

Welcome to Science



Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less – Marie Curie

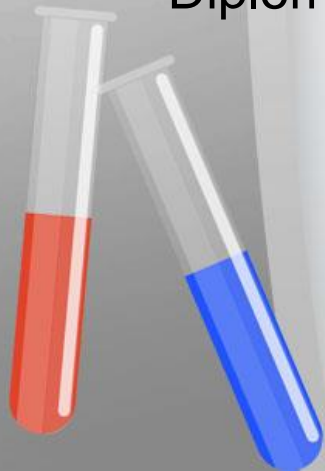
Welcome to Science

We Teach:

- Key Stage 3 Science
- GCSE Double award Science
- GCSE Triple award Science
- A level Biology
- A level Chemistry
- A level Physics
- Diploma in Medical Science

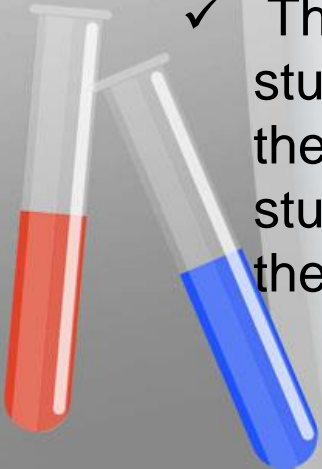
Our Staff

- **Mr M Elsley** (Area of Learning Lead)
- Mrs L Davies (Biology)
- Mrs T Davies (Biology/Chemistry)
- Mrs C Durbridge (Chemistry)
- Mr J Leigh (Biology)
- Ms K Papadovassilakis (Physics)
- Ms L Scale (Medical Science/Physics)
- Mr J Sharpe (Chemistry)
- Mrs H Evans (Senior Technician)
- Mrs J Jones (Technician)



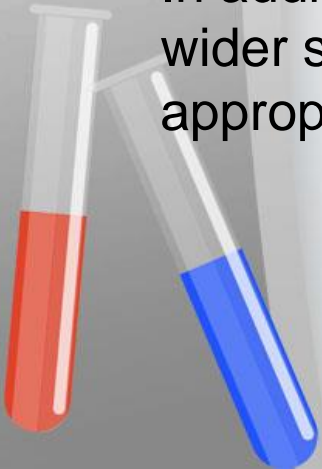
Introduction to our department

- ✓ We strive to provide the very best resources and facilities in this the largest department in the school comprising of 9 fully equipped laboratories as well as access to I.T.
- ✓ The department is extremely well served with technical help from science technicians. The departments real strength lies in how it cherishes and develops the talents of every individual in the laboratory.
- ✓ Pupils are actively encouraged to develop their science skills through investigative experimental work. Students also have the opportunity to be a part of the Science Club.
- ✓ The department believes in providing equal opportunities to all students and offers courses designed to allow students to reach their full potential. We are passionate about our department and our students; we hope that we will meet your expectations in providing the very best for your son or daughter.



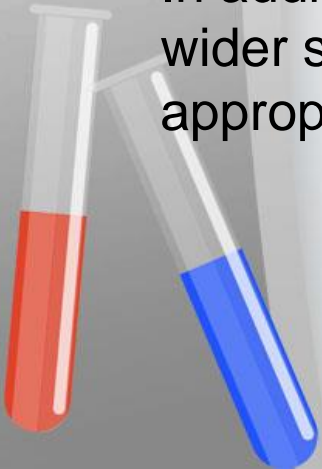
Year 7 Science

- We start our Science studies off with Unit 1 learning about safety in the laboratory and practical skills.
- Students then move on to learn wide areas of science:
 - Unit 2 – Cells & Tissues
 - Unit 3 – Solids, Liquids & Gases
 - Unit 4 – Circuits
 - Unit 5 – Interdependence
 - Unit 6 – Physical & Chemical changes
- Each unit is finished with an end of topic test, and a Mastery activity to show progress in learning.
- In addition, within each unit there will be opportunities to develop the wider skills of literacy, numeracy and digital competency where appropriate.



Year 8 Science

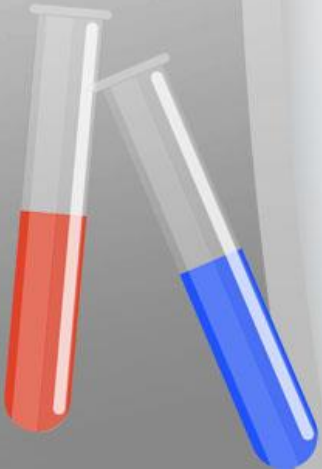
- Year 8 start off the year with unit 1 reinforcing their practical and safety knowledge and building on the skills developed in year 7.
- Students then move on to learn wide areas of science:
 - Unit 2 – Energy
 - Unit 3 – Respiration & Digestion
 - Unit 4 – Patterns of Behaviour
 - Unit 5 – Drugs & their effects
 - Unit 6 – Force, Work & Power
- Each unit is finished with an end of topic test, and a Mastery activity to show progress in learning.
- In addition, within each unit there will be opportunities to develop the wider skills of literacy, numeracy and digital competency where appropriate.



Year 9 Science

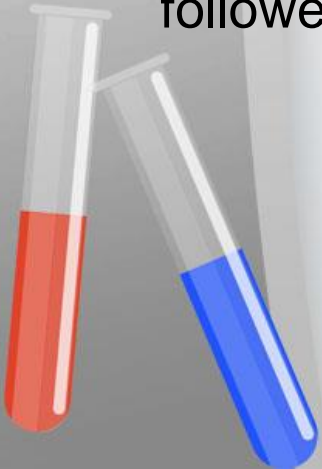
- In year 9, students move to research based projects that bring together the skills they have developed to prepare them for their GCSE studies which commence part way through the year.
 - Research Task 1 – sustainable materials
 - Research Task 2 – applications of science, medicine & technology
 - Research Task 3 – renewable & non-renewable energy resources
- As in previous years, there are opportunities to progress with literacy, numeracy and digital competency skills.
- Each task will also include opportunities to improve skills with Mastery tasks.

Throughout Key Stage 3 – students progress will be tracked to monitor their N.C. targets set.



GCSE Science

- At Key Stage 4 students all take WJEC Double Award Science, and the most able students can opt for Triple Award.
- All students follow a common course of Biology, Chemistry & Physics across 2 years.
- Triple Award students take extra units or part units marked with a **(T)** on the following pages
- All students will also access literacy, numeracy and digital competency skills as part of their lessons, and their progress is monitored and tracked.
- Each unit ends with a test in either foundation or higher, and this is followed by a Mastery task to ensure improvement.



Year 10

Biology

- 1.1 CELLS & MOVEMENT ACROSS CELL MEMBRANES
- 1.2 RESPIRATION & THE RESPIRATORY SYSTEM IN HUMANS
- 1.3 DIGESTION & THE DIGESTIVE SYSTEM IN HUMANS
- 1.4 CIRCULATORY SYSTEM IN HUMANS
- 1.5 PLANTS & PHOTOSYNTHESIS.
- 1.5a STRUCTURE OF THE PLANT **(T)**
- 1.6 ECOSYSTEMS, NUTRIENT CYCLES & HUMAN IMPACT ON THE ENVIRONMENT

Chemistry

- 2.1 THE NATURE OF SUBSTANCES & CHEMICAL REACTIONS
- 2.2 ATOMIC STRUCTURE & THE PERIODIC TABLE
- 2.3 WATER
- 2.4 THE EVER-CHANGING EARTH
- 2.5 RATE OF CHEMICAL CHANGE
- 2.6 LIMESTONE **(T)**

Physics

- 3.1 ELECTRIC CIRCUITS
- 3.2 GENERATING ELECTRICITY
- 3.3 MAKING USE OF ENERGY
- 3.4 DOMESTIC ELECTRICITY
- 3.5 FEATURES OF WAVES
- 3.6 TOTAL INTERNAL REFLECTION **(T)**
- 3.7 SEISMIC WAVES **(T)**
- 3.8 KINETIC THEORY **(T)**
- 3.9 ELECTROMAGNETISM **(T)**

Year 11

Biology

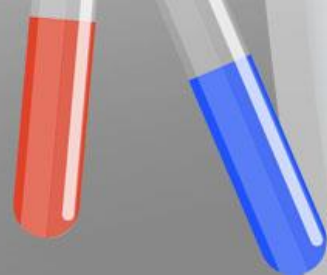
- 4.1 CLASSIFICATION & BIODIVERSITY
- 4.2 CELL DIVISION & STEM CELLS
- 4.3 DNA & INHERITANCE
- 4.4 VARIATION AND EVOLUTION
- 4.5 NERVOUS SYSTEM
- 4.6 KIDNEYS & HOMEOSTASIS **(T)**
- 4.7 MICROORGANISMS & APPLICATIONS
- 4.8 DISEASE, DEFENCE & TREATMENT

Chemistry

- 5.1 BONDING, STRUCTURE & PROPERTIES
- 5.2 ACIDS, BASES & SALTS
- 5.3 METALS & THEIR EXTRACTION
- 5.4 CHEMICAL REACTIONS & ENERGY
- 5.5 CRUDE OIL, FUELS & ORGANIC CHEMISTRY
- 5.6 REVERSIBLE REACTIONS & INDUSTRIAL PROCESSES **(T)**

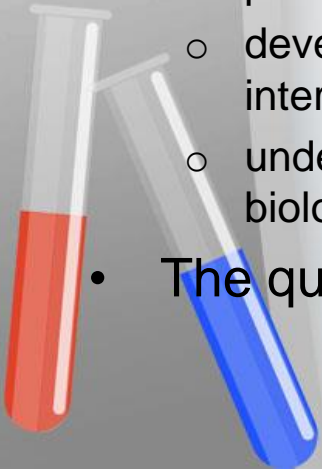
Physics

- 6.1 DISTANCE, SPEED & ACCELERATION
- 6.2 NEWTON'S LAWS
- 6.3 WORK AND ENERGY
- 6.4 FURTHER MOTION **(T)**
- 6.5 STARS & PLANETS
- 6.6 THE UNIVERSE **(T)**
- 6.7 TYPES OF RADIATION
- 6.8 HALF-LIFE
- 6.9 NUCLEAR DECAY & NUCLEAR ENERGY **(T)**



A Level Biology

- The WJEC A level in Biology provides a wide breadth of knowledge which touches on many varied aspects of a range of topics. These include the internal workings of organisms in physiology and the interdependence of living things in ecology, to social issues including human influence on the environment and the ethical considerations of genetics.
 - develop essential knowledge and understanding of different areas of biology and how they relate to each other
 - develop and demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods used within biology
 - develop competence and confidence in a variety of practical, mathematical and problem solving skills
 - develop their interest in and enthusiasm for biology, including developing an interest in further study and careers associated with the subject
 - understand how society makes decisions about biological issues and how biology contributes to the success of the economy and society.
- The qualification is split into 5 units; 2 AS and 3 A2.



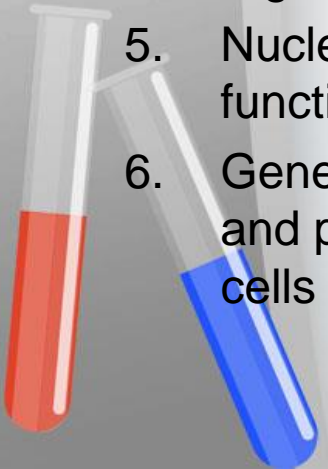
AS Level Biology

Unit 1 BASIC BIOCHEMISTRY AND CELL ORGANISATION

1. Chemical elements are joined together to form biological compounds
2. Cell structure and organisation
3. Cell membranes and transport
4. Biological reactions are regulated by enzymes
5. Nucleic acids and their functions
6. Genetic information is copied and passed on to daughter cells

Unit 2 BIODIVERSITY AND PHYSIOLOGY OF BODY SYSTEMS

1. All organisms are related through their evolutionary history
2. Adaptations for gas exchange
3. Adaptations for transport
4. Adaptations for nutrition



A2 Level Biology

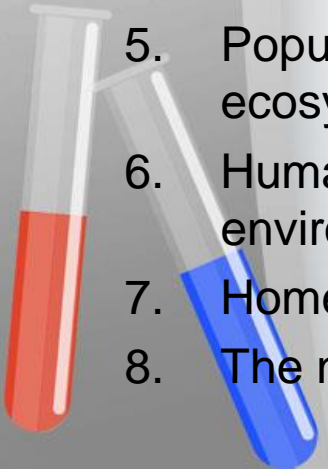
Unit 3 ENERGY, HOMEOSTASIS AND THE ENVIRONMENT

1. Importance of ATP
2. Photosynthesis uses light energy to synthesise organic molecules
3. Respiration releases chemical energy in biological processes
4. Microbiology
5. Population size and ecosystems
6. Human impact on the environment
7. Homeostasis and the kidney
8. The nervous system

Unit 4 VARIATION, INHERITANCE AND OPTIONS

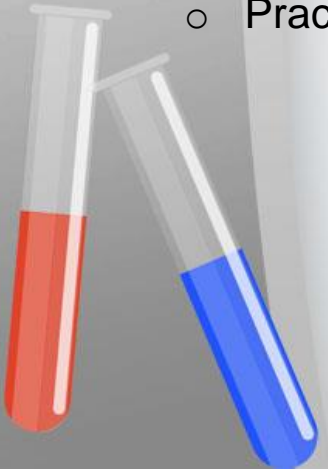
1. Sexual reproduction in humans
2. Sexual reproduction in plants
3. Inheritance
4. Variation and evolution
5. Application of reproduction and genetics

Plus one option of the following:
A. Immunology and Disease
B. Human Musculoskeletal Anatomy
C. Neurobiology and Behaviour



A2 Biology Unit 5 – Practical Exam

- This unit gives learners the opportunity to demonstrate their ability to carry out an
- investigation and to analyse and evaluate experimental data. This will be carried out
- individually, under controlled conditions. The practical examination comprises of two
- tasks:
 - Experimental Task (20 marks)
 - Practical analysis Task (30 marks)



For more information
approach Mrs L Davies
or Mr Leigh

A Level Chemistry

- The WJEC A level in Chemistry provides a broad, coherent, satisfying and worthwhile course of study. It encourages learners to develop confidence in, and a positive attitude towards, chemistry and to recognise its importance in their own lives and to society.
- Studying this A level in Chemistry encourages learners to:
 - develop essential knowledge and understanding of different areas of the subject and how they relate to each other
 - develop and demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods
 - develop competence and confidence in a variety of practical,
 - mathematical and problem solving skills
 - develop their interest in and enthusiasm for the subject, including
 - developing an interest in further study and careers associated with the subject
 - understand how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society.
- The qualification is split into 5 units; 2 AS and 3 A2.



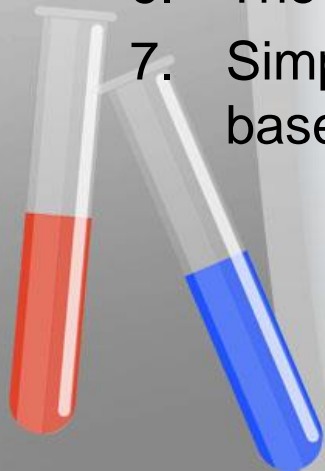
AS Level Chemistry

Unit 1 THE LANGUAGE OF CHEMISTRY, STRUCTURE OF MATTER & SIMPLE REACTIONS

1. Formulae and equations
2. Basic ideas about atoms
3. Chemical calculations
4. Bonding
5. Solid structures
6. The Periodic Table
7. Simple equilibria and acid-base reactions

Unit 2 ENERGY, RATE & CHEMISTRY OF CARBON COMPOUNDS

1. Thermochemistry
2. Rates of reaction
3. The wider impact of chemistry
4. Organic compounds
5. Hydrocarbons
6. Halogenoalkanes
7. Alcohols and carboxylic acids
8. Instrumental analysis



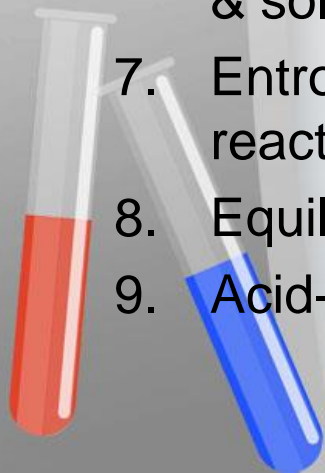
A2 Level Chemistry

Unit 3 PHYSICAL AND INORGANIC CHEMISTRY

1. Redox and standard electrode potential
2. Redox reactions
3. Chemistry of the *p*-block
4. Chemistry of the *d*-block transition metals
5. Chemical kinetics
6. Enthalpy changes for solids & solutions
7. Entropy & feasibility of reactions
8. Equilibrium constants
9. Acid-base equilibria

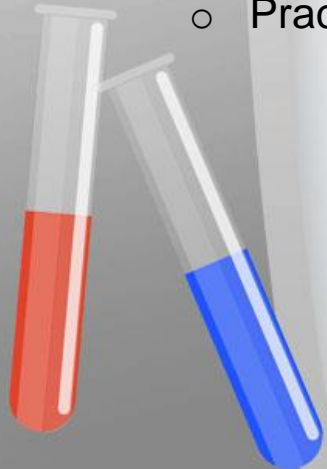
Unit 4 ORGANIC CHEMISTRY AND ANALYSIS

1. Stereoisomerism
2. Aromaticity
3. Alcohols and phenols
4. Aldehydes and ketones
5. Carboxylic acids and their derivatives
6. Amines
7. Amino acids, peptides and proteins
8. Organic synthesis and analysis



A2 Chemistry Unit 5 – Practical Exam

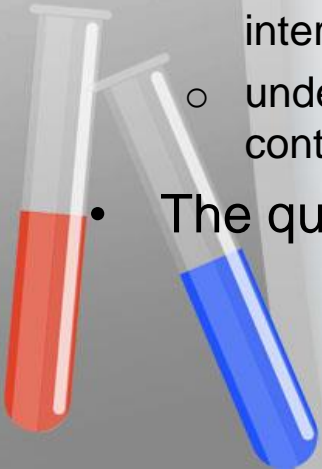
- This unit gives learners the opportunity to demonstrate their skills, knowledge and
- understanding in relation to practical techniques and their ability to analyse and evaluate
- experimental data. The practical examination comprises two tasks to be carried out
- individually under controlled conditions:
 - Experimental Task (30 marks)
 - Practical Methods and Analysis Task (30 marks)



For more information
approach Mrs Durbridge
or Mr Sharpe

A Level Physics

- The WJEC A level in Physics provides a broad, coherent, satisfying and worthwhile course of study. It encourages learners to develop confidence in, and a positive attitude towards, physics and to recognise its importance in their own lives and to society. Studying this A level in Physics encourages learners to:
 - develop essential knowledge and understanding of different areas of the subject and how they relate to each other
 - develop and demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods
 - develop competence and confidence in a variety of practical, mathematical and problem solving skills
 - develop their interest in and enthusiasm for the subject, including developing an interest in further study and careers associated with the subject
 - understand how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society.
- The qualification is split into 5 units; 2 AS and 3 A2.



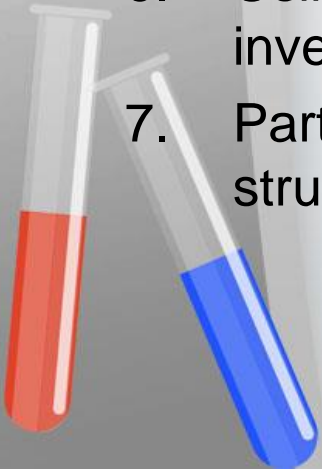
AS Level Physics

Unit 1 - MOTION, ENERGY & MATTER

1. Basic physics
2. Kinematics
3. Dynamics
4. Energy concepts
5. Solids under stress
6. Using radiation to investigate stars
7. Particles and nuclear structure

Unit 2 - ELECTRICITY & LIGHT

1. Conduction of electricity
2. Resistance
3. D.C. circuits
4. The nature of waves
5. Wave properties
6. Refraction of light
7. Photons
8. Lasers



A2 Level Physics

Unit 3 - OSCILLATIONS & NUCLEI

1. Circular motion
2. Vibrations
3. Kinetic theory
4. Thermal physics
5. Nuclear decay
6. Nuclear energy

Unit 4 - FIELDS & OPTIONS

1. Capacitance
2. Electrostatic and gravitational fields of force
3. Orbits and the wider universe
4. Magnetic fields
5. Electromagnetic induction

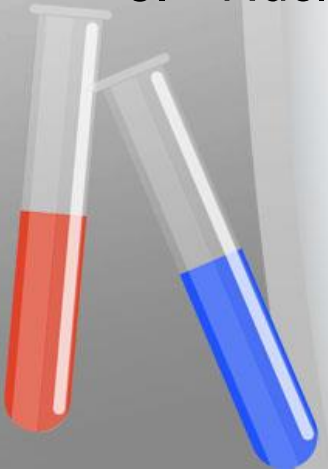
Plus one option from the following:

A: Alternating currents

B: Medical physics

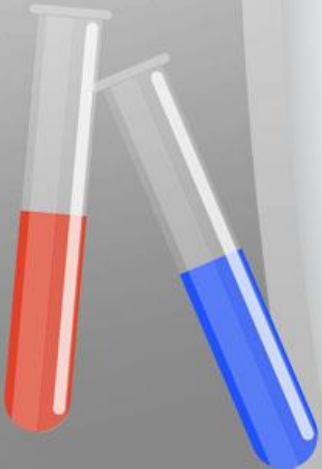
C: The physics of sports

D: Energy and the environment



A2 Physics Unit 5 – Practical Exam

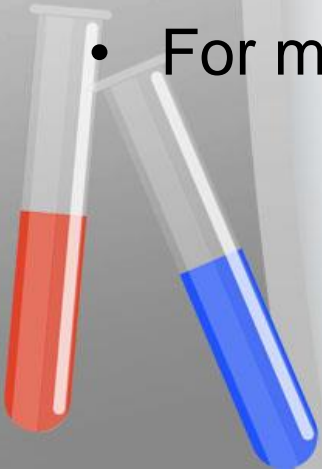
- This unit gives learners the opportunity to demonstrate their ability to carry out an investigation and to analyse and evaluate experimental data. This will be carried out individually, under controlled conditions. The practical examination comprises two tasks.
 - Experimental Task (25 marks)
 - Practical Analysis Task (25 marks)



For more information
approach Ms Papa or Ms
Scale

Level 3 Diploma Medical Science

- The medical science diploma is a level 3 qualification equal to an A level.
- It is split into 2 halves – the Certificate in year 12 and the Diploma in year 13.
- The course is a combination of traditional written exams with coursework, projects, presentations and a practical exam.
- For more information approach Ms Scale or Mr Elsley



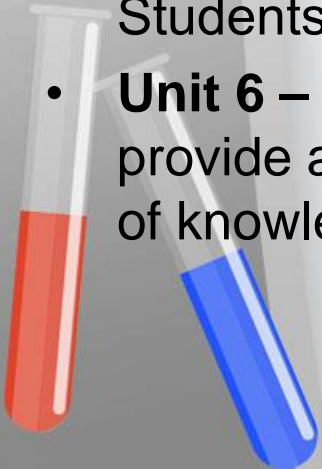
Medical Science – year 12 certificate

- **Unit 1 – Human Health & Disease:** Students learn the structure of the body, how systems communicate, disease – physical and mental health. This unit is synoptic of the entire year, and brings all areas together for the written exam, where students are provided with a pre-release on a particular area of focus.
- **Unit 2 – Physiological Measurements:** Students learn how to take physiological measurements and as part of their coursework, will work with ‘patients’ to advise and perform these measurements. Students learn how to communicate effectively with patients.
- **Unit 3 – Medical Research:** Students learn the importance of medical research, how to carry it out, the ethics involved and important sampling techniques that they will use throughout higher education. Students will also learn statistical techniques to back up their research claims.



Medical Science – year 13 diploma

- **Unit 4 – Medicines & the treatment of disease:** Pharmacology is a wide area that includes how drugs are developed and how they act and interact with the body. Students will learn about a variety of conditions and then concentrate on 4 drugs that teach different body systems. They also will learn about Cancer and new treatments. Students will present their findings to an expert audience.
- **Unit 5 – Clinical Laboratory Techniques:** Pathology units in hospitals provide an important role in diagnosis. Students will learn how to carry out and test various samples to aid in diagnosis. Students are provided with a ‘patient sample’ to test.
- **Unit 6 – Medical Case Studies:** This is a synoptic unit that does not provide any new learning, but instead ties together the 2 years worth of knowledge by studying 3 patients case studies in a holistic way.



Science Club

- Science club takes place every Thursday after school with Ms Scale.
- It is currently open to years 8 and above.
- Each term we follow a theme and plan activities, investigations and a trip around that theme.
- Themes include Rockets & space travel; The active earth; motion and forces; growing useful materials.



Equipped with his five senses, man explores the universe around him, and calls the adventure Science.

– Edwin Hubble

