

Science at Tawhid Boys School

The importance of Science Education

Science stimulates and excites pupils' curiosity about phenomena and events in the world around them. It also satisfies this curiosity with knowledge. Because science links direct practical experience with ideas, it can engage learners at many levels. Scientific method is about developing and evaluating explanations through experimental evidence and modelling. This is a spur to critical and creative thought. Through science, pupils understand how major scientific ideas contribute to technological change – impacting on industry, business and medicine and improving quality of life. Pupils recognise the cultural significance of science and trace its worldwide development. They learn to question and discuss science-based issues that may affect their own lives, the direction of society and the future of the world.

The National Curriculum, 2006

Science is a core subject within the National Curriculum. The aims of Science are to:

- to develop students' understanding of the science around them that affects them in their everyday life
- to develop students' questioning, analytical and evaluative approach to scientific problems and issues
- to develop students' practical skills in science and an understanding of how science works
- to encourage enthusiasm about science leading to continued study (post GCSE).

Learning across the curriculum

Promoting pupils' spiritual, moral, social and cultural development through science

Science provides opportunities to promote:

- spiritual development, through pupils sensing the natural, material, physical world they live in, reflecting on their part in it, and exploring questions such as when does life start and where does life come from?
- moral development, through helping pupils see the need to draw conclusions using observation and evidence rather than preconception or prejudice, and through discussion of the implications of the uses of scientific knowledge, including the recognition that such uses can have both beneficial and harmful effects

- social development, through helping pupils recognise how the formation of opinion and the justification of decisions can be informed by experimental evidence, and drawing attention to how different interpretations of scientific evidence can be used in discussing social issues.
- cultural development, through helping pupils recognise how scientific discoveries and ideas have affected the way people think, feel, create, behave and live, and drawing attention to how cultural differences can influence the extent to which scientific ideas are accepted, used and valued.

Promoting key skills through science

Science provides opportunities for pupils to develop the key skills of:

- communication, through finding out about and communicating facts, ideas and opinions in a variety of contexts
- application of number, through collecting, considering and analysing first-hand and secondary data
- IT, through using a wide range of ICT
- working with others, through carrying out scientific investigations
- improving own learning and performance, through reflecting on what they have done and evaluating what they have achieved
- problem solving, through finding ways to answer scientific questions with creative solutions.

Promoting other aspects of the curriculum

Science provides opportunities to promote:

- thinking skills, through pupils engaging in the processes of scientific enquiry
- enterprise and entrepreneurial skills, through pupils learning about the work of scientists and of the ways in which scientific ideas are used in technological products and processes
- work-related learning, through studies of science-based industrial and commercial enterprises and through contacts with local scientists, engineers and workplaces
- education for sustainable development, through developing pupils' skills in decision making on the basis of sound science, the exploration of values and ethics relating to the applications of science and technology, and developing pupils' knowledge and understanding of some key concepts, such as diversity and interdependence.

Inclusion: providing effective learning opportunities for all pupils

Science at Tawhid aims to provide effective learning opportunities for all of our pupils. The national curriculum sets out three principles that are essential to developing a more inclusive curriculum:

1. Setting suitable learning challenges
2. Responding to pupils' diverse learning needs
3. Overcoming potential barriers to learning and assessment for individuals and groups of pupils.

In order to fulfil these principles:

- Pupils are given the opportunity to experience success in learning and to achieve as high a standard as possible.
- Pupils whose attainments fall significantly below the expected levels at a particular key stage, work is differentiated to enable pupils to enhance their learning further.
- Teachers set high expectations and provide opportunities for all pupils to achieve including pupils with special educational needs, pupils with disabilities, pupils from all social and cultural backgrounds.
- Additional support is given for pupils with Special Educational Needs (SEN). If a student is experiencing learning difficulties beyond general differentiation by the class teacher, then an Individualised Education Plan (IEP) will be written with targets set for students and agreed between the School and the Parents to support the learning of the child. (For more information, please view the schools SEN policy).
- Pupils whose attainments significantly exceed the expected level of attainment during a particular key stage, teachers plan suitably challenging work. As well as drawing on materials from later key stages or higher levels of study.

Visions for the classroom of the future?

At Tawhid we believe that ICT has an enormous role to play in education.

“Teachers and learners will be set free by digital technology. In the classroom of the future teachers will guide their pupils through a wealth of information and support available to them. Each will study at the pace that suits them best, offering a greater ability to fulfil their individual potential.”

**Lord Puttnam of Queensgate C.B.E
Chairman of the General Teaching Council, 2000-2002**

“In the future learning will be transformed by the increasing use of information and communications technology (ICT) in the classroom. Future classroom practice is likely to be very different from its present concept. Classrooms, teachers and pupils will all still exist, but the Classroom of the Future, through its use of up to date ICT, could enable schools to gain levels of improvements in standards that many teachers now only dream of.”

**David Blunkett
Education and Employment Secretary, 1997-2001**

Brief overview of the use of ICT in Science at Tawhid Boys School

1. Locating resources (Internet, CD ROM)
2. Communicating with ICT (Dataloggers, Interactive packages)
3. Creating publications (Worksheets etc)
4. Using word processing to support students learning. (Cloze exercises: fill in the gaps, worksheets etc)
5. Creating and using websites (Homework, achievements, limitless possibilities).
6. Creating multimedia presentations (PowerPoint)
7. Managing admin tasking using ICT (Spreadsheets to track pupil achievement, Parents evenings to demonstrate pupil progress.)
8. Using ICT for classroom management and differentiated teaching.

Overview of Science Provision at Key Stage 2 (KS2) Year 6

During key stage 2 pupils learn about a wider range of living things, materials and phenomena. They begin to make links between ideas and to explain things using simple models and theories. They apply their knowledge and understanding of scientific ideas to familiar phenomena, everyday things and their personal health. They begin to think about the positive and negative effects of scientific and technological developments on the environment and in other contexts. They carry out more systematic investigations, working on their own and with others.

They use a range of reference sources in their work. They talk about their work and its significance, and communicate ideas using a wide range of scientific language, conventional diagrams, charts and graphs.

Lesson Structure: There is a total of four teaching periods per week.

Assessments: will be carried out at the end of each unit of work. Pupils' records will be recorded in the Science database. This will develop a profile of attainment for each pupil over the academic year.

Homework: will be set twice a week and graded according to the School Marking policy. The school logbook system will be encouraged.

Review Pupils' progress: Pupils will be given feedback during the lessons. Parents will be notified of their child's progress via the interim reports and the end of year report.

Preparation for KS2 SAT's: will begin early on in Term Two. Pupils will be given a series of practice SAT's papers prior to the examinations. A comprehensive 8 week revision programme (using the Collins Revise and Shine Revision guide) will commence in February.

Additional after school science *Booster Lessons* will also commence in February.

Overview of Science Provision at Key Stage 3 (KS3) Year 7-9

During key stage 3 pupils build on their scientific knowledge and understanding and make connections between different areas of science. They use scientific ideas and models to explain phenomena and events, and to understand a range of familiar applications of science. They think about the positive and negative effects of scientific and technological developments on the environment and in other contexts.

They take account of others' views and understand why opinions may differ. They do more quantitative work, carrying out investigations on their own and with others. They evaluate their work, in particular the strength of the evidence they and others have collected. They select and use a wide range of reference sources. They communicate clearly what they did and its significance. They learn how scientists work together on present-day scientific developments and about the importance of experimental evidence in supporting scientific ideas.

Lesson Structure: There is a total of four teaching periods per week. During each year in Key Stage 3 Science pupils are taught twelve units, which cover the four strands of the Science National Curriculum:

- Scientific enquiry (Sc1)
- Life processes and living things (Sc2) (*BIOLOGY*)
- Materials and their properties (Sc3) (*CHEMISTRY*)
- Physical processes (Sc4) (*PHYSICS*)

Assessments: will be carried out at the end of each unit of work. Pupils' records will be recorded in the Science database. This will develop a profile of attainment for each pupil over Key Stage 3.

Homework: will be set twice a week and graded according to the School Marking policy. The school logbook system will be encouraged.

Review Pupils' progress: Pupils will be given feedback during the lessons. Parents will be notified of their child's progress via the interim reports and the end of year report.

Preparation for end of KS3 SAT's (Year 9): will begin early on in Term Two. Year 9 pupils will be given a series of practice SAT's papers prior to the examinations. A comprehensive 12 week revision programme (using Lonsdale Science Revision Guides) will

commence in February. Additional after school science *Booster Lessons* will also commence in February.

Overview of Science Provision at Key Stage 4 (KS4) **Year 10-11**

During key stage 4, pupils learn about the way science and scientists work within society. They consider the relationships between data, evidence, theories and explanations, and develop their practical, problem-solving and enquiry skills, working individually and in groups. They evaluate enquiry methods and conclusions both qualitatively and quantitatively, and communicate their ideas with clarity and precision.

All pupils develop their ability to relate their understanding of science to their own and others' decisions about lifestyles, and to scientific and technological developments in society.

Most pupils also develop their understanding and skills in ways that provide the basis for further studies in science and related areas.

Year 10

2006 was a significant year for GCSE Science. The government embarked on a new streamlined curriculum, which was implemented from September 2006 onwards. The current Year 11 class is completing the old Edexcel modular course (more details in year 11 section).

Edexcel GCSE Science is a new qualification equivalent to one GCSE. The content is relevant to students in their everyday life. The course combines modules from GCSE Biology, Chemistry and Physics.

How Science works

How Science Works is a new requirement in the Criteria for GCSE Science. The course identifies opportunities to make How Science Works accessible to all students.

How Science Works is primarily about helping students to engage with and challenge the science they meet in everyday life. Students need to adopt a critical, questioning frame of mind, going 'behind the scenes' to understand the workings of science and how it impacts on society and their lives. It will help students to:

- identify questions that science can, and cannot address, and how scientists look for the answers
- evaluate scientific claims by judging the reliability and validity of the evidence appropriately
- question the scientific reports they see in the media, and to communicate their own findings

- consider scientific findings in a wider context – recognising their tentative nature
- make informed judgements about science and technology, including any ethical issues that may arise.

The GCSE course highlights a range of contemporary and historical science contexts through which to explore How Science Works. Students need, also, to build on their own experience – planning, carrying out and reflecting upon their own scientific investigations.

Lesson Structure: There is a total of four teaching periods per week.

GCSE Science comprises of six modules, which are taught over Year 10.

Module	Topic Titles
B1a	1. Environment
	2. Genes
B1b	1. Electrical & Chemical Signal
	2. Use, Misuse and Abuse
C1a	1. Patterns and Properties
	2. Making Changes
C1b	1. There's One Earth
	2. Designer Products
P1a	1. Producing & Measuring Electricity
	2. You're in Charge
P1b	1. Now You See It, Now You Don't
	2. Space and its Mysteries

Scheme of assessment:

Method of Assessment		Weighting	Duration
Internal Assessment activities	Biology x 1 Chemistry x 1 Physics x 1	30%	3 x 45min
Assessment of practical skills		10%	
External Assessment 6 tiered multiple choice tests	B1a & B1b C1a & C1b P1a & P1b	60%	6 x 20mins Usually Nov, Mar and June

Internal assessment (40%)

- Assessment of practical skills (10%), where the teacher is assessing the student's ability to follow instructions, collect data (by taking readings and measurements, making observations and by using ICT) and to present their raw results.
- Assessment activities (30%), provided by Edexcel, marked by the teacher and externally moderated by an examiner appointed by Edexcel.

External assessment (60%)

- 60% based on six tiered multiple-choice tests in November, March and June.

Homework: will be set twice a week and graded according to the School Marking policy. The school logbook system will be encouraged.

Review Pupils' progress: Pupils will be given feedback during the lessons. Parents will be notified of their child's progress via the interim reports and the end of year report.

Preparation for assessments: Year 10 pupils will be given a series of practice multiple test papers prior to the examinations. A comprehensive revision programme (using Lonsdale Science Revision Guides) will commence prior to the examinations. Additional after school science *Booster Lessons* will also commence in February.

Year 11

Simple breakdown of the EDEXCEL Single and Double Science Syllabus

All our pupils will Insh'Allah complete GCSE Double Award Science. GCSE Double Award Science are taught the same twelve modules through year's 10 and 11.

Module Number	Module Title	Topics
<i>Single and Double Science Modules</i>		
1	The Human Body: Action and Control	Digestive system, blood, nervous system, kidney, skin.
2	Inheritance and Survival	Chromosomes and variation, genes and variation, genetically modified organisms, selection, survival and evolution, pollution and human survival.
3	Chemical Patterns	Structure of atoms, elements and the periodic table, properties of the halogens, rates of reaction.
4	Chemistry in Action	Crude oil, burning fuels, plastics, enzymes, types of chemical reactions.
5	Energy and Electricity	Circuits, mains electricity, energy resources and transfer.
6	Waves, Atoms and Space	Electromagnetic waves, space, atoms and radioactivity.
<i>Double Science Modules</i>		
7	Food Production and the Environment.	Action in leaves, action in roots, control of plant activity, energy and ecosystems, action of micro-organisms in ecosystems, maximising food production, natural ecosystems.
8	Health and Exercise	Lungs, circulation, respiration, energy and exercise, misuse of drugs, inherited diseases.
9	Chemicals and the Earth	Metals, extracting metals from their ore, transition metals, alkali metals, rocks and their uses, atmosphere, useful products from air, noble gases.
10	Understanding Chemical Reactions	Atoms and isotopes, chemical bonds, energy transfers, using chemical equations.
11	Movement and Change	Forces and motion, forces and energy, Earth waves, using half-life.
12	Energy, Force and Communication	Charge and energy, waves and communication, forces and shape.

Scheme of assessment:

Pupils taking Double Award Science are assessed by modular exams, coursework and main exams at the end of year 11.

GCSE Double Science

Method of Assessment	Weighting	Duration
Coursework	20%	
Exam based on: Modules 1 & 2 Modules 3 & 4 Modules 5 & 6	50%	3 x 30min
Exam based on: Modules 7 & 8 Modules 9 & 10 Modules 11 & 12		3 x 30min
Modular Tests 3 sittings per year, usually Nov, Mar and May.	30%	12 multiple choice tests (each 20 min)

Homework: will be set twice a week and graded according to the School Marking policy. The school logbook system will be encouraged.

Review Pupils' progress: Pupils will be given feedback during the lessons. Parents will be notified of their child's progress via the interim reports and the end of year report.

Preparation for assessments: Year 10 and Year 11 pupils will be given a series of practice multiple test papers prior to the modular examinations. A comprehensive revision programme (using Lonsdale Science Revision Guides) will commence prior to the written examinations at the end year 11.