

Science

A Bit About Us

As a core subject we teach Science to all students in the Main School, and a large proportion of the Sixth Form as part of the IB Diploma and Career programmes.

Where We Teach

Science is housed in 2 blocks, dedicated entirely to the subjects. There are 12 fully equipped laboratories, 2 prep-rooms and a science office split between the blocks. Staff can often be found in the shared office (P10) at break or lunchtime.

The ICE programme

Year 7 and 8

There is a strong focus on “Thinking Scientifically”, with each unit of work including at least one extended investigation.

Year 9

This is a foundation year aimed at developing the skills needed for the new GCSEs in the Sciences. We follow the ICE program until February half term and then begin to cover some of the topics common to both GCSE pathways. In lessons, there is a focus on developing mathematical and practical skills. At the end of Year 9, we will review progress and choose a starting pathway for each student going into Year 10.

Years 10 & 11

All students are following the AQA suite of Science GCSEs, either Separate Sciences (three GCSEs in Biology, Chemistry, Physics) or Combined Science: trilogy (two GCSEs).

The specifications are available at: <http://www.aqa.org.uk/subjects/science/gcse>

In addition, some students may complete the Entry Level Certificate: <http://www.aqa.org.uk/subjects/science/elc>

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Y7 Strand 1 IVC Science Curriculum Overview

Key Content/Topics:

This unit begins with lab safety, common lab equipment and measurement in Science

This is followed by:

Biology - Cells

- Features of plant and animal cells
- How specialised cells are adapted to their function
- Organisation of living systems - cells, tissues and organs, including the ethics of cell transplants

Chemistry - The Particle Model



- Particle theory and states of matter - solids, liquids and gases
- Changing state - evaporation, condensation, melting and freezing
- Solutions and dissolving

Physics - Forces

- Contact and non-contact forces
- Reaction and resultant forces
- Friction

Assessed Tasks:

1. Students will complete a task demonstrating their skills in data analysis and representation as graphs
2. Students will write up a practical investigation which they have planned and carried out as part of their Chemistry or Physics learning
3. End of strand test – 10 multiple choice questions on factual recall and questions asking students to apply what they have learnt

SMSC & British Values:

S: Everything is made up of particles

M: The importance of personal safety in the lab & the need to assess and manage risk

S: Cooperative working and group responsibility

C: History and philosophy of science, many individuals contribute to scientific discoveries

Enrichment Ideas:

Build an edible cell model, label all the organelles

Investigate change of state in chocolate <https://www.stem.org.uk/resources/elibrary/resource/315591/what-temperature-does-chocolate-melt>

Make a balloon rocket, <https://assist.asta.edu.au/resource/1428/investigating-contact-and-non-contact-forces> or go on a rollercoaster

Assessment Criteria:

1. Laboratory safety and risk assessment
2. Scientific approaches to problem solving, science thinking and scientific literacy
3. Using a microscope to record accurate scale drawings to represent physical phenomena
4. Application of scientific knowledge to familiar and unfamiliar situations
5. Observation during practical activities
6. Taking measurements and recording
7. Using units when taking measurements and when carrying out calculations

Literacy/Numeracy:



Variables

Cytoplasm

Nucleus

Mitochondria

Objective lens

Condensation

Evaporation

Friction

Gravity

Air/water resistance

Calculation of total magnification

Resultant force calculations

Graph skills

Careers Links(CAEIG):

Biomedical Scientists, Zoologists and Wildlife Biologists, Forensic Scientists and Technicians

Environmental Engineer, Medicinal Chemist or Physicist, Aeronautical Engineer, Design Engineer

Intervention Tasks:

1. Boost your flightpath task can be completed
2. Cells <https://www.bbc.com/education/guides/z9hyvcw/revision/1>
3. States of matter <https://www.bbc.com/education/topics/z9r4jxs>
4. Forces <https://www.bbc.com/education/guides/zttfyrd/revision/1>

Y7 Strand 2 IVC Science Curriculum Overview

Key Content/Topics:

This unit covers the topic of **Waves**

- Longitudinal and transverse wave properties and examples
- The greater the amplitude of a sound waveform, the louder the sound. The greater the frequency (and therefore the shorter the wavelength), the higher the pitch.



- Absorption, reflection and transmission of waves
- The angle of incidence equals the angle of reflection.
- The use of ray models
- Energy is transferred in the direction of movement of the wave.
- Waves of higher amplitude or higher frequency transfer more energy.
- A physical model of a transverse wave demonstrates it moves from place to place, while the material it travels through does not, and describes the properties of speed, wavelength and reflection.

Assessed Tasks:

1. Exam-style questions on light waves
2. Application of taught skills to practical situations
3. End of strand test – 10 multiple choice questions on factual recall and questions asking students to apply what they have learnt

SMSC & British Values:

S: Light is a wave

M: Discuss the ethical issues around the “mosquito” device used to deter teenagers from locations (e.g. shopping centres)

S: How do scientists decide on particular measurements?

C: Not everyone sees things exactly the same way

Enrichment Ideas:

- Make a periscope
- Sound wave activity on TES
- Make a jelly baby wave machine

Assessment Criteria:

1. Application of scientific knowledge to familiar and unfamiliar situations
2. Observation during practical activities
3. Taking measurements
4. Using units when taking measurements and when carrying out calculations
5. Using accurate scale drawings to represent physical phenomena

Literacy/Numeracy:

Wave

Transverse

Longitudinal

Incident ray

Reflected ray

Angle of reflection

Angle of incidence

Transparent

Translucent

Ray diagram

Ultrasound

Ultraviolet

Absorption

Transmission

- Light speed = 300 million metres per second.
- Describe the relationship between angles of incidence and refraction.
- Sketch graphs to illustrate wave properties
- Measure wave properties

Careers Links(CAEIG):

- Many engineering branches require expert knowledge of waves: acoustical, RF (radio frequency), laser, medical imaging
- Opticians require an in-depth knowledge of light waves, optics and lenses

Intervention Tasks:

1. Boost your flightpath task can be completed
2. [BBC Bitesize waves topic](#)

Y7 Strand 3 IVC Science Curriculum Overview

Key Content/Topics:

In this unit, students will study elements, compounds and mixtures. They will look at how elements are classified in a Periodic Table and will consider then ingenuity of the many scientists how sought to define and classify elements, including Dmitry Mendeleev who is credited as the 'Father of the Modern Periodic Table.

The unit then goes to look at how ingenious methods can be used to separate chemical mixtures which are essential in processes such as water purification and fractional distillation.



Finally, students will look at polymers: structure, properties and uses.

Assessed Tasks:

1. After observing the reaction of group 1 metals with water, you will be asked to describe the way they behave and use your knowledge to describe the trends you observed.
2. You will use your knowledge to help explain how to make pure drinking water if you become shipwrecked on an island.
3. End of strand test – 10 multiple choice questions on factual recall and questions asking students to apply what they have learnt

SMSC & British Values:

S: All stuff is made of tiny particles called atoms

M: What happens to the rubbish we produce?

S: How can we improve our environment by using sustainable sources for making products?

C: No scientist makes a discovery in isolation, the development of the periodic table is a good example of this

Enrichment Ideas:

The Wonderlab at the Science Museum, London.

Kitchen Chemistry from the

RSC: http://www.rsc.org/Education/Teachers/Resources/kitchenchemistry/resources4_2.htm

Make plastic from milk: <https://sciencebob.com/make-plastic-milk/>

Make your own slime: <https://theimaginationtree.com/easy-uk-slime-recipe-contact-lens-solution/>

Assessment Criteria:

Students will continue to

- Apply their knowledge to new situations,
- Make observations and explain what they see using their scientific knowledge
- Consider the role of key scientific discoveries and the individuals who made them and their impact on our understanding of our world
- Consider the possibilities of future discoveries in science on the materials that we use every day and plan and carry out their own investigation.

Literacy/Numeracy:

Element, compound, mixture, periodic, polymer, separation, filtration, condensation, evaporation, chromatography, distillation, property, reactivity, solute, soluble, insoluble, solvent, solution, dissolve



Students will also be expected to represent and interpret data in the form of a table or as a graph, collect their own data, calculate averages, and interpret physical properties provided from numerical data.

Careers Links(CAIEG):

- [Design engineer](#)
- [Materials engineer](#)
- [Metallurgist](#)
- [Product/process development scientist](#)
- [Chemical engineer](#)
- [Energy engineer](#)
- [Nuclear engineer](#)
- [Petroleum engineer](#)

Intervention Tasks:

1. Make an element cube. List the plastics you use in a day. Do you think you use a lot of plastic? Do you think your life would be different if we didn't have plastic?
2. Carry out research to find out how new elements are made, and describe the criteria that have to meet in order for the element to be acknowledged and named.
3. Plastic waste has recently featured on the news and in parliament (). Research the issue of plastic waste, describe the problems associated with it and explain why the government is trying to reduce it.
4. Boost your flightpath task can be completed

Y7 Strand 4 IVC Science Curriculum Overview

Key Content/Topics:

This unit covers the concept of **energy**

1. Energy can be stored and transferred.
2. How efficiency in these energy transfers can be increased
3. Power is the rate of energy transfer
4. What is the difference between heat and temperature
5. Where our electricity come from

Assessed Tasks:

1. Students will complete a task demonstrating they have understood the concepts of energy stores and transfers. They will be asked to apply what they know to some unfamiliar situations
2. Students will be asked to analyse data on experiments relating to energy, including what determines how much energy is transferred in different situations
3. End of strand test – multiple choice questions on factual recall and questions asking students to apply what they have learnt. This will cover all material from strand 3 and 4.

SMSC & British Values:



S: Energy is a fundamental concept, underpinning many other ideas in Science

M: Who's responsible to try and limit the environmental impact of the burning of fossil fuels?

S: What can individuals; societies and the government do to reduce the impact of global warming?

C: Why is a universal definition of energy important?

Enrichment Ideas:

Make a lollipop stick chain reaction to show energy stores and transfers: <https://www.stevespanglerscience.com/lab/experiments/popsicle-stick-chain-reaction/>

Assessment Criteria:

1. Application of scientific knowledge to familiar and unfamiliar situations
2. Observation during practical activities
3. Taking measurements
4. Simple calculations
5. Using units when taking measurements and carrying out calculations

Literacy/Numeracy:

Literacy

Energy

Store

Transfer

Efficiency

Heat

Temperature

Power

Work

Renewable

Non-renewable

Numeracy

Performing calculations to find:

- Efficiency
- Energy transferred

- Energy use in the home
- Cost of electricity

Careers Links(CAIEG):

There are many new jobs available in the energy sector, helping to develop and improve the use of renewable energy resources

Carbon capture and storage technology is being developed all the time as a way of reducing carbon dioxide emissions

Intervention Tasks:

1. 'Boost your flightpath' task can be completed
2. BBC Bitesize link for KS3 energy <https://www.bbc.com/education/topics/zc3g87h>

Y7 Strand 5 IVC Science Curriculum Overview

Key Content/Topics:

Habitats are places where organisms live. They will be able to describe habitats and begin to see that in order for organisms to thrive in a habitat they must be adapted to do so.

A range of sampling techniques

including use of quadrats can be used to investigate distribution of species

Appropriate scientific language to describe predators and prey, herbivores and carnivores and students will learn that feeding relationships within habitats are made up of food chains and these combine to make a food web.

The effects that humans have on the environment including the effects of farming, how pesticides can build up in food chains (bioaccumulation). Describe how the major taxonomic groups are classified and given characteristics of a species and the appropriate dichotomous key, students will be able to correctly identify that species.

Assessed Tasks:

1. Plotting and analysis of data related to predator-prey relationships
2. Questions to test understanding of adaptation
3. End of strand test – 10 multiple choice questions on factual recall and questions asking students to apply what they have learnt

SMSC & British Values:

S: All living things are connected



M: Understanding the effects of over use of chemicals that harm the environment

S: The cooperative working and group responsibilities

C: Who's responsible to ensure restrictive imports of endangered species and killing animals for monetary gain

Enrichment Ideas:

National History museum

Downing College Cambridge

Upware

Grapham Water

Wicken Fen

Assessment Criteria:

- Practical skills to carry out an investigation into habitats observation
- Calculations of the number of daisies/dandelions in an area of the school field
- Plotting graphs of predator prey relationships
- Identify adaptations that are necessary for survival of a species
- Using dichotomous keys to identify an organism

Literacy/Numeracy:

Organisms

Species

Ecosystem

Biotic

Abiotic

Survival

Habitat

Environment

Adaptation

Carnivore

Predator

Prey

Herbivore

Bioaccumulation

Classification

Dichotomous

Calculation of area using;

mean, mode, range

Careers Links(CAEIG):

Marine biologist

Nature conservation officer. Recycling officer.

Environmental Sciences

Water Authority pollution control

RSPB /DEFRA

Intervention Tasks:

1. Make a dichotomous key to identify stationary items in a pencil case.
2. Boost your flightpath' task can be completed
3. BBC Bitesize links on ecosystems and habitats <https://www.bbc.com/bitesize/topics/zxhhvcw>

Y8 Strand 1 IVC Science Curriculum Overview

Key Content/Topics:

The unit covers :-

1. Asexual and sexual reproduction in animals
2. Variation between species
3. Recall structure of the cell to identify site of genetic material and its structure.
4. Selective breeding & genetic engineering
5. Specialised cells involved in reproduction simple monohybrid crosses to show sex determination.
6. Human reproduction to include organ systems, puberty, menstrual cycle, fertilisation, development and birth of foetus, lifestyle effects on foetus



Assessed Tasks:

1. Application of taught skills to practical situations graph drawing of continuous and continuous data obtained in class
2. Literacy to describe the process of fertilisation using correct terminology
3. End of strand test – 10 multiple choice questions on factual recall and questions asking students to apply what they have learnt

SMSC & British Values:

S: Where did I come from?

M: Should we interfere in the development of certain species for profit?

S: Differences between groups are superficial, we are all the same on the inside

C: Should all scientific discoveries be shared with the wider world? Should science be gender blind?

Enrichment Ideas:

DNA origami <https://www.yourgenome.org/activities/origami-dna>

Sweet DNA <https://www.yourgenome.org/activities/yummy-gummy-dna>

Assessment Criteria:

1. Application of scientific knowledge to familiar and unfamiliar situations
2. Observation during practical activities
3. Taking measurements
4. Using units when taking measurements and when carrying out calculations
5. Use of formulae to solve mathematical problems
6. Graph drawing and analysis

Literacy/Numeracy:

Clone

Chromosome

Gene

DNA

Nucleus

Variation

Fertilisation

Embryo

Foetus

Genetic

Inherited

Environmental

Discontinuous

Continuous

Careers Links(CAIEG):

Human genome project

Forensic Investigations

Genetically modified plants and animal research

Intervention Tasks:

1. Find out why scientists Watson, Crick and Franklin were so important
2. Research "The Human Genome project"
3. Identify key events of the menstrual cycle https://www.youtube.com/watch?v=vXrQ_FhZmos
4. Research the effect of smoking, alcohol and drugs on the unborn foetus.
5. Collect data about similar and different characteristics that are inherited / environmental by making a family tree of themselves or of a famous family – celebrities or royalty.
6. Boost your flightpath task can be completed

Y8 Strand 2 IVC Science Curriculum Overview

Key Content/Topics:

This unit covers the concept of chemical change and the different types of chemical reactions which can cause a chemical change, including;

1. Oxidation and reduction
2. Combustion
3. Displacement
4. Neutralisation
5. Thermal decomposition

Students will also look in detail at acids and alkalis

Assessed Tasks:



1. Students will be assessed on their planning skills, including whether they can identify variables and complete a risk assessment for a practical task.
2. Students will be asked to analyse data to identify whether a chemical reaction is happening or not
3. End of strand test – 10 multiple choice questions on factual recall and questions asking students to apply what they have learnt

SMSC & British Values:

S: chemical reactions are amazing

M: the impact of profit vs the impact on the environment in the chemical industry

S: assessing risk to individuals and groups

C: why might chemistry seem like magic?

Enrichment Ideas:

20 fun science experiments to try at home <http://www.iflscience.com/chemistry/unfinished-20-fun-science-experiments-you-can-do-home/>

Assessment Criteria:

1. Observation during practical activities – how to spot when a chemical reaction is occurring
2. Application of scientific knowledge to familiar and unfamiliar situations
3. Assessing risks in the science classroom and how those risks might be mitigated by working safely
4. Analysis of data gathered during practical tasks

Literacy/Numeracy:

- Acid
- Alkali
- Metal
- pH
- Neutral
- Neutralisation
- Oxidation
- Reduction
- Combustion
- Displacement
- Thermal decomposition

Careers Links(CAEIG):

Many careers in the chemical industry rely on the ability of scientists to turn one material into another by means of a chemical reaction

Intervention Tasks:

1. BBC bitesize link on chemical reactions <https://www.bbc.com/education/topics/zypsgk7>
2. Chemical reactions 'boost your flightpath' task can be completed



Y8 Strand 3 IVC Science Curriculum Overview

This unit covers the topic of **Forces and Motion**

- Unbalanced forces cause a change in speed or direction
- Relationship between distance, speed and time
- Drawing and understanding distance-time graphs
- Relationship between mass and weight
- All mass exerts a gravitational force
- Pressure on surfaces and in a fluid
- Forces can stretch or compress an object

Assessed Tasks:

1. Exam-style questions on forces
2. Application of taught skills to practical situations
3. End of strand test – 10 multiple choice questions on factual recall and questions asking students to apply what they have learnt

SMSC & British Values:

S: Discussion and comparison of the different usages highlights how our feelings can affect us when the “forces” we feel are too great

M: how do we know what the gravity is like on other planets if we've never been?

S: how important is it that society uses the correct scientific terminology in everyday life?

C: how different cultures measure distance

Enrichment Ideas:

Build a rubber-band powered car

Weird helium balloon experiment

Forces dance mat game (students must work out the resultant force on each slide and step/skip/jump in the correct direction – add your own music!)

Assessment Criteria:

1. Application of scientific knowledge to familiar and unfamiliar situations
2. Observation during practical activities
3. Taking measurements
4. Using units when taking measurements and when carrying out calculations
5. Use of formulae to solve mathematical problems
6. Graph drawing and analysis



Literacy/Numeracy:

Speed

Acceleration

Relative motion

Weight

Mass

Force

Gravitational field strength

Field

Pressure

Fluid

Upthrust

Equilibrium

Newton

Resultant force

Friction

Tension

Compression

Applying equations to solve problems

Calculating average (mean)

Graph skills

Use of SI prefixes (kilo-, milli-, etc.)

Careers Links(CAEIG):

Mechanical engineering, civil (building) engineering and architecture all require in-depth knowledge of forces and motion.

Intervention Tasks:

1. Forces boost your flightpath task can be completed



2. [BBC Bitesize "Forces and movement"](#)
3. [GradeGorilla](#) -> KS3 -> Speed and Forces

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Y8 Strand 4 IVC Science Curriculum Overview

Key Content/Topics:

This unit covers the concept of **Respiration**

- Respiration is a chemical reaction that releases energy from glucose by reacting it with oxygen
- Respiration happens in the mitochondria of every cell and releases energy for life processes (MRS GREN)
- Oxygen for respiration is provided by the mechanism of breathing - Breathing brings oxygen rich air into the lungs; oxygen diffuses through the alveoli into the bloodstream and carbon dioxide diffuses out of the bloodstream into the alveoli to be breathed out as carbon dioxide rich air
- Glucose for respiration is provided by the food we eat through the mechanism of digestion
- The circulatory system, including the heart and blood vessels deliver the reactants for respiration to every cell and take away the waste products

Assessed Tasks:

1. Students will complete an extended writing task on adaptations of the alveoli
2. Students will write up a practical investigation which they have planned and carried out as part of their learning
3. End of strand test – Factual recall: multiple choice questions, Application: applying knowledge to unfamiliar situations. This assessment will cover material from strand 3 and 4.

SMSC & British Values:

S: how the human body keeps us alive through the process of respiration

M: why is a healthy diets important, is it fair that some people do not have enough to eat?

S: what can individuals; society and governments do to ensure people are educated about the benefits of a healthy lifestyle?

C: cooperative working and group responsibility

Enrichment Ideas:

Make a model of a lung: <https://www.youtube.com/watch?v=CBv2BqqAydE>

Design a clinical trial to study the effects of heart disease: <https://www.centreofthecell.org/learn-play/games/heart-disease/>



Research and build a mitochondrion out of paper

Assessment Criteria:

1. Scientific approaches to problem solving, science thinking and scientific literacy
2. Application of scientific knowledge to familiar and unfamiliar situations
3. Observation during practical activities
4. Taking measurements and recording
5. Using units when taking measurements and when carrying out calculations
6. Laboratory safety and risk assessment
7. Evaluation of methods

Literacy/Numeracy:

energy

respiration

mitochondria

trachea

bronchi

bronchioles

gas exchange

deficiency

anaemia

enzyme

Data processing

Calculation of mean

Graph skills

Careers Links(CAIEG):

Biomedical Scientists, Zoologists and Wildlife Biologists, Forensic Scientists and Technicians

Environmental Engineer, Medicinal Chemist or Physicist, Aeronautical Engineer, Design Engineer

Intervention Tasks:

Respiration

<https://www.bbc.com/education/guides/zq349j6/revision/1>



Breathing

http://www.bbc.co.uk/bitesize/ks3/science/organisms_behaviour_health/life_processes/revision/4/

Digestion

<https://www.bbc.com/education/guides/z9pv34j/revision/1>

Circulation

<https://www.bbc.com/education/clips/zjchyrd>

'Boost your flightpath' task can be completed

Y8 Strand 5 IVC Science Curriculum Overview

Key Content/Topics:

This unit covers the topic of Electricity and Magnetism

- Electricity transfers energy
- Electrons are charged particles inside atoms
- Current is the movement of electrons in a circuit
- The voltage (potential difference) in a circuit tells us how much energy is moved by the electrons
- Resistance is the property of a component that makes it difficult for electrons to move easily through the component
- Magnets have "north" and "south" poles
- An electromagnet can be created by passing an electric current through a wire or coil of wire

Assessed Tasks:

- Exam-style questions on forces
- End of unit test
- Application of taught skills to practical situations

SMSC & British Values:

Is our spirit/soul simply the sparks of electricity in our cells, or is it more than this?

Are we morally justified in our extraction of Earth's resources in order to produce the electricity needed for our modern lives?

What social pressures (if any) affect our production and usage of electricity?

How can we resolve the conflict between cultural expectations of luxury (unlimited energy) and a "greener" lifestyle?



Enrichment Ideas:

- Make your own loudspeaker
- Create a homopolar motor
- Build a steady hand game (see left-hand side of page for other projects)
- Visit the Centre for Computing History in Cambridge to see how computers (and video games!) have developed as our skill with electricity has improved

Assessment Criteria:

1. Application of scientific knowledge to familiar and unfamiliar situations
2. Observation during practical activities
3. Taking measurements
4. Using units when taking measurements and when carrying out calculations
5. Use of formulae to solve mathematical problems
6. Use of models to explain fundamental physical principles
7. Drawing electrical circuit diagrams

Literacy/Numeracy:

Current Charge Electrons Voltage

Potential Difference

Series & parallel circuits

Electric field

Resistance Conductor Insulator Electromagnet

Permanent magnet

Applying equations to solve problems Graph skills Use of SI

prefixes (kilo-, milli-, etc.)

Careers Links(CAEIG):

- Electrical & electronic engineering
- Radiographer (MRI operator)
- Electrician
- Army/RAF/Navy engineer

Intervention Tasks:

1. Electricity & Magnetism booster task can be completed

2. BBC Bitesize: [KS3 Electricity](#)

3. BBC Bitesize: [KS3](#)

[Electromagnetism and](#)

[Magnetism](#)

4. [GradeGorilla](#) -> KS3 -> Electricity

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Y9 Strand 1 IVC Science Curriculum Overview

Key Content/Topics:

Students will study Chemistry this strand covering:

1. Energy changes in chemical reactions
2. Fuels and combustion
3. Alternative fuels and their impact on the environment
4. How polymers are made
5. How scientists co-operate on projects
6. The importance of using units

Assessed Tasks:

1. Students will be given a set of data and be asked whether it proves a theory or not
2. Students conclusion and evaluation of the fuels investigation
3. End of strand test – 10 multiple choice questions on factual recall and questions asking students to apply what they have learnt

SMSC & British Values:

S: look at what can be achieved when scientists work together

M: should scientists always try and solve problems?

S: why is international co-operation so important to further our collective understanding of science?

C: why is it important that scientists speak the same language in terms of units

Enrichment Ideas:

Sign up to the Geneva trip which runs every year – visit the CERN facility for yourself



Assessment Criteria:

Key skills covered in this unit

1. How data can be used to prove a theory in Science
2. How chemical tests can be used to prove something is contaminated
3. How to plan and carry out an investigation looking at the energy output of different fuels
4. How to write chemical equations

Literacy/Numeracy:

Accuracy/Precision/Repeatable/ Reproducible/Peer review

Endothermic/Exothermic/Fuels/ Carbon neutral/Polymer

Careers Links(CAEIG):

Many large scale science projects such as CERN or the ISS employ a variety of scientists and engineers working together

There are many jobs in the energy sector

Intervention Tasks:

1. What is combustion?
2. What is a fossil fuel?
3. What is the difference between accuracy and precision?
4. Boost your flightpath task can be completed

Year 9 Home Learning Expectations: Science

When/how will homework be set?	Once per fortnight
How long should each task take?	30 minutes-1 hour (depending on the task chosen)
Will this work be marked by a teacher?	No, tasks will be self or peer marked
How will Home Learning/ intervention tasks be used if a student is underachieving?	Separate 'boost your flightpath' tasks will be set if students are underachieving in Science

Y9 Strand 2 IVC Science Curriculum Overview

Key Content/Topics:

Students will be learning and reviewing a range of exam skills needed for a successful start to their GCSE course. They will be looking at command words, mathematical and graph interpretation skills, required practical skills, and longer-answer question techniques. In addition they will have an introduction to electrical circuits, circuit symbols and how to trouble shoot “broken” circuits.

Assessed Tasks:

1. Demonstrate your mathematical skills in answering exam questions
2. Interpret data using some practical results
3. End of strand test

SMSC & British Values:

S: scientists must use their imagination to solve problems

M: why must science be objective?

S: working together to solve problems

C: all members of a team are valid, all voices deserve to be heard in scientific discoveries

Enrichment Ideas:

Build a simple electric circuit at home with a cell (battery). Build a crystal radio.

Visit the museum of technology.

Discuss science articles in the news, how they are reported and discuss how a key person might be able to find out more.

Assessment Criteria:

- Use a variety of models to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.
- Interpreting observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions.
- Being objective, evaluating data in terms of accuracy, precision, repeatability and reproducibility and identifying potential sources of random and systematic error.

Literacy/Numeracy:



Variables, independent, dependent, categoric, continuous, control, correlation, proportional, precision, accuracy, repeatable, direct. There will also be extensive practice in: calculating percentage change, calculating gradients, calculating averages, drawing graphs, standard-form and significant figures.

Careers Links(CAEIG):

Discussion of the role of scientists to communicate accurate results, draw appropriate conclusions and report these without bias.

Intervention Tasks:

- What is the difference between accuracy and precision?
- How do you represent very large and very small numbers using standard form? <https://tinyurl.com/ydytaxr3>
- How do you represent components of an electrical circuit using symbols and circuit diagrams? <https://tinyurl.com/gq9k3uj>
- Boost your flightpath task can be completed

Year 9 Home Learning Expectations: Science

When/how will homework be set?	Once per fortnight
How long should each task take?	30 minutes-1 hour (depending on the task chosen)
Will this work be marked by a teacher?	No, tasks will be self or peer marked
How will Home Learning/ intervention tasks be used if a student is underachieving?	Separate 'boost your flightpath' tasks will be set if students are underachieving in Science

Y9 Strand 3 IVC Science Curriculum Overview

Key Content/Topics:

Cells are the basic unit of all forms of life. In this section we explore how structural differences between types of cells enables them to perform specific functions within the organism. These differences in cells are controlled by genes in the nucleus.



If cells are isolated at an early stage of growth before they have become too specialised, they can retain their ability to grow into a range of different types of cells. This phenomenon has led to the development of stem cell technology.

We will also study how molecules move in and out of cells.

Assessed Tasks:

1. Exam questions related to diffusion
2. End of topic test using past exam questions

SMSC & British Values:

S: we are made up of trillions of cells

M: should we use embryonic stem cells to treat disease?

S: how do new scientific breakthroughs impact individuals and societies

C: collaboration and research from different scientists over the years have developed our understanding of cells

Enrichment Ideas:

Watch some youtube video songs/raps about parts of the cell and see if you can make your own (better) one.

Assessment Criteria:

Skills:

- Evaluate the risks and benefits, as well as social and ethical issues of the use of stem cells in medical research
- Recognise, draw and interpret diagrams that model transport into and out of cells

Practical skills:

- Observing cells under a microscope and drawing an accurate labelled diagram with a scale bar
- Investigating the effect of a range of sugar solutions on the mass of plant tissue

Literacy/Numeracy:

Prokaryote/Eukaryote

Mitochondria/Ribosome/Chloroplast

Xylem/Pholem

Differentiation

Chromosomes

Diffusion/Osmosis

Use of prefixes centi, milli, micro and nano

Microscopy calculations

Order of magnitude calculations

Percentage change calculations

Careers Links(CAEIG):

Microbiology

Stem cell research

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 9 Home Learning Expectations: Science

When/how will homework be set?	Once per fortnight
How long should each task take?	30 minutes-1 hour (depending on the task chosen)
Will this work be marked by a teacher?	No, tasks will be self or peer marked
How will Home Learning/ intervention tasks be used if a student is underachieving?	Separate 'boost your flightpath' tasks will be set if students are underachieving in Science

Y9 Strand 4 IVC Science Curriculum Overview

Key Content/Topics:

The periodic table provides chemists with a structured organisation of the known chemical elements from which they can make sense of their physical and chemical properties. The historical development of the periodic table and models of atomic structure provide good examples of how scientific ideas and explanations develop over time as new evidence emerges. The arrangement of elements in the modern periodic table can be explained in terms of atomic structure which provides evidence for the model of a nuclear atom with electrons in energy levels.

Assessed Tasks:

1. Explain why atoms are neutral
2. Describe and explain the trends of a group in the periodic table
3. End of topic test using past exam questions

SMSC & British Values:

S: all chemical reactions are driven by the transfer of electrons

M: is it right some chemist's ideas are dismissed because of their background?

S: how do we decide which ideas are 'right' in Science?

C: many different ideas have contributed to the modern day Periodic Table

Enrichment Ideas:

Explore the periodic table through the periodic table of videos

<http://www.periodicvideos.com/>

Assessment Criteria:

Skills:

- Understand why and describe how scientific methods and theories develop over time.
- Represent the electronic structures of the first twenty elements of the periodic table in both forms.
- Explain how testing a prediction can support or refute a new scientific idea.

Practical skills:

- Explore the properties of metals and non-metals
- Displacement reactions of the group 7 elements

Literacy/Numeracy:

Atom/Proton/Electron/Neutron



Element/Compound/Mixture

Use SI units and the prefix nano.

Recognise expressions in standard form.

Careers Links(CAEIG):

Many careers in the chemical industry rely on knowledge of atomic structure and the reactivity of certain elements

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 9 Home Learning Expectations: Science

When/how will homework be set?	Once per fortnight
How long should each task take?	30 minutes-1 hour (depending on the task chosen)
Will this work be marked by a teacher?	No, tasks will be self or peer marked
How will Home Learning/ intervention tasks be used if a student is underachieving?	Separate 'boost your flightpath' tasks will be set if students are underachieving in Science

Y9 Strand 5 IVC Science Curriculum Overview

Key Content/Topics:



This unit covers the AQA GCSE Physics topic Particle Model of Matter

- Matter has three states: solid, liquid, gas
- Modelling matter as particles
- Using the model to explain density, the three states, and state changes
- Linking internal energy to temperature and state changes
- Energy is stored or transferred during a state change
- Modelling gas pressure using the motion of particles

Assessed Tasks:

1. Planning and writing-up a practical
2. Plot a graph of temperature against pressure for a gas and use the graph to answer analytical questions
3. End of topic test using past exam questions

SMSC & British Values:

S: Reflect on any differences between your existing conceptions and the models studied during this unit

M: Use reasoned views to draw conclusions based on facts from experimental observations

S: Co-operate with fellow students to carry out practicals in small teams

C: Appreciate that the particle model is only one of a diverse set of models, each of which has its own pros and cons

Enrichment Ideas:

Break the laws of physics! Make a liquid that you can jump up and down on

Build a cartesian diver. Explain how it works!

Use wire to cut through ice without cutting it

Try to calculate the mass of a cloud

Assessment Criteria:

Skills:

- Maths skills in physics: use of equations to calculate an answer; re-arranging equations to change the subject
- Draw particle diagrams to model the states of matter



- Analysis of results and writing a conclusion
- Apply skills to analyse unfamiliar situations

Practical skills:

- Plan, set-up and carry out a practical
- Record results in a table and plot an appropriate graph

Literacy/Numeracy:

Literacy

Mass

Weight

Density

Internal energy

State change

Solid, liquid, gas

Melt & freeze, Boil & condense, Sublimate

Specific heat capacity

Specific latent heat

Gas pressure

Numeracy

Applying equations to solve problems

Graph skills

Use of SI prefixes (kilo-, milli-, etc.)

Re-arranging equations

Careers Links(CAEIG):

- Materials scientist / engineer
- Particle physicist
- Hydraulic systems engineer / technician
- HVAC (heating, ventilation & cooling) engineer / technician



Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 9 Home Learning Expectations: Science

When/how will homework be set?	Once per fortnight
How long should each task take?	30 minutes-1 hour (depending on the task chosen)
Will this work be marked by a teacher?	No, tasks will be self or peer marked
How will Home Learning/ intervention tasks be used if a student is underachieving?	Separate 'boost your flightpath' tasks will be set if students are underachieving in Science

Y10 Strand 1 IVC Chemistry Curriculum Overview

Key Content/Topics:

This unit covers theories of structure and bonding to explain the properties of materials

Students will cover theories of bonding including;

- Ionic
- Covalent
- Metallic



They will then link the type of bonding present to the structure present in that material to explain the properties present such as;

- Giant covalent
- Simple covalent
- Giant ionic

Separate science students will also look at nanoparticles and their uses.

Assessed Tasks:

1. Link the properties of a substance to its structure
2. End of topic test using past exam questions

SMSC & British Values:

S: everything is made of tiny particles called atoms

M: if scientific theories change over time, are they still correct?

S: importance of the development of new materials on society

C: scientists never work alone, they are always building on someone else's ideas

Enrichment Ideas:

Visit the Sedgwick museum or the Natural museum to see how the chemical make-up of rocks affects their properties

Assessment Criteria:

Skills:

- Recognise substances as ionic compounds, small molecules, polymers, giant covalent structures or metallic giant structures from diagrams showing their bonding.
- Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects.

Practical skills:

- Determine the properties of ionic compounds

Literacy/Numeracy:

Ionic/Covalent/Metallic

Lattice/Molecule

Polymer

Graphene/Fullerene



Nanoparticle

Careers Links(CAEIG):

Research chemist/materials engineer - Scientists use their knowledge of structure and bonding to engineer new materials with desirable properties.

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 10 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
How long should each task take?	The levelled tasks may take students up to one hour. Students are expected to spend 10 minutes at least 4 times a week on Tassomai (15-20 minutes in Year 11)
Will this work be marked by a teacher?	This will not be marked, however completion will be monitored by teachers. Students receive automatic feedback from Tassomai about their answers.
How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y10 Strand 2 IVC Chemistry Curriculum Overview

Key Content/Topics:

This unit links ideas about different types of structures to the types of chemical reactions they might undergo. Chemical reactions covered are:



1. Extraction of metals
2. Neutralisation
3. Electrolysis of molten ionic salts and solutions to predict the products

Assessed Tasks:

1. Analysis of data on the reactivity series
2. Describe and explain how aluminium is extracted via electrolysis
3. End of topic test using past exam questions

SMSC & British Values:

S: all chemical reactions are driven by the transfer of electrons

M: impact on the environment of the chemical industry, is this worth it in the search for profit?

S: why society needs to push scientists to develop alternative methods of metal extraction to conserve resources

C: why it is important scientists speak the same language regarding units

Enrichment Ideas:

There are many natural substances that act as an acid/alkali indicator such as; turmeric, red cabbage, onions, tea and blueberries!

Assessment Criteria:

Practical skills feature heavily in this unit. There are 3 required practical tasks included;

- Electrolysis of solutions
- Making a soluble salt
- Titration (Separate Science only)

Literacy/Numeracy:

Oxidation/Reduction

pH/Acid/Alkali/Neutralisation

Electrolysis/Cathode/Anode

Reactivity series

Careers Links(CAEIG):

Electrolysis and metal extraction are carried out all over the world and are highly lucrative industries

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 10 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
How long should each task take?	The levelled tasks may take students up to one hour. Students are expected to spend 10 minutes at least 4 times a week on Tassomai (15-20 minutes in Year 11)
Will this work be marked by a teacher?	This will not be marked, however completion will be monitored by teachers. Students receive automatic feedback from Tassomai about their answers.
How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y10 Strand 3 IVC Chemistry Curriculum Overview

Key Content/Topics:

The main topics covered this strand are:

1. Earth's atmosphere
2. Atmospheric pollutants
3. Potable water
4. Tests for gases

Students studying separate science will also cover:

1. Chemical tests for dissolved ions



2. Instrumental analysis

Assessed Tasks:

1. Analysis of data looking at the benefits and drawbacks of adding fluoride to drinking water
2. End of topic test using past exam questions

SMSC & British Values:

S; where did Earth's atmosphere come from?

M: how can individuals reduce their carbon footprint? Whose responsibility is it to tackle the problem of global warming?

S: how treatment of water allowed society to thrive as life expectancy rose

C: why groups of people may disagree on how to tackle societies problems

Enrichment Ideas:

Visit the Sedgwick museum to find out more about the history of planet Earth

Assessment Criteria:

1. Data analysis
 2. Practical skills There are 2 required practical tasks included in this strand;
- Water treatment
 - Chemical analysis (Separate Science only)

Literacy/Numeracy:

Combustion/Pollutants/Potable

Filtration/Sedimentation/

Chlorination

Careers Links(CAEIG):

There are many careers available in the branch of analytical science, these are in different industries such as waste water treatment, forensics and space exploration

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)



- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 10 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
How long should each task take?	The levelled tasks may take students up to one hour. Students are expected to spend 10 minutes at least 4 times a week on Tassomai (15-20 minutes in Year 11)
Will this work be marked by a teacher?	This will not be marked, however completion will be monitored by teachers. Students receive automatic feedback from Tassomai about their answers.
How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y10 Strand 4 IVC Chemistry Curriculum Overview

Key Content/Topics:

Energy

- Some chemical reactions exothermic and some are endothermic, we can identify these through a temperature change
- Calculation of energy change using bond enthalpies (H Tier)
- How fuel cells and batteries work (Separate Science)

Mixtures

- What is a mixture?
- Techniques for separating mixtures including; filtration, crystallisation, distillation and chromatography

Assessed Tasks:

1. Tasks related to the required practicals on temperature change and chromatography



2. End of topic test using past paper questions

SMSC & British Values:

S: some chemical reactions get colder when they occur

M: should we develop hydrogen fuel cells for vehicles?

S: retention factors for chromatography are recognised all over the world

C: many scientists contributed to the development of chromatography

Enrichment Ideas:

Make your own fruity battery at home

Assessment Criteria:

Data analysis

- Calculation (using bond enthalpies and of Rf values)

Practical skills.

- There are 2 required practical tasks included;
 - Measuring the temperature change of a chemical reaction
 - Using chromatography to separate a mixture

Literacy/Numeracy:

Endothermic/Exothermic

Distillation/Chromatography/

Filtration/Crystallisation

Calculation of bond enthalpies and of Retention factor in chromatography

Careers Links(CAIEG):

Chromatography is an important chemical analysis technique carried out in many different industries including on Mars by the Mars Rover!

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)



These tasks can be found in the Science area of Moodle.

Year 10 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
How long should each task take?	The levelled tasks may take students up to one hour. Students are expected to spend 10 minutes at least 4 times a week on Tassomai (15-20 minutes in Year 11)
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How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y10 Strand 1 IVC Biology Curriculum Overview

Key Content/Topics:

In this section we will learn about the human digestive system which provides the body with nutrients and the respiratory system that provides it with oxygen and removes carbon dioxide. In each case they provide dissolved materials that need to be moved quickly around the body in the blood by the circulatory system.

Damage to any of these systems can be debilitating if not fatal. Although there has been huge progress in surgical techniques, especially with regard to coronary heart disease, many interventions would not be necessary if individuals reduced their risks through improved diet and lifestyle.

Assessed Tasks:

1. Describing how to carry out each of the food tests and analysing results
2. Explaining the effect of different factors on the rate of enzyme action
3. End of topic test using past exam questions

SMSC & British Values:

S: respiration keeps us alive



M: should we treat diseases such as coronary heart disease?

S: risk factors associated with health issues and understanding what we as a community can do to reduce this.

C: why different cultures may be at risk from different conditions

Enrichment Ideas:

Visit museums such as:

- Anaesthesia Heritage Centre
- Barts Pathology Museum
- Old Operating Theatre & Herb Garret

Assessment Criteria:

Skills:

- Use models such as lock and key to explain enzyme action
- Evaluate methods of treating coronary heart disease and faulty heart valves bearing in mind the benefits and risks associated with the treatments
- Interpret data about risk factors for specified diseases

Practical skills:

- Use qualitative reagents to test for a range of carbohydrates, lipids and proteins
- Investigate the effect of pH on the rate of reaction of amylase enzyme

Literacy/Numeracy:

Enzyme/Denature

Amylase/Lipase/Protease

Lipids/Glycerol/Amino Acids

Coronary/Atrium/Ventricle

Non-communicable

Cardiovascular

Data interpretation about enzyme rates

Rate calculations of blood flow

Careers Links(CAIEG):

Medical or engineering around the design and use of stents, pacemakers and artificial hearts.



Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 10 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
How long should each task take?	The levelled tasks may take students up to one hour. Students are expected to spend 10 minutes at least 4 times a week on Tassomai (15-20 minutes in Year 11)
Will this work be marked by a teacher?	This will not be marked, however completion will be monitored by teachers. Students receive automatic feedback from Tassomai about their answers.
How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y10 Strand 2 IVC Biology Curriculum Overview

Key Content/Topics:

Pathogens are microbes such as viruses and bacteria that cause infectious diseases in animals and plants. They depend on their host to provide the conditions and nutrients that they need to grow and reproduce. They frequently produce toxins that damage tissues and make us feel ill.

We explore how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. Once inside the body our immune system is triggered which is usually strong enough to destroy the pathogen and prevent disease.



When at risk from unusual or dangerous diseases our body's natural system can be enhanced by the use of vaccination.

We also use a range of antibiotics successfully against a number of lethal diseases caused by bacteria, however many groups of bacteria have now become resistant to these antibiotics.

Assessed Tasks:

1. Describing how to carry out each Evaluating risk factors on non-communicable disease
2. Task explaining how the immune system works
3. End of topic test using past exam questions

SMSC & British Values:

S: how are our immune system works

M: should we test on animals?

S: implications of herd immunity and fake news.

C: why might some cultures have a different approach to using antibiotics

Enrichment Ideas:

Visit the Alexander Fleming Laboratory Museum

Assessment Criteria:

Skills:

- Evaluate the global use of vaccination in the prevention of disease
- Understand the stages of testing, trials and peer reviews that new drugs undergo prior to being licensed.

Practical skills:

- Investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition

Literacy/Numeracy:

Communicable/Pathogen

Bacteria/Virus/Protist/Fungi

Phagocyte/Lymphocyte

Toxin

Antigen/Antibody/Antitoxin



Antibiotic/Antibiotic Resistance

Monoclonal antibodies

Calculate cross-sectional areas of clear areas around an antibiotic on agar plates

Careers Links(CAEIG):

Medical research developing new drugs.

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 10 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
How long should each task take?	The levelled tasks may take students up to one hour. Students are expected to spend 10 minutes at least 4 times a week on Tassomai (15-20 minutes in Year 11)
Will this work be marked by a teacher?	This will not be marked, however completion will be monitored by teachers. Students receive automatic feedback from Tassomai about their answers.
How will Home Learning/intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y10 Strand 3 IVC Biology Curriculum Overview

Key Content/Topics:



In this section we will explore how plants harness the Sun's energy in photosynthesis in order to make food. We will also learn how the plant's transport system is dependent on environmental conditions to ensure that leaf cells are provided with the water and carbon dioxide that they need for photosynthesis.

Both animals and plants use this oxygen to oxidise food in a process called aerobic respiration which transfers the energy that the organism needs to perform its functions. Conversely, anaerobic respiration does not require oxygen to transfer energy. During vigorous exercise the human body is unable to supply the cells with sufficient oxygen and it switches to anaerobic respiration. This process will supply energy but also causes the build-up of lactic acid in muscles which causes fatigue.

Assessed Tasks:

1. Questions linked to the required practical investigating the rate of photosynthesis
2. End of topic test using past exam questions

SMSC & British Values:

S: how oxygen came about on planet Earth

M: issues around food miles & food security

S: why plants are so important to society

C: many experiments from different scientist led to a deeper understanding of photosynthesis

Enrichment Ideas:

Experiment with growing plants in different conditions – which is the best?

Assessment Criteria:

Skills:

- Extract and interpret or plot graphs of rate of photosynthesis
- Use data to relate limiting factors to the cost of effectiveness of adding heat, light or carbon dioxide to greenhouses

Practical skills:

- Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed
- Measure the rate of transpiration by the uptake of water
- Investigate the distribution of stomata and guard cells
- Investigate the effect of exercise on the body

Literacy/Numeracy:

Photosynthesis

Aerobic respiration



Anaerobic respiration

Fermentation

Metabolism

Calculate rates of photosynthesis

Use inverse square law and light intensity in the context of photosynthesis

Careers Links(CAEIG):

Arable farming, plant nurseries, hydroponics.

Personal training/gym

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 10 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
How long should each task take?	The levelled tasks may take students up to one hour. Students are expected to spend 10 minutes at least 4 times a week on Tassomai (15-20 minutes in Year 11)
Will this work be marked by a teacher?	This will not be marked, however completion will be monitored by teachers. Students receive automatic feedback from Tassomai about their answers.
How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y10 Strand 4 IVC Biology Curriculum Overview

Key Content/Topics:

- Cells in the body can only survive within narrow physical and chemical limits.
- In order to do this the body requires control systems that constantly monitor and adjust.
- The structure and function of the nervous system and how it can bring about fast responses.
- The hormonal system which usually brings about much slower changes, including regulation of the menstrual cycle
- Development of both contraceptive drugs and drugs which can increase fertility.

Assessed Tasks:

1. Analyse and explain the effect of different factors on reaction time.
2. End of topic test using past exam questions

SMSC & British Values:

S: how our bodies work

M: choice of contraception is personal decision

S: implications of IVF

C: attitudes towards contraception

Enrichment Ideas:

Play a sports game to improve reaction times

Assessment Criteria:

- Evaluate the use of different hormonal and non-hormonal contraceptives and explain why issues around contraception cannot be answered by science alone.
- Evaluate methods of treating infertility and understand social and ethical issues associated with IVF.
- Evaluate the advantages and disadvantages of treating kidney failure by transplant or dialysis (Separate Biology only)

Practical skills:

- Plan and carry out an investigation into the effect of a factor on human reaction time
- Investigate the effect of light or gravity of seedlings (Separate Biology only)

Literacy/Numeracy:

Homeostasis



Stimuli/CNS/Reflex arc

Endocrine/Hormone

Pituitary gland/Thyroid gland

Insulin/Glycogen/Glucagon

FSH/LH/Oestrogen/Progesterone

Fertility/Contraception

Translate information about reaction times between numerical and graphical forms

Careers Links(CAEIG):

Developing sports drinks, IVF research/fertility clinics.

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 10 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
How long should each task take?	The levelled tasks may take students up to one hour. Students are expected to spend 10 minutes at least 4 times a week on Tassomai (15-20 minutes in Year 11)
Will this work be marked by a teacher?	This will not be marked, however completion will be monitored by teachers. Students receive automatic feedback from Tassomai about their answers.
How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above.

	Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them
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Y10 Strand 1 IVC Physics Curriculum Overview

Key Content/Topics:

This topic covers ideas around matter. Including;

- Particle models of solids, liquids and gases
- Density
- Changing state
- Specific heat capacity
- Conduction, convection and radiation

Separate science students will cover additional content on pressure and gases

Assessed Tasks:

1. Task involved with calculating specific heat capacity and practical skills
2. Questions on pressure (separate science only)
3. End of topic test using past paper questions

SMSC & British Values:

S: are there only 3 states of matter?

M: who decides what constitutes a new state of matter?

S: the need for scientists to agree on measurements and units for temperature

C: Science on film – many Hollywood movies imagine shrinking objects or people – will this be possible?

Enrichment Ideas:

Investigate the physical properties of slime

<http://scienceprojectideasforkids.com/2010/starting-slime-project/>

Assessment Criteria:

Students will be expected to:

- Carry out a required practical to calculate the density of regular and irregular objects

- Analyse heating and cooling curves
- Carry out calculations involving both specific heat capacity and latent heat
- Carry out a required practical looking at insulating materials (separate science only)

Literacy/Numeracy:

Particles/state of matter/internal energy/specific heat capacity/latent heat/pressure/heat/temperature

Careers Links(CAIEG):

Many careers rely on knowing by how much the temperature will change of a substance when that substance is heated – precision engineering is one example

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 10 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
How long should each task take?	The levelled tasks may take students up to one hour. Students are expected to spend 10 minutes at least 4 times a week on Tassomai (15-20 minutes in Year 11)
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How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y10 Strand 2 IVC Physics Curriculum Overview



Key Content/Topics:

This unit covers ideas about energy

Topics included are;

- Energy stores and transfers
- Energy efficiency & methods to increase the energy efficiency of energy transfers
- Energy resources from both renewable and non-renewable sources

Assessed Tasks:

1. Practical skills for the specific heat capacity practical
2. End of topic test using past paper questions

SMSC & British Values:

S: energy is fundamental concept to understanding how the universe works

M: who's responsible to try and limit the environmental impact of the burning of fossil fuels?

S: what can individuals; societies and the government do to reduce the impact of global warming?

C: energy solutions need to be appropriate to the location they are needed

Enrichment Ideas:

Make a lollipop stick chain reaction to show energy stores and transfers: <https://www.stevespanglerscience.com/lab/experiments/popsicle-stick-chain-reaction/>

Assessment Criteria:

Students will be expected to calculate;

- Kinetic energy, Gravitational potential energy & elastic potential energy store of an object
- Work done and power transferred in a system
- Energy efficiency

Students will be expected to carry out a required practical to calculate the specific heat capacity of substances

Literacy/Numeracy:

Energy store/energy transfer/energy efficiency/energy resource/Joule/Watts

Students need to learn the relevant equations.

Careers Links(CAEIG):



There are many new jobs available in the energy sector, helping to develop and improve the use of renewable energy resources.

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 10 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
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Y10 Strand 3 IVC Physics Curriculum Overview

Key Content/Topics:

This unit of work covers the concept of electricity including;

- Circuit symbols and different types of circuits
- Resistance in a circuit and the factors that affect it
- Properties of thermistors and light dependent resistors



- Electricity in the home (how the national grid works, wires inside a plug)
- Power and energy in circuits

Separate science students will also cover static electricity and electric fields

Assessed Tasks:

1. Required practical write-up on resistance in a circuit
2. Task linking power and energy
3. End of topic test made up of past paper questions

SMSC & British Values:

S: what is electricity?

M: should everyone have access to electricity? Is it fair that some communities around the world do not?

S: what happens if the lights go out? Why is the National grid so important?

C: why is it important that circuit symbols are recognised all over the globe

Enrichment Ideas:

Some fun electricity experiments to try at home <https://www.kiwico.com/blog/2016/12/12/electric-science-projects-for-kids/>

Assessment Criteria:

- Building and taking measurements in circuits
- Calculating; current, voltage, charge, resistance and power in circuits
- Plotting graphs of data to determine resistance of components

There are two required practical tasks in this unit:

1. Factors affecting the resistance of a wire
2. Looking at the changing IV characteristics of components in series and parallel circuits

Literacy/Numeracy:

Series/parallel/current/ resistance/voltage/power

Students need to learn the relevant equations

Careers Links(CAEIG):

Electrical engineering

Aerospace engineer



Cardiovascular technicians

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 10 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
How long should each task take?	The levelled tasks may take students up to one hour. Students are expected to spend 10 minutes at least 4 times a week on Tassomai (15-20 minutes in Year 11)
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Y10 Strand 4 IVC Physics Curriculum Overview

Key Content/Topics:

This unit cover ideas around radioactivity

- Structure of the atom
- How ideas about the atom have changed over time
- Radioactive decay including; half-life, writing decay equations & dangers and uses
- Background radiation



- Irradiation and how this is different to contamination

Separate science students will also cover

- Radiation in medicine
- Nuclear fission
- Nuclear fusion

Assessed Tasks:

1. Describe and explain the properties of alpha, beta and gamma radiation
2. End of topic test made up of past paper questions

SMSC & British Values:

S: not all radiation is bad

M: do the benefits of using radioactivity outweigh the risks associated with using them?

S: who should deal with radioactive waste, is it acceptable that UK nuclear waste goes to other countries for processing?

C: many ideas contributed to atomic theory

Enrichment Ideas:

Why does the sun shine?

<https://www.youtube.com/watch?v=3JdWISF195Y>

Building the Chernobyl arch

<http://world-nuclear-news.org/Articles/Chernobyl-arch-moved-into-place-in-historic%C2%A0engine>

Assessment Criteria:

- Understand why and describe how scientific methods and theories develop over time.
- Interpret data about half-life and count rates to determine what kind of radioactive source is present
- Writing nuclear decay equations

Literacy/Numeracy:

Proton/neutron/electron/

alpha/beta/gamma/decay

contamination/irradiation

background radiation

Careers Links(CAEIG):

There are many careers available in nuclear medicine and the nuclear energy industry

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 10 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
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How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y11 Strand IVC Chemistry Curriculum Overview

Key Content/Topics:

This unit looks at measurements in Chemistry and introduces ideas around the mole.

The main topics covered are:

1. Conservation of mass in chemical reactions



2. How to measure changes in mass during reactions
3. Moles in solids, solutions and gases (HT/Separate only)

Assessed Tasks:

1. Practise calculations
2. End of topic test using past exam questions

SMSC & British Values:

S: Avogadro's ideas around the mole were a leap of imagination

M: Atom economy – should chemical companies sacrifice profit to protect resources and the environment?

S: why is it important that chemists can measure substances the same way no matter where they are in the world?

C: approaches to conserving the environment vary widely around the world

Enrichment Ideas:

Celebrate mole day on 23/10 (Avogadro's number 6×10^{23})

<https://sciencenotes.org/fun-chemistry-mole-puns-mole-day/>

Assessment Criteria:

Mathematical reasoning feature heavily in this unit. Students are expected to calculate the following:

1. Relative formula mass
2. Percentage yield of a reaction
3. Number of moles

If studying separate science, additional calculations include:

1. Atom economy of a reaction
2. Finding the concentration of an unknown solution via titration
3. Moles of gases

Literacy/Numeracy:

Relative formula mass/mole/percentage yield/atom economy/titration

Careers Links(CAEIG):

Many jobs in the research and chemical industry depend upon maximising the percentage yield of a chemical reaction

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 11 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
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How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y11 Strand 2 IVC Chemistry Curriculum Overview

Key Content/Topics:

This unit covers rates of reaction. Topics included:

- Factors which affect the rate of a chemical reaction
- How to measure the rate of a chemical reaction
- Reversible reactions
- Chemical equilibria (H tier only)

Separate science students will also look at

- The Haber process



- Production of fertilisers

Assessed Tasks:

1. Write up of the required practical tasks – one on an experiment that is measured through a change in volume, one is monitored through changing colour
2. End of topic test comprised of past paper questions

SMSC & British Values:

S: particles need to collide in order for a chemical reaction to occur

M: What responsibility does the chemical industry have to try and solve mankind's problems?

S: how development of the Haber process meant societies could flourish

C: why scientific discoveries should be freely shared

Enrichment Ideas:

Try the diet coke and mentos experiment at home to investigate rates of reaction

<http://www.eepybird.com/>

Assessment Criteria:

- Practical skills – setting up rates experiments, taking measurements and identifying weaknesses in the experimental set-up
- Students must complete 2 required practical tasks on rates
- Graph plotting and analysing the changing rate of reaction through graphical data

Literacy/Numeracy:

Rate of reaction/concentration/ pressure/surface area/catalyst/equilibrium

Careers Links(CAEIG):

Chemical engineers are highly valued in the chemical industry as they ensure that chemical reactions run as expected

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.



Year 11 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
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Y11 Strand 3 IVC Chemistry Curriculum Overview

Key Content/Topics:

This unit covers introduces students to the topic of organic chemistry. Ideas covered are;

- Crude oil and fractional distillation
- Alkanes
- Cracking of hydrocarbons

Separate science students will also cover;

- Alkenes
- Alcohols
- Carboxylic acids
- Polymers

Assessed Tasks:

1. Describe and explain how crude oil is separated
2. End of topic test comprised of past paper questions

SMSC & British Values:



S: the amazing world of carbon

M: is making disposable plastics the best use such a valuable resource such as crude oil?

S: why events such as crude oil spills have a detrimental impact across populations

C: how the life cycle assessment of a product will be determined by the geographical conditions

Enrichment Ideas:

Some further reading, why organic chemistry is awesome!

<http://theweek.com/articles/653266/why-organic-chemistry-awesome>

Assessment Criteria:

Students will be expected to;

- Identify types of organic compounds from the bonds present
- Write balanced equations for the combustion of alkanes
- Use data to draw conclusion about whether plastic or paper has more impact on the environment

Separate science students will also be expected to predict the products made in;

addition reactions of alkenes and polymerisation reactions

Literacy/Numeracy:

Hydrocarbon/alkane/alkene/ cracking/alcohol/carboxylic acid/polymers/life cycle assessment

Careers Links(CAIEG):

There are many careers in the organic chemistry, it is a vast and lucrative field covering everything from drug development to specialised agriculture products

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 11 Home Learning Expectations: Science



When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
How long should each task take?	The levelled tasks may take students up to one hour. Students are expected to spend 10 minutes at least 4 times a week on Tassomai (15-20 minutes in Year 11)
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Y11 Strand 1 IVC Biology Curriculum Overview

Key Content/Topics:

- Cells in the body can only survive within narrow physical and chemical limits, requiring a constant temperature and pH as well as a constant supply of dissolved food and water.
- The human body requires control systems that constantly monitor pH and temperature & adjust this accordingly
- Structure and function of the nervous and hormonal system
- Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle.
- This has led to the development of contraception and treatments for infertility

Assessed Tasks:

1. Analyse and explain the effect of different factors on reaction time.
2. End of topic test using past exam questions

SMSC & British Values:

S: the many processes our body has to keep us alive

M: choice of contraception is personal decision

S: should we treat infertility on the NHS?



C: attitudes towards fertility differ around the world

Enrichment Ideas:

Play a sports game to improve reaction times

Assessment Criteria:

Skills:

- Evaluate the use of different hormonal and non-hormonal contraceptives and explain why issues around contraception cannot be answered by science alone.
- Evaluate methods of treating infertility and understand social and ethical issues associated with IVF.
- Evaluate the advantages and disadvantages of treating kidney failure by transplant or dialysis (Separate Biology only)

Practical skills:

- Plan and carry out an investigation into the effect of a factor on human reaction time
- Investigate the effect of light or gravity of newly germinated seedlings (Separate Biology only)

Literacy/Numeracy:

Homeostasis

Stimuli/CNS/Reflex arc

Endocrine/Hormone

Pituitary gland/Thyroid gland

Insulin/Glycogen/Glucagon

FSH/LH/Oestrogen/Progesterone

Fertility/Contraception

Translate information about reaction times between numerical and graphical forms

Careers Links(CAIEG):

Developing sports drinks, IVF research/fertility clinics.

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)



These tasks can be found in the Science area of Moodle.

Year 11 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
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Y11 Strand 2 & 3 IVC Biology Curriculum Overview

Key Content/Topics:

Meiosis forms gametes which combine to produce unique offspring. Gene mutations occur continuously and on rare occasions can affect the functioning of the organism. These mutations may be damaging and lead to a number of genetic disorders. Variation generated by mutations and sexual reproduction is the basis for natural selection; this is how species evolve. An understanding of these processes has allowed scientists to selectively breed livestock with favoured characteristics. It is also possible to clone individuals to produce larger numbers of identical individuals

Assessed Tasks:

1. Compare sexual and asexual reproduction
2. Compare mitosis and meiosis
3. Evaluate the use of embryo screening
4. Predict inheritance of characteristics
5. End of topic test using past exam questions

SMSC & British Values:

S: where did I come from?



M: should we be allowed to clone or genetically modify organisms?

S: how do genetic conditions affect society

C: are women fairly remembered in Science?

Enrichment Ideas:

Cycle the DNA path from Addenbrooke's to Great Shelford which is decorated with 10,257 colourful stripes to represent the sequence of the BRCA2 gene

Assessment Criteria:

Skills:

- Understand that embryo screening and gene therapy may alleviate suffering but consider the ethical issues which arise.
- Use the theory of natural selection to explain evolution and use data to support that theory.
- Understand how scientific methods and theories develop over time.
- Explain the benefits and risks of selective breeding, given appropriate information.
- Interpret information about genetic engineering techniques and to make informed judgements about cloning and genetic engineering

Literacy/Numeracy:

Sexual/asexual reproduction

Meiosis/Gametes

Genome/DNA Allele/Dominant/Recessive

Homozygous/Heterozygous

Genotype/Phenotype

Polydactyly/Cystic Fibrosis

Genetic Engineering/Cloning

Careers Links(CAEIG):

Gene sequencing, development of personalised medicines, genetic engineering, animal husbandry.

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 11 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
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Y11 Strand 4 IVC Biology Curriculum Overview

Key Content/Topics:

The Sun is a source of energy that passes through ecosystems. Materials including carbon and water are continually recycled by the living world.

All species live in ecosystems composed of complex communities of animals and plants dependent on each other and that are adapted to particular conditions, both abiotic and biotic.

In this section we will explore how humans are threatening biodiversity as well as the natural systems that support it. We will also consider some actions we need to take to ensure our future health, prosperity and well-being.

Assessed Tasks:

1. Plan how to use a sampling technique to investigate the effect of a factor on the distribution of this species
2. End of topic test using past exam questions

SMSC & British Values:



S: energy from the Sun drives all life on planet Earth

M: how are humans impacting the environment?

S: what can society do to limit human impact?

C: why might different cultures have different approaches to solving problems such as loss of biodiversity?

Enrichment Ideas:

Pond dipping

Assessment Criteria:

Skills:

- Explain how waste, deforestation and global warming have an impact on biodiversity.
- Understand that the scientific consensus about global warming and climate change is based on systematic reviews of thousands of peer reviews publications.
- Evaluate given information about methods that can be used to tackle problems caused by human impacts on the environment.

Practical skills:

- Measure the population size of a common species in a habitat
- Investigate the effect of temperature on the rate of decay of fresh milk (Separate Biology only)

Literacy/Numeracy:

Communities

Abiotic/Biotic

Adaptations

Biodiversity

Careers Links(CAEIG):

Environmental consultant, restoration ecologist.

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)



These tasks can be found in the Science area of Moodle.

Year 11 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to select and complete one of the levelled homework tasks as well as Tassomai quizzes
How long should each task take?	The levelled tasks may take students up to one hour. Students are expected to spend 10 minutes at least 4 times a week on Tassomai (15-20 minutes in Year 11)
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Y11 Strand 1 IVC Physics Curriculum Overview

Key Content/Topics:

This strand completes the Forces topic that was begun at the end of Year 10. It covers:

- Scalar and vector quantities
- Newton's three Laws of Motion
- Force, velocity and acceleration
- Velocity-time graphs
- Terminal velocity
- Stopping distance of a car
- Momentum (higher tier only)

Assessed Tasks:

- Equations test: recall and application of all equations studied in Year 10
- Plan and write up a practical investigation into Newton's Second Law
- End of unit test

SMSC & British Values:



S: motion can be predicted and measured

M: Science is changing: Newton's Laws are a useful model, but they are superseded by Einstein's Special Relativity, how can they both be correct?

S: why should drink and drug driving limits be imposed?

C: why there may be differences in the car technological advancements around the world

Enrichment Ideas:

Helium balloons move strangely in a car

Calculate terminal velocity using your phone camera

Visit the Cambridge Museum of Technology

Assessment Criteria:

Skills:

- Recall and application of physics equations to solve mathematical problems
- Planning, execution and analysis of practical activities relating to forces and motion
- Draw, interpret and analyse force and motion graphs
- Recall Newton's Laws of Motion and use them to simplify and analyse physical scenarios

Literacy/Numeracy:

Scalar & vector

Contact & non-contact forces

Thinking, braking & stopping distance

Momentum

Solving problems using force equations

Careers Links(CAEIG):

- Any engineering discipline that works with machines, motion or forces
- Driving instructor
- Astronaut
- Theme park designer

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)



- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 11 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to complete Tassomai quizzes
How long should each task take?	Students are expected to spend 15-20 minutes a day on Tassomai
Will this work be marked by a teacher?	This will not be marked by a teacher as students receive automatic feedback about their answers
How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y11 Strand 2 IVC Physics Curriculum Overview

Key Content/Topics:

This strand covers the Waves topic.

- Properties of waves
- Waves in gases, liquids and solids
- The electromagnetic (EM) spectrum
- Uses, applications and hazards of EM waves
- Ray diagrams for light waves
- Separate science only: transmission and reflection; sound waves; lenses; visible light; black-body radiation; waves for detection and exploration

Assessed Tasks:

- Exam-style questions comparing transverse and longitudinal wave properties
- Plan and write up a practical investigation into reflection and/or refraction



- End of unit test

SMSC & British Values:

S: the amazing properties of light

M: Science is changing: light was viewed as simply a wave, but is now also modelled as a particle – both are valid, why?

S: how the use of gamma rays to treat cancer improved survival rates

C: many scientists carried out experiments to determine the structure of the inside of the Earth

Enrichment Ideas:

Make a pinhole camera ([page 19](#))

Measure the speed of light using marshmallows ([page 21](#))

Why has the sun already set when we see “[sunset](#)”?

How can we [see the stars using radio waves](#)?

Visit [Jodrell Bank](#)

Assessment Criteria:

Skills:

- Recall and application of physics equations to solve mathematical problems
- Planning, execution and analysis of practical activities relating to sound and/or light waves
- Use of graphical techniques (ray diagrams) to solve wave problems

Literacy/Numeracy:

Transverse & longitudinal

Wavelength, frequency & amplitude

Reflection, refraction, transmission and absorption

Use of wave equations

Careers Links(CAEIG):

- Any [engineering discipline](#) that works with wave properties
- [Warfare specialist – sonar](#)
- [Photographer](#)
- [Holographer](#)
- [Radiographer](#)
- [Acoustics consultant](#)



Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 11 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to complete Tassomai quizzes
How long should each task take?	Students are expected to spend 15-20 minutes a day on Tassomai
Will this work be marked by a teacher?	This will not be marked by a teacher as students receive automatic feedback about their answers
How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y11 Strand 3 IVC Physics Curriculum Overview

Key Content/Topics:

This strand covers the Magnets and Electromagnetism topic.

- Poles of a magnet
- Draw, plot & explain magnetic fields
- The Earth's magnetic field
- Magnetic field due to an electric current flowing through a wire
- The motor effect and Fleming's left-hand rule



- Separate science only: loudspeakers & microphones; induced potential & the generator effect; transformers

Assessed Tasks:

- Exam-style questions describing and drawing magnetic fields for permanent magnets and electromagnets
- Plan and write up a practical investigation into factors affecting the strength of an electromagnet
- End of unit test

SMSC & British Values:

S: Science in history: magnetism was the key to the development of early navigational techniques, linking the countries of the world together across the oceans.

M: how do we know magnetic fields exist?

S: use of transformers to transfer electricity across the country improving lives

C: Science on film – will the flux capacitor from Back to the Future ever be a real device?

Enrichment Ideas:

Homemade [gauss gun](#)

Make a [homopolar motor](#)

See the electric motors at the [Cambridge Museum of Technology](#)

Assessment Criteria:

Skills:

- Recall and application of physics equations to solve mathematical problems
- Planning, execution and analysis of practical activities relating to electromagnets and/or electric motors

Literacy/Numeracy:

Permanent & induced magnets

Attraction & repulsion

Solenoid

Magnetic flux density

Alternator & dynamo

Careers Links(CAEIG):

- Any engineering discipline that works with motors or electromagnets
- MRI technician
- Loudspeaker designer

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 11 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to complete Tassomai quizzes
How long should each task take?	Students are expected to spend 15-20 minutes a day on Tassomai
Will this work be marked by a teacher?	This will not be marked by a teacher as students receive automatic feedback about their answers
How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y11 Strand 4 IVC Physics Curriculum Overview

Key Content/Topics:

This topic is only studied by those students on the separate science pathway.

This strand covers the Space topic.



- Planets, moons, stars, solar systems, galaxies
- Life cycle of stars
- Orbital motion
- Fission and fusion
- Formation of new elements in stars and supernovae
- Red-shift of light due to relative motion

Combined Science students will start revising for external exams.

Assessed Tasks:

- Exam-style questions describing the fate of different sized stars
- Explain the difference between fusion and fission
- Analysis and explanation of what we can learn from the red shift of distant galaxies
- End of unit test

SMSC & British Values:

S: How did emerging scientific ideas about the structure of the solar system conflict with the teachings of the church? How was this resolved?

M: Direct measurement of most objects and distances in space is not possible. How can we be sure that our ideas are correct?

S: Work with fellow students to discuss, analyse and solve problems.

C: How have the stars been incorporated into the culture and beliefs of ancient civilizations? How does space affect our modern civilization?

Enrichment Ideas:

Join the IVC Astronomy club!

Visit a public event at the [Cambridge University Institute of Astronomy](#)

Visit the [National Space Centre](#) in Leicester

Assessment Criteria:

Skills:

- Recall and application of physics equations to solve mathematical problems
- Research information about the solar system and present it in a form suitable for others to understand
- Use models to help explain the expanding universe and the subsequent red shift of light

Literacy/Numeracy:

Solar system

Galaxy



Main sequence star

Supernova

Fusion

Careers Links(CAIG):

- Astronomer
- Meteorologist
- Rocket scientist
- Satellite design engineer

Intervention Tasks:

If students fail to meet their minimum target, they will be expected to complete one of the following for that module:

- GetIT (for Entry Level students)
- KnowIT (for Combined Science students)
- GraspIT (for Separate Science students)

These tasks can be found in the Science area of Moodle.

Year 11 Home Learning Expectations: Science

When/how will homework be set?	Students will be expected to complete Tassomai quizzes
How long should each task take?	Students are expected to spend 15-20 minutes a day on Tassomai
Will this work be marked by a teacher?	This will not be marked by a teacher as students receive automatic feedback about their answers
How will Home Learning/ intervention tasks be used if a student is underachieving?	If students fail to meet their minimum target, they will be expected to complete one of the tasks listed above. Teachers will then check that students have completed the task. Students will self-assess their answers using the mark schemes available to them

Y9 Home Learning Strand 1-2 IVC Science



Independently:

These tasks are designed to build students' independence using flipped learning. This could include doing research, some reading or recapping prior learning before a lesson.

Excelling/Mastering

Find a scientific news item related to strand 2 and summarise it in your own words.

Teach today's lesson to a family member or friend and mark the work that they produce.

Securing/Developing

Choose a maths topic and show how it can be used in science.

Compose three extension questions, based on the current topic, and research the answers.

Emerging

Write a tweet (no more than 140 characters) explaining a Science skill we have covered this term.

Write your own teacher-style progress report for this week's Science lessons.

When will this be completed?

One task to be completed by October half term, another task to be completed by Christmas

Make:

These tasks are designed to support students' learning, based around Learning Scientists themes. They will include a focus on memory, revision techniques and note-taking.

Excelling/Mastering

Choose a science skill we have studied this term and design a revision task for the class to complete.

Create a board game based on a topic from this term. It should test skills and knowledge.

Securing/Developing

Create a iMovie trailer to illustrate a topic in Science this term

Make a crossword using only key terms from science this term. Don't forget to write detailed clues!

Emerging

Create a ten question quiz for your classmates based on this week's Science lessons.



Design a whole-class game that reflects on any skills that we have developed this term in Science.

When will this be completed?

One task to be completed by October half term, another task to be completed by Christmas

Progress:

These tasks will help students secure their progress by practising/preparing for the next assessment. This could include planning or completing exam style questions.

Excelling/Mastering

Choose a topic from another subject, other than English and maths, and show how you can link it to science

Complete an audit of your written work in science. What are your strengths? Where are your common errors? What targets could you set yourself for improvement?

Securing/Developing

Produce a graph to demonstrate what you have learnt and the progress you have made in science this term.

Choose one piece of marked work in your book and re-do it, ensuring that you are responding to feedback and making improvements where necessary

Emerging

Create a Facebook Profile Page for any famous scientist.

Choose 3 how science works key words and explain how they relate to an experiment we have done this term.

When will this be completed?

One task to be completed by October half term, another task to be completed by Christmas

Y9 Home Learning Strand 3 IVC Science

Independently:

These tasks are designed to build students' independence using flipped learning. This could include doing research, some reading or recapping prior learning before a lesson.

Excelling/Mastering



Explain the diffusion during a dialysis session for patients who don't have functional kidneys. <https://www.nhs.uk/conditions/dialysis/>

Students need to produce a one-page essay to answer a specific question using a range of sources for information

Securing/Developing

Explain why a chef preparing chips will soak the cut potatoes in salty water. Include a diagram to show the movement of water particles

Students will need to produce a Scientific poster summarise part of the topic, using the guidance provided.

Emerging

Draw an animal and plant cells – label their organelles. <https://www.bbc.com/bitesize/guides/z9hyvcw/revision/3>

Students will need to complete 5 summary pages using the guidance provided.

When will this be completed?

By the end of the strand

Make:

These tasks are designed to support students' learning, based around Learning Scientists themes. They will include a focus on memory, revision techniques and note-taking.

Excelling/Mastering

Build a 3D model of a specialised animal and/ or plant cell; include labels of the organelles, explanation of their function and an overview on the adaptation of the cells to its function.

<https://owlcation.com/stem/3d-cell-model>

Students need to make Cornell notes on two videos related to the topic being studied.

Securing/Developing

Build a 3D model of an animal and/or plant cell; include labels of the organelles with explanation of their function. <https://owlcation.com/stem/3d-cell-model>

Students will need to complete 5 summary pages for using the guidance provided.

Emerging

Build a 3D model of an animal and / or plant cell, include labels of the organelles. <https://owlcation.com/stem/3d-cell-model>



Students will need to complete 20 multiple choice questions.

When will this be completed?

By the end of the strand

Progress:

These tasks will help students secure their progress by practising/preparing for the next assessment. This could include planning or completing exam style questions.

Excelling/Mastering

Observe an item with a magnifying glass or a microscope. Draw the image. Measure the actual size of the item and the size of your enlargement picture. Calculate the magnification of the drawing

Students need to complete the exam- style questions set

Securing/Developing

Produce a Venn diagram to compare diffusion, osmosis and active transport.

<https://www.bbc.com/bitesize/guides/z8nfrdm/revision/2>

Students need to complete the exam- style questions set

Emerging

Make a list of the key words and explain them. Make them on revision cards if you can.

Students need to complete the exam- style questions set

When will this be completed?

By the end of the strand

Y10 Home Learning Strands 1-6 IVC Science

Independently:

These tasks are designed to build students' independence using flipped learning. This could include doing research, some reading or recapping prior learning before a lesson.

All target grades

Students will be expected to complete Tassomai quizzes at least 4 times a week.



In Year 10, students will be expected to complete 10 minutes of quizzes at least 4 times a week in order to stay on track.

Make:

These tasks are designed to support students' learning, based around Learning Scientists themes. They will include a focus on memory, revision techniques and note-taking.

All target grades

Students will be expected to complete Tassomai quizzes at least 4 times a week.

In Year 10, students will be expected to complete 10 minutes of quizzes at least 4 times a week in order to stay on track.

Progress:

These tasks will help students secure their progress by practising/preparing for the next assessment. This could include planning or completing exam style questions.

Grades 7-9

Students need to make Cornell notes on two videos related to the topic being studied.

OR

Students need to produce a one-page essay to answer a specific question using a range of sources for information.

Grades 4-6

Students will need to complete 5 summary pages for each discipline using the guidance provided.

OR

Students will need to produce a Scientific poster summarise part of the topic, using the guidance provided.

Grades 1-3

Students will need to complete 20 multiple choice questions for each discipline.

OR

Students will need to complete 5 summary pages for each discipline using the guidance provided.

When will this be completed?



One task will be completed per strand. The task will be set at the beginning of the strand and collect in at the end of the strand.

Y11 Home Learning Strands 1-6 IVC Science

Independently:

These tasks are designed to build students' independence using flipped learning. This could include doing research, some reading or recapping prior learning before a lesson.

All target grades

Students will be expected to complete Tassomai quizzes at least 4 times a week.

In Year 11, students will be expected to complete 15-20 minutes of quizzes at least 4 times a week in order to stay on track.

Make:

These tasks are designed to support students' learning, based around Learning Scientists themes. They will include a focus on memory, revision techniques and note-taking.

All target grades

Students will be expected to complete Tassomai quizzes at least 4 times a week.

In Year 11, students will be expected to complete 15-20 minutes of quizzes at least 4 times a week in order to stay on track.

Progress:

These tasks will help students secure their progress by practising/preparing for the next assessment. This could include planning or completing exam style questions.

Grades 7-9

Students need to make Cornell notes on two videos related to the topic being studied.

OR

Students need to produce a one-page essay to answer a specific question using a range of sources for information.

Grades 4-6



Students will need to complete 5 summary pages for each discipline using the guidance provided.

OR

Students will need to produce a Scientific poster summarise part of the topic, using the guidance provided.

Grades 1-3

Students will need to complete 20 multiple choice questions for each discipline.

OR

Students will need to complete 5 summary pages for each discipline using the guidance provided.

When will this be completed?

One task will be completed per strand. The task will be set at the beginning of the strand and collect in at the end of the strand.

