



At IncludEd Learning, we follow an adapted National Curriculum, with wellbeing central to everything we do. We offer a broad and balanced curriculum, with all pupils having the opportunity to study Maths and English up to Level 2 with a range of short course/vocational options in other subjects. The study of these subjects, allows pupils to apply theoretical knowledge to the practical elements of the curriculum. We believe in all our pupils and have high expectations for their futures. A comprehensive package of both pastoral and learning support, delivered by highly trained staff, allows them to navigate their learning journeys and improve their life outcomes, becoming the best versions of themselves.

Engaged	A degree of attention, curiosity, interest, optimism, and passion extends to the level of motivation to learn and progress.
Empowered	Fostering a sense of ownership, creating active participants who take responsibility for their own growth and development.
IncludEd	A nurturing environment allowing equal access to educational opportunities where all students are safe, valued, and respected.

SCIENCE CURRICULUM VISION

Our curriculum aims to develop our pupils' literacy understanding by breaking the National Curriculum objectives into smaller steps which develop skills and knowledge to meet the National Curriculum requirements. This enables all pupils to make good progress from their starting points. Understanding is at the core of our curriculum. Pupils' often start with gaps in their learning and it is important that their needs are understood but expectations remain high. We focus on this through the teaching of key words and the use of ELKLAN strategies to develop understanding of what these words mean. It is important that our pupils see the value and purpose of science in the real world, for this reason we highlight the links to potential careers through talks and lessons, cultural capital and essential life skills (see cultural capital map).

Our vision aims for students to develop a sound knowledge of a range of key scientific concepts which will be built on throughout the curriculum. A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils will be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They will be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, analyse causes, encourage creativity and problem solve.

SCIENCE FRAMEWORK FOR LEARNING

The Key Goals of Science

- To develop understanding of the 6 key fields of science
 - Mathematics
 - Computer and information sciences
 - Physical sciences
 - Chemical sciences
 - Earth and related environmental sciences
 - Biological sciences
- To build resilience and confidence in having “a go”
- To develop problem solving approaches in a range of contexts
- To develop confidence to apply themselves to problem solving in a range of context

Characteristic of a Compelling Learning Experience

- Open ended problems to explore
- Discussion- without fear of being wrong
- Collaboration group/paired work encouraged to explore problems
- Using a broad range of strategies and resources (low/hi tech)

Key Concepts

Discovery - A way of discovering what's in the universe, how things work today, how they worked in the past and how they are likely to work in the future.

Problem-solving - Recognising problems and using different methods to find logical solutions and checking to see if they work.

Scientific reasoning - Encompasses critical thinking skills as a vital learning outcome in modern science education.

Scientific Concept - An idea that helps make sense of natural processes or objects.

Key Skills

- Compile, analyse and critically evaluate information
- Understand and make informed judgements about science-based issues
- Interpret, use and evaluate data
- Put together reasoned arguments and question assumptions
- Conduct practical and investigative work and be aware of risk assessment and health and safety regulations


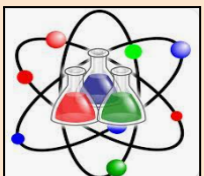
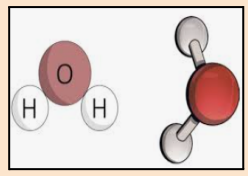
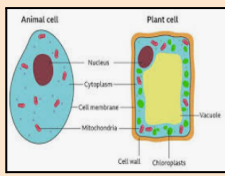

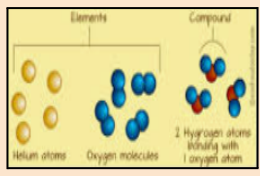
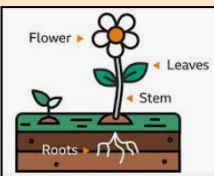
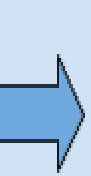
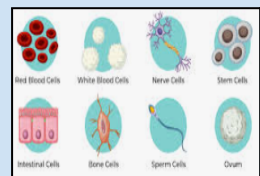
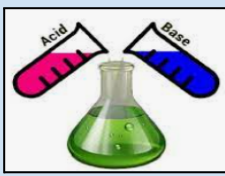
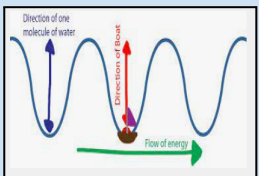
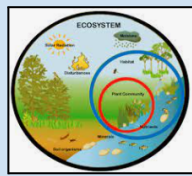
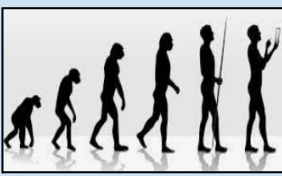

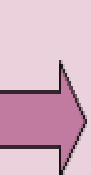
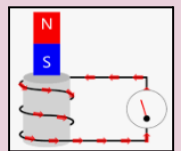
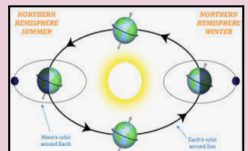






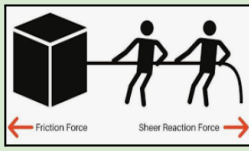
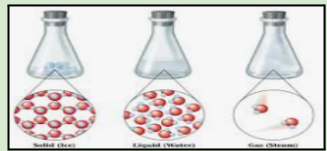




Key Knowledge

Students are expected through the curriculum to gain a mastery of the subject.
Students who excel in science lessons are likely to develop a strong ability to think critically.

Promoting SMSC and Fundamental British Values through Science

SMSC and British Values	In Science Lessons Students will:
<p>Spirituality Explore beliefs, experience and faiths, feelings and values; enjoy learning about oneself, others and the surrounding world; use imagination and creativity and reflect on experiences.</p>	<ul style="list-style-type: none"> - explore aspects of nature including seasons and other natural phenomenon - find out about Earth, space, and the universe and their place in it - question and explore why things happen and how things work - debate and question 'big' ideas such as evolution - develop a sense of 'awe' and 'wonder' about the world around them
<p>Moral Recognise right and wrong and respect the law; understand consequences; investigate moral and ethical issues and offer reasoned views.</p>	<ul style="list-style-type: none"> - explore sensitive issues such as genetic modification, selective breeding, sex and relationships or animal testing
<p>Social Use a range of social skills to participate in the local community and beyond; appreciate diverse viewpoints; participate, volunteer and cooperate; resolve conflict.</p>	<ul style="list-style-type: none"> - find out how medical research has changed and saved lives, for example, heart transplants - find out how science-based charities promote and support health and well-being, for example, the British Heart Foundation or Cancer Research UK - explore inventions that have changed lives, such as flight, electricity and steam power
<p>Cultural Appreciate cultural influences; appreciate the role of Britain's parliamentary system; participate in cultural opportunities; understand, accept, respect and celebrate diversity.</p>	<ul style="list-style-type: none"> - find out about different scientists from around the world - explore differing beliefs about aspects of science, especially evolution and life and death - investigate variation between all living things
<p>Democracy A system where everyone plays an equal part.</p>	<ul style="list-style-type: none"> - work collaboratively - listen to other's opinions and ideas about scientific stories, theories or hypotheses
<p>Rule of law The principle that all people and institutions are subject to and accountable for their actions and behaviour.</p>	<ul style="list-style-type: none"> - follow safety rules in science – see guidance from CLEAPSS - consider the ethics and legality of certain scientific approaches, for example, dissection - explore changes in the law that benefit society, for example, organ donation
<p>Individual liberty Being free to express views or ideas.</p>	<ul style="list-style-type: none"> - express hypotheses and ideas make predictions - express a view on a sensitive or controversial issue - try out an idea or approach including investigating areas of personal interest
<p>Tolerance and respect The ability or willingness to respect and tolerate the opinions or behaviour of others.</p>	<ul style="list-style-type: none"> - work together to plan shared enquiries - listen to feedback and share conclusions - decide on roles during shared investigations - learn from others, including experts - listen to and evaluate the ideas of others

SCIENCE CURRICULUM MAP

TERM	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Spring 2
KS3 Y1 						
	Science Skills	Atoms & Elements	Cells & Reproduction	Electricity & Magnetism	Particles & Separation	Plant Structure
KS3 Y2 						
	Health & Nutrition	Acids & Alkalis	Waves, Light & Sound	Rock, Climate & Universe	Genes & Evolution	Forces & Energy Transfers
KS3 Y3 						
	Energy	Cellular Processes	Sustainable Earth	Energy Efficiency & Power	The Digestive System	Matter & Periodic Table
KS4 Y1 						
	Human Machine & Projects		Forces and Motion & Projects		Chemical Change & Projects	
KS4 Y2 						
	Biological Challenges & Projects		Space Physics & Projects		Performance in Sport & Projects	

KS3: Y1 - 2023-2024 - MATHS FRAMEWORK FOR LEARNING



Preparing for Life in Modern Britain



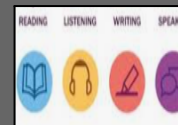
Careers (CEIAG)



Culture Capital



Enrichment Opportunities



Literacy and Communication

AUTUMN 1

AUTUMN 2

SPRING 1

SPRING 2

SUMMER 1

SUMMER 2

**SCIENCE
SKILLS**

**ATOMS &
ELEMENTS**

**CELLS &
REPRODUCTION**

**ELECTRICITY &
MAGNETISM**

**PARTICLES &
SEPARATION**

**PLANT STRUCTURE
INTERDEPENDENCE**



KNOWLEDGE

- How Science Works (HSW) Skills
- Practical skills and writing scientifically
- Command words
- Repeats, means, anomalies, accuracy, errors
- Variables and methods
- Graphs Sample size (range, intervals and scale)
- Control groups

- Elements, compounds and mixtures
- Using the Periodic table
- Group 1 of periodic table
- Chemical reactions
- Chemical Equations
- Structure of an atom
- Electron shells
- Atomic and mass number
- Reactivity of metals
- Investigating the reactivity of metals

- Using microscopes
- Animal and Plant cells
- Labelling and describing cell organelles
- Movement in and out of cells
- Specialised cells
- Puberty
- Reproductive system
- Fertilisation
- Menstrual cycle
- Foetal development

- Circuit Components
- Series and parallel circuits
- Conductors and insulators
- Measuring current and Voltage
- Magnetism
- Electromagnetism
- Static Resistance

- Photosynthesis
- Testing leaves for starch
- Investigating photosynthesis
- Food chains
- Food webs
- Predator/Prey relationships
- Insect pollination
- Leaf structure
- Seed dispersal
- Observing Stomata
- Ecosystems and Habitats

- States of matter (solids, liquids and gases)
- Conservation of matter
- Boiling
- Melting
- Stearic acid (latent heat investigation)
- Solubility
- Separating techniques
- Filtration, evaporation, condensation, distillation and chromatography

SKILLS

- Identifying key Scientific Equipment
- How to keep safe in a lab
- Conducting/writing scientific equations

- Identify properties of certain elements
- Familiarise the periodic table
- Write word equations for the reactions including the

- Learning how to use a microscope
- Memory recall – for cell parts and the reproductive system







- Predictions – are materials conductive or not
- Correctly build series and parallel circuits

- Students work as a team to complete complex food webs
- Students will conduct/write up scientific

- Learning how to annotate a graph
- Retrieval practice
- Students will conduct/write up

<ul style="list-style-type: none"> Effectively using key terms such as anomaly, range, mean, resolution, interval, scale, repeats Understanding how to write a conclusion Explaining results / findings of practicals Identifying variables Howto plot a line graph Learning how to plot a bar chart - choosing an appropriate scale Analysing a graphs 	<p>reactions of metals and non-metals and the formation of oxides From non-metals</p> <ul style="list-style-type: none"> Students will investigate reactions to see if they exo or endothermic Students will investigate metals with acid to see the temperature change (reactivity) Students will heat metals with oxygen 	<ul style="list-style-type: none"> Making models of Animal and Plant cells Comparison of egg and sperm cell Making a 3D model of the reproductive systems Making a Menstrual Cycle beads bracelet 	<ul style="list-style-type: none"> Current in series and parallel circuits Investigate voltage in series/ parallel circuits Investigate static electricity Using magnets - difference between repel and attract Draw magnetic field lines and demonstrate magnetic field lines Make an electromagnet, investigate what happens when strength is increased or decreased 	<p>investigations:</p> <ul style="list-style-type: none"> Iodine test for starch Testing rate of photosynthesis using pond weed Observe stomata Using a microscope 	<p>scientific investigations</p> <ul style="list-style-type: none"> Conservation of mass Rate of evaporation Cooling curve for stearic acid Investigating solubility, melting and boiling Points Evaporation and condensation Chromatography Distillation
ASSESSMENT		Class Discussions, Q&A, Practical Observations, Peer to Peer Learning, Information Posters Summative Assessment, Formative Assessment, EOT Assessment/Test			

KS3: Y2 - 2024-2025 - SCIENCE FRAMEWORK FOR LEARNING

AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
HEALTH & NUTRITION	ACIDS & ALKALIS	WAVES, LIGHT & SOUND	ROCK, CLIMATE & UNIVERSE	GENES & EVOLUTION	FORCES & ENERGY TRANSFERS
					
KNOWLEDGE					
<ul style="list-style-type: none"> Organisms Diet Food groups Food tests Diabetes Digestive system Modelling the journey of food Enzyme digestion 	<ul style="list-style-type: none"> Acids and Alkali Chemical and physical reactions Acids and Alkalis indicators and pH neutralisation Strong and weak acid, Concentration 	<ul style="list-style-type: none"> Energy transfer Waves Wave equations Transverse and longitudinal waves Reflection Refraction 	<ul style="list-style-type: none"> Rocks climate and the universe Global warming The rock cycle (types of rock) The Earth's structure Composition of the 	<ul style="list-style-type: none"> Genes and Evolution Variation The structure of DNA <ul style="list-style-type: none"> Genes, chromosomes and the nucleus Genetic modification 	<ul style="list-style-type: none"> Motion and Forces Resultant force Friction Gravity Air resistance Hooke's Law Calculating speed

<ul style="list-style-type: none"> Respiratory system Gas exchange Impact of exercise Drugs (recreational and drugs in sport) 	<ul style="list-style-type: none"> Metals and non-metals Metals and oxygen Metals and water Metals and acids Making salts Displacement reactions Reactivity series - fruit Batteries 	<ul style="list-style-type: none"> Dispersion Sound Transfer of sound through matter Structure of the Ear 	<ul style="list-style-type: none"> atmosphere Days and seasons Space (planets, stars and galaxies) Gravity on Earth Changing Moon 	<ul style="list-style-type: none"> Selective breeding Natural selection Evolution Extinction Wildlife conservationist 	<ul style="list-style-type: none"> Distance time graphs Speed and velocity Acceleration Pressure moments
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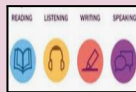


SKILLS

<ul style="list-style-type: none"> Write persuasive articles Evaluate models and carry out dissections Carry out/write up scientific investigations: Investigate food groups and food tests Investigate the pH of substances Carry out filtration and evaporation Learn the importance of sample size and consider factors that might affect a scientific study. (e.g. age/gender etc.) 	<ul style="list-style-type: none"> Scientific investigations: • Investigate pH of different solutions and use indicators Investigate the reactivity of different metals and make predictions using fruit batteries for displacement Learn how to make salt crystals 	<ul style="list-style-type: none"> Carry out/write up scientific investigations Investigate waves in solids and liquids Investigate ray diagrams (Reflection and refraction, dispersion) Investigate the speed of sound in air 	<ul style="list-style-type: none"> Carry out/write up scientific investigations Analysis of data from the department of energy relating to global warming Interpret graphs showing climate change data Practical skills- analysis of rock samples, and identification using data Use of prefixes <ul style="list-style-type: none"> kilo, mega, giga 	<ul style="list-style-type: none"> Develop oracy and presentation skills Learn how to write evaluations and comparisons effectively Build DNA models and evaluate the use of models in science Write about and discuss the ethics of selective breeding in class 	<ul style="list-style-type: none"> Learn how to use and apply key terminology and data such as: <ul style="list-style-type: none"> Repeats, Reliability Reproducibility Mean Error, Accuracy Carry out/write up scientific investigations: Investigate speed Investigate the extension of a spring Investigate friction, air resistance and weight and make a Newton meter
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ASSESSMENT	Class Discussions, Q&A, Practical Observations, Peer to Peer Learning, Information Posters Summative Assessment, Formative Assessment, EOT Assessment/Test
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KS3: Y3 - 2025-2026 - SCIENCE FRAMEWORK FOR LEARNING

AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
ENERGY	CELLULAR PROCESSES	SUSTAINABLE EARTH	ENERGY EFFICIENCY & POWER	THE DIGESTIVE SYSTEM	MATTER & PERIODIC TABLE
 		 	 	 	
KNOWLEDGE					
<ul style="list-style-type: none"> • Energy stores Energy transfers • Energy efficiency • Energy dissipation • Power • Energy costs • Power stations • Non-renewable energy • Renewable energy • Evaluating energy sources 	<ul style="list-style-type: none"> • Cells Types of cells • Cell differentiation and growth • Stem cells • Diffusion and active transport in cells • Osmosis in cells • Investigating osmosis in cells • Aerobic and anaerobic respiration in cells systems 	<ul style="list-style-type: none"> • The Earth's early atmosphere • The modern atmosphere • Human effects on the atmosphere • Global warming • Using the Earth's resources sustainably • Clean water 	<ul style="list-style-type: none"> • Power work • Conservation and dissipation of energy • Energy transfers in a system • Efficiency • Specific heat capacity 	<ul style="list-style-type: none"> • Cells to tissues • Digestive enzymes and digestion • Investigating enzymes in digestion • Health issues • Lifestyle choices • Cancer • The heart and blood vessels • Components of the blood 	<ul style="list-style-type: none"> • Circuit Component • Series and parallel circuits • Conductors and insulators • Measuring current and voltage • Magnetism
SKILLS					
<ul style="list-style-type: none"> • Carry out practicals to look at changes in: <ul style="list-style-type: none"> - kinetic (Ek), - Elastic (Ee) - Gravitational (Ep) energy; • Understand how we can convert energy stores into different forms • Study the National Grid - how electrical energy is generated and distributed. • Evaluation of energy 	<ul style="list-style-type: none"> • Practical skills- • Osmosis practical: measuring the change in mass of potato pieces • Exercise practical: measuring change in pulse rate and breathing rate • Interpret/analyse data from tables and graphs • Draw conclusion from experimental data 	<ul style="list-style-type: none"> • Explain the evolution -what is responsible for the changes in the Earth's early atmosphere to present time; • Recognise what gases are greenhouse gases • How greenhouse gases are currently affecting the average temperature of our atmosphere and ultimately changing our climate • Explain the effects of other gases that are also polluting 	<ul style="list-style-type: none"> • Use models to explain enzyme action • A large focus on Maths in Science • Students will learn how to calculate energy changes • Recall and apply the following equations: <ul style="list-style-type: none"> - $KE = \frac{1}{2} mv^2$ - $GPE = mgh$ - $P = E/t$ - $P = W/t$ • Use of equations to 	<ul style="list-style-type: none"> • Be able to test foods for: starch using potassium iodide, protein using biuret's reagent, glucose using benedict's reagent fats using ethanol / paper • Explain the action of enzymes using the lock and key method • Know what foods contribute to a healthy diet • How to lead a healthy lifestyle considering diet 	<ul style="list-style-type: none"> • Make predictions on whether materials are conductive or not, then testing their predictions • Correctly building series and parallel circuits • Investigate current in series and parallel circuits • Investigate voltage in series and parallel circuits

resources using data ● Analyse advantages and disadvantages of renewable energy		our atmosphere ● Be able to make decisions on how we access and use the earth's resources, including clean water, in a sustainable way for future generations	calculate efficiency	and exercise	
ASSESSMENT		Class Discussions, Q&A, Practical Observations, Peer to Peer Learning, Information Posters Summative Assessment, Formative Assessment, EOT Assessment/Test			

KS4: Y1 - 2023-2024 - SCIENCE FRAMEWORK FOR LEARNING

ASDAN - SCIENCE AWARD

AUTUMN 1 - HUMAN MACHINE - ASDAN SECTION A

AUTUMN 2 - HUMAN MACHINE - ASDAN SECTION B : PROJECTS



Complete At Least 4 Challenges

Complete at Least 1 Challenge

KNOWLEDGE

SKILLS

SKILLS

KNOWLEDGE

Challenge 1

- Use an infrared thermometer to map the skin temperature of either a person's face arm or hand

Challenge 1

- Present findings as a coloured diagram and add labels to explain your findings

Challenge 1

- Measure the reaction speeds of a sample of different people by asking them to catch a falling ruler. Record their ages and then explore the correlation between age and reaction speed

Challenge 1

- Present your findings as a graph, with an explanation of how you ensured your data was accurate

Challenge 2

- Collect diagrams from the Internet to show how short sight can be treated with spectacle lenses or by laser surgery

Challenge 2

- Present the images in a way that clearly explains how laser treatment is a cure whereas wearing spectacles just treats the symptoms

Challenge 2

- Use a data visualizer from the Internet to explore how human fertility and population are changing

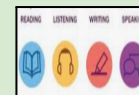
Challenge 2

- Describe patterns over time and in different countries. Suggest explanations for any patterns

<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> ● Measure the diameter of the pupil of someone's eye in different light intensities. Repeat the measurements with one of their eyes completely covered 	<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> ● Describe the patterns you notice in your results and suggest an explanation for your findings 	<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> ● Carry out tests on other people in the school to find out how well they can coordinate hand movements 	<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> ● Analyse the data to produce some hypotheses that you could test
<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> ● Measure the effectiveness of at least three different materials at insulating against sound 	<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> ● Design a pair of ear defenders that can reduce sound by 10 decibels. Provide test evidence to justify your design 	<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> ● Analyse charts used by health professionals to assess growth rates in children 	<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> ● Discuss your findings with others to find patterns in the data
<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> ● Carry out a survey to find the average family size for your class. Carry out a second survey to find the average family size of your parents' generation 	<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> ● Use the two surveys to make predictions about changes in your local population size. List assumptions you made when making your predictions 	<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> ● Working in a group, design and use a questionnaire to collect data about hair and beauty products 	<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> ● Create charts to explain your findings
<p><u>Challenge 6</u></p> <ul style="list-style-type: none"> ● Collect images from the Internet of the inside lining of different parts of the gut. Arrange the images in the order of the parts of the human gut 	<p><u>Challenge 6</u></p> <ul style="list-style-type: none"> ● Describe the changes you can see in the gut lining 		
<p><u>Challenge 7</u></p> <ul style="list-style-type: none"> ● Match up different types of food with their nutritional properties 	<p><u>Challenge 7</u></p> <ul style="list-style-type: none"> ● Use your information to analyse a Roman banquet and plan menus for different people who lived in Roman times 		
<p>ASSESSMENT</p>		<p>Class Discussions, Q&A, Practical Observations, Peer to Peer Learning, Information Posters Summative Assessment, Formative Assessment, EOT Assessment/Test</p>	

SPRING 1 - FORCES & MOTION - SECTION A

SPRING 2 - FORCES & MOTION - SECTION B : PROJECTS



Complete At Least 4 Challenges

Complete At Least 1 Challenge

SKILLS

KNOWLEDGE

SKILLS

KNOWLEDGE

Challenge 1

- A can of diet cola floats in water but ordinary cola sinks. Find the mass and volume of other cans of drink and predict if they will float or sink

Challenge 1

- Present your results as a poster and suggest an explanation

Challenge 1

- Downhill cyclists wear leg guards for protection. Investigate different materials in your group to find out which is best at reducing the force of an impact, and which would be suitable for use in making leg protectors

Challenge 1

- Your written report should include what you found out and details of the method you used

Challenge 2

- In groups build the tallest tower possible using only the dried spaghetti and Plasticine provided

Challenge 2

- Draw a scale diagram of the winning design, labelling the features that provided support and stability

Challenge 2

- Construct a simple vehicle out of wood, card and similar materials that is powered by an elastic band. Use the Internet to find lots of ideas for designs. Compete with other groups to find out which design of car travels furthest in a straight line

Challenge 2

- Create a presentation to explain why the winning design was successful

Challenge 3

- Test threads made of different materials (such as cotton, wool, nylon, polyester, silk) to discover which is strongest and which is stretchiest

Challenge 3

- Write a report of your investigation explaining how you controlled different variables and obtained accurate data

Challenge 3

- Construct a simple vehicle out of wood, card and similar materials that is powered by an elastic band. Compete with groups to find out which design of car travels up the steepest slope

Challenge 3

- Create a presentation to explain why the winning design was successful

Challenge 4

- In your group, use bathroom scales to measure the mass of each person using as they travel up and down in a lift

Challenge 4

- Collect sufficient data to draw a graph of your results and give a verbal presentation to explain your findings

Challenge 4

- Modify a paper bun case so that it can accurately hit a target when dropped from a height of two metres. Record a video of the bun case as it falls

Challenge 4

- Use video analysis software, such as Video Physics or Movie Maker, to analyse frames from your video to measure how the velocity changes as it falls. Record another video when it falls from a different height and compare velocities measured

<u>Challenge 5</u> <ul style="list-style-type: none"> Design and make a model sycamore seed using only card and paper clips. Find out which design stays in the air longest when dropped from a height of two metres 	<u>Challenge 5</u> <ul style="list-style-type: none"> Prepare a verbal report with your results and explaining the features that contributed to the winning design 	<u>Challenge 5</u> <ul style="list-style-type: none"> Investigate the stretchiness of jelly sweets and look for patterns in your results 	<u>Challenge 5</u> <ul style="list-style-type: none"> You will need to plan your own design for this investigation
<u>Challenge 6</u> <ul style="list-style-type: none"> Make model bones by rolling strips of newspaper 10cm wide into tubes. Measure how much force each tube can support 	<u>Challenge 6</u> <ul style="list-style-type: none"> Investigate the effect of changing the tube diameter and the amount of paper used. Design suitable graphs to report your findings 	<u>Challenge 6</u> <ul style="list-style-type: none"> As a group plan and build different structures 	<u>Challenge 6</u> <ul style="list-style-type: none"> Use the data you collect to improve your design and then give your recommendations for designs built to withstand different forces
<u>Challenge 7</u> <ul style="list-style-type: none"> Find out how developers have used their knowledge of forces to investigate accidents and improve car safety in the last 30 years 	<u>Challenge 7</u> <ul style="list-style-type: none"> Research how developers have used their knowledge of forces to investigate accidents and improve car safety in the last 30 years 		
ASSESSMENT		Class Discussions, Q&A, Practical Observations, Peer to Peer Learning, Information Posters Summative Assessment, Formative Assessment, EOT Assessment/Test	

SUMMER 1 - CHEMICAL CHANGE - SECTION A

SUMMER 2 - CHEMICAL CHANGE - SECTION B : PROJECTS



Complete At Least 4 Challenges

Complete At Least 1 Challenge

SKILLS

KNOWLEDGE

SKILLS

KNOWLEDGE

Challenge 1

- Explore the change in mass of a candle as it burns

Challenge 1

- Present your findings as a poster with a graph and an explanation for any changes seen

Challenge 1

- Investigate the properties of lycra as a suitable fabric for making cycling clothing. The properties to assess include thermal insulation, stretchiness, barrier to UV light, weight, breathability and absorbance of dye

Challenge 1

- Write a report on your findings

<p><u>Challenge 2</u></p> <ul style="list-style-type: none"> • Measure the pH of a range of fizzy and still soft drinks 	<p><u>Challenge 2</u></p> <ul style="list-style-type: none"> • Present your results as a chart, listing any ingredients on the drink labels that could explain the pHs measured 	<p><u>Challenge 2</u></p> <ul style="list-style-type: none"> • Conduct a survey of gravestones. Include at least ten stones made of igneous rock and ten made of metamorphic rock. Record the age of each stone, its appearance and the degree of erosion 	<p><u>Challenge 2</u></p> <ul style="list-style-type: none"> • Analyse your results and identify any patterns in your data
<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> • Measure the temperature of ice as you add different amounts of table salt. Plot a graph to show the change in temperature with amount of salt 	<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> • List any steps you took to obtain accurate data. How do your results explain why salt is spread on icy roads? 	<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> • Investigate the effect of cooking on proteins in different types of milk. Experiment to assess the effect of heat and pH on the coagulation of protein 	<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> • Which type of milk would you recommend for use in cookery?
<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> • Watch videos from the Internet that show potassium, lithium, sodium and caesium being added to water 	<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> • Record your observations and explain any pattern in your observations using the periodic table of elements as a clue 	<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> • Use modern day forensic evidence to solve the mystery of who Jack the Ripper was. Would the evidence have been sufficient to justify capital punishment? 	<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> • Your task is also to take part in a debate about the justification for capital punishment
<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> • Use a spirit lamp containing different hydrocarbon fuels, and a beaker of cold water, to measure the heat given out by different fuels 	<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> • Find out how many carbon atoms are combined to form a molecule of each fuel. Describe the pattern between the heat produced by a fuel and the number of carbon atoms it contains 	<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> • Research government statistics to analyse and identify patterns of recycling 	<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> • Use your scientific knowledge to communicate with others the importance of recycling
<p><u>Challenge 6</u></p> <ul style="list-style-type: none"> • Make three different indicator solutions – from red cabbage, spinach and turmeric. Compare how each one reacts to changes in pH using dilute acids and alkalis 	<p><u>Challenge 6</u></p> <ul style="list-style-type: none"> • Write a report to explain which indicator would be the best substitute for litmus solution 		
<p><u>Challenge 7</u></p> <ul style="list-style-type: none"> • Observe the shape of a sample of different crystals and analyse their properties in terms of shape and symmetry 	<p><u>Challenge 7</u></p> <ul style="list-style-type: none"> • Look for patterns in your observations and test out your theories on how crystal shapes are determined 		
<h2>ASSESSMENT</h2>		<p>Class Discussions, Q&A, Practical Observations, Peer to Peer Learning, Information Posters Summative Assessment, Formative Assessment, EOT Assessment/Test</p>	

KS4: Y2 - 2024-2025 - SCIENCE FRAMEWORK FOR LEARNING

AUTUMN 1 - BIOLOGICAL CHALLENGES - SECTION A

AUTUMN 2 - BIOLOGICAL CHALLENGES - SECTION B : PROJECTS



Complete At Least 4 Challenges

Complete At Least 1 Challenge

SKILLS

KNOWLEDGE

SKILLS

KNOWLEDGE

Challenge 1

- As a pair, collect between 10 and 15 images of different types of cell from the Internet.

Challenge 1

- Classify these cells into different types using either a Venn diagram or a hierarchy tree. Explain the characteristics you used in your classification

Challenge 1

- Germinate radish seeds on wet paper towels in small dishes. Place the dishes of seeds into plastic bags containing either a few drops of acid or a few drops of ammonia on cotton wool. Investigate the percentage that germinate with different types of pollution

Challenge 1

- Present your results as graphs, illustrated with photographs of the germinating seeds

Challenge 2

- Use a 2cm x 2cm quadrant to estimate the percentage cover of green algae on the bark of a tree trunk. Estimate the percentage cover at different points around the circumference

Challenge 2

- Compare different trees and describe any patterns you detect

Challenge 2

- As a group clear all the vegetation away from a metre square of ground leaving only bare earth. At weekly intervals (for six weeks) mark the position of any new plant that grows with a cocktail stick. Record your plot of ground each week using photographs

Challenge 2

- Present your findings as a collection of annotated photographs

Challenge 3

- Use a website to identify five different animals under threat of extinction in the UK, and five animals that are increasing in number

Challenge 3

- Explain some of the threats to UK wildlife

Challenge 3

- Interview an environment expert from the council, wildlife society or university about the local environment and any projects in place to improve the environment

Challenge 3

- Submit your account of the interview to a local newspaper or publish it on a school blog

Challenge 4

- Carry out an experiment to find out how stimulants such as drinks like cola and coffee affect heart rate

Challenge 4

- You need to use a control experiment and take steps to make sure you used a fair test

Challenge 4

- Find out what is in the food we eat in terms of calories, sugar, salt and fat. Decide how much of these you need and if you can get the information you need for healthy eating from food packaging

Challenge 4

- Record the information you need for healthy eating from food packaging

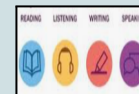
<p>Challenge 5</p> <ul style="list-style-type: none"> Carry out a survey of local trees. Identify the species and estimate their height and circumference. 	<p>Challenge 5</p> <ul style="list-style-type: none"> Plot the data you collect on a map and look for patterns in their distribution 	<p>Challenge 5</p> <ul style="list-style-type: none"> Investigate how Latin squares can be used when dividing up fields to maximise food yields in farming 	<p>Challenge 5</p> <ul style="list-style-type: none"> Solve the puzzles from the National Stem Centre website: http://www.nationalstemcentre.org.uk/elibrary/resource/92/growing-more
<p>Challenge 6</p> <ul style="list-style-type: none"> Germinate some cress seedlings on damp paper towels. When they are three days old place them so light is shining from one side only 	<p>Challenge 6</p> <ul style="list-style-type: none"> Take photographs of the seedlings at 15-minute intervals for one hour and explain any changes you detect 		
<p>Challenge 7</p> <ul style="list-style-type: none"> Work in a group to imagine what an extinct animal may have looked like 	<p>Challenge 7</p> <ul style="list-style-type: none"> Use different sources of evidence to help refine your drawings and decide which evidence provides the best information 		

ASSESSMENT

Class Discussions, Q&A, Practical Observations, Peer to Peer Learning, Information Posters Summative Assessment, Formative Assessment, EOT Assessment/Test

SPRING 1 - PHYSICS - SECTION A

SPRING 2 - PHYSICS - SECTION B : PROJECTS



Complete At Least 4 Challenges

Complete At Least 1 Challenge

SKILLS

KNOWLEDGE

SKILLS

KNOWLEDGE

Challenge 1

- Take part in a star watch over three successive nights, keeping a log of your observations

Challenge 1

- You either need a star atlas or software to help you identify what you see.

Challenge 1

- Plan an investigation that could be carried out on the surface of Mars, either by robots or humans, to compare the effect of gravity on Mars with that on Earth

Challenge 1

- You need to include an explanation of what you would do and the results you would expect. Present your ideas as if they were a proposal for funding from a research council

Challenge 2

Challenge 2

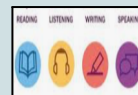
Challenge 2

Challenge 2

<ul style="list-style-type: none"> • Create a stop motion animation to show the phases of the moon 	<ul style="list-style-type: none"> • Your animation should include labels and a soundtrack to entertain and inform viewers 	<ul style="list-style-type: none"> • Design a space vehicle for humans to use to travel to Mars. The vehicle needs a source of freshwater, food and oxygen. It also needs either to provide artificial gravity or have exercise machines to keep the passengers fit and healthy 	<ul style="list-style-type: none"> • Present your ideas as a large labelled diagram
<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> • As a group, find out data about the planets in our Solar System 	<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> • Use the data and images you collect to create a Top Trumps-style card game. You will need at least eight pieces of data on each planet 	<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> • Design a small solar-powered satellite capable of sending ultraviolet images of vegetation growth in Europe back to Earth 	<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> • Present your ideas as a large labelled diagram
<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> • Fix a pole in the ground to make a shadow. Measure the angle of the shadow and the length of the shadow regularly throughout the day 	<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> • Use a spreadsheet to produce graphs to show how the length and angle change throughout the day. Use the graphs to predict how the shadow would change at different latitudes and times of year 	<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> • Measure and analyse the way buildings are constructed as part of a problem-solving activity 	<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> • Use the information you gather to plan how to construct a rigid space structure using a minimum of materials.
<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> • Use a tray of sand and a ball bearing as a model to investigate crater depth and area when meteors hit Earth. Investigate different heights (speed), angles and mass 	<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> • Compare your results with those produced by a simulation 	<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> • Work in a racing team to modify and test your solar car for different challenges 	<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> • Use the data you collect to improve your design
<p><u>Challenge 6</u></p> <ul style="list-style-type: none"> • Create a set of quiz cards on facts about space for use as a revision aid 	<p><u>Challenge 6</u></p> <ul style="list-style-type: none"> • Present your quiz as an online resource for pupils using mobile devices, either as iFlash or a Socrative quiz 		
<p><u>Challenge 7</u></p> <ul style="list-style-type: none"> • Working in a group, examine the evidence that humans really set foot on the Moon. 	<p><u>Challenge 7</u></p> <ul style="list-style-type: none"> • Put together your argument based on the evidence provided and present this to the rest of the class 		
<h2>ASSESSMENT</h2>		<p>Class Discussions, Q&A, Practical Observations, Peer to Peer Learning, Information Posters Summative Assessment, Formative Assessment, EOT Assessment/Test</p>	

SUMMER 1 - PERFORMANCE IN SPORT - SECTION A

SUMMER 2 - PERFORMANCE IN SPORT - SECTION B : PROJECTS



Complete At Least 4 Challenges

Complete At Least 1 Challenge

SKILLS		KNOWLEDGE	
<p><u>Challenge 1</u></p> <ul style="list-style-type: none"> Carry out a survey to find the average number of hours of physical activity done by each person in your class. Measure either their peak flow or their lung volume 	<p><u>Challenge 1</u></p> <ul style="list-style-type: none"> Decide whether gender or physical activity is more closely linked with their breathing measurements 	<p><u>Challenge 1</u></p> <ul style="list-style-type: none"> As a group design a fitness test based on a shuttle run in a gym 	<p><u>Challenge 1</u></p> <ul style="list-style-type: none"> Create a presentation to explain how the test could be used to measure the fitness of members of a hockey team. Include some model data in your presentation
<p><u>Challenge 2</u></p> <ul style="list-style-type: none"> In a group measure how pulse rate varies with different postures and poses. Make sure you conduct a fair test and decide how many repeat measurements are needed 	<p><u>Challenge 2</u></p> <ul style="list-style-type: none"> Prepare a verbal report of your findings 	<p><u>Challenge 2</u></p> <ul style="list-style-type: none"> As a group measure how far each student in your class can jump from a standing position. Investigate how closely the distance jumped correlates with the length of the student's Femur 	<p><u>Challenge 2</u></p> <ul style="list-style-type: none"> Analyse the results and present your findings to the class
<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> Build a model system to investigate how the angle of projection influences the distance a ball bearing travels 	<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> Make a cardboard ramp to launch a ball bearing at different angles. Show the effect of angle on distance in a series of diagrams 	<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> Investigate the cooling effect of aerosol sport muscle cooling sprays. Think about the speed of cooling, the duration and the amount of cooling 	<p><u>Challenge 3</u></p> <ul style="list-style-type: none"> PWrite a 'Which?'-style consumer report on which brand is best value for money
<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> Find out how much wearing trainers improves your speed. In pairs compare the time taken for a 5m shuttle run when wearing trainers or the time taken when wearing socks 	<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> Make a large scientific poster to share your results 	<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> Analyse how world records have changed over time 	<p><u>Challenge 4</u></p> <ul style="list-style-type: none"> Using the data provided, find out how performance changes to provide new benchmarks for athletes to target

<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> Investigate grip strength by counting how many times you can squeeze a tennis ball in 30 seconds. Compare your left and right hand and compare squeezing the ball above your head with by your side 	<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> Suggest explanations for your findings 	<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> Collect your own data sets from the class to investigate how different students perform in a number of sport challenges 	<p><u>Challenge 5</u></p> <ul style="list-style-type: none"> Analyse the results and report back with your conclusions
<p><u>Challenge 6</u></p> <ul style="list-style-type: none"> Carry out a survey to find out who in your class plays sport regularly. Find out if there is a correlation between the number of hours of activity per week and the number of other people in their family who play sport regularly 	<p><u>Challenge 6</u></p> <ul style="list-style-type: none"> Evaluate the quality of your findings 		
<p><u>Challenge 7</u></p> <ul style="list-style-type: none"> Find out which drugs are used to enhance performance in sport and the risks they create 	<p><u>Challenge 6</u></p> <ul style="list-style-type: none"> As a group, discuss what penalties authorities should impose on drug users 		
<p>ASSESSMENT</p>		<p>Class Discussions, Q&A, Practical Observations, Peer to Peer Learning, Information Posters Summative Assessment, Formative Assessment, EOT Assessment/Test</p>	