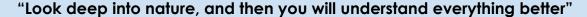


# Curriculum plan: Science seperate



# INTENT:



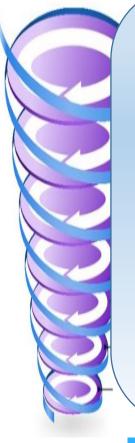
**Albert Einstein** 

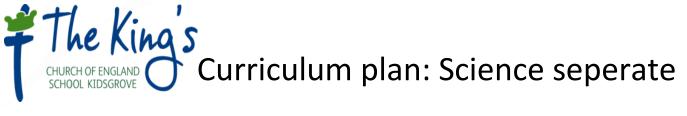
The intent of the science department is to convey to students that science underpins everything.

At The King's, we study:

- **Physics** to be able to understand the fundamental principles that govern all Energy and matter in the Universe. Physics gives us tools to understand nature from the scale of a sub-a-tomic particles up to the inter-galactic scale of the universe;
- Chemistry to be able to understand the nature of substances: how they are composed, their behaviors, and their physical and chemical properties. Chemistry allows us to identify unknown substances, monitor concentrations and synthesize new chemicals. Above all, chemistry is about finding solutions to the problems that concern us and our surroundings;
- **Biology** to be able to understand life and thereby understand ourselves. Biology allows us an understanding od the amazing complexity of many life processes and mechanisms. Biology encourages us to seek out reasons for strange, surprising and sometimes usual observations.

Science provides some incredibly challenging topics helping to gauge an awareness of topical issues and their impact on the climate, earth as well as human growth.







# \*\*Please click on the icons to access our online portal where you can learn more about each topic\*\*

Half term points									
	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2			
	Cell Division	Organisation	Infection and response	Infection and response	Bioenergetics	Required Prac <mark>tical Revision Biology paper 1</mark>			
	•	<u>•</u>	<u>•</u>	•	<u> </u>	<u> </u>			
)	Learning to include: B2 Cell Division  • mitosis • growth and differentiation • stem cells  Organisation	Learning to include: B4 Organising animals and plants  • the blood • the structure of blood vessels • the structure and function of the heart • helping the heart • breathing and gaseous exchange • transport system in plants • evaporation and transpiration of	Learning to include: B5 Communicable diseases  • health and disease  • preventing infections  • viral diseases  • bacterial diseases  • diseases caused by fungi and protists  • the human defence response  • growing bacteria  • plant diseases and defence	B7 Non-communicable disease	Learning to include: B9 Respiration      aerobic respiration     the body's response to exercise     anaerobic respiration     metabolism and the liver	Learning to include:			
	Learning to include: B3 Organisation and the digestive system  tissues and organs the human digestive	classification	B6 Preventing and treating disease  vaccinations  antibiotics and painkillers discovering and developing drugs  making and using monoclonal antibodies						
	system     the chemistry of food     catalysts and enzymes     the factors affecting		<b>©</b>						



# Curriculum plan: Science seperate

# CONNECTED

### Energy



#### Learning to include: P2 Energy transfer by heating

- conduction
- infrared radiation
- specific heat capacity
- heating and insulating buildings

#### **Electric Circuits**



#### Learning to include: P4 Electric circuits

- current and charge
- potential difference and resistance
  - component characteristics
- series and parallel circuits

### Electricity in the home



#### Learning to include: P5 Electricity in the home

- alternating current cables and pluas
- electrical power and potential difference
- electrical current and energy transfer

#### Atomic structure



#### Learning to include: P7 Radioactivity

- atoms and radiation
- the discovery and changes to the nucleus
- alpha, beta and gamma radiation
- activity and half-life
- nuclear radiation in medicine
  - nuclear fission
- nuclear fusion
- nuclear issues





# **Revisiting prior** learning: Energy



#### Learning to include: P1 Conservation and dissipation of energy

- changes in energy and energy conservation
- energy and work
- aravitational potential energy
- kinetic and elastic energy
- energy dissipation
- energy efficiency
- energy and power





### **Electricity**



# **Quantitative chemistry**



## **Chemical changes**







# Chemical changes



# Atomic structure and the periodic table



#### Learning to include: P3 Energy resources

- energy demands
- renewable energy: wind, water, sun and earth
- energy and the environment

#### Learning to include: C4 Chemical calculations

- relative masses and moles equation and calculations
- from masses to balanced equations
- expressing concentrations yield and atom economy





#### Learning to include: C5 Chemical changes

- the reactivity series displacement reactions
- extracting metals
- making salts
- neutralisation and the pH scale



#### Learning to include: C6 Electrolysis

- introduction to electrolysis
- changes at the electrodes
- the extraction of aluminium

electrolysis of aqueous solutions





#### Learning to include: C1 Atomic structure

- atoms
- chemical equations
- methods of separation
- history of the atom and its structure
- ions, atoms and isotopes
- electronic structure



## Required Practical **Revision Chemistry** paper 1

#### Learning to include:

- Making salts
- Electrolysis
- Temperature changes



### Maths Skills Review





## The periodic table



#### Learning to include: C2 The periodic table

- the development of the periodic table
- group 1
- group 7
- explaining trends
- the transition elements



## Structure, bonding and matter



#### Learning to include: C3 Structure and bonding

- states of matter
- atoms and ions
- bonding: ionic and covalent
- giant ionic and giant covalent structures
- metallic bonding
- nanoparticles and their application



## C7 Energy changes



#### Learning to include: C7 Energy changes

- exothermic and endothermic reactions
- using energy transfers
- reaction profiles
- bond energy calculations
- chemical cells and batteries
- fuel cells

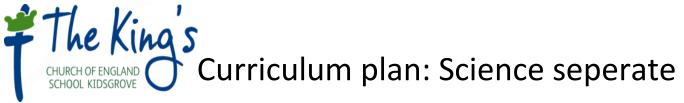


### Chemistry of the atmosphere



#### Learning to include: The Earth's atmosphere

- history of our atmosphere
- our evolving atmosphere
- greenhouse gases
- global climate change atmospheric pollutants





**Please click on the icons to access our online portal where you can learn more a	e about each topici	**
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Half term points								
AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2			
Homeostasis and response	Homeostasis and response	Inheritance, variation and evolution	Ecology	Required Practical Revision Biology P2	Grade range en point:			
<u> </u>	•	<u>•</u>	<u>•</u>	<u>•</u>				
Learning to include: The human nervous system  the principles of homeostasis  the structure and function of the nervous system  reflex actions  the brain  the eye and problems  Hormonal coordination  principles of hormonal control  control  controlling blood glucose  treating diabetes  negative feedback  human reproduction and artificial control of fertility  infertility treatment  plant hormones and their response  Homeostasis in action  controlling body temperature  removing waste products  the human kidney  dialysis kidney transplants	Learning to include: B13 Homeostasis in action  controlling body temperature  removing waste products the human kidney dialysis kidney transplants	Learning to include: Reproduction	Learning to include: Adaptations, interdependence and competition  • the importance of communities • distribution and abundance • competition in animals and plants  • adaptations in animals and plants  Organising an ecosystem • feeding relationships • materials cycling • the carbon cycle  Biodiversity and ecosystems • the human population explosion • land, water and air pollution • deforestation and peat destruction • global warming • trophic levels • food production and security biomass transfer	Learning to include:  Reaction time Plant responses Field investigations Decay  Maths Skills Review	9-1			



# CHURCH OF ENGLAND Curriculum plan: Science seperate



#### **Forces**



#### Learning to include: Forces in balance

- vectors and scalars
- forces between objects
- resultant force
- levers and gears
- centre of mass
- parallelogram of force
- resolution of force
- moments and equilibrium

#### Motion

- speed-distance time
- velocity and acceleration
- analysing motion graphs

#### Forces and motion

- Force and acceleration
- Weight and terminal velocity
- Force and braking
- Momentum
- Forces and elasticity
- Impact forces
- Safety first

#### Forces and pressure

- pressure and surfaces
- pressure in liquids at rest
- atmospheric pressure up thrust and flotation

#### **Forces**





#### Learning to include: P13 Electromagnetic waves

Waves

- The electromagnetic
- Light, infra-red, microwaves and radio waves
- Communication
- UV, X-rays and gamma
- Using X-rays in medicine





#### Waves



#### Learning to include:

- reflection and refraction of
- light and colour
- lenses



#### Magnetism and **Electromagnetics**



## Learning to include:

#### P15 Electromagnetism

- electromagnetism
- magnetic fields
- magnetic fields with electric currents
- the motor effect
- the generator effect
- transformers





## Solar system/ Red shift



#### Learning to include: 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





#### Revisit prior learning from Y10

P1 -3 Energy





P4 & P5 Electricity



#### **Required Practical Revision** Physics paper 2

#### Learning to include:

- Force and extension
- Acceleration
- Waves
- Light
- Radiation and absorption





**Maths Skills Review** 

# CHURCH OF ENGLAND Curriculum plan: Science seperate



#### The rate and extent of chemical change



#### Learning to include: C8 Rates and equilibrium

- rates of reaction
- collision theory
- factors that affect rates of reactions
- reversible reactions dynamic equilibrium



# Organic chemistry



#### Learning to include: C9 Crude oil and fuels

- hydrocarbons
- fractional distillation
- burning hydrocarbons cracking hydrocarbons



## **Organic chemistry**



#### Learning to include: C10 Organic reactions

- reaction of alkenes
- structure and uses of organic molecules

#### Learning to include: C11 Polymers

- additional polymerisation
- condensation polymerisation
- Natural polymers
- DNA



#### Chemistry of the atmosphere



#### Learning to include: C13 The Earth's atmosphere

- history of our atmosphere
- our evolving atmosphere greenhouse gases
- global climate change
- atmospheric pollutants

## Chemical analysis



#### Learning to include: C12 Chemical analysis

- pure substances and mixtures
- analysing chromatograms
- testing for gases: positive and negative ions
- instrumental analysis





#### Using resources



#### Learning to include: C14 The Earth's resources

- Finite and renewable resources
- water safe to drink
- treating waste water
- extracting metals from

#### Learning to include: C15 Using our resources

- rusting
- alloys and their uses
- properties of polymers
- glass, ceramics and composites
- the Haber process
- making fertilisers in the lab and in industry







Maths Skills Review

# **Revision Chemistry** paper 2

**Required Practical** 

#### Learning to include:

- Rates of reaction
- Chromatography
- Identifying ions
- Water purification





