Science

Why is Science important and relevant to the development of the whole child in the 21st Century?

A high-quality science education provides the foundations for understanding the world. Science has changed our lives and is vital to the world's future prosperity. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

What skills will students develop through studying Science that will benefit them as a successful learner?

Literacy; numeracy; observational skills; drawing conclusions; analysing data; making assumptions; verbalising abstract ideas; accuracy and precision; objectivity; fair testing procedure; constructing an argument; identifying further questions to ask.

How do we bridge from the Key Stage 2 National Curriculum for Science as students move from year 6 to 7?

KS3 Learning grids map out the themes in the science curriculum from KS2 to KS4. Upon commencing a new topic, teachers and pupils are aware of the relevant content covered at KS2 as well as what will be studied at KS4. This forms the foundations on which to build a series of lessons. Pupils use the rungs of the grid to resume from the position they left off from at primary school and establish what they need to learn in order to progress across year 7.

How do we assess our students' performance in Science as they move across years 7 to 9? How do we track the progress of our students' learning and skill development across years 7 to 9?

Teachers use formative assessment techniques in lessons to help students assess their current knowledge and to promote self-reflection.
Summative assessments take place each half term in the form of a formal test. Each test assesses the biology, chemistry and physics topics covered during the preceding six week block of learning. Periodically, papers will feature additional questions that re-test content from previous blocks of study; the intention being to give students experience of bulk learning. During their final GCSE exam period, students will be expected to retain three years' worth of knowledge at once.
In year nine, students begin their GCSE courses and are assessed in line with the KS4 assessment policy.
Grade collections will report if a pupil's progress shows that they are **'on track'** for achieving both the **'expected standard'** at the end of years 7 to 9 and their own **personal GCSE target**. If a pupil continues to make the necessary progress towards the end of year **'expected standards'** then they will be **'on track'** to meet the **national expectation at GCSE** which is **grade 5**.

Science Course Summaries

Year 7 Science Course Summary

Each half term pupils study one module from each of the three sciences. The topics covered are identical to the topics pupils will encounter at GCSE but at a lower level of difficulty. Pupils have level ladders in their exercise books that map the content of each unit from KS2 up to GCSE. Therefore a high attaining year seven student could encounter GCSE level material if this was appropriate for her ability. Each module is taught over approximately eight lessons.

How will the students be assessed?

Students are assessed formally at the end of each half term with a written test.

Pupils will also receive two *formative assessments* during each module. Here the emphasis isn't on the overall mark, but how to improve. These assessments will focus on numeracy, literacy, exam technique and practical skills.

What topics will the students study?

Half Term	Biology Topic	Chemistry Topic	Physics Topic
1	Cells 1	Particles 1	Force & Motion 1
2	Nutrition 1	Chemical Reactions 1	Energy 1
3	Reproduction	Acids and Alkalis 1	Waves 1
4	Interdependence 1	Environmental Chemistry 1	Electricity and Magnetism 1
5	Photosynthesis	Acids and Alkalis 1	Matter 1
6	Variation	Purity 1	Space 1

By the end of year seven, pupils are expected to be able to:

- Decide appropriate approaches to a range of tasks, including selecting sources of information and apparatus. Select and use methods to obtain data systematically. Recognise hazard symbols and make, and act on, simple suggestions to control obvious risks to themselves and others. Use line graphs to present data, and draw conclusions from them. Analyse findings to draw scientific conclusions that are consistent with the evidence. Evaluate their working methods to make practical suggestions for improvements.

- Describe processes and phenomena related to organisms, their behaviour and the environment, drawing on abstract ideas and using appropriate terminology, for example the main functions of plant and animal organs and how these functions are essential. Explain processes and phenomena, in more than one step or using a model, such as the main stages of the life cycles of humans and flowering plants. Apply and use knowledge and understanding in familiar contexts, such as different organisms being found in different habitats because of differences in environmental factors. Describe applications and implications of science, such as solving some of the health problems that arise when organ damage occurs.

- Describe processes and phenomena related to materials, their properties and the Earth, drawing on abstract ideas and using appropriate terminology, for example the weathering of rocks. Explain processes and phenomena, in more than one step or using a model. Apply and use knowledge and understanding in familiar contexts, such as identifying changes of state. Describe applications and implications of science, such as the uses of metals based on their specific properties or the benefits and drawbacks of the use of fossil fuels.

- Describe processes and phenomena related to energy, forces and space, drawing on abstract ideas and using appropriate terminology, for example 'balanced forces'. Explain processes

and phenomena, in more than one step or using a model, such as the length of a day or a year. Apply and use knowledge and understanding in familiar contexts Describe applications and implications of science, such as the ways sound can be produced and controlled, for example in musical instruments.

Year 8 Science Course Summary

Each half term pupils study one module from each of the three sciences. The topics covered build on the topics they encountered in year seven. As in year seven, topics covered are topics pupils will encounter at GCSE but at a lower level of difficulty. Pupils have level ladders in their exercise books that map the content of each unit from KS2 up to GCSE. Therefore a high attaining year eight student could encounter GCSE level material if this was appropriate for her ability. Each module is taught over approximately eight lessons.

How will the students be assessed?

Students are assessed formally at the end of each half term with a written test.

Pupils will also receive two *formative assessments* during each module. Here the emphasis isn't on the overall mark, but how to improve. These assessments will focus on numeracy, literacy, exam technique and practical skills.

What topics will the students study?

Half Term	Biology Topic	Chemistry Topic	Physics Topic
1	Skeleton and Muscles	Particles 2	Force & Motion 2
2	Digestion	Chemical Reactions 2	Energy 2
3	Health	Acids and Alkalis 2	Waves 2
4	Interdependence 2	Environmental Chemistry 2	Electricity and Magnetism 2
5	Respiration	Acids and Alkalis 2	Matter 2
6	Heredity	Purity 2	Space 2

By the end of year eight, pupils are expected to be able to:

- Identify an appropriate approach in investigatory work, selecting and using sources of information, scientific knowledge and understanding. Select and use methods to collect adequate data for the task, measuring with precision, and identify the need to repeat measurements and observations. Record data and features effectively, choosing scales for graphs and diagrams. Analyse findings to draw conclusions that are consistent with the evidence and use scientific knowledge and understanding to explain them and account for any inconsistencies in the evidence. Evaluate evidence, making reasoned suggestions about how their working methods could be improved.

- Describe processes and phenomena related to organisms, their behaviour and the environment, using abstract ideas and appropriate terminology, for example simple cell structure and function. Use abstract ideas in their explanation of processes. Apply and use knowledge and understanding in unfamiliar contexts, such as a food web in a habitat. Describe some evidence for some accepted scientific ideas, such as the causes of variation between living things. Explain the importance of some applications and implications of science, such as the use of selective breeding.

- Describe processes and phenomena related to materials, their properties and the Earth, using abstract ideas and appropriate terminology, for example the particle model applied to solids, liquids and gases. Use abstract ideas in their explanations of processes. Apply and use knowledge and understanding in unfamiliar contexts, such as relating changes of state to

energy transfers in a range of contexts such as the formation of igneous rocks. Describe some evidence for some accepted scientific ideas, such as the patterns in the reactions of acids with metals and the reactions of a variety of substances with oxygen. Explain the importance of some applications and implications of science, such as the production of new materials with specific desirable properties.

- Describe processes and phenomena related to energy, forces and space, using abstract ideas and appropriate terminology, for example electric current as a way of transferring energy. Also use abstract ideas, for example sustainable energy sources and the refraction of light. Apply and use knowledge and understanding in unfamiliar contexts. Describe some evidence for some accepted scientific ideas, such as the transfer of energy by light, sound or electricity, and the refraction and dispersion of light. Explain the importance of some applications and implications of science, such as the responsible use of unsustainable sources of energy.

Year 9 Science Course Summary

Science in year 9 is taught as Biology Chemistry and Physics. Each subject is taught in a block by a specialist teacher such that each subject is given the same amount of lesson time. The order in which the subjects are taught will vary in each set, so that each set will always have a specialist in that subject.

How will the students be assessed?

Students are assessed formally at the end of each block term with a written test. During each block there will also be a smaller written test (20 marks) to check students' progress.

Pupils will also receive two *formative assessments* during each block. Here the emphasis isn't on the overall mark, but how to improve. These assessments will focus on numeracy, literacy, exam technique and practical skills.

What topics will the students study?

Year nine is the first year of students' GCSE studies. During the year, students cover the *building blocks* of the main GCSE topics.

Specifications for the new AQA GCSE science qualifications (first examined in 2018) can be found by following the links below:

Combined Science

Biology

Chemistry

Physics

By the end of year nine, pupils are expected to be able to:

- demonstrate mostly accurate and appropriate knowledge and understanding and apply these mostly correctly to familiar and unfamiliar contexts, using mostly accurate scientific terminology
- use appropriate mathematical skills to perform multi-step calculations

- analyse qualitative and quantitative data to draw plausible conclusions supported by some evidence
- evaluate methodologies to suggest improvements to experimental methods, and comment on scientific conclusions