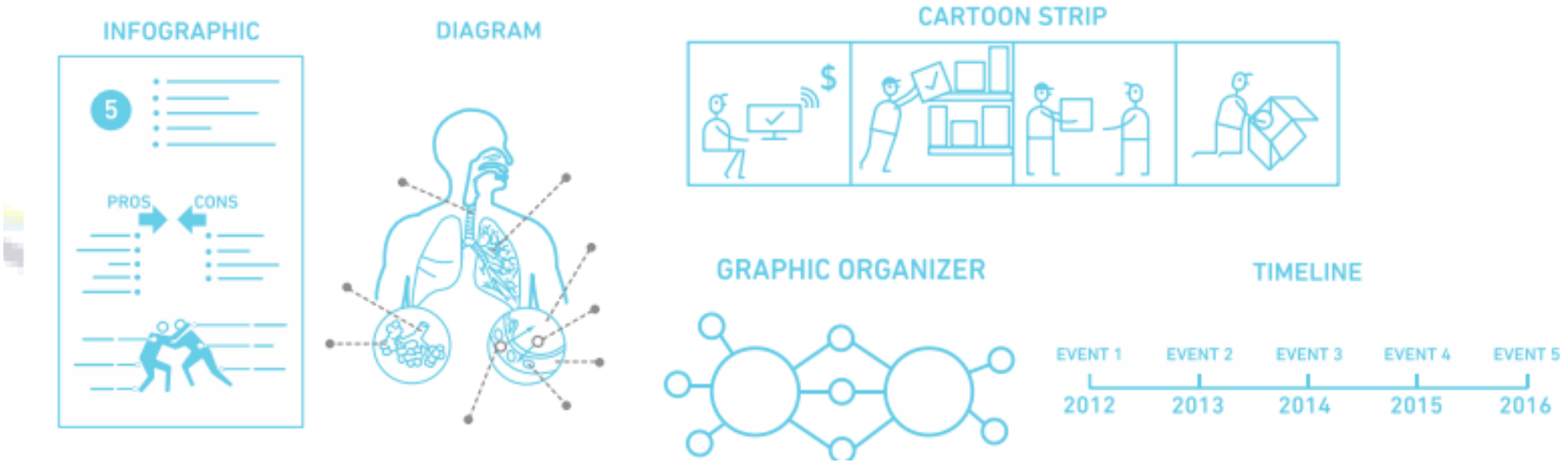
The first time we see information we ‘know’ it, but students must review, revise and consolidate to make sure that they ‘master’ knowledge. This makes identification of question matter easier in exams and saves time.



Students must explain science using specific scientific vocabulary

How can students ‘master’ content?

Active note taking involves turning the material into a different format… Simply copying notes is passive and limited in impact.

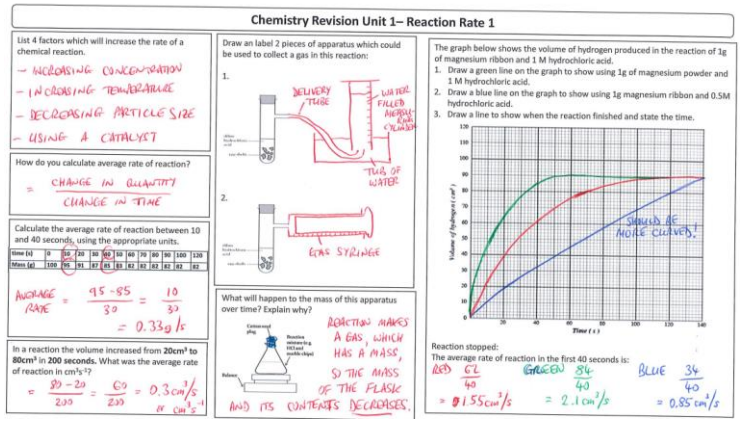


Students must process information to ensure active learning.

How can students ‘master’ content?

Flashcards

Questions



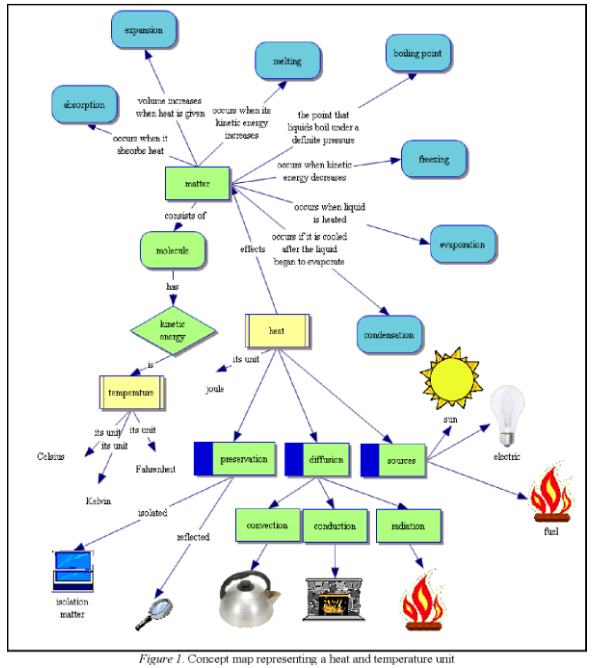
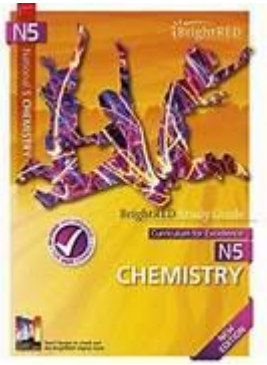
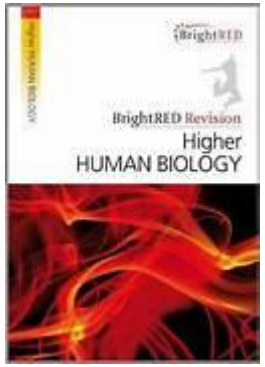
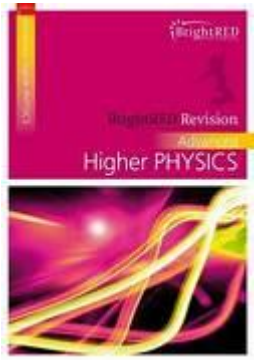


Figure 1. Concept map representing a heat and temperature unit

Concept Maps







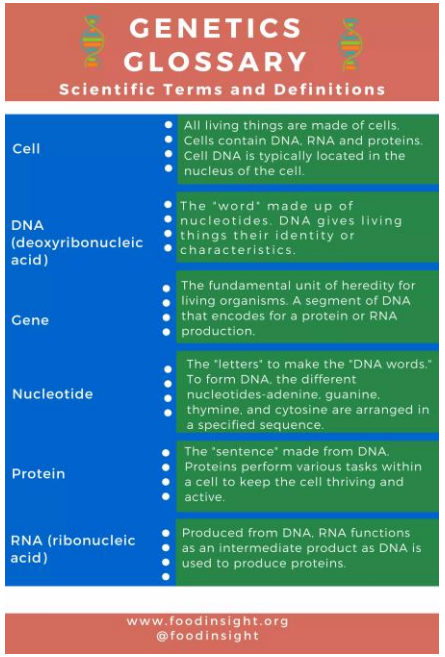
Revision guides

How can students check they have mastered content?

Quick fact recall and self study questions, review learning outcomes, online quiz apps such as Quizlet , definition and glossary checks, YouTube Video Channels with questions.

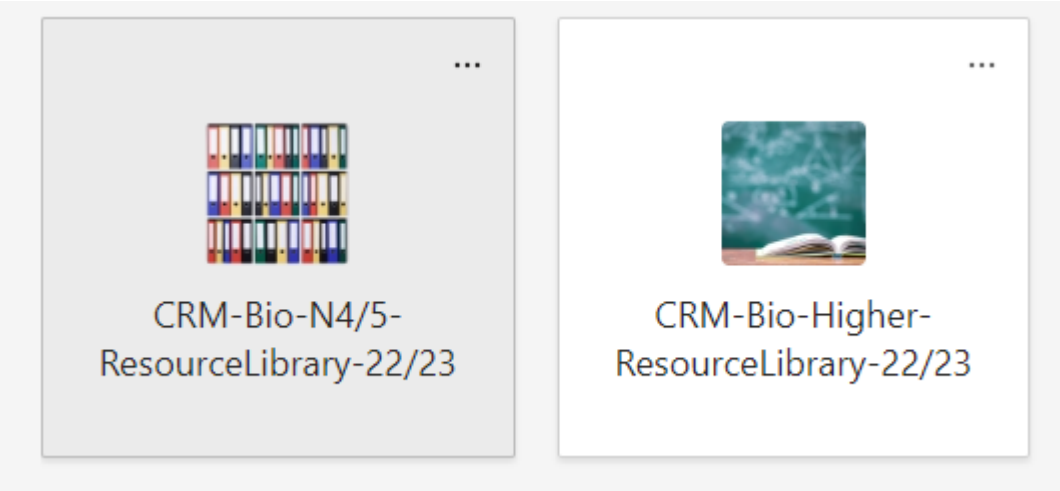
N5 Physics Dynamics Outcomes 2023-2024

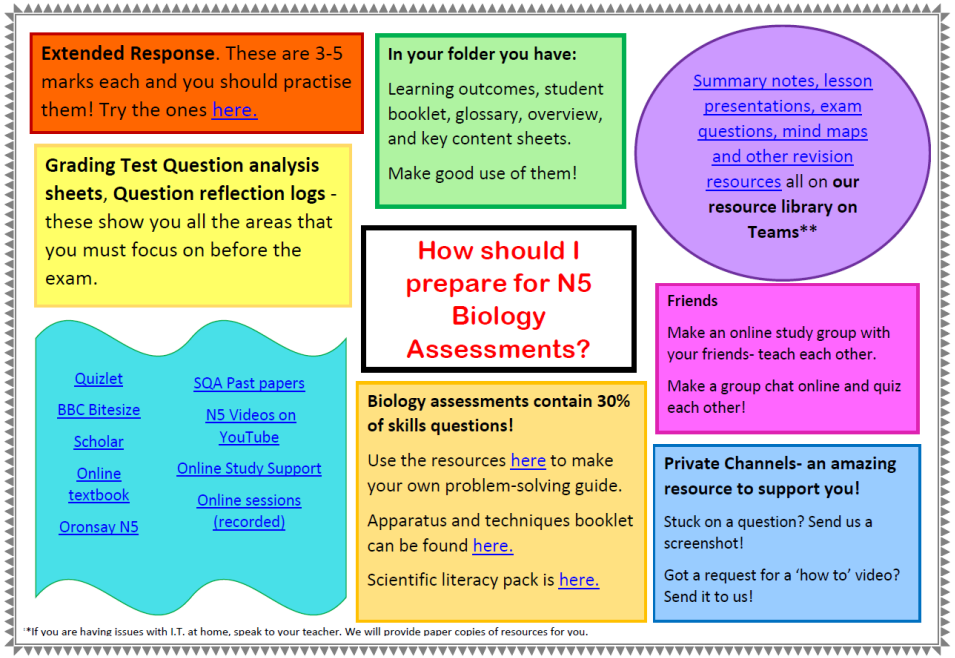
CONTENT	✓×	Traffic Light		
Vectors and scalars				
I can define scalar quantities and vector quantities. A scalar has magnitude/size and unit. A vector has magnitude/size and unit and direction.		☺	😐	☹
I can identify scalar quantities such as: speed, distance, mass, time and energy.		☺	😐	☹
I can identify vector quantities such as: force, velocity, displacement, acceleration, weight.		☺	😐	☹
I can calculate the resultant of two vector quantities in one dimension and at right angles.		☺	😐	☹
I can determine displacement and/or distance using scale diagram or calculation.		☺	😐	☹
I can determine velocity and/or speed using scale diagram or calculation.		☺	😐	☹
I can perform calculations/solve problems involving the relationship between speed, distance and time ($d = vt$, and $d = \bar{v}t$)		☺	😐	☹
I can perform calculations/solve problems involving the relationship between velocity, displacement and time ($s = vt$)		☺	😐	☹
I can determine average and instantaneous speed.		☺	😐	☹
I can describe experiments to measure average and instantaneous speed.		☺	😐	☹
Velocity-time graphs				
I can draw velocity-time and speed-time graphs for objects from recorded or experimental data.		☺	😐	☹
I can interpret velocity-time and speed-time graphs to describe the motion of an object.		☺	😐	☹
I can find displacement from a velocity-time graph, where *s = area under the v-t graph.*		☺	😐	☹
I can find distance from a speed-time graph, where *d = area under the v-t graph.*		☺	😐	☹
Acceleration				
I can define acceleration in terms of initial velocity, final velocity and time.		☺	😐	☹
I can use the relationship involving acceleration, change in speed and time ($a = \Delta v/t$).		☺	😐	☹



How can students check they have mastered Biology content?

Quick fact recall and self study questions, review learning outcomes, online quiz apps such as Quizlet , definition and glossary checks, YouTube Video Channels with questions.





How can students check they have mastered Physics content?

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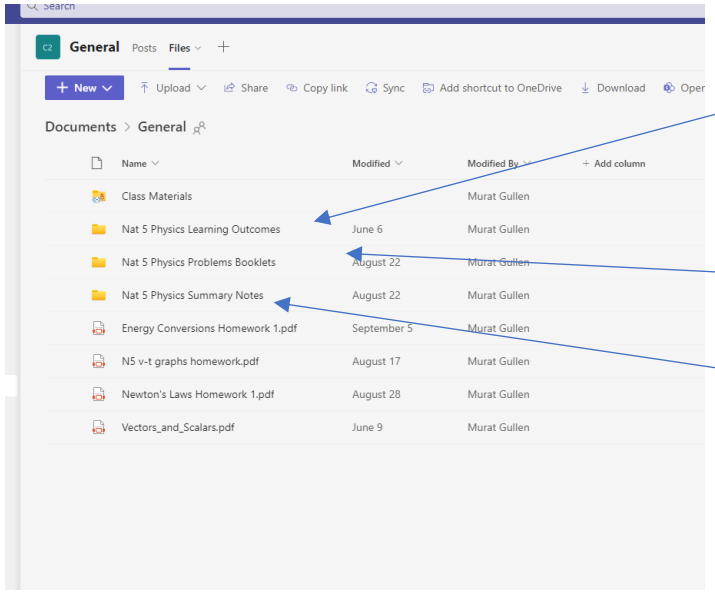
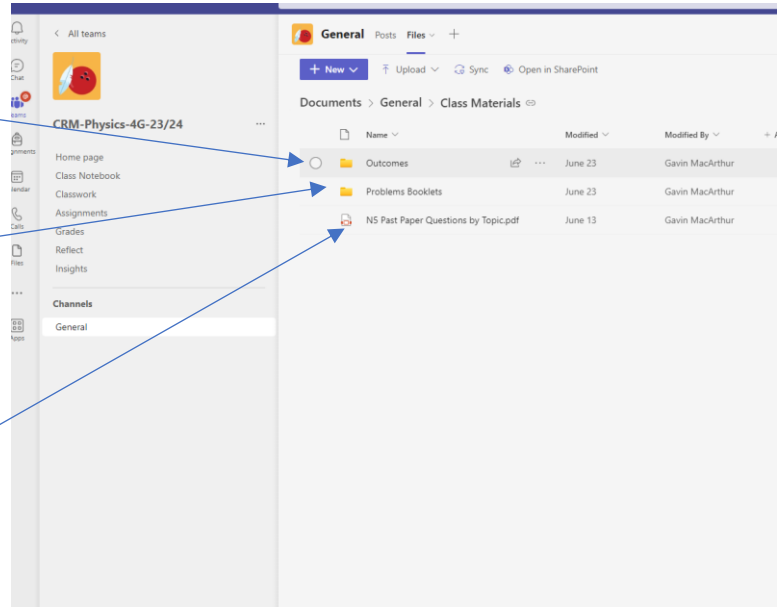


Outcomes

Problem Booklets

Summary Notes

Past Paper Questions



How can students check they have mastered Chemistry content?

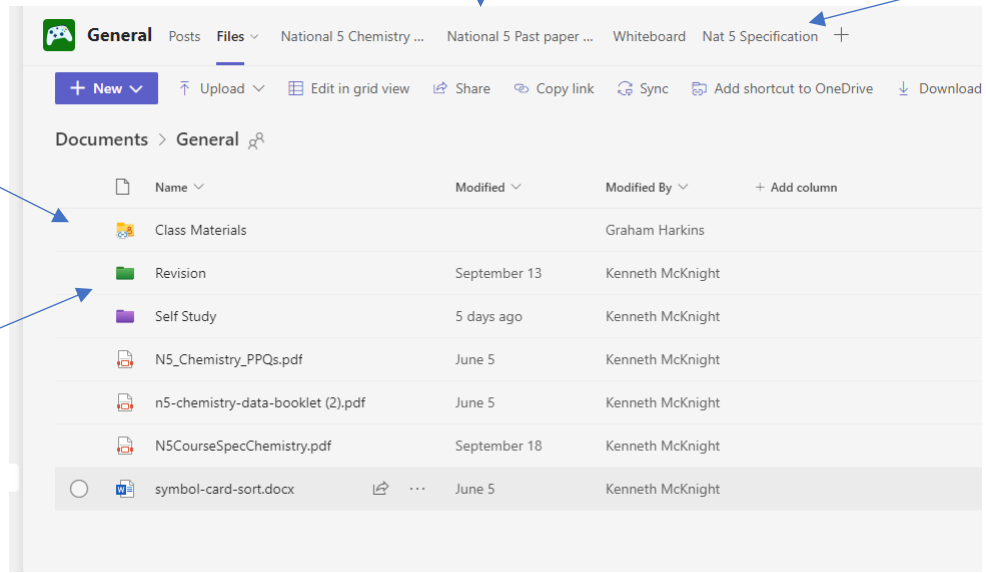
Quick fact recall and self study questions, review learning outcomes, online quiz apps such as Quizlet , definition and glossary checks, YouTube Video Channels with questions.

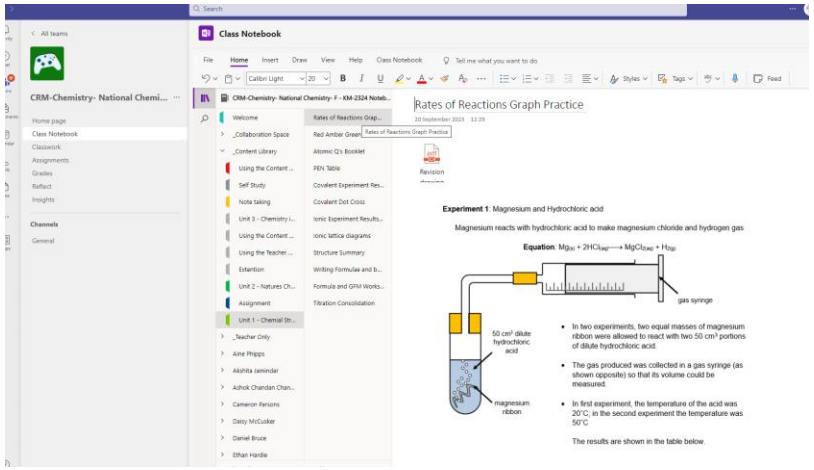
Past Paper Questions pdf

National 5 Specification

In class materials

Revision and Self Study questions





Subtle differences in the specialisms and how we prepare

Biology

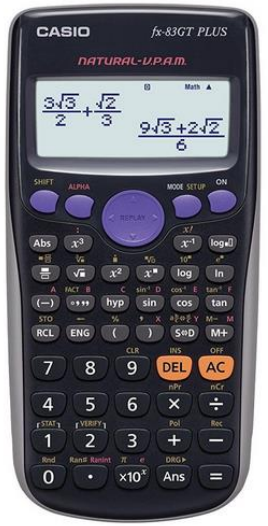
Knowledge
Key terminology
Application
Practical Assignments
Abstract contexts

Chemistry

Knowledge
Key terminology
Application
Practical Assignments
Using the Data Booklet

Physics

Knowledge
Key terminology
Application
Practical Assignments
Using the Data Sheet



Calculator required for every science exam!

The most important step, applying knowledge to exam questions.

8. As the atomic number of the alkali metals increases

A the first ionisation energy decreases

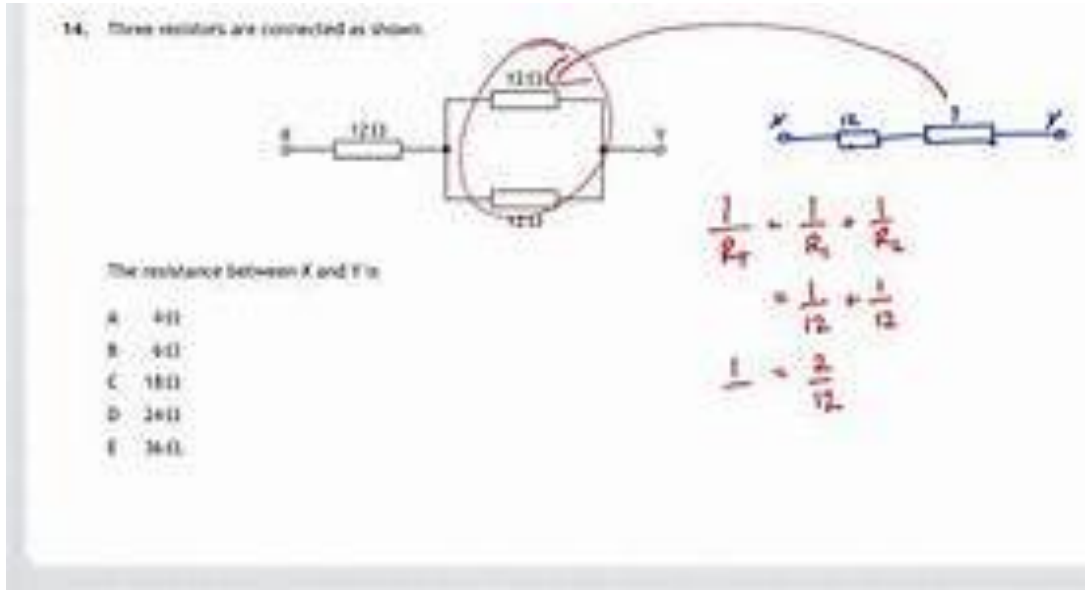
B the atomic size decreases

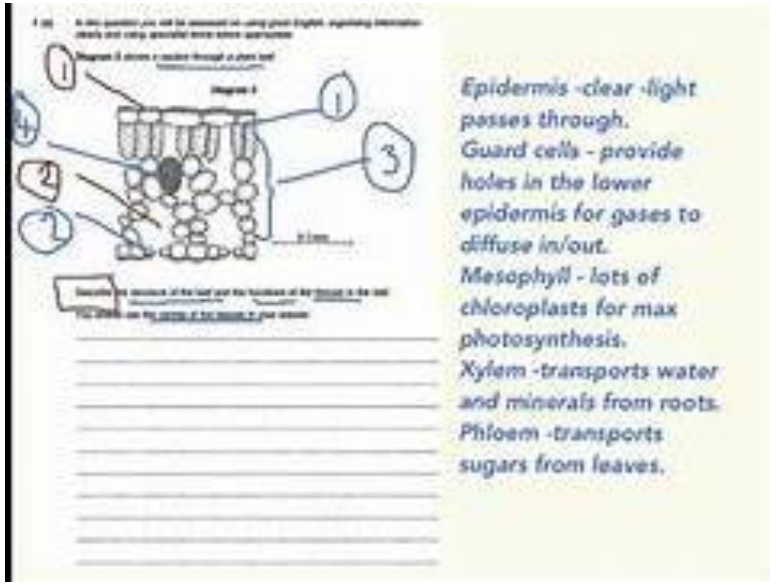
C the electronegativity increases

D the melting point increases.

This refers to the change I properties as you move down a group. The atom size increases (more shells), so the electronegativity and the first ionisation decreases (electrons further from the nucleus/ shielding). The melting point also decreases because the strength of the metallic bond decreases. More information on these trends can be found by clicking here.

Use your knowledge of the properties of the elements or, consult the data book.





When approaching a question;

1. What is the **topic**?

2. What are the **command** words… describe, explain, compare, evaluate.

3. What is the question **specifically** looking for?

4. Has there been any **information** provided that you must use?

5. What key **scientific terms** will you make sure are in your answer?

Figure 2 shows an axolotl.

Figure 2

(d) Explain why an axolotl may die in water with a low concentration of oxygen. **4 Marks**

- Oxygen concentration gradient is low
- less oxygen diffuses into blood / cells / gills
- less aerobic respiration and more anaerobic occurs so less energy is released
- Less metabolism
- Lactic acid produced which is toxi

Useful Science Websites…

https://scholar.hw.ac.uk/

https://www.bbc.co.uk/bitesize/levels/z6gw2hv

https://jabchem.org.uk/

https://letsachieve.co.uk/

https://www.sqa.org.uk/pastpapers/findpastpaper.htm

Useful Physics Websites…

https://www.bbc.co.uk/bitesize/subjects/z6fsgk7

https://mrmackenzie.co.uk/national-5/

https://mrsphysics.co.uk/n5/

Useful Chemistry Websites…

https://www.youtube.com/@MissAdamsChemistry/about

https://docbrown.info/

https://www.hsn.uk.net/resources/Hchem/notes/

http://www.rsc.org/Education/SchoolStudents/index.asp

Useful Biology Websites…

N5

Pitlochry High School - Biology Revision

National 5 Biology | (glowscotland.org.uk)

Higher

CfE Higher Unit 1 – Higher Biology Unit 1 Revision (glowscotland.org.uk)

Larbert High School - Higher

Both

(116) Mr Mitchell – YouTube

National 5 Biology (oronsay.org)

The key points

- Revision needs to involve **active** strategies (not just reading!)
- You cannot do enough past questions – move away from making notes and out of your comfort zone to complete practice questions.

When approaching a question;

1. What is the topic?
2. What are the command words… describe, explain, compare, evaluate.
3. What is the question specifically looking for?
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