'An ambitious curriculum that meets the needs of all'

Medium Term Planning - Topic: Speed and Gravity

Curriculum Intent	
Skills/National Curriculum Links	**In addition to working further on objectives from Year __, pupils will be taught, following National Curriculum guidelines, the following this topic:** - non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity. - speed and the quantitative relationship between 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.
Spiritual, moral, social, and cultural development	**SMSC:** Safe working and using the forces model. The importance of energy in real life. Students will reflect on their experiences and apply their understanding to a range of issues. Students will be encouraged to be reflective about their own beliefs and those of others and compare different people's faiths, feelings and values in order to develop their own perspective on life. Students will explore how Science influences the next stage of their education and/or employment. **PSHE/British Values:** learn about everyday uses of forces **Skills Builder:** Listening (Receiving, retaining and processing info), Speaking (The oral transmission of info and ideas), Problem solving (Find a solution to a situation or challenge), Creativity (imagination and generation of new ideas), Staying positive (The ability to use tactics and strategies to overcome setbacks), aiming high (Set clear and tangible goals), Leadership and teamwork
Numeracy	drawing and interpreting graphs, using a formula.
Literacy	**Vocabulary Tier 2:** prediction, categorise, complex, unfamiliar, illustrate, calculate, appropriate, stationary, equipment, justifying, variation, **Vocabulary Tier 3:** Force, contact force, non-contact force, newtonmeter, interaction pair, gravity, equilibrium, resultant force, motion, speed, relative motion, accuracy, precision, distance-time graph, mass, weight, obits, **Reading** Following a written method and read risk assessments. Students may be directed to the textbook; this could be in lesson or at home on Kerboodle. **Writing:** Describing and explaining scientific phenomenon, free response writing for describing precautions taken, use of word mat to promote sentence formation. **Oracy:** inclusion of BEST resources which are research evidence on common misunderstandings in science, effective diagnostic questioning and formative assessment, constructivist approaches to building understanding, and effective sequencing of key concepts that promote metacognitive talk and dialogue.
Becoming future ready	**Careers/Employability:** - *Engineer* - *Mechanic* - *Race car driver* - *Astronaut*
Adaptation	Throughout this topic, quality first teaching will provide differentiation:

QFT/SEND Provision	**By product:** Linear assessments and differentiated practical work. **By resource:** Lessons are differentiated per class and students, worksheets are coloured blue if support and assessments are linear. **By Intervention**: by providing different levels of supervision and support **By Progressive Questioning:** exploring pupils' understanding through interactive dialogue. **By Grouping:** according to prior attainment, gender, social preference, preferred learning style. **By Task:** Pupils should be involved in the identification of targets which are meaningful to them and in the selection of an appropriate task from the given range. **By Offering Optional Activities:** In class or as homework, to extend learning. This QFT/SEND provision will be explicit within the lesson-by-lesson schemes of work.
Implementation Curriculum Delivery **Learning Outcomes (Core Knowledge)**	To be able to: *Know* *- Describe what forces do.* *- Identify a 'contact force', 'non-contact force', and 'newton'.* *- Use a newtonmeter to make predictions about sizes of forces.* *Apply* *- Categorise everyday forces as 'contact' and 'non-contact' forces.* *- Identify interaction pairs in a simple situation.* *- Interpret force diagrams used to illustrate problems involving gravity.* *- Describe what 'interaction pair' means.* *- Make predictions about forces in familiar situations.* *Extend* *- Identify interaction pairs in complex situations.* *- Explain the link between non-contact forces, contact forces, and interaction pairs.* *- Make predictions about pairs of forces acting in unfamiliar situations.* *Know* *- Identify familiar situations of balanced and unbalanced forces.* *- Recognise equilibrium.* *- Identify a resultant force.* *- Identify when the speed or direction of motion of an object changes.* *- Present observations in a table with help.* *Apply* *- Draw a force diagram for a problem involving gravity.* *- Describe the difference between balanced and unbalanced forces.* *- Describe situations that are in equilibrium.* *- Calculate resultant forces.* *- Explain why the speed or direction of motion of objects can change.* *- Present observations in a table including force arrow drawings.* *Extend* *- Explain the difference between balanced and unbalanced forces.* *- Describe a range of situations that are in equilibrium.* *- Describe the link between the resultant force and the motion of an object.* *- Explain why the speed or direction of motion of objects can change using force arrows.* *- Predict and present changes in observations for unfamiliar situations.* *Know* *- State the equation for speed and use it to calculate speed, with support.* *- Recognise relative motion.* *- Use appropriate techniques and equipment to measure times and distances.* *Apply* *- Calculate speed using the speed equation.* *- Describe relative motion.* *- Choose equipment to make appropriate measurements for time and distance to calculate speed.* *Extend* *- Use the speed equation to explain unfamiliar situations.* *- Describe and explain how a moving object appears to a stationary observer and to a moving observer.* *- Choose equipment to obtain data for speed calculations, justifying their choice based on accuracy and precision.* *Know* *- Describe simply what a distance–time graph shows.* *- Use a distance–time graph to describe a journey qualitatively.* *- Present data given on a distance–time graph, with support.* *- Calculate speed from a distance–time graph, with support.* *Apply*

	- Interpret distance–time graphs. *- Calculate speed from a distance–time graph and convert between units.* *- Plot data on a distance–time graph accurately.* *Extend* *- Draw distance–time graphs for a range of journeys.* *- Analyse journeys using distance–time graphs.* *- Manipulate data appropriately to present in a distance–time graph.*
	Know *- Describe the difference between mass and weight.* *- Describe simply how gravity varies with mass and distance.* *- State the force that holds planets and moons in orbit around larger bodies.* *- State g on the Earth and the moon.* *- Use the formula weight = mass × g, with support.* *Apply* *- Describe how gravity due to an object changes if the mass or the distance from the object changes.* *- Use a formula (weight = mass × g) to work out your weight on different planets, and compare it to your weight on Earth.* *- Explain why your weight changes in unfamiliar circumstances.* *Extend* *- Compare and contrast gravity with other forces.* *- Explain how the effect of gravity changes moving away from Earth, and in keeping objects in orbit.* *- Analyse data about orbits in terms of the variation of gravity with mass and distance.* *- Present results in a table, ensuring they are reliable.*
Current learning to be developed in the future within:	***Before**: In KS2 you will have explained that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. You will have also identified the effects of air resistance, water resistance and friction, that act between moving surfaces* ***Future:** At GCSE you will learn that speed and gravity are forces. The speed of a moving object is rarely constant. When people walk, run or travel in a car their speed is constantly changing. Weight is the force acting on an object due to gravity.*
Assessment	Refer to assessment maps for formative and summative assessment opportunities.
Impact	Attainment and Progress – Refer to assessment results / data review documentation.