Year 7 Physics Curriculum – 2020-21

	Autumn Term		Spring Term		Summer Term	
	1	2	1	2	1	2
Key Concepts	Forces		Electromagnets	Energy	Waves	
National Curriculum Knowledge & Understanding	**Speed** * Forces as pushes or pulls, arising from the interaction between two objects * Forces measured in newton * Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces * Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) * Change depending on direction of force and its size. * Speed and the quantitative relationship between	**Gravity** * Non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity * Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun	**Potential Difference and resistance** * Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current * Differences in resistance between conducting and insulating components Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge	**Calculation of fuel uses and costs in the domestic context** * Comparing energy values of different foods (from labels) (kJ) * Comparing power ratings of appliances in watts (W, kW) * Comparing amounts of energy transferred (J, kJ, kW hour) * Domestic fuel bills, fuel use and costs * Fuels and energy resources * Energy as a quantity that can be quantified and calculated; the total energy has the same value	**Sound** * Sound needs a medium to travel, the speed of sound in air, in water, in solids * Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound * Sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal * Auditory range of humans and animals.	**Light** * Light waves travelling through a vacuum; speed of light * The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface * Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye *Light transferring energy from source to absorber leading to chemical and

	average speed, distance and time (speed = distance ÷ time) * The representation of a journey on a distance-time graph * Relative motion: trains and cars passing one another. * Change depending on direction of force and its size.		* Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects * The idea of electric field, forces acting across the space between objects not in contact.	before and after a change * Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions * Using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes. * Other processes that involve energy transfer: changing motion, dropping an object, completing an		electrical effects; photo-sensitive material in the retina and in cameras * Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.

				electrical circuit, stretching a spring, metabolism of food, burning fuels.		
Assessment	End of Unit Assessment Badger Assessment	End of Unit Assessment Badger Assessment End of term Summative Assessment	End of Unit Assessment Badger Assessment	End of Unit Assessment Badger Assessment End of term Summative Assessment	End of Unit Assessment Badger Assessment	End of Unit Assessment Badger Assessment End of term Summative Assessment

Why this? Why now?	It is important for pupils to be introduced to the concept of force interaction pairs in their most basic form, as identifying these interactions leads to the knowledge of balanced/unbalanced forces and resultant force which is needed to better understand motion in a straight line and Newtons Laws which pupils will need before progressing on to non-linear motion in year 8. Pupils have already been introduced to basic interaction pairs in in KS2 when they studied the effect of gravity and resistance on moving objects. It is important to now use investigative techniques to predict the motion of objects	Pupils will move forward in year 8 to investigate the stretching relationships in Hooke's Law. To fully understand and make scientific predictions based on knowledge, pupils need to understand how gravity effects objects with mass and be able to define the difference between force and mass. Pupils also study energy changes later in year 7 and then in more detail in year 8 and for this, pupils must be able to predict the energy changes when gravity is acting upon an object. Pupils need to have be able to plan, predict and obtain data, which	This unit is moving pupils forward to understanding what electricity is, how it is generated, how it is transferred, and the units associated with it. Pupils cover this unit to provide them with the necessary skills and understanding to understand electricity generation by electromagnetic induction in year 8. Pupils have already built simple series and parallel circuits in KS2 and can identify appliances powered by electricity, so this knowledge acts a good precursor to think about electrical current as moving charge, moving pupils	Energy is very important and often abstract concept that forms the basis of many topics in Biology, Chemistry and Physics. Pupils will have heard the term energy, but energy stores and transfers are not distinctly covered at KS2 outside of food chains and ecosystems. It is important for pupils to start understanding what energy it is in its own right, and how it can be stored and transferred through the main pathways. This will provide pupils with the skills and understanding needed to access the Light and	Sound is a concept that pupils will have been familiar with throughout their early years and KS1/KS2 education, but some pupils may not be aware that sound is a wave. It is important to correct this misconception and build upon pupils existing knowledge of sound. Pupils will study further the properties of waves I year 8 so fundamental knowledge of sound waves is required in this unit. Pupils should already be aware that sound must travel through a medium, but some may not be aware that sound travels as waves. It is	Light is another concept that pupils will be familiar with from KS2 and they can visualise some of its properties easily. Pupils should be aware that light travels in straight lines from their studies at KS2, but pupils may not have much knowledge or understanding of the wave nature of light, so it is important to address these misconceptions now in the teaching of this topic and build further upon their existing knowledge. Pupils should already be aware that light travels in straight lines, but some may not be aware that is a wave. It is

	based upon the relative force applied. Pupils should have now gained the appropriate skill sets from the “working scientifically” aspect of KS2 to plan, interpret and record the data needed to show the relationship between force interaction pairs and speed and should have the required mathematical skills from KS2 to use given formula and perform basic calculations.	they should have gained the necessary skills from during the “working scientifically” element of KS2. Pupils should have the mathematical ability in year 7 to calculate force/weight from mass. These concepts need to be taught before moving on to energy transfers later in year 7 and before stretching is taught in year 8, so that pupils can make scientific predications based on skills and knowledge.	towards thinking at a subatomic level. Pupils should have the practical skills needed to observe and record the relationship between current and resistance and should have the mathematical skill needed to perform basic calculations using given formula. This unit needs to be taught before further work on electromagnetism is completed in year 8.	sounds topics in year 7. Pupils will have heard of energy, but many will not be able to give a true definition at the start of year 7. It is important o address to gaps in knowledge about energy transfer and stores at this point in year 7, before the light and sound topic are taught in year 7 and before the additional Physics topics are taught in year 8. Pupils should now have the scientific skills from KS2 to make observations and record results, from which they can draw conclusions and make further predictions. Pupils will have already studied states of	important that pupils have already studied the energy unit before moving on to the sound topic, so they can apply their knowledge and understanding of energy transfers to the big question of “why can we hear sounds?”	important that this topic is taught after the energy topic, so that pupils can build upon their understanding of energy transfer pathways. Pupils should have the mathematical skills in year 7, required to measure angles and use a protractor correctly. This unit must be taught before the properties of waves unit taught in year 8, to ensure pupils can apply their knowledge and understanding to the new context.

				matter in year 7 chemistry, so they should already understand the changes taking place at a particle level when a substance changes state.		

Skills & Characteristics	**Listening** Pupils will have opportunities to develop their listening skills throughout the academic year, specifically when being given instructions for investigative work for e.g. forces. They will also listen to each other throughout group work and opportunities for presenting their work. **Problem Solving** Pupils will use problem solving skills when evaluating the results from investigative processes. They will work collaboratively to explain the results of their practical experiments using scientific reasoning. **Aiming High** All pupils will set clear, tangible goals and which can especially be met during investigative work when following methods and use of level ladders in tasks. **Teamwork:** Pupils will be required to work in a group whilst carrying out practical work or problem-solving activities showing that these skills are necessary in the world of work irrespective of career choice.
Aspirations & Careers	**CEIAG** Aerospace shadowing Careers Fair Work Experience **Cultural Capital** Pupils are encouraged to make links between current events, like renewable energy sources, and our Physics learning in the classroom. All pupils take advantage of our excellent links with the Engineering department at Sunderland University, the Reece Foundation and the Ogden Trust for external visits and in school activities. **Extracurricular** Stem club Lego Robotics league “Physics is Fun” schools’ competition “Schools Physicist of the year” award

Year Group	Basic (Lower Ability End Points)	Clear (Middle Ability End Points)	Detailed (Higher Ability End Points)
7	Pupils use knowledge and understanding of concepts in physics to identify and state similarities and differences, for example between contact and non-contact forces, and sound and light. They can identify patterns, for example current in series and parallel circuits. They can use basic scientific terminology when writing or in conversations about forces, electricity, and energy. They use simple scientific ideas with evidence they have collected to give explanations of their observations, linking cause and effect, for example light and sound waves can be reflected at a boundary. Pupils use their knowledge related to energy, forces, and waves to state some changes in light, sound or movement, that result from actions, such as those caused by pushing and pulling objects or switching on an electrical circuit. **Working Scientifically** Pupils respond to prompts to suggest practical ways to find answers to questions. They make observations about features of objects, living things and events. They communicate their findings in ways such as talking about their work in everyday terms, or through drawings or by completing pictograms.	Pupils use knowledge and understanding of concepts in physics, processes, and phenomenon to describe similarities and differences, for example between contact and non-contact forces, and sound and light. They can describe patterns, for example current in series and parallel circuits. They can use a range of scientific terminology correctly about forces, electricity and energy. Pupils use questions based on their own ideas and evidence such as what happens when they bring two similarly charged objects together or when the charges are not the same. They can describe how their evidence supports or refute scientific ideas. Pupils use scientific ideas with evidence they have collected to give explanations of their observations, linking cause and effect, for example light and sound waves can be reflected at a boundary. They recognise some applications and implications of science, such as that not all energy is transferred usefully, and that wasted energy can be dissipated to the surroundings. **Working Scientifically** Pupils respond to suggestions and make their own suggestions, with help, about how to collect relevant data and answer questions. They find information by using texts, with help. They follow direct instructions in order to stay safe. They make observations and measurements to compare living things, objects and events, using equipment provided for them. They record findings using prepared tables and communicate observations using scientific vocabulary. They say whether what happened was what they expected and,	Pupils use knowledge and understanding of concepts in physics, processes, and phenomenon to explain similarities and differences, for example between contact and non-contact forces, and sound and light. They can explain patterns, for example current in series and parallel circuits. Pupils can use a wide range of scientific terminology correctly about forces, electricity and energy. They apply and use knowledge and understanding in familiar contexts, such as how energy is dissipated to the surroundings and account for all energy transfers in a range of situations. Pupils use their knowledge and understanding of energy, forces and waves to explain cause and effect in their observations of the properties and effects of light, sound, forces, and electricity. They recognise and explain the purpose of a variety of scientific and technological developments in their everyday lives, for example streamlining and air resistance. **Working Scientifically** Pupils respond to suggestions and put forward their own ideas about how to investigate an idea or find answers to questions. They recognise why it is important to collect data to investigate ideas and answer questions, and use texts to find information. They begin to recognise risks with help. They make relevant observations and measure quantities, such as length or mass, selecting and using a range of simple equipment. They carry out fair tests with some help, recognising and explaining what makes them fair. They record findings in a variety of ways, including tables or charts. They give explanations for observations and for patterns in measurements they have made and recorded. They communicate in a scientific way what they have found out and suggest improvements in their work.

		when prompted, suggest different ways they could have done things.	