Broadway Junior School

Subject: Science Topic: Magnets and Forces Year: 3 Term: Autumn 2

NC Purpose of Study
A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Intent	Implementation	Impact
At Broadway Junior School we believe that a high quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational 'Big Ideas', pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. Science in our school is about developing children's ideas and ways of working that enable them to make sense of the world in which they live through investigation, as well as using and applying process skills. The staff here ensure that all children are exposed to high quality teaching and learning experiences, which allow children to explore their outdoor environment and locality, thus developing their scientific enquiry and investigative skills. They are immersed in scientific vocabulary, which aids children's knowledge and understanding not only of the topic they are studying, but of the world around them. We intend to provide all children regardless of ethnic origin, gender, class, aptitude or disability, with a broad and balanced science curriculum.	Teachers create a positive attitude to science learning within their classrooms and reinforce an expectation that all children are capable of achieving high standards in science. Our whole school approach to the teaching and learning of science involves the following Science will be taught in planned and arranged blocks by the class teacher, to have a subject specific approach. This is a strategy to enable the achievement of a greater depth of knowledge. Through our planning, we involve problem solving opportunities that allow children to find out for themselves. Children are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom. Planning involves teachers creating engaging lessons, often involving high-quality resources to aid understanding of conceptual knowledge. Teachers use precise questioning in class to test conceptual knowledge and skills, and assess children regularly to identify those children with gaps in learning, so that all children keep up. Teachers build upon the learning and skill development of the previous years. As the children's knowledge and understanding increases, and they become more proficient in selecting, using scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to come to conclusions based on real evidence. Working Scientifically skills are embedded into lessons to ensure these skills are being developed throughout the children's school career and new vocabulary and challenging concepts are introduced through direct teaching. This is developed through the years, in-keeping with the topics.	The impact and measure of this is to ensure children not only acquire the appropriate age related knowledge linked to the science curriculum, but also skills which equip them to progress from their starting points, and within their everyday lives. All children will have: • A wider variety of skills linked to both scientific knowledge and understanding, and scientific enquiry/investigative skills • A richer vocabulary which will enable to articulate their understanding of taught concepts • High aspirations, which will see them through to further study, work and a successful adult life.

Key Vocabulary
Force Push Pull Friction Magnetic force Magnet Magnetic Non-magnetic Attract Repel Pole North pole South pole Surface Contact force Distance Material Metal Fair test Variable Observation Measure Compare

Knowledge	Skills
• Know that a force is a push or a pull. • Understand that forces can make objects move, stop, and speed up, slow down or change direction. • Know that friction is a force that acts between two surfaces and affects movement. • Recognise that magnets produce a force that acts without direct contact. • Identify magnetic and non-magnetic materials through investigation. • Know that magnets have two poles: north and south. • Understand that opposite poles attract and like poles repel. • Recognise that the strength of a magnetic force decreases as distance increases. • Use scientific vocabulary to explain observations and results.	• Observe and compare how objects move on different surfaces. • Carry out fair tests to investigate friction and magnetic forces. • Predict which materials will be magnetic. • Classify materials as magnetic or non-magnetic. • Record observations using tables and simple diagrams. • Measure distances during investigations where appropriate. • Identify patterns in results and draw simple conclusions. • Use evidence to answer scientific questions. • Communicate findings using appropriate scientific language.

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Enrichment Opportunities
Magnet treasure hunt around the classroom or school. Design and build a magnetic fishing game. Explore magnets used in everyday objects (doors, bags, speakers, toys). Outdoor investigation exploring friction on different playground surfaces

Learning Objectives/End Points
By the end of the unit, pupils will be able to: • Explain that forces are pushes and pulls. • Describe how friction affects movement. • Identify magnetic and non-magnetic materials. • Explain that magnets attract some materials but not others. • Describe how magnets attract and repel depending on their poles. • Carry out simple comparative and fair tests involving forces and magnets. • Record, interpret and explain scientific findings using appropriate vocabulary.

Key Questions/Learning Objectives/End Points				
What are magnetic forces?	How do magnetic forces work through different materials?	How does changing the surface affect how well a magnet can move?	Do magnet poles attract or repel?	Which is the strongest magnet? TAPs Focussed Assessment - Magnet Strength
Introduce magnets and explore that magnets exert a force without touching. Investigate which materials are attracted to magnets. Test a range of classroom materials using a magnet and a paper clip to identify magnetic and non-magnetic materials. Record results in a simple table.	Explore whether magnetic force can pass through different materials such as paper, card, plastic and fabric. Investigate whether a magnet can attract a paper clip through different materials and discuss which materials affect the magnetic force.	Introduce friction and investigate how different surfaces affect the movement of a magnet. Compare how easily a magnet moves across surfaces such as wood, carpet, fabric and sandpaper.	Explore magnetic poles and discover that like poles repel and opposite poles attract. Investigate attraction and repulsion using pairs of bar magnets and record findings using diagrams.	TAPS focussed assessment. Pupils carry out a full TAPS comparative/fair test by planning, predicting, investigating and evaluating a question about magnets. They will select appropriate equipment, identify variables, record results in tables, identify patterns and draw conclusions using scientific vocabulary. Possible enquiry questions include: Which magnet is the strongest? Compare bar, horseshoe, ring and disc magnets by testing how many paper clips each can attract or the maximum distance from which they can attract a paper clip.

Substantive Knowledge
• A force is a push or a pull that can make an object move, stop, speed up, slow down or change direction. • Some forces require contact between two objects, such as friction. • Magnetic force is a non-contact force that can act over a distance. • Not all materials are magnetic; some materials are attracted to magnets while others are not. • Magnets attract materials containing iron, nickel and cobalt (at Year 3, pupils should recognise common magnetic materials such as iron and steel). • Magnets have two poles: a north pole and a south pole. • Like poles repel each other and opposite poles attract.

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Careers	
Linking Curriculum Learning to Careers Discuss how the skills developed in this unit are used in a range of careers, including: • Scientist • Engineer • Mechanical engineer • Electrical engineer • Civil engineer • Design engineer • Product designer • Architect • Technician • Laboratory technician • Electrician • Electronics engineer • Robotics engineer • Manufacturing worker • Materials scientist • Physicist • Construction worker • Vehicle designer • Vehicle engineer • Toy designer • Inventor • Technology developer • Research scientist Transferable skills such as Curiosity Observation Investigation Problem solving Teamwork Communication Research Organisation Attention to detail Classification Data handling Critical thinking Decision making Creativity Resilience Responsibility Confidence	**Learning from Career and Labour Market Information** • Children will explore a range of careers linked to science, engineering, technology, manufacturing and design. They will begin to understand how different jobs use knowledge of forces and materials. **Addressing the Needs of Each Pupil** • Children will explore a variety of careers and be encouraged to consider their own interests and strengths, particularly in practical problem solving, investigating, designing and building. **Linking Curriculum Learning to Careers** Children will make direct links between their learning about forces and magnets and careers such as engineer, scientist, designer, electrician, technician and product developer. **Encounters with Employers and Employees** • Where possible, children can hear from people who work in science, engineering, construction, manufacturing or technology through visitors, videos, interviews or virtual encounters. **Experiences of Workplaces** • Children can explore workplaces where forces and magnets are important, such as factories, engineering companies, construction sites, laboratories and technology businesses.