CURRICULUM MAP (Long term plan)

SUBJECT :_____Science_____ **YEAR GROUP _____Year 8_____**

	Cycle 1 **Autumn**	**Cycle 2** **Spring**	**Cycle 3** **Summer**
Substantive knowledge – Essential knowledge & conceptual understanding of the National Curriculum	**8H** Rocks **8B** Plants and their reproduction **8J** Light **8A** Food & Nutrition	**8K** energy transfers **8E** combustion **8C** breathing & respiration **8L** earth & space	**8D** Unicellular Organisms **8F** The periodic table **8I** Fluids **8G** Metals & their uses
Disciplinary knowledge - what skills are practised?	**8H** how the scientific method is adapted for mainly observational sciences, such as geology. **8B** make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements, and apply sampling techniques. **8J** the use of conventions in scientific communication. **8A** apply mathematical concepts and calculate results	**8K** pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility. **8E** select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate. How evidence can be interpreted in different ways and the importance of testing ideas scientifically. **8C** understands that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review, applying mathematical concepts and calculating results. How ranges and means are calculated, follows this, and will help students to process results from practical work on the effects of exercise on breathing and pulse rates.	**8D** presents observations and data using appropriate methods, including tables and graphs (pie charts). **8F i**nterpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions, present reasoned explanations, including explaining data in relation to predictions and hypotheses, evaluate data, showing awareness of potential sources of random and systematic error. **8I** apply mathematical concepts and calculate results. **8G** make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements.

		8L apply mathematical concepts and calculate results.	
Key questions (What is the learning about?)	**8H** How can we describe rocks? How does grain size and shape affect permeability? What is the structure of the earth? How are igneous and metamorphic rocks formed? How are rocks weathered and eroded? How sedimentary rocks are formed? How are these processes linked in the rock cycle? How are metals extracted and the environmental effects of mining. What are the benefits of recycling metals? **8B** How can we classify plants? Why is biodiversity important? What are the different types of reproduction in plants? How does pollination occur in flowering plants.? How does fertilisation occur? How are seeds produced & dispersed? How do seeds germinate and grow? Looking at the complete life cycle of a flowering plant. **8J** How do we draw ray diagrams and how to do ray tracing. What is specular and diffuse reflection? How images are formed in plane mirrors?	**8K** What is the difference between internal (thermal) energy and temperature? What factors affect the amount of energy stored in a heated substance? Why does evaporation have a cooling effect on the remaining liquid? How does energy transfer by radiation, conduction and convection? How can we control energy transfers, including the best colours for emitting and absorbing infrared radiation? What is power? The equation for calculating efficiency is introduced. How is energy paid for ? Introduces the kilowatt-hour as a unit of energy. The idea of payback time is explained. 8E What is combustion? How do we define a fuel? What is oxidation of non-metals and of metals? This is developed to introduce the law of conservation of mass during reactions, using oxidation as the example. What's the importance of fire safety? What is incomplete combustion of fossil fuels and what is the impact of this on air pollution?	**8D** How do microorganisms cause disease? What are the differences between multicellular and unicellular organisms and the reasons for those differences (such as the supply of resources by diffusion). The division of organisms into kingdoms is also considered. What are the features of microscopic fungi and yeast? Aerobic and anaerobic respiration are considered in the contexts of baking and brewing, Topic 8Dc What are the features of bacteria and how do they reproduce? How are bacteria important in yoghurt- and cheesemaking? How are protoctists important in ecosystems? What is the carbon cycle? **8F** What is Dalton's atomic theory? What is the difference between elements and compounds? How do we use symbols to describe elements? What is the difference between physical and chemical change? How do we use formulae to describe compounds a How can we extend Dalton's theory to explain what happens during chemical reactions in terms of rearranging atoms and changes in mass? What are the properties of the main groups of elements (alkali metals, halogens and noble gases) What work led to the construction of the periodic table? How can we interpret melting points, boiling points and physical states?

	How refraction of light links this to the properties of lenses. How do cameras and eyes work? How can we compare them? How is light dispersed to give a spectrum Why do coloured objects appear coloured and why their appearance can change when viewed in coloured light. **8A** How is food advertised? The different types of nutrients found in food are then considered. What are the uses for different nutrients? What is a balanced diet and malnutrition (including obesity). Structures of the digestive system and what it does. How digested food is absorbed by the small intestine. The concept of diffusion is also covered The importance of surface area in biology.	How is acid rain formed after the release of sulphur dioxide and nitrogen oxides from fossil fuel combustion? The role of carbon dioxide in the air in the development of the greenhouse effect and how the release of greater amounts of the gas from fossil fuel combustion is thought to be linked to global warming and climate change. **8C** How did the discoveries of Boyle, Mayow, Priestley and Lavoisier help to shape our modern understanding of aerobic respiration? What is the structure & function of the human gas exchange system, including how breathing occurs and the importance of surface area in gas exchange. What is the role of blood in transporting oxygen to tissues and how a lack of oxygen can affect cells? How does gas exchange occur in other organisms, including plants? The various ways in which respiration can be detected is also covered. What is anaerobic respiration, including the concept of EPOC (oxygen debt). **8L** How observations are made and the Solar System models that have been used over time to explain observations. What are the seasons and their causes?	How do typical physical properties of metals and non-metals show patterns within the modern periodic table? How do the formation and properties of oxides show trends in both physical and chemical properties in the periodic table? It also shows how the periodic table can be used to make predictions about the properties of elements and compounds. **8I** Revises the particle model first encountered in Unit 7G Why do materials expand or contract with temperature changes? How can we calculate density, including using different forms of a formula? Can we describe changes of state and use the particle model to explain why the temperature of a substance remains constant during a state change. The anomalous behaviour of ice at the ice–water transition is also covered. What are the causes of pressure in fluids, and why pressure changes with depth (for water) or height (for air). What is upthrust, floating and sinking. What is drag, its causes and how it can be increased or reduced. **8G** What are the physical properties of metals and non-metals? Ideas about chemical properties and equations are considered through simple reactions of metals and non-metals. The link between properties and uses is illustrated, including metals as catalysts. Corrosion as an oxidation reaction of metals with oxygen, including the rusting of iron, and uses symbol and word equations to represent chemical change. The different reactions of a range of

		How can we describe the magnetic fields of bar magnets and of the Earth? How can we calculate weight from mass and gravitational field strength, and look at the role of gravity in space? What do we know about stars and galaxies, and the distances involved when studying space?	metals with water and how the products of the reactions can be identified. The idea of the reactivity series is introduced. Once again chemical equations are used to model the reactions. Then the reactions of metals with dilute acids are explored, leading to the formation of a reactivity series for metals. What are alloys and explains how their properties are different from the pure metals.
Assessment	PPC mid topic, based on a scientific skill, marked and then fix it time to improve End of unit assessment	PPC mid topic, based on a scientific skill, marked and then fix it time to improve End of unit assessment	PPC mid topic, based on a scientific skill, marked and then fix it time to improve End of unit assessment
Literacy (L),**Numeracy** (N), **Oracy** (O) **opportunities**	**8H Literacy & Communication skills** analysing the use of emotive language and evaluating media reports. **Maths skills** interpreting more complex graphs, substituting into formulae. **8B Literacy & Communication skills** information can be presented in different ways to communicate scientific ideas clearly. This includes understanding paragraph construction (using ideas of unity, cohesion and order) to develop logical and fluid text that communicates information clearly. **Maths skills** use appropriate units for area measurements, Calculate areas for squares and rectangles use a sample to calculate an estimate of population size.	**8K Literacy & Communication skills** using language appropriate to the audience. **Maths skills** Substituting values in simple formulae and solving equations , understanding percentages, drawing and interpreting scale drawings, using a suitable level of accuracy for measurements. **8E Literacy & Communication skills** distinguish between information and explanation text,use information and explanation texts to answer different types of questions. **Maths skills** interpreting line graphs. **8C Literacy & Communication skills** information can be presented in different ways to communicate scientific ideas clearly. This includes understanding how sentences can be constructed to show cause and effect and writing different types of paragraph.	**8D Literacy & Communication skills** information can be presented in different ways to communicate scientific ideas clearly. This includes understanding how modal verbs are used to express certainty. **Maths skills** identify pie charts describe what a certain pie chart shows extract simple information from pie charts present data in pie charts to identify when to use a pie chart. **8F Literacy & Communication skills:** the use of sentences to explain ideas clearly. **Maths skills** identify anomalous results (outliers), identify ranges use a variety of charts and graphs to present and analyse data **8I Literacy & Communication skills** The Literacy & Communication pages look at the use of prepositional phrases to help with clear descriptions. **Maths skills a**pply mathematical concepts and calculate results.

	8J Literacy & Communication skills preparing effective presentations. **Maths skills** measuring angles. **8A Literacy & Communication skills:** how verbs and adjectives can be used to add 'weight' to an opinion bias. **Maths skills** use appropriate units for area measurements, and calculate area for a variety of shapes, including rectangles and cuboids.	**Maths skills** identify the ranges of readings in data, explain why data with a small range is of good quality, calculate means and explain their use, identify anomalous results in data. **8L Literacy & Communication skills** presenting arguments. **Maths skills** using ratios to compare quantities, writing one number as a fraction of another, converting fractions to decimals, substituting values into formulae and equations, drawing line graphs and scatter graphs.	**8G Literacy & Communication skills** the use of adjectives to accurately describe substances in science. **Maths skills** calculating mean values and percentages drawing and interpreting bar charts and line graphs.
Cross Curricular Opportunities	**8H** 8E – climate change 8I – expansion and contraction with temperature and the anomalous expansion of ice, and the effects these can have on rocks. 8Hc, 8He – Geography – geological maps of the UK, links between rock type and scenery/ mining. **8B** 8Bc – Physics 8Je – visible spectrum, UV light and nectar guides 8Bd – Physics 8Ie – air resistance 8Be – Physics 8Ja – energy transfer by light 8Ba – Art – drawing plants, plants as decoration, plants for textiles and dyes – English – plant poetry **8J** 8Ja – Drama – Use of stage lighting 8Jd – ICT – Multimedia graphics, presenting information 8Je – Art – Use of colour 8Je – Drama – Use of stage lighting **8A** 8Ab – Physics 8K – energy transfers 8Ae – Chemistry 8E –	**8K** 8Ka – Chemistry 8Ea – energy transfers in combustion 8Ke – Chemistry 8Ea – carbon capture. 8Kc, 8Ke – Design and technology – how the design of buildings and appliances can impact individuals and the environment. 8Kc – Geography – how humans cope with living in different environments **8E** 8Ea – Biology 8Ba – biofuels 8Ec – Physics 8Ia – thermometers 8Ec – Physics 8Ka – energy and temperature 8Ed – Biology 8Cc – carbon monoxide as a poison 8Ee – Biology 8De – carbon cycle History – the history of industrial development since the Industrial Revolution in the UK. **8C** 8Ca – Chemistry 8Ea – combustion 8Cb – Physics 8Ic – pressure in fluids – Biology 8Ae – surface area 8Cb – PE – effects of exercise on pulse and breathing rates 8Cc – History – use of chemical	**8D** 8Da – Biology 8Ba – kingdoms, Biology 8Cb – diffusion 8Db – Biology 8Ba – kingdoms, Biology 8Ce – anaerobic respiration 8Dc – Biology 8Ba – kingdoms, Biology 8Ce – anaerobic respiration 8Dd – Chemistry 8Ee – bioethanol, Biology 8Be – photosynthesis 8De – Chemistry 8Ea – combustion, Biology 8Ad – enzymes 8Db – Food technology – baking, brewing 8Dc – Food technology – yoghurt-making, cheesemaking **8F** 8Fa, 8Fb – Physics 8I – the difference between chemical and physical changes 8Fa – Physics 8I – atoms and molecules as particles 8Fd – Physics 8K – energy transfers on changes of state (qualitative) 8Fc – History – development of ideas from philosophy to science 8Fe – English – debating an issue, looking at pros and cons **8I** 8Bd Biology – seed dispersal 8C Biology – pressure and ventilation of the lungs 8Fd Chemistry – heating curves 8H Physics – melting and freezing of rocks 8Ia, 8Ib – D&T – taking account of operating

	combustion to release energy from fuels 8Aa – Art – advertising posters English – advertising and persuasive language 8Ab – PE – energy from food	weapons, for example, in the First World War **8L** 8Lc – Geography, PE – use of map and compass for navigation.	temperatures in design 8Ib – History – Polar exploration 8Id – D&T – designing boats 8Ie – D&T – design of moving objects **8G** 8Ge – Physics 8K – energy transfers on changes of state (qualitative) History – the Bronze and Iron Age and uses of available metals and alloys
SMSC / Character/Careers (C) (personal development)	**SMSC** -pair & group working, working safely in a science laboratory. **Character** **Integrity :** during practical work **Resilience:** using equations & data handling **Confidence:** participation during classroom discussions	**SMSC** -pair & group working, working safely in a science laboratory. **Character** **Integrity :** during practical work **Resilience:** using equations & data handling **Confidence:** participation during classroom discussions	**SMSC** -pair & group working, working safely in a science laboratory. **Character** **Integrity :** during practical work **Resilience:** using equations & data handling **Confidence:** participation during classroom discussions
Super Curriculum (personal development)	**Forensics Club**	Forensics Club Planetarium Visit	Best Science Fair
Careers	**HT1** **How to become a forensic scientist: Lucinda's story - BBC Bitesize** **HT2** **How to become a science journalist: Rosie's story - BBC Bitesize**	**HT1** How to become a cardiac coach: Josh's story - BBC Bitesize **HT2** **How to become a sonographer: Hassan's story - BBC Bitesize**	**HT1**:How to become a science officer: Lauren's story - BBC Bitesize **HT2** **How to become a lighting technician: Peter's story - BBC Bitesize**
Equality and Diversity Gender Disability Religion Race Sexuality	Diverse representation within text/ videos/website links shared. Display shows a variety scientists of different genders and from different ethnicity **8H** Inspiring scientists: Sanjeev Gupta's story	Diverse representation within text/ videos/website links shared. Display shows a variety scientists of different genders and from different ethnicity Diversity in science	Diverse representation within text/ videos/website links shared.

Local Community Links			
British Values **Democracy**	**Democracy** There are opportunities to debate issues where students can share their opinions and listen to the views of others. For example, the generation of electricity, the placement of quarries, the use of drugs, genetic modification, selective breeding and climate change. Acceptance and engagement with fundamental British values of democracy • Forces and electricity – link to British technology firms and advancement made in knowledge based on British scientists' discoveries e.g. Faraday. Building electrical circuits requires teamwork, resilience and show respect to others. • Reproduction – inclusion and discussion of the LGBTQ community **Contribute positively to life in Modern Britain** • Discussion about microbes, e.g. Coronavirus and how we can limit the spread and help suppress the effects. • The science department have celebrated the influence and contribution to science by female scientists which is deployed on our corridors. • During acid and alkali and plant cell lessons can discuss UK farming and different soil conditions in the UK. Helen Sharman carried out agricultural experiments whilst up in space • Effects of extreme hot climates - can find newspaper articles when it has got hot in the UK and the advice given by the NHS and governments when it gets hot and cold. And effects on other organisms e.g. animals • Ecology – using different methods of increasing and sustaining biodiversity. Looking at the human impact of certain areas. **The Rule of Law**
The rule of Law	Laws protect everyone and no-one is above the law. We should understand the need for rules to make a happy, safe and secure environment and know the consequences when rules are not followed. **What does this look like in science?** • Students follow laboratory rules for the safety of all. • Students learn about the need for speed limits and seat belts. • There are opportunities to discuss laws relating to science, such as the use of IVF, stem cells, genetic modification and DNA databases, maintaining biodiversity, use of energy sources, fishing and farming.
Individual Liberty	**Individual Liberty** We have a freedom of choice and a right to respectfully express our views and beliefs. We can act as we choose within the law. The rights of ourselves and the others around us are protected. **What does this look like in science?** • There are opportunities for students to work independently and make choices in a safe environment when carrying out investigations. • There are opportunities to debate issues where students can share their opinions and listen to the views of others. For example, the generation of electricity, the placement of quarries, the use of drugs, genetic modification, selective breeding and climate change.
Mutual Respect and Tolerance of others	**Mutual Respect and Tolerance**

SMSC **Character Education**	There is equality and fairness for all, regardless of background or religious beliefs. We understand that we do not all share the same beliefs and values. We respect the values, ideas and beliefs of others and do not impose our own onto them. **What does this look like in science?** • Students work together practically in groups which encourages teamwork and respect for others. • There are opportunities to learn about scientific discoveries by a diverse range of people from our culture and other cultures. • Students learn about the continual evolution of scientific ideas which occurs through the acceptance that different people have different ideas about a concept. • There are opportunities to consider conflict between religious beliefs and scientific understanding with respect and acceptance of people's values. **SMSC -**pair & group working, working safely in a science laboratory. **<u>Character</u>** **Integrity :** during practical work **Resilience:** using equations & data handling **Confidence:** participation during classroom discussions