

“Science is simply the word we use to describe a method of organising our curiosity.”

The programme for KS3 (years 7-9) sees a single* teacher following the curriculum roadmap for each class. All teachers teach the same unit to aid sequencing and consistency with teaching and learning.

*There are few classes which are split between staff - but again, the same unit is delivered by both staff.

There are two data collection points for all KS3 students, which will then be analysed with a subsequent KS3 Standardisation Meeting.

[illegible]

	Community - working collaboratively to complete practical tasks Global importance of using renewable fuels and finding alternative energy sources to support the needs of people across the globe.
Cultural Capital	Cultural capital in science is about providing students with scientific literacy, familiarity of science, and the experience of being a scientist. Historical investigation – using Newton's original apparatus for the $F = m \times a$ investigation Modern car design uses materials that will quickly "squash" thus allowing for reduced impact forces/injury upon passengers. (e.g. FI cars are designed to fall apart to protect the driver, collisions look horrific but drivers often appear unscathed)
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .

Topic	Unit title	Key knowledge/ Content to learn and retain	Essential skills to acquire (subject & generic)	Anticipated misconceptions	Links to previous KS	Links to future KS	Opportunity for stretch for high prior attainers
Three	Particles and behaviour	Particle model - arrangement of particles in solid / liquid and gold Solids, liquids and gases – describing and explaining the properties of each – including density Changing states – identifying changes in states. Brownian motion Gas pressure Concentration	Practical Skills: - Using a gas syringe - Using a thermometer - Identifying equipment - Following a plan accurately to collect results - Carrying out practical work safely - Focusing on Teamwork to collect accurate results Scientific Skills: - Using models to represent solids, liquids, and gases. - Drawing tables of results - Using Mathematics to solve Scientific problems	Students should be clear about accurate representation of particles in solids, liquids and gases. For the same substance being represented, its particles should all be the same shape and size. In a solid, there should be no gaps between the particles and the arrangement should show clear uniformity. In liquids, all particles should be touching another liquid particle. Students often think there is air in between gas particles – there is nothing between gas particles. Pupils often think that liquids can be compressed Melting and dissolving are confused. Melting/freezing and boiling/condensation are often understood only in terms of water. Not all substances melt (or freeze) at 0 °C and boil (or condense) at 100 °C,	Year 4: Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)	This content leads into: Y7 – Separating substances Y7 - Atoms, elements and compounds Y8 - Chemical reactions, Y9 - atomic structure, Y10 - quantitative chemistry	Students can look as plasma, glass and custard to discuss how they fit into the solid, liquid and gas brackets.

				like water does. Evaporation and boiling are not the same thing – evaporation takes place at all temperatures between the melting point and the boiling point; only part of the liquid changes into a gas. Boiling only occurs at the boiling point, when all the liquid changes into a gas.			
SMSC & British Values	British values in science SMSC-Why scientists develop models						
Cultural Capital	Cultural capital in science is about providing students with scientific literacy, familiarity of science, and the experience of being a scientist. Students will have the opportunity to take part in practical activities within a laboratory environment, including the use of scientific equipment and chemicals such as acids, while following standard safety procedures for working within a lab. They will have the opportunity to develop their skills and gain a familiarity with scientific working practices, with a focus on them as young scientists. They will be able to explain every day phenomena such as what happens to water when placed in a freezer or in a pan on the stove, and dilute juice drinks using their new scientific knowledge, and also begin to appreciate more complex phenomena using their understanding of the particle model. They will experience the history of science and the work of British scientist Robert Brown in explaining the movement of atoms by Brownian motion.						
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .						
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Four	Cells	Life processes Plant and animal cells - structure of cells, functions of organelles Specialised cells- process of differentiation and specialisation, need for specialised cells	Practical Skills: - Using microscopes - Identifying equipment - Following a plan accurately to collect results - Carrying out practical work safely	“Cells are too small to see.” Because of the very small nature of cells and the difficulty in visualising them, students often have misconceptions regarding the actual sizes of cells Root hair cells are animal cells		This content leads into: Y7 – Organ systems Y7 – Reproduction Y8 – How organisms get energy	Students can measure the size of cells using calculations Students can rearrange the subject of calculations Students can convert

Capital	Review how medical treatments work based on cells, tissues, organs & systems – both historical and the latest developments						
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Five	Motion & Pressure	Speed calculations Investigating speed Distance time graphs Forces and the effects on speed Pressure – what pressure is, pressure in solids and liquids Floating and sinking – density	Practical Skills: - Investigating a named variable and the effect on speed - Identifying equipment - Following a plan accurately to collect results - Carrying out practical work safely - Focusing on teamwork to collect accurate results Scientific Skills: - Focus on risk assessments - Drawing tables of results - Using mathematics to solve Scientific problems	If an object is moving, a force must be acting on it. Motion implies force. Forces cause changes in motion. If an object is moving, no force is necessary to keep it moving, but a force is needed to make it stop moving or change direction. All objects slow down and eventually stop. If no forces are acting on a moving object, its motion will never change or stop. In outer space, for example, no air resistance or friction is present to act on an object, so the object will keep moving in the same direction or in a straight line indefinitely. This is why a rocket in outer space needs only a short burst from the thruster to experience a change in speed or direction. Speed and acceleration are the same thing	Basic forces will have been covered at KS2. Students should know about speed	This content leads into: Y8 – Light Y8 – Sound and Hearing Y9 – Particle model Y10 – Forces and interactions Y11 – Forces and motion Y11 - Waves	Predict changes in speed when forces change Calculate gradients to graphs Changing the subject of equations to calculate a desired amount

SMSC & British Values	British values in science Community – working collaboratively to complete practical investigations						
Cultural Capital	Historical application of war fare – building and firing catapults and trebuchets The use of simple machines through time to make life simpler						
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .						
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Six	Separating Substances	Particle model Properties of solids, liquids and gases Changing state Exploring brownian motion Gas pressure Explaining concentration	Design and carry out experiments to separate mixtures Use evidence from chromatograms to identify the components in a mixture Construct and use graphical information to draw conclusions	Separation techniques provide a platform to remedy common misconceptions. Some students think that substances disappear when they dissolve – evaporation shows this is not true. Some believe that air is empty space – distillation proves otherwise. Other erroneous ideas include: Evaporation and boiling are the same thing; Filtration can separate solutions; The boiling/condensation point is different eg if it boils at 100°C, it must condense at 99°C; Water flows through the condenser and not around it.		This content leads into: Y7 – Cells Y7 – Organ systems Y8 – Chemical reactions	
SMSC & British	British values in science						

Values	Working collaboratively on practical tasks
Cultural Capital	How distillation and desalination can be used to support the demand for fresh water in areas of the globe that have little/no rain fall each year Use of chromatography in forensic analysis
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .

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Seven	Organs & Systems	The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms. The structure and function of the circulatory system The tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts) The importance of bacteria in the human digestive system The structure and functions of the gas exchange system in humans, including adaptations to function The mechanism of breathing to move air in and out of the lungs, using a pressure model to explain	<u>Practical Skills:</u> - Simple tests for different substances (starch and iodine) - Using pipettes - Using a water bath - Making simple models of organ systems - Simple dissection (chicken wing as an example of a joint) <u>Scientific Skills:</u> - Interpreting results of chemical tests - Explaining our results using scientific ideas - Using models to represent scientific ideas - Describing and evaluating our models - Extended writing	That respiration and breathing are the same process That digestion and movement of food through the digestive system are the same process That digestion only takes place in the stomach That the oesophagus and trachea (windpipe) are the same organ That all bacteria are bad for us, and that bacteria and viruses are the same thing That air is mostly made of oxygen That sugar and fat are exclusively bad parts of the diet	At Key Stage 2, pupils will have learned to describe the simple functions of the basic parts of the digestive system in humans and identify that humans and some other animals have skeletons and muscles for support, protection and movement	This content leads into: Y7 – Human health Y7- Reproduction Y8 – Energy in living organisms Y9 – Transport systems Y9 - Respiration Y10 – Organisation Y10 – Plant tissues	Investigate the link between gut health and mental health that is currently topical within the health industry. Research the latest developments in artificial limbs Investigate how conditions such as cystic fibrosis or crohns disease impact on quality of life Other use for bacteria in the food & drink industry

		the movement of gases, including simple measurements of lung volume The impact of exercise, asthma and smoking on the human gas exchange system The structure and functions of the human skeleton, to include support, protection, movement and making blood cells Biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles and the function of muscles and examples of antagonistic muscles.					
SMSC & British Values	British values in science Social – health implications of smoking v vaping Social – how much exercise per week should we be getting & how can we make this more appealing for young people to encourage good habits that will take us through to old age with fewer health issues						
Cultural Capital	Do gut health & your gut bacteria really influence your mental and physical health? How do some people manage to hold their breath long enough to free dive to over 100m below the surface of the ocean?						
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .						
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Eight	Energy Stores	Energy stores – describing the law of conservation of energy and different stores it can be held in	<u>Practical skills</u>	Energy can be created or destroyed	In KS2 students learn about renewable	This content leads into:	

		Doing work - how energy, power and efficiency all link together including calculations to investigate this Energy costs – describing and calculating how much it costs to run appliances for a set period of time and the impact of this. Kinetic energy – describing the energy stored and calculating how energy can be influenced Elastic potential energy - describing the energy stored and calculating how energy can be influenced	- Investigate elastic potential energy - Modelling work with energy Scientific skills - Calculations	Energy disappears Energy appliance costs the same to run	energy and different 'types' of energy	Y7 – Thermal energy Y8 – Light Y8 – Sound Y9 – Energy stores Y10 – 6.5 Forces and their interaction Y11 – Waves	
SMSC & British Values	British values in science Cost of living crisis and the impact of energy costs on families and homes. Style of appliances used - eg large TV's, more modern mobile phones						
Cultural Capital	Relating a variety of appliances and their energy implications to the wider world Using the political impact of the wider world to explain the cost in energy increases.						
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1, https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf, https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here.						
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Nine	Atoms, elements and compounds	Atomic model – structure of the atom, development of this structure Atoms, elements and compounds	Practical skills Measuring accurately using a stop clock	Elements were 'invented'; they all have symbols with the same letters as their English names; elements and atoms are		This information leads into: Y7 – Separating substances	

		– differences between each. Making compounds - Chemical reactions as the rearrangement of atoms History and structure of the periodic table - The principles underpinning the Mendeleev Periodic Table. Periods and groups; metals and non-metals Chemical formulae Word equations	- Measuring mass accurately using a balance - Identifying equipment - Following a method - Carrying out practical work safely - Making models of atoms, elements and compounds Scientific skills - Focus on identifying variables. - Carrying out a reproducible investigation - Recording results in a table	different substances; atoms are like cells and of a similar size Atoms change when compounds form; atoms change size; when things burn they disappear or are destroyed forever An element is a substance made from one atom [made from one type of atom];		Y8 – Chemical reactions Y9 – Atomic structure Y9 – Periodic table Y10 – Chemical changes Y11 – Rates of reaction Y11 – Chemical analysis	
SMSC & British Values	British values in science Community – working in collaboration with others						
Cultural Capital	Historical development of atomic structure						
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4j/jobs-that-use-science/1, https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf, https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here.						
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Ten	Health & Lifestyle	Content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed	Practical skills - Using a Bunsen Burner - Measuring accurately using a stop clock	A diet is made up of all the food and drink that a person takes in. It does not refer to 'being on a diet' to lose weight, for example.	In Key Stage 2, students will have learned about the basic needs of animals, including humans, for survival (water, food and air), and the importance for humans of exercise,	This content leads into: Y9 – Cells Y10 – Infection & Response	Students will practice the art of converting values into the standard units that are required for calculations in science. Use of multiple graph and data formats from

		Calculations of energy requirements in a healthy daily diet for different people Comparing energy values of different foods (from labels) (kJ) The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases The impact of exercise, asthma and smoking on the human gas exchange system The effects of recreational drugs (including substance misuse) on behaviour, health and life processes.	- Measuring volumes accurately using a measuring cylinder - Identifying equipment - Following a method - Carrying out practical work safely Scientific skills: - Drawing Conclusions from graphs - Analysing data and drawing conclusions	A food group is a set of foods that share similar nutritional properties. A common approach is to group foods as carbohydrates, proteins, fats, vitamins, minerals, fibre and water. A healthy diet includes all the food groups. An 'eatwell plate' gives an indication of the relative proportions of each required. The amount of energy needed from food varies with age, gender and activity. When working out how to meet energy requirements, data about the food groups and the nutrients needs to be looked at to ensure a balanced diet and to avoid deficiency diseases. Water is not a food or a food group Foods are made up of only one food group. We only need energy when we are moving. Obesity is linked only with overeating. Hunger and starvation are the same things.	eating the right amounts of different types of food, and hygiene. They will have identified that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. They will have recognised the impact of diet, exercise, drugs and lifestyle on the way their bodies function, and described the ways in which nutrients and water are transported within animals, including humans.	Y11 – 4.5 Homeostasis Y11 – 4.6 Inheritance, variations and evolution .	which to draw conclusions. Independent research projects on various drugs – potential for small group work & presentations here. Designing a diet and lifestyle that could be promoted to their peers
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				Obese people cannot be deficient. Malnutrition does not occur in developed countries. Eating is the same as digestion All microbes cause disease. Microbes cannot make useful products. All drugs are illegal. All drugs are bad for us. You will not be charged by the police for possessing drugs for your own use. Overcoming addiction requires only willpower. If recovery from addiction has failed in the past, it will never work. Everyone who smokes will get cancer. Non-smokers cannot be harmed by smoking. Smoking cannabis is not as harmful as smoking cigarettes. Cannabis isn't addictive. Only alcoholics damage their bodies with alcohol. All diseases are infectious. All diseases show symptoms.			
SMSC & British Values	British values in science Social impact of addiction, use of drugs and obesity (viewed as impact on the individual, families, communities and health services) Social impact of UK recession on the ability for families to obtain sufficient food and what we as a community can do to support these families Moral obligation to ensure that everyone across the world has sufficient food and access to clean drinking water Community – working collaboratively on practical tasks						

Cultural Capital	Impact of pandemics on global health and methods of preventing these from occurring						
Career Link	https://www.bbc.co.uk/bitesize/tags/zjb8f4/jobs-that-use-science/1 , https://www.bradfordacademy.co.uk/wp-content/uploads/2019/10/CEIAG-in-the-Curriculum-Science.pdf , https://www.pearson.com/uk/educators/schools/subject-area/science/why-science-matters/your-future-in-stem-a-z.html More information here .						
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Eleven	Thermal Energy	Heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference: use of insulators. Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions. The differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice-water transition. Changes with temperature in motion and spacing of particles Internal energy stored in materials.	Practical skills: - Using a thermometer - Measuring time using a stop clock - Measuring volumes accurately using a measuring cylinder - Identifying equipment required - Following a method - Carrying out practical work safely Scientific skills: - Carrying out a reliable test - Drawing results tables - Drawing a line graph or a bar chart (Skills lesson focus) - Concluding from results - Calculating temperature changes - Interpreting Sankey diagrams	Heat and temperature mean the same. There can be a quantity of 'cold'. Heat rises. Fuels are only liquid fuels, such as petrol for cars. All fuels give out the same amount of energy. Particles themselves get bigger when they are heated. Putting on a coat on makes you warmer or that the coat transfers energy to your body.	In Key Stage 2, students will have observed that some materials change state when they are heated or cooled, and measured or researched the temperature at which this happens in degrees Celsius (°C). They will have also identified that some materials feel hotter than others when heat sources are placed against them. Students have previously studied the Particles topic and have a basic understanding of Energy transfer	This content leads into: Y8 – Chemical reactions Y9 – Energy Y10 - Energy changes	There are lots of opportunities for students to practice using equations, rearranging equations to establish an unknown value. The use of data in standard form and the need to convert values into the standard units used within the physics topics are a good opportunity for the HPA students to tackle. Investigate the density changes that occur when materials are heated

	Community – working in collaboration with others
Cultural Capital	Historical development of atomic structure Predictions regarding the future of particle physics and the discovery of the elusive “God Particle”
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