



Year 7 Science Learning Journey

Introduction

- Hazards in science
- Chemical symbols
- Using a Bunsen burner
 - Scientific questions
- Recording and analysing data
 - Planning investigations

Cells

- Cell structure
- Movement of substances
- Microscopes
- Unicellular organisms

Term 1

Body systems

- Gas exchange
 - Skeleton
 - Movement

Reproduction

- Adolescence
- Reproductive systems
- Fertilisation
- Development of the foetus
- The menstrual cycle
- Flowers and pollination

Term 2

Particles

- States of matter
- Melting and freezing
- Changes of state
 - Diffusion
 - Gas pressure

Term 4

Acids and alkalis

- Acids and alkalis
- Indicators and pH
- Neutralisation
- Making salts

Chemical reactions

- Reactions
- Word equations
- Burning fuels
 - Thermal decomposition
- Conservation of mass
 - Exo and Endothermic

Term 3

Atoms, elements and compounds

- Elements
- Atoms
- Compounds
- Chemical formula

Forces

- Introducing forces
- Squashing and stretching
 - Drag and friction
- Non-contact forces
- Balanced and unbalanced

Sound

- Waves
- Loudness and pitch
- Detecting sound
- Echoes and ultrasound

Term 5

Light

- Light
- Reflection
- Refraction
- The eye and camera
- Colour

Space

- The night sky
- Our solar system
- The Earth
- The Moon

Term 6





Year 8 Science Learning Journey

The periodic table

- Metals and non-metals
- The groups and periods
- The elements of group 1
- The elements of group 7
- The elements of group 0

Separation techniques

- Mixtures
- Solutions
- Solubility
- Filtration
- Evaporation and distillation
- Chromatography

Term 1

Metals and acids

- Reactions of metals
- Extracting metals
- Ceramics
- Polymers
- Composites

The Earth

- The Earth and its atmosphere
- The rock cycle
- The carbon cycle
- Climate change
- Recycling

Term 2

Term 4

Motion and pressure

- Speed
- Motion graphs
- Pressure in gasses
- Pressure in liquids
- Pressure on solids
- Turning forces

Energy

- Food and fuel
- Energy adds up
- Energy transfer
- Energy and temperature
 - Energy resources
- Energy and power
- Work, energy and machines

Term 3

Electricity and magnetism

- Current and circuits
- Series and parallel
 - Resistance
- Magnets and magnetic fields
- Electromagnets

Health and lifestyle

- Nutrients
- Food tests
- Diet
- Digestive system
- Enzymes
- Drugs
- Alcohol
- Smoking

Term 5

Ecosystem processes

- Photosynthesis
 - Leaves
- Plant minerals
- Chemosynthesis
- Respiration
- Food chains and webs
- Ecosystems

Adaptation and inheritance

- Competition and adaptation
- Variation
- Inheritance
 - Natural selection
- Extinction

Term 6



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Year 9 Science Learning Journey

New technology in biology

- Genetics
- Inherited disorders
- Selective breeding
- Genetic engineering
- Cloning
- Biotechnology
- Enzymes in industry

Turning points in biology

- Vaccines
- Antibiotics
- DNA
- Charles Darwin
- Preventing extinction

Term 1

Detection in biology

- Microscopy
- Fingerprinting
 - DNA fingerprinting
- Blood typing
- Time of death
- Pathology

New technology in Chemistry

- Nanoparticles
- Nanoparticles in medicine
- Nanoparticles and safety
- Cars: pros and cons
- New fuels
- Cleaning up exhausts
- HEVs

Term 2

Careers

Careers are built into all units including the development of many transferable skills. The science curriculum enables students to apply their understanding to a range of situations and has many links to aspirational scientists.

Turning points in Physics

- Discovering the universe
- The Big Bang
- Spacecraft and satellites
- Mission to the Moon
- Radioactivity
- Electromagnetism

New technology in Physics

- Your house
 - Your hospital
- Your sports
- Your planet

Term 3

Detection in chemistry

- Break in!
 - Smelly problem
- Message in a bottle
- Blood alcohol
 - Body
- Clues in the carpet
- A week in court

Turning points in chemistry

- Evidence for atoms
- Discovering the periodic table
- Lessons from fossils
- The oldest primate

Term 4

Detection in physics

- Detecting planets
- Detecting alien life
- Detecting position
- Detecting messages
- Detecting particles

B1 Cell Structure

- Eukaryotes and prokaryotes
- Microscopy
- Animal and plant cells
- Specialised cells
- Cell Transport
- Exchange surfaces

Assessment

Each topic is assessed with a formative end of topic test where students are given time to address and improve their misconceptions.

Each unit is then assessed with a summative end of unit assessment.

Term 5

C1 Atomic structure

- Structure of the atom
- Electronic configuration
- Chemical equations
- Separation techniques
- Ions and isotopes

P1 Conservation and dissipation of energy

- Energy stores and transfers
- Conservation of energy
- Energy and work
- Efficiency
- Power

Term 6



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Year 10 Science Learning Journey

- B2 Cell division**
- Cell division
 - Growth and differentiation
 - Stem cells

- B3 Organisation and the Digestive system**
- Tissues and organs
 - Digestive system
 - Enzymes as catalysts
 - Chemistry of food

Term 1

- B4 Organising animals and plants**
- Components of the blood and blood vessels
 - The heart
 - Heart disease and treatments
 - Gas exchanges
 - Plant tissue
 - Transpiration and evaporation

Term 2

- B5 Communicable diseases**
- Health and disease
 - Pathogens
 - Diseases caused by fungi, bacteria, virus and protist
 - Defence mechanisms
 - Growing bacteria in a lab
 - Plant diseases
 - Plant defences

Term 4

- B7 Non-communicable diseases**
- Non-communicable disease
 - Cancer
 - Risks of disease

Term 3

- B6 Preventing and treating disease**
- Vaccination
 - Antibiotics and painkillers
 - Discovering and developing drugs
 - Making and using monoclonal antibodies

B8 Photosynthesis

- Photosynthesis
- Rate of photosynthesis
- How plants use glucose
- Making the most of photosynthesis

Term 5

B9 Respiration

- Aerobic and anaerobic respiration
- Responding to exercise
- Metabolism and the liver

Term 6





Year 11 Science Learning Journey

B10 The human nervous system

- Homeostasis
- Structure of the nervous system
- Reflex actions
- The brain
- The eye
- Problems with the eye

B11 Hormonal coordination

- Hormonal control
- Control of blood glucose
- Treating diabetes
- Negative feedback
 - Human reproduction
 - Hormones and the menstrual cycle
- Control of fertility
- Plant hormones and responses
 - Using plant hormones

Term 1

B12 Homeostasis in action

- Controlling body temperature
- Removing waste products
- The human kidney
- Dialysis
- Kidney transplants

B13

Reproduction

- A-sexual and sexual reproduction
- Meiosis
- DNA and the genome
 - Inherited disorders and genetics
 - Genetic screening
- DNA structure
 - Protein synthesis
 - Gene expression and mutation

Term 2

B16 Adaptation and inheritance

- Adaptation in animals and plants
- Competition in animals and plants
- Distribution and abundance of organisms in their environment

Term 4

B15 Genetics and evolution

- Evidence for evolution
- Fossils and extinction
- Antibiotic resistance
- Classification
 - Accepting Darwin's theory
 - History of genetics and evolution
- Speciation

Term 3

B14 Variation and evolution

- Variation
- Evolution by natural selection
- Selective breeding
- Genetic engineering and ethics
 - Cloning
- Adult cell cloning

B17 Organisation of an ecosystem

- The carbon cycle
- The water cycle
- Feeding relationships
 - Decomposers
- Rates of decomposition

Term 5

B18 Biodiversity and ecosystems

- Human population explosion
- Land, air and water pollution
 - Human effects on the environment
 - Maintaining biodiversity
 - Global warming
- Trophic levels and biomass
- Factors affecting food security
- Sustainable and efficient food production

Term 6

Further study

- A-level biology
- Apprenticeships
- Career pathways
- Biology teacher
 - Medicine
 - Veterinary science
- Forensic science
 - Ecology
 - Nursing
 - Dentistry



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Year 10 Science Learning Journey

C2 The periodic table

- History of the periodic table
- The alkali metals
- The halogens
- The noble gases
- Transition metals

Term 1

C3 Structure and bonding

- States of matter
- Ionic bonding
- Giant ionic structures
- Covalent bonding
- Bonding in metals
- Nanoparticles

Term 2

C4 Chemical calculations

- Relative mass and moles
- Balanced equations
 - Yields
- Atom economy
- Concentrations
- Titrations
- Volumes of gases

Term 4

C5 Chemical changes

- Reactivity series
- Displacement reactions
- Extracting metals
 - Making salts
- Acids and alkalis

Term 3

C6 Electrolysis

- Extraction of aluminium
- Electrolysis of aqueous solutions

Term 5

C7 Energy changes

- Exothermic/endothemic
 - Useful changes
 - Reaction profiles
- Bond energy calculations
- Cells, batteries and fuel cells

Term 6



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Year 11 Science Learning Journey

C8 Rates and equilibrium

- Rate of reaction
- Collision theory and surface area
- The effects of temperature, concentration, pressure and catalysts
- Reversible reactions
- Dynamic equilibrium and altering conditions

C9 Crude oil and fuels

- Hydrocarbons
- Fractional distillation of oil
 - Burning hydrocarbon fuels
 - Cracking hydrocarbons

Term 1

C10 Organic reactions

- Reactions of the alkenes
- Structures of alcohols, carboxylic acids and esters
- Reactions and uses of alcohols
- Carboxylic acids and esters

C11 Polymers

- Addition polymerisation
- Condensation polymerisation
- Natural polymers
- DNA

Term 2

C12 Chemical analysis

- Pure substances and mixtures
- Analysing chromatograms
- Testing for gases
- Tests for positive and negative ions
- Instrumental analysis

Term 4

C13 The Earth's atmosphere

- History of our atmosphere
- Our evolving atmosphere
 - Greenhouse gases
 - Global climate change
 - Atmospheric pollutants

Term 3

C14 The Earth's resources

- Finite and renewable resources
- Water safe to drink
- Treating wastewater
- Extracting metals from ores
- Life cycle assessments

Term 5

C15 Using our resources

- Rusting
- Useful alloys
- The properties of polymers
- Glass, ceramic, and composites
- Making ammonia – the Haber process and its economics
- Making fertilisers in the lab and in industry

Term 6

Further study

- A-level chemistry
- Apprenticeships
- Career pathways
- Chemistry teacher
- Forensic scientist
- Geochemist
- Hazardous waste chemist
- Materials scientist
- Pharmacologist/toxicologist
- Water chemist



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Year 10 Science Learning Journey

P2 Energy transfer by heating

- Conduction
- Infrared radiation
- Specific heat capacity
- Heating and insulating buildings

Term 1

P3 Energy resources

- Energy demands
- Renewable energy
- Non-renewable energy
 - Energy and the environment
 - Energy issues

Term 2

Assessment

Throughout KS4 students have end of unit assessments with formative feedback and then larger assessments covering a range of topics.

P4 Electric circuits

- Electrical charges and fields
- Current and charge
 - Potential difference and resistance
- Component characteristics
- Series circuits
- Parallel circuits

Term 4

P5 Electricity in the home

- Alternating current
- Cables and plugs
- Electrical power and potential difference
- Electrical currents and energy transfer
- Appliances and efficiency

Term 3

P6 Molecules and matter

- Density
- States of matter
- Internal energy
- Specific latent heat
- Gas pressure and temperature
- Gas pressure and volume

Term 5

P7 Radioactivity

- Atoms and radiation
- The discovery of the nucleus
- Changes in the nucleus
- More about alpha, beta and gamma
 - Activity and half life
- Nuclear radiation in medicine
 - Nuclear fission
 - Nuclear fusion
 - Nuclear issues

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Year 11 Science Learning Journey

P8 Forces in balance

- Vectors and scalars
- Forces between objects
 - Resultant forces
- Moments at work
- More about levers and gears
- Centre of mass
- Moments an equilibrium
 - The parallelogram of forces
- Resolution of forces

P9 Motion

- Speed and distance/time graphs
- Velocity and acceleration
- More about velocity-time graphs
- Analysing motion graphs

Term 1

P10 Force and motion

- Force and acceleration
- Weight and terminal velocity
- Forces and braking
- Momentum
 - Using conservation of momentum
- Impact forces
- Safety first
- Forces and elasticity

P11 Force and pressure

- Pressure and surfaces
- Pressure in a liquid at rest
- Atmospheric pressure
- Upthrust and flotation

Term 2

P12 Wave properties

- The nature of waves
- The properties of waves
- Reflection and refraction
- More about waves
 - Sound waves
 - The uses of ultrasound
- Seismic waves

Term 4

P14 Light

- Reflection of light
- Refraction of light
- Light and colour
 - Lenses
- Using lenses

P13

Electromagnetic waves

- The electromagnetic spectrum
 - Light, infrared, microwaves and radio waves
 - Communications
 - Ultraviolet waves, x-rays and gamma rays
 - X-rays in medicine

Term 3

P15 Electromagnetism

- Magnetic fields
- Magnetic fields of electric currents
- Electromagnetic devices
 - The motor effect
 - The generator effect
 - The ac generator
 - Transformers

Term 5

P16 Space

- Formation of the solar system
 - The life history of a star
- Planets, satellites and orbits
- The expanding universe
- The beginning and future of the universe

Term 6

Further study

- A-level physics
- Apprenticeships
- Career pathways
- Physics teacher
- Medical research
 - Engineer
 - Astronomer
 - Geophysicist



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