CURRICULUM MAP (Long term plan)

SUBJECT :_____Science _____ **YEAR GROUP _____11_____**

	Cycle 1 **Autumn**	**Cycle 2** **Spring**	**Cycle 3** **Summer**
Substantive knowledge – Essential knowledge & conceptual understanding of the National Curriculum	CB9 Ecosystems & Cycles CB7 Control & Homeostasis CC13 -CC15 Reactivity & Energy CP9 _ Electricity & Circuits	CB8 Exchange & Transport in animals CC 10-12 Electrolytic processes CP10-11 Electromagnetism SP 8 Astronomy	CP12&13 Forces & Matter Revision & Exam technique
Disciplinary knowledge - what skills are practised?	**CB9** Carry out sampling techniques. **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. 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. **CB7** Can sequence and interpret key biological mechanisms of hormone control.**CC13-15** Use graphs to calculate rates of reaction. **CP9** apply mathematical concepts and calculate results.	**CB8 -** make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements, **CC10-12** 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. **CP10-11** apply mathematical concepts and calculate results. **SP8** apply mathematical concepts and calculate results.	**CP12-13** apply mathematical concepts and calculate results. **Focus revision** on core practicals including paying attention to objectivity and concern for accuracy, precision, repeatability and reproducibility.
Key questions (What is the learning about?)	**CB9**Can I describe the organisation of ecosystems? Can I explain how abiotic factors affect communities? Can I explain how biotic factors affect communities?	CB8 **Can I** understand which substances need to be transported into and out of our bodies? **Can I** explain how surface area and concentration affect the rate of diffusion? Can I describe the structure and function of the circulatory system?	
Assessment			

Literacy (L),**Numeracy** (N), **Oracy** (O) **opportunities**	Can I understand the difference between parasites and mutualists? Can I explain how humans affect biodiversity? Can I understand how biodiversity can be preserved? Can I understand how water is moved through an ecosystem? Can I understand how carbon is moved through an ecosystem? Can I understand how nitrogen is moved through an ecosystem? **Can I understand how energy is moved through an ecosystem?** **Can I understand how air pollution and water pollution are measured using indicator species?** **Can I understand food security, its importance and factors that can affect it?** **Can I understand the importance of decomposition in ecosystems? Triple only** **CB7 Can I** recall the main glands, hormones and their roles? **Can I** describe how adrenaline and thyroxine control our metabolic rate? **Can I** describe the main stages of the menstrual cycle and contraception? **Can I** describe the role of the 4 hormones in the menstrual cycle and how they are used in fertility treatments? **Can I** explain the cause of type 1 diabetes? **Can I** explain the cause of type 2 diabetes? **Can I explain how mammals control their body temperature?** **Can I explain how mammals control their water levels?** **Can I describe the structure and function of the kidney?**	Can I explain the structure and function of the heart? Can I explain how organisms transfer energy in respiration? **CC10 -12** Can I outline what happens during electrolysis? Can I use the reactivity series to predict reactions? Can I explain how metals can be extracted? Can I explain what happens in an oxidation and reduction reaction? Can I evaluate recycling and data from a life cycle assessment? Can I explain how dynamic equilibrium works? Can I describe and explain the properties & uses of transition metals? **Can I describe and explain the problems that corrosion can cause?** **Can I describe how electroplating is carried out?** **Can I explain what an alloy is and how we use it? (Triple)** **CP 10-11** Can I describe magnetic fields in temporary and permanent magnets? Can I explain how to make an electromagnet and give everyday examples? Can I describe and explain Fleming's Left hand rule? Can I describe what a transformer is and how it works? Can I explain how transformers are used in the national grid? Can I explain how electromagnetic induction works? **Can I use an equation to calculate energy transfer in a transformer?** **SP8 Can I describe and explain models of the solar system?** **Can I link the use of satellites to gravity and orbits?**	**CP12-13** Can I calculate the density of a substance and explain it? **Can I** explain what is shown by a heating curve? **Can I** calculate specific heat capacity and specific latent heat? Can I investigate the properties of water? **Can I** use the link between gas temperature and pressure to describe what absolute zero is? Can I explain how gas pressure affects its volume? **Can I** describe how materials behave when they are **stretched?** **Can I** understand how to calculate the energy stored in a spring? **Can I explain & calculate how pressure changes with depth?** **Can I explain how pressure and upthrust are linked?**

	CC 13-15 Can I explain the main properties of alkali metals? Can I explain how the physical properties of halogens change, going down group 7? Can I explain why noble gases are unreactive? Can I explain how rates of reaction can be investigated? Can I explain what a catalyst is and what it is used for Can I distinguish between exothermic and endothermic reactions & give examples? How can we model exothermic and endothermic reactions? **CP9 Can I** link atomic structure to current and distinguish between series and parallel circuits? **Can I** understand what current and potential differences are and how to measure them in circuits? Can I understand the connection between the electric current and the amount of charge that flows in a circuit? **Can I** understand what resistance is and how to calculate its value in circuits? Can I understand how potential difference affects current and resistance in fixed resistors, lamps and diodes? Can I explain the advantages and disadvantages of the heating effect of a current? **Can I** understand what power is and how to calculate it? Can I explain how energy is transferred from cells to motors and heating devices and the difference between ac and dc? Can I explain how safety features in plugs protect us? **Can I explain how static electricity is caused?** **Can I outline the dangers and uses of**	**Can I describe a star's life cycle?** **Can I describe what evidence there is that the universe is expanding?** **Can I compare theories on the origin of the universe?**	

	static electricity? **Can I explain what is meant by an electric field? Triple only**		
Cross Curricular Opportunities	Geography - field work ecosystems DT - electronics	Engineering - electro magnets	
Super curriculum	Astronomy Club for enrichment possibly leading to GCSE STEM challenge	Astronomy Club for enrichment possibly leading to GCSE STEM challenge	Astronomy Club for enrichment possibly leading to GCSE STEM Challenge
Careers	HT 1 Ecologist How to become an ecologist: Gabrielle's story - BBC Bitesize HT 2 electrical engineer What qualifications do you need to be an electrical engineer? - BBC Bitesize	HT1 Vet How to become a vet: Lucy's story - BBC Bitesize HT2 Air craft engineer Aircraft engineer jobs: What GCSEs do I need? - BBC Bitesize	HT1 Biomedical scientist How to become a biomedical scientist: Hannah's story - BBC Bitesize HT2 Clinical photographer How to become a clinical photographer: Bethany'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 Inspiring scientists: Sanjeev Gupta's story **How to become a physicist: Mark Richards' story - BBC Bitesize** Diversity and the Science Curriculum - BDSIP	Diverse representation within text/ videos/website links shared. Display shows a variety scientists of different genders and from different ethnicity Diversity in science Guidance on Diversity and Equality	Diverse representation within text/ videos/website links shared. Diversity Matters in Education The Development of Children's Gender-Science Stereotypes: A Meta-analysis of 5 Decades of U.S. Draw-A-Scientist Studies - Miller - 2018 Promoting Equality and Diversity in the Classroom | Principles
Local Community Links	GSK Stevenage	Cambridge Bio science	Life science group Lockheed Martin
British Values Democracy The rule of Law	**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 Britain** From inventing the world wide web, to mobile phones (physics year 9 em waves), laptops, electricity(CP9 electricity), televisions, bicycles, stem cell transplants (CB3 Genetics, DNA fingerprinting and marmite, no other country has contributed so much to modern life in the 21st century **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?**		

Individual Liberty Mutual Respect and Tolerance of others SMSC Character Education	• 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** 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** 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