Scientific skills progression in term 1

	WS1: Ask relevant questions by using different types of scientific enquiries.		WS8: Plan different types of scientific enquiries to answer questions including recognising and controlling variables where necessary.	
Topic	**Forces:**	**Electricity:**	**Forces:**	**Electricity:**
	Y3:	Y4:	Y5:	Y6:
	1.) Questioning will be **modelled**. Example questions will be given before pupils attempt this 'independently'. 2.) Pupils will ask **Scaffolded** questions. Prompts and support aids may be given to structure questioning. For example question starters could be provided. Key vocabulary to include in a question could also be provided as a prompt. **Examples:** **To investigate the effects of friction.** What does the surface look like? What does the surface feel like? How would we describe the texture? What effect is the surface having on the movement of the car? **To investigate the strength of magnets.**	**Constructing a simple circuit** Scaffolded questions relevant to the set-up of a simple circuit (batteries, wires, and bulbs). E.g. Can you make the bulb light up? Does it matter which way round the bulbs, wires, batteries are? Can you explain what is happening?	**Friction Experiment** **Surface area of weighted object against carpet** Independently generated questions from pupils using different materials as the stimulus – eg, plastic wallet, sandpaper, white board. Plan experiment with newton metre to measure the force required to drag based on friction.	**Comparing electrical circuits** Independently generated questions based on a range of different circuits – thinking about the purpose of the circuit, the components, the order in which the circuits have been set up. Children plan an experiment to test the independently generated questions. Children need to start using questioning to challenge their trust in what is presented to them and explore alternative perspectives.

	How can we tell which magnet is the strongest? **To identify <u>magnetic</u> and <u>non-magnetic</u> material.** How can we tell what is magnetic and what isn't? Why was this material attracted to the magnet? Why wasn't this material attracted to the magnet? How would we describe this material? What makes this material different to others?			
	WS2: Be able to discuss enquiries and complete fair tests.		WS9: Be able to plan an experiment, discuss the method and independently carry out the investigation.	
	Y3:	Y4:	Y5:	Y6:
	Scaffolded and supported investigation. Investigation planned as a class with teacher modelling. Support aids provided to help the planning process. Pupils can select from given options. Pupils shown how to keep the test fair. For example	**Conductors and Insulators experiment** Children should understand what makes a fair test and apply this knowledge to the experiment. E.g. making sure the set-up of the circuit stays the same for each material tested. Will changing the set-up impact the results?	**Air Resistance Parachute Experiment** Children to discuss the experiment with links to why people use parachutes. Children will then think about materials and impacting factors on materials when designing and creating the best parachute to measure air resistance. E.g. exploring the weight of materials before deciding on which to use for their parachute.	**Recognising symbols** Use knowledge of symbols and circuits to design investigations through detailed labelled scientific diagrams. E.g. Children show understanding of electricity and circuits by independently planning and carrying out an entire investigation. Starting with hypothesis, method, summary, investigation and then results presented in a number of ways, finished with a scientific evaluation.

	To investigate the strength of magnets. Children to explore the strength of different magnets and draw conclusions based on their findings. Plan as a class.			
	WS3: Make careful observations and take accurate measurements using standard units.		WS10: Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs	
	Y3:	Y4:	Y5:	Y6:
	To investigate the effects of friction. Children use rulers/metre sticks to measure the distance the car travels based on each surface. E.g. 10cm on surface one and 36cm on surface two. **To identify magnetic and non-magnetic material.** Pupils to observe carefully what the effect of putting different materials next to a magnet is. Pupils have an option of a structured support aid for recording observations. This is modelled by the teacher.	**Lighting a lamp in a circuit** Children to explore and observe how changing a simple circuit could impact whether the lamp turns on or not. E.g. Children to carry out experiment using simple circuits, and record findings using labelled diagrams in books with a sentence explaining what they have done in each diagram.	**Friction Experiment** **Surface area of weighted object against carpet** Children use a newton metre to accurately measure the amount of force required to pull the weighted object along the floor. Completing the same test three times, recording results on a chart, and then working out average. E.g. Children can decide which chart would be best, complete chart, draw and label a diagram of the investigation, and then write a conclusion using scientific vocabulary.	**Brightness of bulb and loudness of buzzer experiment** Children to carry out experiment and show results through a range of methods. E.g. scientific detailed diagrams explaining the process, tables to record data and predictions and experiment is being carried out, several graphs to show comparative data side by side, and evaluations of results.

	To investigate the strength of magnets. Pupils to observe carefully how many paper clips each magnet can pick up.			
	WS4: Gathering, recording, and presenting data in a variety of ways		WS11: Be able to decide how to record and present their data.	
	Y3:	Y4:	Y5:	Y6:
	Children to complete experiment and record data in tables. Children to record amount of paper clips held in a **results table**.	**Conductors and Insulators experiment** Once experiment has been completed, children can present their findings in several ways. E.g. simple representations such as a simple table showing results and a simple labelled diagram showing the method.	**Investigating pulleys experiment** Children use appropriate methods of recording and presenting data. Teacher to guide discussion. E.g. Children can input their ideas, class discussion to discuss the procs and cons of ideas given. Children to decide on best method together. For example, a chart to record data, and a line graph to represent data. Children can then evaluate data and explain why they have chosen presentation methods.	**Encourage across all experiments** By year 6, children should have a good understanding of how to present results. E.g. encourage children to think about the best ways to present data that is appropriate to their investigations being carried out. Children should be encouraged to have discussions based on previous experiments and decide which would be best to record data for the experiment being carried out. Teacher should begin to encourage children to question if there are better ways to present data and explore why.
	WS5: Record findings using written methods such as diagrams, graphs and charts and oral methods using scientific language		WS12: Using test results to make predictions to set up further comparative and fair tests	
	Y3:	Y4:	Y5:	Y6:
	Pupils are given a chance to discuss their findings orally with both a partner and with the class.	**Conductors and Insulators experiment** Children to be encouraged to start talking through the method	**Investigating levers experiment** Use the findings from a previous experiment to plan and carry out a new experiment.	**Brightness of bulb and loudness of buzzer experiment** Potentially split into two lessons depending on timing. Children can interpedently design loudness of buzzer experiment based on

	Pupils to write scaffolded conclusions. Support aids, such as writing templates, can be given where appropriate. Children to record data in tables and bar charts where appropriate for the data collected.	and their findings. Perhaps as a group presentation. E.g. Once children have completed the experiment and recorded their data, they could create a poster to present their findings and talk through everything they did and found out.	E.g. children can use the findings and method from the pulleys experiment to set up a new experiment to test levers. Children can then demonstrate their decisions and findings in their investigation summary and evaluation comments.	experience from brightness of bulb experiment. E.g. use initial table results from first experiment when making predictions and setting up a fair test for buzzer experiment. For this to meet requirements, this should be child led. Teacher should encourage children to question their decisions based on scientific evidence throughout.
	WS6: Use results to draw simple conclusions, make predictions, suggest improvements, and ask further questions.		WS13: Reporting and presenting findings from enquiries, including conclusions, causal relationships, and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations	
	Y3:	Y4:	Y5:	Y6:
	Example lesson: to investigate the strength of magnets. Children to use learning from previous lesson on **identifying magnetic and non-magnetic material** to make predictions. Pupils give conclusions after completing an investigation. This will be supported by an adult.	**Conductors and Insulators experiment** Children to use knowledge of conductors and insulators to make predictions before experiment takes place and record predictions in results table. E.g. table to have a column for predictions next to each conductor and insulator. Children to write a definition of each in their books, and then make a prediction for each material. Questions could then be presented to the class with regards to using certain materials for electrical items.	**Exploring gears experiment** Children to explore several ways of presenting findings. Findings to explored and questioned using scientific understanding and trust from previous experiments. E.g. Children could complete experiment, present findings in a number of practiced ways, write a detailed evaluation that includes questioning of results, and a detailed labelled diagram. This could then be presented to the class as either individual work or group work.	**Implement across every experiment** The children should be doing this across every experiment and encouraged to do so as independently as possible. This would be the perfect time for teachers to encourage children to be thinking about their scientific vocabulary. The key to achieving this requirement would be children questioning every aspect of a scientific investigation in terms of finding results. They should be pulling ideas and concepts from previous science lessons when creating hypothesis and predictions and following these lines of inquiry throughout the process of each experiment. The teacher should act as a supportive guide – as a this point – children should be thinking scientifically and as independently as possible.

	WS7: Use straightforward scientific evidence to answer questions or to support their answers		WS14: Identifying scientific evidence that has been used to support or refute ideas or arguments	
	Y3:	Y4:	Y5:	Y6:
	Towards end of module and as part of summative assessment Teacher to pose questions from experiments that children can answer based on their findings. E.g. Which magnet was able to hold the most paper clips? Which pole will be attracted to a north pole of a magnet? Which surface had the most amount of friction? Which surface had the least?	**Teacher to model throughout entire module** Children encouraged to think about how they can answer questions based on their scientific findings. E.g. What would be the best material to protect from electricity? How do you know this?	**Implement across every experiment** Children to refer to their findings in their evaluations and can refute/conclude based on their predictions and methods – this is a skill that will become more independent as the module progresses. E.g. Children to discuss what they may have done differently when carrying out experiment, if they think their results are reliable, is their prediction is relevant to their findings.	**Implement across every experiment** The children should be doing this across every experiment and encouraged to do so as independently as possible. This would be the perfect time for teachers to encourage children to be thinking about their scientific vocabulary. The key to achieving this requirement would be children questioning every aspect of a scientific investigation in terms of finding results. They should be pulling ideas and concepts from previous science lessons when creating hypothesis and predictions and following these lines of inquiry throughout the process of each experiment. The teacher should act as a supportive guide – as a this point – children should be thinking scientifically and as independently as possible.