1. CURRICULUM INTENT OVERVIEW PLAN
Key Stage 3

Subject: Science

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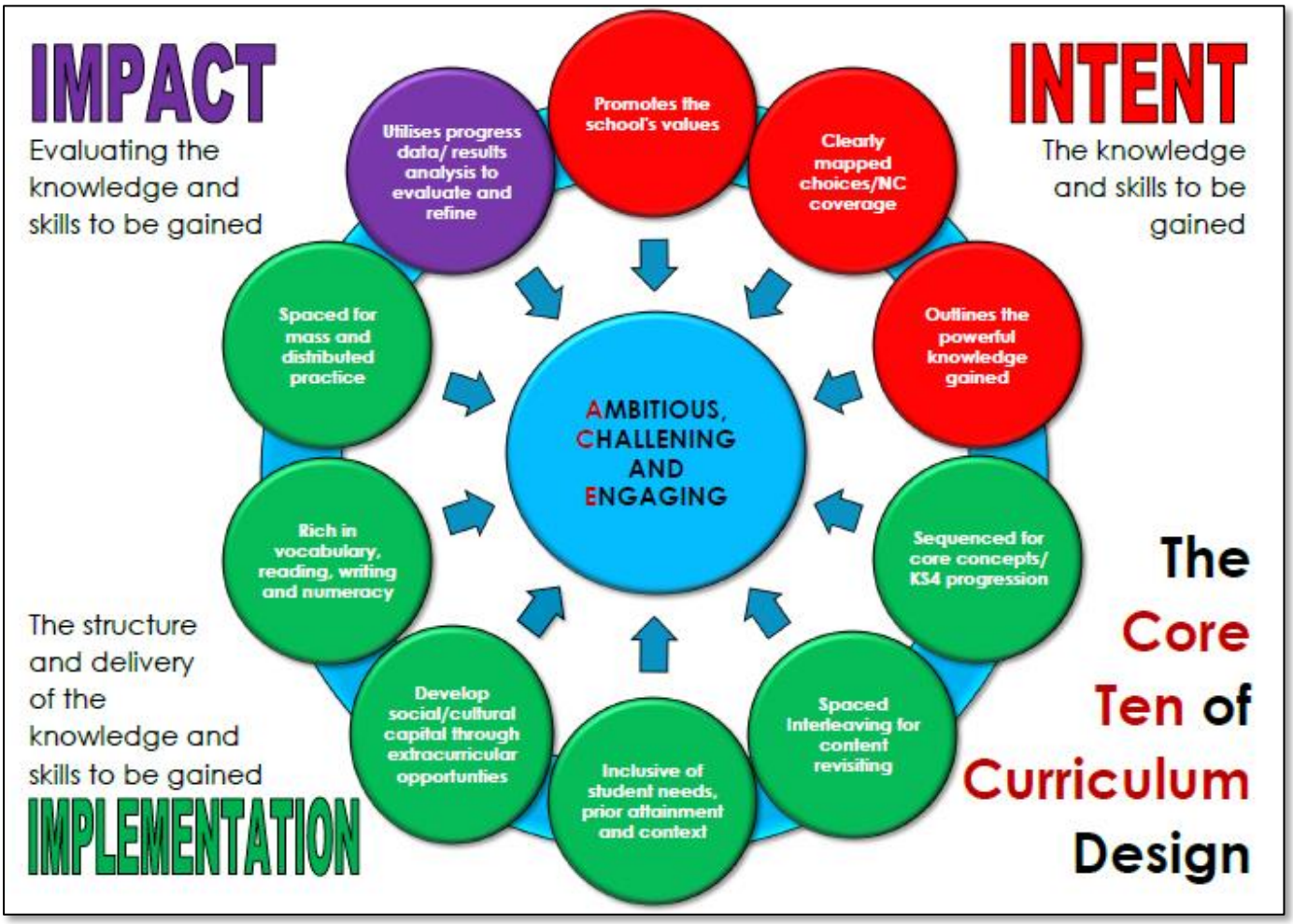
Created: February 2020

Updated: March 2022



THINKING PROCESS - CURRICULUM INTENT OVERVIEW PLAN (KS3)

Intent Statement – at Landau Forte Amington, we believe learning powerful knowledge helps students achieve and creates a fairer society.
How are you trying to accomplish this, with this Programme of Study (PoS)?

DEFINITION: Powerful Knowledge is described as knowledge which enriches students' lives and creates a fairer society by providing students with intellectual power. It is knowledge which support students in engaging with the world and communicating with people regardless of background or social standing.

The science department provides an enriching, engaging and accessible curriculum for all of our students. We aim to build and development our students' skills and powerful knowledge that will enable all of our students to utilise their skills and knowledge in their everyday lives. All students will develop scientific knowledge to engage in a range of discussions about our changing world.

Aims – what do you want pupils to be able to know and do by the time they finish this Programme of Study (PoS)?

We want our students to have gained a good understanding of the main principles in science and its worldly applications and to have gained the necessary skills to aid them in their future learning and careers.
We want all students to be able to communicate their knowledge and skills they have learnt in a variety of ways.
Students will gain knowledge about cells, the structure of a variety of organisms, a range of science techniques, why chemicals react, energy in all its stores from electromagnetic radiation to kinetic.

Academy Values – at Landau Forte Amington, we want students to be ambitious, brave and kind. How are these values promoted in this PoS?

Our students will need to be brave when completing new learning, accepting they will make mistakes and learn from them. Our students will be ambitious by always trying to increase the amount of detail in their answers and increase their knowledge. Our students will also need to be kind and supportive of other students, accepting of other people's mistakes and supporting others learning through helping in group tasks and sharing their ideas with the class

KS3 Curriculum Choices – what topics are taught and does it ensure breadth and depth, as well as meet the legal requirements of the National Curriculum (NC)? *(Please note - the sequencing of topics will be explored in the implementation overview, the main purpose at this stage is to know what is taught)*

The Science curriculum is designed to give students a breadth and depth of the building blocks of Science. We have ensured that all students are following the national curriculum to ensure this breadth. Some of the aspects taught under the national curriculum are not assessed in GCSE Science. These aspects are taught as they help prepare students for other GCSE specifications such as Geography. The skills learnt in these topics aids students with their scientific enquiry and the content is important for students to understand the world around them.

KS3 Specification Choices – what topics are taught and does it ensure breadth and depth, as well as meet the requirements of the exam specification?
(Please note - the sequencing of topics will be explored in the implementation overview, the main purpose at this stage is to know what is taught)

YEAR		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
7	**Unit/Topic**	7A Cells, tissues, organs and systems. 7E Mixtures and Separation	7I Energy 7B Sexual Reproduction in animals	7G The particle model 7J Current and electricity	7C Muscles and Bones 7F Acids and Alkalis	7K Forces 7D Ecosystems	7H Atoms, elements and compounds 7L Sound

	Specification/ Assessment Objective	What are the minimum requirements for cells to exist and how do they carry out their role? Students will carry out simple and engaging experiments, such as using a microscope, to help to build their scientific intrigue and skills. How to separate more complicated mixtures using Distillation. Students will carry out a range of investigations to separate substances that will include filtering rock salt to leave brine, and then evaporating techniques to leave behind pure salt. Checking for any misconceptions from KS2	Looking at the different energy stores that are used to provide us with energy. Students will look at the different energy stores that humans use for example: electrical energy or heat energy and then build on their understanding of how we use these stores for our own uses. For example a dam being used to provide electrical energy for a child`s play station! Understanding how plants and animals reproduce. Students will also look closely at the reproductive organs of plants and animals so that they can understand how plants produce offspring and how animals have babies. This topic will help them to understand why some animals give birth to live young and why some animals lay eggs instead.	Looking at the structure of an atom. What makes up the matter in the universe? What are the different states of matter What are the building blocks for life? Drawing circuit diagrams and understanding how electricity flows. Students design and build circuits will a selection of components, such as a bulb, motor or switch.	Skeletal structure and breathing. Students will look at a human skeleton in detail. They will be able to answers questions such as: How many bones make up our skeleton? Where in our bodies would you find the smallest/largest bones? Neutralisation, indicators and how to test for acids and alkalis. Students will carry out scientific experiments using a variety of acids and alkalis and different experimental techniques to build on their practical skills.	What is a force and how can they Influence objects? Students will start to understand what happens to objects if they are pulled or pushed. They may start to develop an understanding of gravity and the difference between mass and weight. For example bathroom scales measure our mass not our weight! What is an Ecosystem? Variation of plants and animals and inheritance of characteristics Students will investigate different types of ecosystems, how organisms interact in them and how different factors can influence an ecosystem.	Students will be introduced to atoms and the Periodic Table so that they can gain an appreciation that everything is made up of something and as a young scientist they can then study atoms and which elements to use to make certain compounds. Introduction to the Periodic Table, chances are most students will not have seen one before. Sound waves, how is sound produced and recorded. Introduction of a longitudinal wave Students will also explore how sound waves are formed and how our ears and brain detect and transform sound waves into sounds that we understand and can hear. If a tree falls in the forest and no one hears it does it still make a sound?

8	**Unit/Topic**	8A Food and Nutrition 8E Combustion	8I Fluids 8B Plants and Reproduction	8F The Periodic Table 8J Light	8C Breathing and Respiration 8G Metals and their uses	8K Energy Transfers 8D Unicellular organisms	8H Rocks 8L Earth and Space
	Specification/ Assessment Objective	Nutrients needed for basic nutrition and how waste food is then disposed of. Students will gain a good understanding of the different types of nutrients that a human body needs and the reasons why we need to eat a balanced diet. Students will focus on combustion and learn how to write basic equations. Students will have a go at burning metals, as an example of combustion, to observe and record what happens.	Pressure in air and in liquids. Students will investigate the meaning of pressure, how to calculate it and how it affects everyday objects. Students will then focus on plants, how they reproduce in terms of pollination. Students will then also study how plants use pollination to produce offspring.	Introduction to elements in the Earth and where to find them. Students will explore some of the elements that we can find in the Periodic Table and how we then use these elements to make everyday products. Introduction to the study of light energy. Students will learn about refraction, reflection and how colour is seen. Students will lastly develop their understanding of light and all of the amazing things that light energy can do. For example using light energy to create disco lights!	Introduction to the process of Respiration. Students will explore respiration in plants and the conditions necessary for the process to take place. Students will also study the process of gas exchange. Introduction to metals, their chemical reactions, properties ad their uses. Students will engage in experiments to predict and discover what happens to metals when they react with fire, water and acids and what they can be used for.	Students will learn about the transfer of energy, Power, Efficiency and how to calculate energy used and the energy efficiency of different appliances. Introduction to Microorganisms, unicellular and multicellular organisms. Students will study the structure and behaviour of bacteria, viruses and fungi. Students can then begin to associate this behaviour with diseases and start to understand how bacteria and viruses cause illness and what can be done to treat them. Students will hopefully realise that antibiotics are not necessary for all illnesses.	Introduction to Rocks and the Rock Cycle. Students will learn about the different categories of rocks, how they are formed and categorised. Introduction to Space, luminous objects, the solar system and space travel. Students will explore space and its structure to try to understand as much as we can understand about space. Students will learn about the International Space station (ISS) and how astronauts can live in space.

9	**Unit/Topic**	9A Genetics and Evolution 9E Making materials 9F Reactivity	9I Forces and Motion 9B Plant Growth 9J Force Fields and Electromagnets	B1. Cell biology	C1. Atomic structure and the periodic table	P1. Energy	B7. Ecology

	Specification/ Assessment Objective	Introduction to Genetics and Evolution in animal and plants. Students will explore the structure of DNA and how it leads to genetic changes in humans and the idea of natural selection. Introduction to Materials used for the production of everyday objects. Students will learn about the use of ceramics and glass to make materials. Introduction to Reactivity in terms of chemical reactions. Students will look at reactions of metals with acids and water for example.	Forces, Speed and how it is calculated. Students will explore the connection between the distance objects can travel and how long it takes them to and then learn how to calculate the speed of the object. Introduction to how plants grow and how farmers try to increase the yield of their crops. Students will learn about the process of Photosynthesis and what plants need to grow and develop. Further study of electricity by looking at force fields and electromagnets. Building on previous learning from year 7J current and electricity. Students will learn about resistance in circuits, static electricity, the formation of force fields and electromagnets.	4.1.1.1 Eukaryotes and prokaryotes 4.1.1.2 Animal and plant cells 4.1.1.3 Cell specialisation 4.1.1.4 Cell differentiation 4.1.1.5 Microscopy **4.1.1.6 Culturing microorganisms** 4.1.2.1 Chromosomes 4.1.2.2 Mitosis and the cell cycle 4.1.2.3 Stem cells 4.1.3.1 Diffusion 4.1.3.2 Osmosis 4.1.3.3 Active transport	5.1.1.1 Atoms, elements and compounds 5.1.1.2 Mixtures 5.1.1.3 The development of the model of the atom (common content with physics) 5.1.1.4 Relative electrical charges of subatomic particles 5.1.1.5 Size and mass of atoms 5.1.1.6 Relative atomic mass 5.1.1.7 Electronic structure 5.1.2.1 The periodic table 5.1.2.2 Development of the periodic table 5.1.2.3 Metals and non-metals 5.1.2.4 Group 0 5.1.2.5 Group 1 5.1.2.6 Group 7 **4.1.3.1 Comparison with Group 1 elements** **4.1.3.2 Typical properties**	6.1.1.1 Energy stores and systems 6.1.1.2 Changes in energy 6.1.1.3 Energy changes in systems 6.1.1.4 Power 6.1.2.1 Energy transfers in a system 6.1.2.2 Efficiency 6.1.3 National and global energy resources	4.7.1.1 Communities 4.7.1.2 Abiotic factors 4.7.1.3 Biotic factors 4.7.1.4 Adaptations 4.7.2.1 Levels of organisation 4.7.2.2 How materials are cycled **4.7.2.3 Decomposition** **4.7.2.4 Impact of environmental change** 4.7.3.1 Biodiversity 4.7.3.2 Waste management 4.7.3.3 Land use 4.7.3.4 Deforestation 4.7.3.5 Global warming 4.7.3.6 Maintaining biodiversity **4.7.4.1 Trophic levels** **4.7.4.2 Pyramids of biomass** **4.7.4.3 Transfer of biomass** **4.7.5.1 Factors affecting food security** **4.7.5.2 Farming techniques** **4.7.5.3 Sustainable fisheries** **4.7.5.4 Role of biotechnology**

National Curriculum content missing from this PoS and why?	Content taught in addition to the National Curriculum and why?
No content from the National curriculum is missing	Viruses are not referenced in the KS3 NC. Viruses are not counted as living as they don't reproduce themselves, a cell is needed for this. Foods are also tested in order to calculate the amount of energy in foods – this links with nutrition, and Health and Wellbeing

Powerful Knowledge Choices – what powerful knowledge is included in this PoS? Consider what knowledge is it important for our students to know, so that when they leave school they can engage in and lead discussions, with people from the most advantaged backgrounds? *(Please note - the sequencing of topics will be explored in the implementation overview, the main purpose at this stage is to know what powerful knowledge is gained)*

YEAR		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
7	Powerful Knowledge	Cells – An understanding of how the body functions. How our cells function through healthy lifestyles. Separating substances – An understanding that mixed substances can be made pure, such as drugs and medicines.	Energy – To be able to discuss the different energy stores there are how they can be altered used and transferred. Reproduction – Demonstrating links to cells and growth. To be able to talk about how babies are made and grown inside a humans body	The Particle Model – An understanding of what makes up all matter and an insight into how different materials can be made. Current and Electricity –To be able to demonstrate understanding of how circuits work. An insight into how most devices are powered by electrical circuits. To be able to build an electrical circuit using different components.	Muscles and breathing – How the body produces energy. To be able to discuss how muscles allow movement. Acids and Alkalis – Show an understanding of the function of acids and alkalis and be able to discuss their everyday uses.	Forces – How forces can change the movement of objects. To be able to discuss the different types of forces and the impact they can have. Ecosystems – To demonstrate an understanding that all living organisms live in habitats that are part of ecosystems.	Atoms, elements and compounds– To be able to discuss patterns and trends displayed in chemical reactions. To be able to predict the name of a compound made from certain elements. Sound – To be able to talk about ow this type of energy can be produced and transferred, and how a human ear can detect sound.

	Why it is important to know	Cells –Are the Building blocks for life. It is important to know how cells function in all living organisms functions. Separating substances – Pharmaceutical companies need to have pure drugs made. Engineering firms will need to check purity. A Pharmacist for example needs to have an understanding of how medicines are made from pure substances.	Energy – An understanding of how future energy needs to be created. It is important to understand how renewable energy sources work. Reproduction – Healthy lifestyles and demographics planning within the NHS for future population. A midwife needs to have a good understanding of how a foetus grows inside a mother's womb and how a mother then gives birth to their baby.	The Particle Model – Students being able to link chemistry topics together and apply this to new situations. Engineers need to have an understanding of which materials are going to be suitable when engineering certain products Current and Electricity – It is important to know how our future energy needs will change and what different techniques we will need to develop to produce energy.	Muscles and breathing – Healthy Lifestyles and how the body converts chemical energy to different energy stores. A Physiotherapist needs to have a good understanding of how muscles and bones work and how different breathing exercises can help a person to recover from a Physical illness. Acids and Alkalis – How industries make different chemicals through neutralisation reactions. A person who takes an indigestion tablet should have a basic idea of why they need to take it.	Forces – Links to transport infrastructure. HS2 construction and energy/forces implications. Investigate the careers within this project. A RAF pilot needs to understand how forces and gravity will impact the way that they can fly a plane. Astronauts need to have a strong understanding of the conditions and lack of gravity in space therefore how will forces affect them in a space shuttle. Ecosystems – Are living organisms adapted for a changing climate? What measures need to be taken? Marine Biologists need to have a strong understanding of the different habitats and ecosystems that exist in our oceans so that they can keep investigating and trying to prevent climate change damage to our oceans.	Atoms, elements and compounds – Application of knowledge to new situations. For example, if chemical X and Y react with Z then what would happen if we react Q with Z. Sound – Sound engineers and how the NHS improve the hearing of those with hearing loss. How does a cochlear implant work? A doctor needs to have an excellent understanding of how the human ear detects sound.

8	Powerful Knowledge	Food and Nutrition– An understanding of how the human body carries out the process of digestion and why nutrients are so important in the human body. Combustion – Understanding how the process of combustion works and what the products will be.	Fluids – Knowledge of the range of uses for fluids and pressure in everyday situations. Plants and Reproduction- Understanding how plants reproduction using the process of pollination	The Periodic Table – Understand how useful the Periodic Table is and what is found in it. To be able to state how we can use the Earth's resources. Light – How light and other waves can be used for data communication. An understanding of visible light and how we see objects	Breathing and Respiration – How the body effectively carries out respiration and the difference between breathing and respiration. Metals and their uses –How metals are extracted from the Earth and what we can use metals for.	Energy Transfers – The range of energy transfers that can take place and how we change these energy stores. Unicellular organisms –To understand what unicellular organisms are and their structure and functions.	Rocks – To understand the formation of different types of rocks and what they can be used for. Space – What is out there? To understand the structure of our solar system and how space exploration works.

	Why it is important to know	Food and nutrition– Healthy lifestyle and how athletes/elderly etc. can support their health through diet. A Nutritionist will use information about a healthy diet and nutrition to put together meal plans for a person with diabetes, for example, to help support their health and nutrition. Combustion – The use of fuels as an energy source. For example it is important to know which fuel sources, when burned, release the most energy.	Fluids – Uses of fluids in various industries such as water pressure or hydraulic brakes, and how we benefit from these processes. Plants and Reproduction- Understanding how specific plants reproduce. Farmers need to understand how to increase their crop yields by ow the plants reproduce and grow.	The Periodic Table – What resources will/won't be available to us in the future. It is important to know how useful Earth`s elements are to us so we know what to use them for. Light – It is important to understand how data communication is changing and how it will continue to change in the future. A computer engineer will need to understand how fibre optics work in internet connections to therefore fix problems when they occur.	Breathing and Respiration – Healthy lifestyles, how we can maximise energy for the body. It is important to understand the difference between respiration and breathing. Metals and their uses –It is important to know where we get our raw materials from. An Architect needs to understand how different materials, such as granite, stone, steel and marble are obtained and produced and how suitable they are for specific uses.	Energy Transfers – Energy for the future. It is important to know how will we produce it? What impact will this have? Unicellular Organisms – How diseases are spread and the guidance given by NHS England is formulated. A scientist during an epidemic, needs to have a strong understanding of how diseases are spread, how vaccines work and how diseases can be treated.	Rocks – How the Earth was formed and how we know this. Sea fossils on Snowdon. How? A Geologist needs to have a good understanding of the formation and features of our planet and what it is made up of Space – What is out there? Why isn't there life on other planets in our solar system? Why does it take so long to get to the moon?

9	**Powerful Knowledge**	Genetics and Evolution- The understanding of how the same species of organisms can be different. To be able to discuss how certain organisms have evolved over time. Making Materials- To understand how materials are chosen to make certain products and how they are made. Reactivity-The understanding of how metals react with different substances and how to test for their products.	Forces and Motion- Understanding how forces are used in the movement of different kinds of objects, for example race cars and industrial cranes Plant Growth-The understanding of what plants need to grow successfully and what can impede their growth Force field and Electromagnets-The understanding of how electrical of how a force field is generated and how an electromagnet can be made.	Plant and animal cells (eukaryotic cells) have a cell membrane, cytoplasm and genetic material enclosed in a nucleus. Bacterial cells (prokaryotic cells) are much smaller in comparison. They have cytoplasm and a cell membrane surrounded by a cell wall. The genetic material is not enclosed in a nucleus. It is a single DNA loop and there may be one or more small rings of DNA called plasmids. Students should be able to demonstrate an understanding of the scale and size of cells and be able to make order of magnitude calculations, including the use of standard form. **The culturing of microorganisms to help to identify a specific type of pathogen that may be causing infection**	All substances are made of atoms. An atom is the smallest part of an element that can exist. • write formulae and balanced chemical equations • suggest suitable separation and purification techniques for mixtures when given appropriate information. Understand how scientific investigations has led to differing models for the atom. Atoms are very small, having a radius of about 0.1 nm (1 x 10^{-10} m). The radius of a nucleus is less than 1/10 000 of that of the atom (about 1 x 10^{-14} m). Students should be able to relate size and scale of atoms to objects in the physical world. The relative atomic mass of an element is an average value that takes account of the abundance of the isotopes of the element.	A system is an object or group of objects. There are changes in the way energy is stored when a system changes. Students should be able to describe all the changes involved in the way energy is stored when a system changes, for common situations. Power is defined as the rate at which energy is transferred or the rate at which work is done. Energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed. The energy efficiency for any energy transfer can be calculated using the equation: efficiency = useful output energy transfer / total input energy transfer The main energy resources available for use on Earth include: fossil fuels (coal, oil and gas), nuclear fuel, bio-fuel, wind, hydroelectricity,	Students should be able to describe: • different levels of organisation in an ecosystem from individual organisms to the whole ecosystem • the importance of interdependence and competition in a community. Students should be able to explain how a change in an abiotic factor would affect a given community given appropriate data or context. Students should be able to explain how a change in a biotic factor might affect a given community given appropriate data or context. Students should be able to explain how organisms are adapted to live in their natural environment, given appropriate information. Students should understand that photosynthetic organisms are the producers of biomass for life on Earth.

						geothermal, the tides, the Sun and water waves.	Biodiversity is the variety of all the different species of organisms on earth, or within an ecosystem. Humans reduce the amount of land available for other animals and plants by building, quarrying, farming and dumping waste. Students should be able to describe some of the biological consequences of global warming.

	Why it is important to know	Genetics and Evolution- It is important to understand how organisms can and have evolved. How have humans evolved as a species? Making Materials – It is important to understand that certain products have to be made by specific materials so that the properties of the product match the intended use. Reactivity- To understand the problems of what can happen to a product if it is made from an incorrect metal.	Forces and Movement- In engineering, an engineer needs to understand how objects work and how to fix them, what forces need to be applied to make a race car go faster. Plant Growth- It is important that a farmer understands how plant growth can be promoted to increase yield of crops. Force fields and Electromagnets- It is important to understand how force fields are generated and what they can be used for.	Students will gain an understanding of new innovations, such as, new types of man-made polymers and smart materials, such as, nanotubes. Why does the same chemical but bonded differently behave differently? – Links to the materials Royal Royce uses such a turbine blades being grown as one crystal of metal! Students will gain an understanding of how scientists calculate the exact amount of chemicals needed to produce a certain chemical reaction or chemical product. For example, a food scientist. In short how does a chemist work alongside an accountant in order to make a profit. A force is a push or pull that acts on an object due to the interaction with another object. How forces affect movement and a range of examples for moving objects.	Students will learn that Engineers use these principles of s,l, g when designing vessels to withstand high pressures and temperatures, such as submarines and spacecraft. How can specific heat capacity be important for future homes storing heat energy? Why and how are particular elements chosen to perform specific tasks, such as, being used for water pipes om our homes. A plumber need to understand that specific metals can only be used because of their structure. Advancements in materials used in a range of industries. A force is a push or pull that acts on an object due to the interaction with another object. How forces affect movement and a range of examples for moving objects. The braking distance of a vehicle can be affected by adverse road and weather	Students will be able to understand how plants play an important part in the creation of life. An appreciation for the impact human activity has in the atmosphere so students can engage in the debate for future changes we need to make. Eg population size, energy production, use of land It is important in industry to choose materials based on their particular product students will gain an insight into how these properties could be tested. Pharmacists need to have a good understanding of how chemicals, such as, acids and alkalis react when dispensing medicines to patients.	Students will use their prior knowledge of cells to help explain why cells need to maintain its conditions. Understanding how the body regulates conditions. Students will have the knowledge to interact effectively with health professionals in order to discuss their own health and that of others. Students will gain an understanding of how to alter the rate of a reaction. The applications are wise and varied, simply any reaction than is taking place uses this science. Students will gain skills to analyse graphs. A vital skill in any sector of employment. Radioactive materials are widely used in medicine, industry, agriculture and power generation. This knowledge would be very important for students wanting to take any of these

				The braking distance of a vehicle can be affected by adverse road and weather conditions and poor condition of the vehicle.	conditions and poor condition of the vehicle.		career paths. Students will have the understanding about the social, environmental and economical impacts that a nuclear accident can have on society. This could aid careers in journalism or as a historian looking into previous nuclear disasters. MSci degree at Birmingham University to train radiation scientists for working/dismantling nuclear power plants in the UK.

How does the Curriculum Intent meet the ACE curriculum design?	
Ambitious	**Students are able to access the content and their appropriate level and the content allows for all students to be stretched in their development of new skills, knowledge, and application.** **Students learn through a range of activities, including practical work. All students will be stretched through the various forms of new learning and assessment.**
Challenging	**They will have a range of learning activities to stretch their knowledge. The curriculum builds on their prior knowledge and students will need to link prior learning from a range of topics.** **Assessments test knowledge, new skills, and their application in order for students to understand their weaknesses and strengths.**
Engaging	**Links to the world around us, the impact that we have on the world through application are used to demonstrate why science is important.** **Students see a range of practical applications for the science and careers where these are useful.**
What are the current strengths of the Curriculum Intent?	
Content is revisited throughout KS3 with topics being linked together **A link to the applications of the science taught** **A range of activities to include practical work** **Using a range of skills in the lesson and therefore linking learning from other curriculum areas** **Time for students to explain their understanding through open activities**	
What specific actions have to be taken in response to the above? Please consider: • KS3 Curriculum content changes; • Powerful knowledge changes; • Modifications to ensure an ACE curriculum design; • CPD for teachers in your subject area; • Additional research you have to consider as part of this review.	
The previous curriculum within the department did not allow students to develop deeper understanding of the content. The previous curriculum covered the contents in two years and didn't engage students and develop skills in the same level of depth. Using the What, why, how and links to particular applications or careers will give students the powerful knowledge to be continue to gain knowledge and skills. Assessments have changed to assess practical skills, knowledge, and the depth of these. Staff have been working on practical skills in their CPD – the department had previously reduced the amount of practical work that the students had been completing. We are currently reviewing a change to exam board and well as two possible vocational awards for Delta. AQA exam questions regarding core practical investigations are more consistent as to the skills and techniques students will need to answer these.	