Year 8 Physics Curriculum – 2021-2022

	Autumn Term		Spring Term		Summer Term	
	1	**2**	**1**	**2**	**1**	**2**
Key Concepts	Forces		Electromagnets	Energy Changes	Energy	Waves
National Curriculum Knowledge & Understanding	**Contact Forces** * Forces measured in newtons, measurements of stretch or compression as force is changed * Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water * Force-extension linear relation; Hooke's Law as a special case * Moment as the turning effect of a force	**Pressure** * Atmospheric pressure, decreases with increase of height as weight of air above decreases with height * Pressure in liquids, increasing with depth; upthrust effects, floating and sinking * Pressure measured by ratio of force over area – acting normal to any surface.	**Magnetism** * Magnetic poles, attraction and repulsion * Magnetic fields by plotting with compass, representation by field lines * Earth's magnetism, compass and navigation * The magnetic effect of a current, electromagnets, D.C. motors (principles only)	**Energy changes and transfer** * Work done and energy changes on deformation * Simple machines give bigger force but at the expense of smaller movement: product of force and displacement unchanged * Moment as the turning effect of a force	**Heating and Cooling** * Atoms and molecules as particles. * Changes with temperature in motion and spacing of particles * Internal energy stored in materials. * Heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature	**Wave effects and properties** * The similarities and differences between light waves and waves in matter * Waves on water as undulations which travel through water with transverse motion; these waves can be reflected and add or cancel – superposition. * Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound; waves transferring information for conversion to electrical signals by microphone.

	* Work done and energy changes on deformation * Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface.				difference: use of insulators * Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with temperatures.	
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?	Pupils have investigated force interaction pairs in year 7. They are now going to further their knowledge and understanding by investigating specific force relationships such as Hooke's law.	Pupils will have heard of the term pressure used in a variety of contexts. Pupils will also understand the particle model of matter and what happens to the energy and particle arrangement when a substance	Pupils will already have some knowledge of magnetic fields and the effect of magnetic poles from the year 7 curriculum and their studies at KS2. Pupils should also understand how electric current	Pupils have been introduced to the concept of energy and fuels as energy stores in year 7. This unit will further develop their understanding by introducing work done and energy transfer. It is important that the	Pupils have already studied energy and energy transfer in year 7 and then building on this knowledge in year 8. This unit further applies their existing knowledge to explain the properties of substances	Pupils should know that light and sound are both waves. Pupils should also be familiar with the transfer of energy through waves and pressure in fluids from their prior Physics topics. This unit builds upon

	Pupils will need to have covered the topics of forces, gravity and energy in year 7 before they start this topic to ensure they can apply their existing knowledge to this new content and context. Pupils should now have the mathematical skills needed to plot a graph and identify the proportional relationship between force and extension. Understanding relationships between forces will prepare pupils for further investigation of motion, such as acceleration and circular motion in year 9 and KS4.	changes state from their year 7 Chemistry studies. This unit is important to build upon these fundamentals and provide pupils with the knowledge and skills to investigate and describe pressure in fluids. Pupils should have the appropriate mathematical skills to carry out calculations using given formula and record and observe findings from investigations.	flows and how it can be created using static rods and clothes from year 7. Pupils will build upon their existing understanding in this unit and apply principles of magnetism and electricity to electromagnetism. Pupils should have the appropriate scientific skills at this age to use plotting compasses correctly and use the equipment needed to produce an electromagnet safely. Pupils should have the scientific skills to plan, observe and make conclusions and predictions based on outcomes.	year 7 energy unit is taught prior to this unit, to allow pupils to apply their existing knowledge to the concepts of energy transfers and pathways. Pupils should have appropriate mathematical skills in year 8 to calculate work done and energy.	undergoing changes of state in relation to the energy of their particles. It is also important that this unit is taught after particle theory is taught in year 7 and year 8 Chemistry. Aspects of this unit of work will be reinforced at KS4 where pupils will revisit energy transfer by conduction, convection and radiation.	their existing knowledge while introducing new contexts. Waves have played a vital part in exploring the structure of the Earth and formation of the universe and a good understanding of these properties now, will enable pupils to explore the potential uses of waves in topics in year 9 and KS4.
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)
8	Pupils use knowledge and understanding of concepts in physics such as energy, forces and electromagnetism to identify and state similarities and differences, for example between magnets and electromagnets using basic scientific terminology. They use simple scientific ideas and their knowledge and understanding of energy, forces electromagnetism and waves to link cause and effect in their observations, for example increasing the current in an electromagnet increasing the strength of the electromagnet or the effects of increasing the length of a lever. They recognise and state the purpose of a variety of scientific and technological developments in their everyday lives, for example the benefits of some electromagnetic waves. **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	Pupils use knowledge and understanding of concepts in physics such as energy, forces and electromagnetism to describe similarities and differences, for example between magnets and electromagnets using a range of scientific terminology. They use more detailed scientific ideas with evidence they have collected to give explanations of their observations, linking cause and effect, for example the magnetic field strength due to a current carrying wire varies with distance from the wire. Pupils can draw on abstract ideas such as 'turning forces' and explain processes and phenomena, in more than one step or using a model for example turning on a circuit activates an electromagnet which can attract ferrous materials. Pupils recognise that both evidence and creative thinking contribute to the development of scientific ideas, such as modelling waves. They describe applications and implications of science, such as the ways in which radiation can be used and controlled in the wave's topic. **Working Scientifically** Pupils decide on an appropriate approach, including using a fair test to answer a question, and select suitable equipment and information from that provided. They select and use methods that are adequate for the task. Following instructions, they take action to control obvious risks to themselves. They make a series of observations and measurements and vary one factor while keeping others the same. They record their observations, comparisons and measurements using tables and bar charts and begin to plot points to form simple graphs. They interpret data containing positive and negative numbers. They begin to relate their conclusions to	Pupils explain processes and phenomena related to energy, forces, waves and electromagnets, using abstract ideas and appropriate terminology, for example magnetic fields around a wire. They take account of a number of factors in their explanations of processes and phenomena, for example gas pressure increasing with temperature or size of container. They also use abstract ideas or models to explain the properties of different kinds of waves. They apply and use knowledge and understanding in unfamiliar contexts for example how two wires placed together carrying current may behave in a magnetic field. They describe some evidence for some accepted scientific ideas, such as the transfer of energy by light, sound or electricity, and the refraction and dispersion of light. They explain the importance of some applications and implications of science, such as the responsible use of different types of electromagnetic waves. **Working Scientifically** Pupils decide appropriate approaches to a range of tasks, including selecting sources of information and apparatus. They select and use methods to obtain data systematically. They recognise hazard symbols and make, and act on, simple suggestions to control obvious risks to themselves and others. They use line graphs to present data, interpret numerical data and draw conclusions from them. They analyse findings to draw scientific conclusions that are consistent with the evidence. They communicate these using scientific and mathematical conventions and terminology. They evaluate their working methods to make practical suggestions for improvements.

	in a scientific way what they have found out and suggest improvements in their work.	patterns in data, including graphs, and to scientific knowledge and understanding. They communicate their conclusions using appropriate scientific language. They suggest improvements in their work, giving reasons.	