

# Science at Norbury Manor

## Overview

The Norbury Manor Science Faculty is committed to ensuring that all students reach their full potential through a rigorous, broad, challenging, friendly, enjoyable, adaptable and culturally diverse curriculum. We aspire to nurture students who are skilled critical thinkers, open-minded, problem solvers, and innovators, team players, kind, caring, resilient and tenacious. We will develop the minds of students by providing access to a variety of courses that will support their curiosity, creativity, communication and critical thinking. We will empower our students to become confident informed citizens who are capable of comprehending, analysing and making well-reasoned judgement on global issues. We work with parents, carers and other stakeholders to achieve the best outcomes for our students. At the conclusion of their secondary education, our students will be capable of applying their scientific knowledge to current issues, making connections between scientific disciplines and pursuing post-secondary education or careers in the fields of science and engineering.

## Year 7 Science

Science in year 7 prepares all students for understanding scientific techniques, safe practice and development of experimental skills which underpins the understanding of theoretical contents.

KS 3 Science Curriculum includes topics such as:

BIOLOGY - Organisms, Ecosystems, Genes

CHEMISTRY - Matter, Reactions, Earth

PHYSICS - Forces, Electromagnets, Energy, Waves

At KS 3 students are encouraged and guided to develop independent learning study skills attributes that are vital for their future academic careers.

### UNIT 1: Forces

The unit covers speed, and how it can be described through calculation and graphically.

Ideas about gravity are explored which relates to the concept of fields, the relationship between mass and weight, and the context of space travel.

### UNIT 2: Electromagnets

The unit starts by exploring static electricity, the concept of charge and the idea of a field, then proceeds to link the concepts of current, voltage and resistance with the observed behaviour of circuits.

### **UNIT 3: Energy**

The unit uses food as a personal energy store to introduce the idea that stores of energy are needed to make things happen. It looks at energy stores and transfers, energy resources in terms of non-renewable fuels and renewable resources. The concepts of kinetic energy, elastic potential energy and gravitational potential energy are introduced and used as ways of understanding transfers.

### **UNIT 4: Waves**

This unit is about light and sound waves. There is a strong focus on wave properties and wave characteristics, this lays foundations for a more theoretical understanding of the nature of waves. There are links with biological topics: sight and hearing are explored, as is the way that colour is perceived.

### **UNIT 5: Matter**

This unit develops the understanding of the different properties of solids, liquids and gases using the particle model theory.

It also offers students a range of opportunities to develop practical skills and problem-solving skills through the context of separating mixtures.

### **UNIT 6: Reactions**

This unit explore the physical and chemical properties of metals and non-metals. Specific types of chemical reaction such as reactions of acids with some metals, oxidation and displacement reactions, and consider the products formed during each reaction.

The relevance of acids and alkalis to our everyday lives is considered, as are the applications of neutralisation reactions.

### **UNIT 7: Earth**

This unit covers the science of 'what's beneath us' and 'what's above us' It examines the different types of rock and the processes that bring about their formation leading to the idea of the rock cycle that operates within huge geological timescale. It also looks at the Solar System and what is beyond. The theme is exploring the Solar System in terms of observations and using a model to develop explanations.

### **UNIT 8: Organisms**

This unit covers the roles of the skeleton and muscles, how movement is brought about at joints by muscles working in pairs. The unit also looks at the organisation in multicellular organisms and in unicellular organisms, then looks at organs, tissues and cells and offers the opportunity to make careful observations, both with the naked eye and using a microscope.

### **UNIT 9: Ecosystem**

This unit looks at ecosystems, the interdependence of organisms, including food webs and insect-pollinated crops and their importance to human food security. It offers the opportunity to use and evaluate a model to investigate the effects of one population on another. The unit also cover plant structure to further understand how flowering plants reproduce, including the role of the wind and insects in pollination.

### **UNIT 10: Genes**

This unit is about the variation between and within species, and the causes and types of variation. It is also about human reproductive systems, including the menstrual cycle, how a foetus develops, supported by the mother, and will consider the effects of various substances on a developing foetus, to critique claims and explore what is meant by bias in sources of information using the context of the effects of smoking in pregnancy. There are lots of opportunities for developing graph skills, including plotting, and analysing both bar charts and line graphs.

## **Year 8 Science**

In year we build on students' knowledge from year 7 and focus on deeper understanding of key scientific ideas and analysis.

### **UNIT 1: Forces**

The unit explores situations in which forces are in opposition, such as the actions of friction and drag in opposing movement, and then explores Hooke's Law, developing a more quantitative approach. It also considers pressure both in relation to solids and fluids, developing explanations around applications such as floating and sinking and using calculations to work out pressure.

### **UNIT 2: Electromagnets**

This unit is about magnets and magnetic fields, building on ideas about fields and their representation and then looking at various applications.

### **UNIT 3: Energy**

This unit explores concepts such as work, thermal energy, and energy transfer. It develops the idea that when things happen, they do not happen because energy has been transferred – but the model of transfer is a useful way of describing what has happened.

### **UNIT 4: Waves**

This unit compare the properties of waves in water and light waves and how they transfer energy. It offers the opportunity to use and evaluate models to explain the properties of light in terms of waves.

### **UNIT 5: Matter**

Various groups of elements are explored, such as Group 1 metals, the halogens, and the noble gases, with regard to their different chemical and physical properties. It is also about the structure, properties and uses of new materials, including ceramics, polymers, and composites.

### **UNIT 6: Reactions**

The unit looks at energy changes in chemical reactions using an understanding of bond making and bond breaking. The idea of catalysts is explored and how they can change the rate of chemical reactions. This unit provides several opportunities to carry out chemical reactions and to make detailed observations.

### **UNIT 7: Earth**

The unit is about the composition of the Earth's atmosphere, how it has evolved and what caused it to change, explores how these changes affect the Earth and all life on it.

Natural recycling and the recycling of waste materials are considered.

### **UNIT 8: Organisms**

The unit is about the human breathing system and the digestive system; the role of each of the organs involved; and the way that each organ is adapted to its particular function and how the products of digestion and breathing are exchanged in our bodies to generate energy.

### **UNIT 9: Ecosystems**

The unit is about aerobic respiration and how it relies on breathing to provide oxygen, and on digestion to provide glucose as a reactant and anaerobic respiration. The reactants and products of each type of respiration will be compared, as well as the amount of energy released in each process. It is also about the process of photosynthesis and the factors that affect it, the movement of water and minerals through plants, and the effects of mineral deficiencies on their growth and the adaptations in plants that allow them to carry out their life processes effectively.

### **UNIT 10: Genes**

This unit looks at how variation drives natural selection and consider the theory of Charles Darwin in more depth. It explores the structure of chromosomes, genes, and DNA, and investigate their importance in the inheritance of characteristics. It offers a number of opportunities to review theories, such as a theory to explain why and how dinosaurs became extinct, use models to help develop explanations, for example to explain inheritance of a specific characteristic, and to research and evaluate evidence.

## **Year 9 Science**

In the autumn term of year 9, we study GCSE transition topics in biology, chemistry and physics to prepare students to begin their GCSE courses by giving them a flavour of what to expect. During the spring and summer terms we begin teaching GCSE content.

### **GCSE BIOLOGY TRANSITION TOPICS**

Diseases  
Control Systems  
Testing Medicines  
Ecological Sampling  
Cell Transport

### **GCSE CHEMISTRY TRANSITION TOPICS**

Ions  
Energy Transfer  
Rates of Reaction  
Chemical Reactions

### **GCSE PHYSICS TRANSITION TOPICS**

Latent Heat  
Fields  
Gas Pressure  
Models

### **SPRING TERM UNITS**

Cells  
Atomic Structure and the Periodic Table  
Energy

### **SUMMER TERM UNITS**

Organisation  
Bonding, Structure and the Properties of Matter  
Particle Model of Matter

## **KS4 Science**

There are three pathways in science. Some students will sit AQA GCSE Separate (Single) Science leading to the triple award and some will also sit AQA GCSE Combined (Trilogy) Science leading to a double award at the end of year 11.

Students who may not be able to access the contents of GCSE Science and/or find it challenging are not left out. They follow the Edexcel Entry Level Certificate in Science course leading to the award of Entry Level Certificates.

The GCSE courses provide students with the opportunity to explore the world around them through enquiry based teaching and learning. Students are mandated to complete compulsory required practicals which constitute a huge component of the course. They are assessed on the knowledge of 'How Science Works' through required practicals during the GCSE.

## **AQA GCSE SINGLE (TRIPLE) SCIENCE CONTENTS**

### **YEAR 10**

#### **BIOLOGY UNITS**

Bioenergetics  
Homeostasis and Response  
Inheritance, Variation and Evolution  
Ecology

#### **CHEMISTRY UNITS**

Atomic Structure and the Periodic Table  
Bonding, Structure and the Properties of Matter  
Quantitative Chemistry  
Chemical Changes  
Energy Changes  
The Rate and Extent of Chemical Change

#### **PHYSICS UNITS**

Energy  
Electricity  
Particle Model of Matter  
Atomic Structure  
Forces

### **YEAR 11**

#### **BIOLOGY UNITS**

Cells  
Organisation  
Infections and Response

#### **CHEMISTRY UNITS**

Organic Chemistry  
Chemical Analysis  
Chemistry of the Atmosphere

Using Resources

## **PHYSICS UNITS**

Waves

Magnetism and Electromagnetism

Space Physics

## **AQA GCSE SINGLE (TRIPLE) SCIENCE REQUIRED PRACTICAL**

Students need to complete 28 required practicals: 10 biology practicals, eight chemistry and 10 physics. Any aspect from the practicals may be assessed in the final exams.

## **AQA GCSE COMBINED (TRILOGY) SCIENCE CONTENTS**

### **YEAR 10**

Bioenergetics

Quantitative Chemistry

Forces

Infections and Response

Homeostasis and Response

Chemical changes

Energy Changes

Particle Model of Matter

Chemical Analysis

Chemistry of the Atmosphere

### **YEAR 11**

Inheritance

Chemistry of the Atmosphere

Atomic Structure (Physics)

Rates of Reaction

Organic Chemistry

Magnetism and Electromagnetism

Chemical Analysis

Waves

Using Resources

Ecology

## **AQA GCSE COMBINED (TRILOGY) SCIENCE REQUIRED PRACTICAL**

Students need to complete 21 required practicals: seven biology practicals, six chemistry and eight physics. Any aspect from the practicals may be assessed in the final exams.

## **PEARSON EDEXCEL ENTRY LEVEL CERTIFICATE IN SCIENCE**

Each qualification is broken into six manageable units; two biology, two chemistry and two physics. Below, you can see how the subject areas are broken up into units

relating to each qualification. The method of assessment consists of short unit tests which students can sit when they are ready to and at any time during the course.

## **PEARSON EDEXCEL ENTRY LEVEL CERTIFICATE IN SCIENCE CONTENTS**

### **YEAR 10**

B1A – Cell genetics, inheritance and modification

C1A – Atoms, compounds and states of matter

P1A – Forces, movement and energy

### **YEAR 11**

B1B – Health and disease and medicines

C1B – Separating mixtures, breaking down substances, acids and metals

P1B – Waves and radiation

## **USEFUL RESOURCES**

There are excellent resources available to help your revision. Please visit and use the websites below and also download the apps.

## **WEBSITES**

**Doddle Learn:** <https://www.doddlelearn.co.uk/app/login> - Excellent resource the faculty has subscribed to. Students should know their login details but if you experience any difficulties logging in, please see your science teacher.

**AQA:** For copies of the syllabuses, past paper questions and more information from AQA, go to: <http://www.aqa.org.uk/subjects/science/gcse> and follow the links to specific subjects.

**BBC Bitesize:** <https://www.bbc.co.uk/education/levels/z98jmp3>

**Free Science Lessons:** <https://www.freesciencelessons.co.uk/>

**Pearson Edexcel:** <https://qualifications.pearson.com/en/qualifications/edexcel-entry-level-certificate/science-2016.html>

## **APPS**

There are several good apps available for you to download including:

**Revision Buddies** – Large selection of multiple choice questions to choose from

**Gojimo** – Excellent question based activities

**GCSE 9-1 Scholastic Revision** – Excellent revision planning and questions, just choose your subject and you are good to go

**Brainscape Smart Flashcards** – Excellent revision flashcards