Long Term Plan: Year 7 2024-2025

ARCHBISHOP SENTAMU ACADEMY
Church of England

"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.

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
One	**Scientific Skills**	Introduction to practical work at ASA Short series of lessons to embed the requirements of the practical aspects of our programmes Complete the GL Assessment	Naming & drawing equipment Introduction to health & safety in the laboratory Writing Methods Recording Observations Bunsen Burner Licence	Names of equipment Students attempting to draw in 3D	Students will have used very basic equipment at KS2	All our course programmes depend upon this knowledge	Introduction of variables & values Accuracy & validity of results
SMSC & British Values	British values in science Working cooperatively Working safely in a laboratory setting						
Cultural Capital	Scientist throughout history						
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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Two	**Materials** **Discovering Forces**	Describing properties of different materials Investigating, designing, evaluating homemade composite materials Describing what is meant by a polymer and giving examples Describing forces – names of forces, contact and non-contact examples, free body diagrams Measuring forces – units for force, how we measure force Forces & motion - balanced / unbalanced forces, resultant forces Friction – describing friction, how can friction be useful Air & water resistance – what drag is, how resistance can affect the movement of objects, how we can overcome resistance	**Practical Skills:** • 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 identifying variables. • Drawing tables of results •	Materials can only exhibit properties of one state of matter.. Students are likely to think that all these materials are human-made – they will be introduced to the natural examples. Students are likely to think that all these materials are human-made – they will be introduced to the natural examples.	Students are likely to think that all these materials are human-made – they will be introduced to the natural examples.	This information leads into: Y7 – Y8 – Y8 – Y10 – Y11 –	Opportunities for pupils to relate knowledge to wider world around them Opportunities to evaluate the effectiveness of composites
SMSC & British Values	British values in science Cultural – working like a scientist Community - working collaboratively to complete practical tasks						
Cultural	Cultural capital in science is about providing students with scientific literacy, familiarity of science, and the experience of being a scientist.						

Capital	
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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Three	**Particles**	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	**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, 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	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.

				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**	State what a cell is. Explain what each part of the microscope does and how it is used. Explain how to use a microscope to observe a cell. List the components of plant and animal cells.	**Practical Skills:** • Using microscopes • Identifying equipment • Following a plan accurately to collect results • Carrying out practical work safely • Focusing on teamwork to collect accurate results **Scientific Skills:**	"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 that make hair grow - One specialised cell that causes a great deal of confusion is the plant root hair cell. Because of its name, students often regard this as an animal cell linked to		This content leads into: Y7 – Organ systems Y7 – Reproduction Y8 – How organisms get energy Y8 – Plants Y9 – Cells and DNA Y9 – Plants and	Students can measure te size of cells using calculations Students can rearrange the subject of calculations Students can convert units between cm – mm – um

		Describe the functions of the components of a cell. Describe the similarities and differences between plant and animal cells Name some examples of specialised animal and plant cells Describe features of specialised animal and plant cells. Explain how the specialised features of the cells allow them to function. State the definition of diffusion Describe the role of diffusion in the movement of materials in and between cells Explain how to increase the rate of diffusion Describe what a unicellular organism is. Describe the structure of an amoeba .	• Focus on following and writing methods	hair. "Specialised DNA is found in specialised cells." A very common misconception is the link between the structure of the cell and the information found in the nucleus. When asked, many students will state that a nerve cell contains only the genetic information needed to make another nerve cell. Students should be aware that every cell in the body contains information for 'making' every other cell in the body. "Clear round structures under the microscope are cells." When preparing slides, air bubbles will often get trapped under the cover slip, and students commonly mistake these distinctive structures for cells. When placing a cover slip onto a specimen it is important to gently lower it from one side to exclude air bubbles. Students could be shown what air bubbles look like under the microscope before they start to make their own observations.		photosynthesis Y9 – Respiration Y10 – Organisation Y10 – Infection and response Y10 – Plant tissues Y11 – Homeostasis	

		Describe the structure of a euglena					
SMSC & British Values	British values in science Reasons to keep a healthy body and mind						
Cultural Capital	Investigate the historical and latest developments in prosthetic limbs Review how medical treatments work based on cells, tissues, organs & systems – both historical and the latest developments						
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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Five	**Thermal Energy**	Define energy Name the energy stores and give examples Describe energy transfers, identifying pathways State the Law of conservation of energy, Use energy transfer diagrams to show the processes involved in the energy transfers Use the law of conservation of energy to calculate energy values, Give examples of energy	**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	*Energy is a thing and object or something that is tangible. Energy is truly lost in many energy transformations. Things use up energy.*	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	This content leads into: Y8 – Chemical reactions Y9 – Energy Y10 - Energy changes	

		stores which are useful and those that are not. Describe how energy is transferred by particles in conduction State the difference between thermal conductors and thermal insulators Investigate the conductivity of different materials Describe the role of insulation Describe how heat transfers occurs by convection Explain what is meant by a convection current Explain everyday observations using ideas about convection. Explain how heat is transferred by radiation			topic and have a basic understanding of Energy transfer		
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/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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Six	**Separating Substances**	Particle model Properties of solids, liquids and gases Changing state Exploring brownain 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 Values	British values in science Working collaboratively on practical tasks						
Cultural	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						

Capital	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**	Define and state examples of tissues, organs and organ systems Describe the hierarchy of organisation in a multicellular organism Explain why multicellular organisms can be so complex Describe the structure of the gas exchange system Describe how the parts of the gas exchange system are adapted to their function Compare inhaled and exhaled air	<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

		Describe the processes of inhaling and exhaling Describe how breathing can be modelled Explain how to measure lung volume Describe the structure of the skeleton Describe the functions of the skeletal system Design a skeleton Describe the role of joints in movement State the parts of a joint Investigate the joints of a chicken wing Describe the function of major muscle groups Explain how antagonistic muscles cause movement					

		Design a model to show how the arm is able to bend, Explain how to measure the force exerted by different muscles. Investigate how to measure force exerted by 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	**Discovering Forces**	Define the word force Be able to measure forces Describe interaction pairs Describe how forces deform objects	**Practical Skills:** • Using a Newton Meters • Identifying equipment • Following a plan accurately to collect results • Carrying out practical work safely • Focusing on Teamwork to collect accurate results	**Forces:** Students may think that moving objects always have forces acting on them. Their experience makes it hard to accept the idea that an object which is moving will continue with the same speed and direction unless a force acts (Newton's First Law), because on Earth the	In the Earth, and that friction acts on moving objects, including air and water resistance Fundamental to physics are ideas about forces and energy to explain phenomena.	This information leads into: Y7 – Motion Y8 – Space Y8 – Magnetism Y10 – Forces & interactions Y11 – Forces and	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

		Investigate the relationship between force and extension Describe the effect of drag forces and friction Explain why drag forces and friction occur Apply the concept of drag Recognise man made and natural examples of streamlining Link streamlining to top speed in cars Investigate streamlining in falling objects Describe the effects of a field Describe the effect of gravitational forces on earth and in space Calculate weight and understand how it differs to mass	**<u>Scientific Skills:</u>** • Focus on identifying variables. • Drawing tables of results • Using Mathematics to solve Scientific problems	forces of friction and gravity are always present. **Weight and Mass:** Students need to grasp the idea that weight is a force with the unit Newton, yet when people talk about weight they often mean mass. **Free fall:** On film, free-fall parachutists can appear to fly upwards when they open their parachute. Students may need help to realise that this is only a dramatic slowing in relation to the camera (which is still in free fall). At terminal velocity all forces are in balance so the object won't get faster.		motion	topics are a good opportunity for the HPA students to tackle. Investigation into the compression properties of materials or substances used to reduce the impact of injuries (air bags, flooring in children's play parks, packaging materials for parcels etc)

		Describe the difference between balanced and unbalanced forces Investigate balanced and unbalanced forces Apply knowledge of balanced and unbalanced forces					
SMSC & British Values	British values in science Cultural – working like a scientist 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 x a investigation Modern car design uses materials that will quickly "squash" thus allowing for reduced impact forces/injury upon passengers. (e.g. F1 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.						

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Nine	**Atoms, elements and compounds**	Atomic model – structure of the atom, development of this structure	**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	

		Atoms, elements and compounds – 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 **<u>Scientific skills</u>** • 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];		substances 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	**Reproduction**	State the difference between adolescence and puberty Describe the main changes that occur at puberty	**<u>Practical Skills</u>**: • Simple dissection- flowers to identify different parts including plant reproductive organs • Recording time using stopwatches	Ovulation and fertilisation are the same thing Puberty and adolescence are the same thing.	At Key Stage 2, pupils will have learned to describe the life process of reproduction in plants and some animals, including sexual and asexual reproduction in	This content leads into: PSHE Y9 – Cell structure and DNA	Wider review of reproduction methods of other organisms (e.g. fish, fungi, trees etc) which will allow for a comparison of methods. Literacy opportunity to

		Compare puberty in males and females Identify the main structures in the male and female reproductive systems Describe the function of the main structures in the male and female reproductive systems Describe the structure and function of gametes Explain the process of fertilisation Describe what happens during gestation Describe what happens during birth Describe what the menstrual cycle is Explain what happens at each stage of the menstrual cycle Identify the male and female parts of a flower Describe the main process	• Measuring small and large distances using various rulers **Scientific Skills**: • Scientific drawings of observations • Interpreting graphs (bee population decline) • Planning an experiment- identifying independent, dependent and control variables • Making a hypothesis • Drawing a conclusion • Evaluating a method	Puberty occurs at the same time and in the same way for everyone. Plant sex cells are the same as sperm and egg cells The terms 'pollination' and 'fertilisation' describe the same process. Pollination and seed dispersal are the same processes	plants, and sexual reproduction in animals. An earlier topic in year 7 has covered cells, specialised cells & DNA which leads directly into the work within this topic area.	Y11 – Homeostasis Y11 – 4.6 Inheritance, variation and evolution	produce an informative leaflet, aimed at their peers, to share information around puberty & support for mental health at this time. Investigate the shape of wind pollinated flowers using specific species as the basis for looking at the impact of dispersal methods.

		of pollination Explain the difference between wind-pollinated and insect-pollinated plants Describe the process of fertilisation in plants Explain how seeds and fruits are formed Describe the way seeds can be dispersed Describe how seeds are adapted to be dispersed					
SMSC & British Values	British values in science Moral – impact of puberty on health & mental health Moral – complexity of puberty on a young person who is considering gender reassignment or transition. Cultural – awareness of the approaches of different cultures to menstruation and reproduction						
Cultural Capital	Awe & Wonder around the nature of reproduction and the continuation of the Human species. Importance of pollination of plants, by bees and other insects, in ensuring that there is sufficient food to meet the demands of the world population						
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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Eleven	**Sound and light**	Explain what a wave is and what it transfers. Describe what happens when waves hit barriers or hit together Describe the different types of waves and their features describe how sound is produced and travels explain why sound travels differently in different materials contrast the speed of light with the speed of sound State the link between loudness and amplitude State the link between frequency and pitch Apply knowledge of frequency and pitch Give the range of human hearing and describe how it differs from the range of hearing in animals Describe how the ear works	**<u>Practical Skills</u>**: • Observing demo of an Oscilloscope • Identifying equipment • Using ray boxes • Using a protractor • Measuring angles of incidence & reflection • Using converging and diverging lenses • Measuring the energy produced by a solar cell with a multi-meter • Identifying equipment required • Following a method • Carrying out practical work safely **<u>Scientific Skills:</u>** • Understanding ranges when looking at data • Observing models to deepen understanding • Analysing and Interpreting graphs • Introduced to a hypothesis and designing an experiment • Carrying out reproducible tests • Drawing results tables • Concluding from results • Calculating the speeds of light and sound	That material objects are not needed to make sounds, pitch and loudness mean the same thing and that ultrasound is simply very loud noise. That sound travels instantaneously, or is faster than light, and that sound cannot travel through solids and liquids, or can pass through a vacuum. All materials reflect sound equally. The ear is simply the part outside our head that we can see. Waves and ripples carry water in the direction in which they move (transfer matter as well as energy) Light goes around things, not just in straight lines. Air is empty space. Light can only be reflected from shiny surfaces (such as a mirror). An object either absorbs or reflects light, and cannot do both. White light is made up of discrete colours. Colour is a property of objects rather than of reflected light. Sound travels instantaneously	In Key Stage 2, students will have learned about how sounds are produced and how they travel to the ear, and ideas relating to pitch and volume of sounds. The content of this topic leads directly on from the Forces and energy topic covered in year 7. At key stage 2 students will have begun to recognise that light appears to travel in straight lines, this idea is then used to explain that objects are seen because they give out or reflect light into the eye and that light travels from light sources to our eyes or from light sources to objects and then to our eyes. Also, this can be used to explain why shadows have the same shape as the objects that cast them.	This information leads into: Y8 - Light Y11 - Waves This information leads into: Y9 – Energy Y11 - Waves	Calculation of wave speed using $v = f \times \lambda$ Students will practice the art of converting values into the standard units that are required for calculations in physics. Investigate the impact of ear size on ability to hear a sound Building a speaker in order to observe the vibration of particles needed for sound to travel Opportunity for the rearrangement of an equation to identify an unknown quantity. Students will practice the art of converting values into the standard units that are required for calculations in physics. Accurate drawing of ray diagrams with lens that will lead to the calculation of focal length

		Describe how hearing is damaged Explain how a microphone detects sound Describe what an echo is Explain why some surfaces absorb or reflect sound Explain what ultrasound is and how it is used. Explain how we see things. Explain how images are formed in a plain mirror. Explain reflection with ray diagrams Explain the difference between diffuse scattering and specular reflection. Describe and explain what happens when light is refracted Explore refraction by creating ray diagrams Describe what happens when light passes through a lens.					

		Describe how the eye works Describe how a simple camera forms an image Compare the eye and a camera Explain what happens when light passes through a prism Describe how primary colours make secondary colours Explain how filters and coloured materials affect light					
SMSC & British Values	British values in science **Community –** working collaboratively to complete practical tasks						
Cultural Capital	Opportunities to discuss the future of energy transportation, communication, and off-world travel Awe and wonder of the world around them – including how we as humans see things using our eyes (and potential issues with vision) Historical experiments looking at the dispersion of light						
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**

Twelve	**Energy 2**	Explain the relationship between energy and power. Use the equation P = E/t to calculate power Convert between units for power and time Calculate how much energy devices transfer based on their power rating and the time of operation Calculate the costs of running home appliances Identify energy values for food and fuel. Compare the energy in food with energy requirement. Calculate energy requirements for different situations. Describe how fossil fuels are formed Describe how electricity is generated in a fossil fuel power station	**Practical skills** • Modelling energy and power **Scientific skills** • Comparing power ratings • Comparing energy values	Energy can be created or destroyed Energy disappears Energy appliance costs the same to run	In KS2 students learn about renewable energy and different 'types' of energy	This content leads into: Y7 – Thermal energy Y8 – Light Y8 – Sound Y9 – Energy stores Y10 – 6.5 Forces and their interaction Y11 – Waves	

		Explain advantages and disadvantages of fossil fuel use Define renewable energy resources and give examples Describe how renewable sources produce electricity using energy transfers Describe the advantages and disadvantages of different renewable energy sources					
SMSC & British Values	British values in science Community – Collaboration in practical work						
Cultural Capital	Comparison of energy costs from different national provider Methods of reducing energy bills in homes National (and Global) issue of people having insufficient access to suitable, and consistent, energy for their homes and the ongoing costs issues that some families are facing						
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**

Thirteen	**Solar System & Beyond**	Describe how the motions of the Earth explain day, night and years. Describe the motion of the moon. Describe the objects in our solar system Describe the locations, movements, sizes and distances of the different objects within our solar system. Describe gravitational attraction Describe gravity on the moon and planets Describe gravity in the solar system Describe what the sun and other stars are. Explain the different appearance of stars, Describe what galaxies are. Explain why the heating effect of the Sun is greater at midday than at sunrise.	**<u>Practical skills</u>** • Using a force meter / Newton meter • Measuring mass using a balance • Measuring weight using scales • Measuring time to an appropriate degree of accuracy • Identifying equipment required • Following a method • Carrying out practical work safely **<u>Scientific skills</u>** • Carrying out a fair test • Drawing results tables • Concluding from results • Calculating averages • Calculating gravity and weight • Calculating the acceleration of a falling object	Our Solar System is at the centre of the Universe. Seasonal changes are due to the varying distance of the Earth from the Sun. Only objects that are moving can have energy. Heavy objects fall faster than lighter objects. Gravity is linked to the Earth's rotation. If the force holding an object in circular motion is removed, the object will fly away at 180° to the force.	At key stage 2 students will have studied: The movement of the Earth and other planets relative to the sun in the solar system, The movement of the moon relative to the Earth To describe the sun, Earth and moon as approximately spherical bodies. They will also have used the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky, They will have recognised that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.	This information leads into: Y10 – Forces and interactions Y11 – Forces and motion	Opportunity for the rearrangement of an equation to identify an unknown quantity. Students will practice the art of converting values into the standard units that are required for calculations in physics. Introduction to the use of standard form and the concept of light years, in order to manage the huge distance values needed when considering the magnitude of the Universe

		Describe the difference between summer and winter in the UK. Explain the difference between the seasons in the UK and other countries. Explain the effect of the Earth's tilted axis on seasons. Explain how and why the seasons change, and why some countries do not have summers and winters					
SMSC & British Values	British values in science 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"						
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.						