



# KS3 Science Learning Journey

## Biology - Evolution and genetics

- DNA
- Variation and inheritance
- Natural selection
- Taxonomy

## Chemistry - Acids and reactivity

- Acids and bases
- Concentration
- pH
- Acids and metals

## Biology - Movement, protection and energy

- Skeletal system
- Muscles
- Neurons and reflexes
- Respiration
- Photosynthesis

GCSE science  
Combined or  
separate science

# Year 9

## Chemistry - Gas, pressure and energetics

- Diffusion
- Gas pressure
- Testing for gases
- Reactions with gases

## Physics - Y9 2

- Current electricity
- Generating electricity
- Forces energy and work
- Contact and non contact forces

## Physics - Y9 1

- Kinetic energy
- GPE
- Energy in homes
- Static electricity
- Speed and acceleration

## Physics - Women in physics

- Radiation
- The electromagnetic spectrum
- Standard form and prefixes
- Terminal velocity

## Biology - Transport systems

- Circulatory system
- Respiratory system
- Plant transport

## Chemistry - Earth through time

- Early atmosphere and volcanoes
- Rock cycle
- Fossils
- Fossil fuels
- Mining and recycling

# Year 8

## Chemistry - Chemical reactions

- Combustion
- Thermal decomposition
- Displacement reactions
- Types of reactions

## Biology - Life under the microscope

- Plant and animal cells
- Stem cells
- Unicellular organisms
- Organs and tissues

## Physics - Physics in biology

- Energy
- Stores and transfers
- Light waves
- Sound waves

# Year 7

## Physics - Physics of superheroes

- Contact forces
- Non contact forces
- Working scientifically
- Hooke's law

## Biology - Healthy living

- Food groups
- Smoking
- Drugs and alcohol
- Exercise and heart rate

## Chemistry - Atoms and elements

- Atoms
- Compounds and molecules
- Periodic table
- Common compounds and chemicals.

## Chemistry - Murder mystery

- Separation techniques
- Scientific observations
- Scientific recordings
- Safety

## Biology - Survival in the wild

- Predator prey interactions
- Reproduction
- Adaptations
- Simple taxonomy

## Physics - Space

- Bodies in space
- Stars
- Weight and gravity
- Speed

# KS4 Separate Physics Learning Journey

## Electromagnetism

- Electromagnets
- Motors
- Motor effect
- EM Induction
- Generator
- Microphones and speakers
- National Grid
- Transformers
- Transformers 2
- Transformers 3

## Static electricity

- Electric fields
- Charge
- Potential difference
- Static charge
- Electrostatic induction
- Uses of static
- Dangers of static

## Pressure

- Pressure
- Gas pressure
- Fluid pressure
- Pressure and upthrust
- Archimedes principle

## Bending and stretching

- Changing matter with forces
- Elastic and inelastic stretching
- Stretching
- Work done stretching
- Spring core prac
- Forces and vectors
- Vector diagrams

**Year 11**

## Current electricity

- Resistance
- Changing resistance
- Series circuits
- Parallel circuits
- Resistors in series and parallel

- Electricity core prac.
- Components
- Batteries vs mains electricity
- Current through wires

## The atom and density

- The atom
- Rutherford's experiment
- The atom and density
- Density core prac

## Medical uses of radiation

- Uses of ionising
- Detecting cancer
- Treating cancer

## Human senses and using waves

- How we see
- The eye and lenses
- Lenses and images
- Sound Vs light
- Wave speed and depth
- How we hear
- Infrasound and ultrasound
- Wave speed core prac

## Acceleration as a vector

- Calculating speed graphically
- Acceleration graphically
- Calculating acceleration differently
- Orbits
- Orbits of electrons

## Space

- Gravity and satellites?
- The Universe
- The Solar System
- Changing ideas of the Universe
- Stars and fusion
- Fusion
- Life cycle of stars
- Future of space

## Waves interacting with matter

- EM waves and matter
- Waves through changing materials
- Refraction core prac
- Reflection
- Other types of wave

## The EM spectrum

- The electromagnetic spectrum
- Uses of the EM spec and energy transfers
- Dangers of the EM spec
- Production of EM Waves
- 

## Radiation in the universe

- Using decay: Nuclear fission
- Nuclear powerstations
- Background radiation
- Half life and decay
- Exponentials
- Gamma radiation

## Electrical power

- Power
- Power, Work done and efficiency link
- Electrical power

## Electrical heating

- Inefficiencies in electrical circuits
- Power loss across a resistor
- Thermal energy and power
- Hot objects
- Thermal energy core prac
- National Grid
- Electrical safety and dangers

## Radioactive decay

- Radiation. What is it and why is it dangerous?
- Chernobyl
- The atom and radiation
- What are the types of radiation?
- Differences of radiation and decay

**Year 10**

## Energy and heating

- Work done and states
- Gas pressure and energy
- Specific heat capacity
- SHC prac
- SLH
- SLH prac
- Insulation and efficiency

## Effects of forces -

- Thinking and stopping distance
- Work done
- Work done and stopping distances
- Newton's 3rd law
- Moments

## Principles of forces

- Displacement
- Acceleration
- Newton's 2nd law
- Free body diagrams
- Weight and gravity
- Core prac (force)
- **Momentum**
- **Newton's 2nd law**
- **Collisions**
- Braking distances

# KS4 Combined Physics Learning Journey

- Electromagnetism**
- Electromagnets
  - Motors
  - Motor effect
  - EM Induction
  - Generator
  - National Grid
  - Transformers
  - Transformers

- Current electricity**
- Resistance
  - Changing resistance
  - Series circuits
  - Parallel circuits
  - Resistors in series and parallel
  - Electricity core prac.
  - Components
  - Batteries vs mains electricity
  - Current through wires

## Year 11

- Acceleration as a vector**
- Calculating speed graphically
  - Acceleration graphically
  - Calculating acceleration differently
  - Orbits
  - Orbits of electrons

- Bending and stretching**
- Changing matter with forces
  - Elastic and inelastic
  - Stretching
  - Work done stretching
  - Spring core prac
  - Forces and vectors
  - Vector diagrams

- The atom and density**
- The atom
  - Rutherford's experiment
  - The atom and density
  - Density core prac

- Waves interacting with matter**
- EM waves and matter
  - Waves through changing materials
  - Refraction core prac
  - Reflection
  - Other types of wave
  - Wave speed core prac

- The EM spectrum**
- The electromagnetic spectrum
  - Uses of the EM spec and energy transfers
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  - Production of EM Waves

- Radiation in the universe**
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- Electrical power**
- Power
  - Power, Work done and efficiency link
  - Electrical power

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  - National Grid
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- Work done and states
  - Gas pressure and energy
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  - SHC prac
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  - SLH prac
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- Effects of forces -**
- Work done
  - Work done and stopping distances
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- Principles of forces**
- Displacement
  - Acceleration
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  - Free body diagrams
  - Weight and gravity
  - Core prac (force)
  - **Momentum**
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  - **Collisions**
  - Braking distances

# KS4 Separate Biology Learning Journey

## Exchange

- Unicellular organisms
- Multicellular organisms
- Diffusion
- Breathing
- Blood
- Blood vessels
- 

- Heart
- Heart calculations
- Plant requirements
- The leaf
- Water transport
- Sucrose transport

## Reactions

- Investigating enzymes
- Photosynthesis
- Investigating photosynthesis
- Respiration
- Investigating respiration

## Cycles

- Water cycle
- Transpiration
- Carbon cycle
- Nitrogen cycle
- Nitrogen in fertilisers
- Menstrual cycle

- **Menstrual hormones**
- Pregnancy
- Cell cycle
- Cell division

## Growth

- Cell division
- Cells
- Specialised cells
- Stem cells
- Animal and plant growth
- **Plant hormones**

Year  
11

## Risk factors

- Non-communicable disease
- Lifestyle
- Cardiovascular disease
- Diabetes
- Human genome project
- New medicines

## Pathogens

- Health and disease
- Communicable diseases
- First line of defence
- Specific immune response
- Vaccination
- Antibiotics

- **Core Practical: Aseptic technique**
- STIs
- **Virus replication**
- **Monoclonal antibodies**
- **Plant disease**

## Inheritance

- DNA
- Genes
- **Making proteins**
- Variation
- Gametes
- Genetic diagrams
- **Codominance**
- **Sex-linked disorders**
- Selective breeding
- Genetic engineering (GM and then advantages)
- **Tissue culture**

## Evolution

- Natural selection
- Antibiotic resistance
- Human fossils
- Stone tools
- Classification
- **Darwin Vs Wallace**
- **Pentadactyl limb**

## Responses

- Responding to changes
- Neurones
- Nervous response
- Reflex arc
- **Brain**
- **Eye**
- Hormones
- **Hormonal response**
- Homeostasis
- **Thermoregulation**
- Glucoregulation
- **Osmoregulation**

Year  
10

## Survival

- Ecosystems
- Investigating ecosystems
- CORE PRACTICAL: Investigating ecosystems
- Food chains
- **Energy transfers**
- **Energy in food**
- **Core Practical: Nutrients in food**
- Competition
- Relationships
- Human impact
- **Food security**
- **Decomposition**

# KS4 Combined Biology Learning Journey

- Exchange**
- Unicellular organisms
  - Multicellular organisms
  - Diffusion
  - Breathing
  - Blood
  - Blood vessels
  -
- Heart
  - Heart calculations
  - Plant requirements
  - The leaf
  - Water transport
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- Reactions**
- Investigating enzymes
  - Photosynthesis
  - Investigating photosynthesis
  - Respiration
  - Investigating respiration

- Cycles**
- Water cycle
  - Transpiration
  - Carbon cycle
  - Nitrogen cycle
  - Nitrogen in fertilisers
  - Menstrual cycle
- **Menstrual hormones**
  - Pregnancy
  - Cell cycle
  - Cell division

- Growth**
- Cell division
  - Cells
  - Specialised cells
  - Stem cells
  - Animal and plant growth

## Year 11

- Risk factors**
- Non-communicable disease
  - Lifestyle
  - Cardiovascular disease
  - Diabetes
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  - New medicines

- Pathogens**
- Health and disease
  - Communicable diseases
  - First line of defence
  - Specific immune response
  - Vaccination
  - Antibiotics
  - STIs

- Inheritance**
- DNA
  - Genes
  - Variation
  - Gametes
  - Genetic diagrams
  - Selective breeding
  - Genetic engineering
  - (GM and then advantages)

- Evolution**
- Natural selection
  - Antibiotic resistance
  - Human fossils
  - Stone tools
  - Classification

- Responses**
- Responding to changes
  - Neurones
  - Nervous response
  - Reflex arc
  - Hormones
  - **Hormonal response**
  - Homeostasis
  - Glucoregulation

## Year 10

- Survival**
- Ecosystems
  - Investigating ecosystems
  - CORE PRACTICAL: Investigating ecosystems
  - Food chains
  - Competition
  - Relationships
  - Human impact

# KS4 Separate Chemistry Learning Journey

## Electrolysis

- Ions
- Electrolysis Recap
- Products of electrolysis
- Half-Equations [HIGHER ONLY]
- Core Practical - Electrolysis of Copper Sulfate (copper electrodes)
- Purifying Copper
- Purifying Copper
- Testing for cations
- Testing for anions
- Core prac
- Flame photometry

## Measuring rates of reaction

- Collision theory
- CORE Practical: Concentration
- Surface area
- CORE Practical: Temperature
- Catalysts
- Calculating rate
- Measuring temperature changes
- Endo and Exothermic reactions
- Energy profile diagrams
- Bond energies [Higher only]

## Groups of the periodic table

- Group 1
- Group 7
- Group 7 displacement reactions
- Group 0

Year  
11

## Dynamic equilibrium

- Dynamic equilibrium
- Le Chatelier's principle
- Le Chatelier's principle
- The Haber process
- Fertilisers
- Making fertiliser prac
- Molar gas volume calculations

## Metal extraction

- Extracting metals
- Biological methods of extraction
- Reactivity of metals
- Displacement reactions
- Recycling
- Life Cycle assessments
- Transition metals
- Alloys
- Corrosion

## Neutralisation

- Acids, alkalis and bases recap
- Neutralisation
- Balancing equations
- Making insoluble salts/solubility rules
- Purify an insoluble salt
- Core prac: making a soluble salt from an acid and base
- Strong and weak acids
- Core prac: making a soluble salt from an acid and alkali (titration)
- Moles
- Concentration
- Limiting reagents

## Separating mixtures

- Changes of state
- Measuring purity
- Distillation
- Chromatography
- Chromatography Prac
- Filtration and Crystallisation
- Prac: Making crystals
- Prac: Making crystals include write-up
- Drinking Water

Year  
10

## Fuel

- Crude Oil - Fractional Distillation
- Crude Oil - Properties of Fractions
- Homologous Series
- Alkanes
- Alkenes
- Cracking
- Combustion
- Acid Rain/Pollutants
- Future fuels
- Early atmosphere
- Climate change
- Measuring Oxygen in the Atmosphere

## Bonding

- Simple covalent bonding
- Giant covalent bonding
- Properties of covalent compounds
- Fullerenes
- Graphene

# KS4 Combined Chemistry Learning Journey

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- Purifying Copper

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