
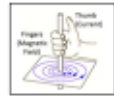
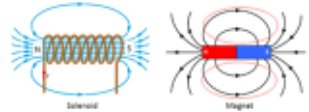
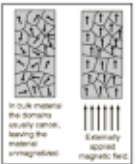

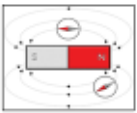
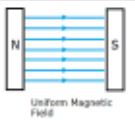
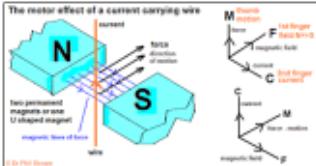
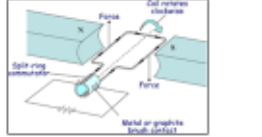


Topic: KS4: Magnetism & the Motor Effect				Duration: 5 Lessons	Composite: Unit test
Key vocabulary:	Core knowledge Components Powerful knowledge components crucial to commit to long term memory (IN RED BOX)				Links to previous and future topics
Pole Magnetic Field Force Permanent Induced Domain Earth Current Uniform Magnetic flux density Tesla Solenoid Motor	<p>KS4 MAGNETISM & MOTOR EFFECT KNOWLEDGE ORGANISER</p> <p>POWERFUL KNOWLEDGE</p> <ul style="list-style-type: none"> Magnets have a North pole and South pole. Like poles repel; opposite poles attract. Iron, nickel, cobalt and steel are magnetic materials. Magnetic materials feel a force in the region around a magnet called a magnetic field. Magnetic field lines show the pattern and direction of the magnetic field. <p>Permanent magnets: always magnetic; always have poles. Uses – speakers, compasses and electric generators.</p>	<p>Earth's Core:-</p> <ul style="list-style-type: none"> Magnetic – creates large magnetic field around Earth We know this because a freely suspended magnetic compass will align itself with the Earth's field lines & point North A compass is effectively a suspended Bar Magnet, with its own North pole lining up with Earth's North pole:- <ul style="list-style-type: none"> This cannot be right - like poles repel So in fact, Earth's magnetic pole in the north is a magnetic South Pole and the geographic south pole is close to the magnetic North Pole 	<p>The magnetic field lines around a straight current-carrying wire:-</p> <ul style="list-style-type: none"> Current produces a magnetic field around a wire The direction is dictated by the "right hand rule" Plotting compasses on a piece of paper through which a wire is pierced shows this Current direction is perpendicular to the magnetic field direction Magnetic field strength depends on current size; Greater current, stronger magnetic field 	<p>The magnetic field lines around a coil of wire (also called a solenoid):-</p> <ul style="list-style-type: none"> Magnetic Field Shape is similar to a bar magnet Coiling the wire causes the field to align and form a giant single, almost uniform field along the centre of the Solenoid. Having an iron core in the centre increases its strength as it is easier for magnetic field lines to pass through than air The fields from individual coils cancel inside to produce a weaker field outside the solenoid Factors that affect strength of field: Size of current; Length; Cross sectional area; Number of turns (coils); Using a soft iron core 	<p>Y7: Electricity</p> <p>Y8: Magnetism</p> <p>KS4: Conservation of Energy; Forces & their Effects; Electromagnetism</p> <p>KS5: Magnetic Fields; Electric Fields</p>
<p>Induced magnets:-</p> <ul style="list-style-type: none"> 'magnetic' but no fixed poles Induced = temporary magnetism 'made to happen' Made by stroking with a permanent magnet which aligns domains in the same direction After time, or a knock, domains move into random positions so magnetism lost. 	<p>Magnetic Fields</p> <ul style="list-style-type: none"> Magnets create magnetic fields. Field Lines point North to South at any point. Field strength decreases with distance from the magnet They fill the space around a magnet where the magnetic forces work, and where they can attract or repel magnetic materials. We can detect them using iron filings. The tiny pieces of iron line up in a magnetic field. 	<p>Plotting Magnetic Field Lines for a Bar Magnet</p> <ul style="list-style-type: none"> Magnetic fields can be mapped out using small plotting compasses: Place the plotting compass near the magnet on a piece of paper. Mark the direction the compass needle points. Move the plotting compass to many different positions in the magnetic field, marking the needle direction each time. Join the points to show the field lines. 	<p>Uniform Magnetic Field:-</p> <ul style="list-style-type: none"> Between 2 magnets that interact Closer lines = stronger field Uniform = field is same strength at any point as lines have the same distance between them 	<p>A wire carrying a current creates a magnetic field.</p> <ul style="list-style-type: none"> This can interact with another magnetic field, causing a force that pushes the wire at right angles. This is called the motor effect. Force = magnetic flux density x current x length ($F = B \times I \times l$) (Newtons, N) (Tesla, T) (Amps, A) (metres, m) 	<p>The motor effect of a current carrying wire</p>  <p>Two permanent magnets or one U shaped magnet Magnetic force on wire Wire Current Magnetic field Force Magnetic field</p>  <p>Two permanent magnets or one U shaped magnet Magnetic force on wire Wire Current Magnetic field Force Magnetic field</p>
Impressive reading	Impressive speaking	Impressive writing	Resilience	Employability via:	
https://www.nhs.uk/conditions/mri-scan/ https://newcastleclinic.co.uk/honouring-inventor-mri-scanner/	Explain how an MRI scan works	Explain how an MRI scan works	Construction of magnetic field diagrams	Medical imaging/ Radiographer in hospitals (MRI), Electrical Power Technician, Geomagnetist, Chemical Physicist, Robotics Engineer, Magnet Engineer	
CULTURAL CAPITAL: Peter Mansfield (who couldn't do Science allegedly!), the MRI scanner and a Nobel Prize.					

SEND

- Opportunities for retrieval practice and building on prior knowledge – Knowledge Recall Starter slide each lesson
- Multi-sensory approach using video, watching teacher demonstrations/modelling, tactile activities, practical work, team/paired work
- Additional curriculum time allocated to after school revision sessions.
- MRI/Peter Mansfield case study chosen to support cultural capital at KS4/KS5
- MRI/Peter Mansfield case study chosen as relatable
- MRI/Peter Mansfield case study chosen that are life skills or work-related to support the pathway into adulthood
- Repetition of key vocabulary in every lesson
- Curriculum time allocated for the explicit teaching of key vocabulary
- Skills ordered logically and sequenced with an increase in complexity
- Links to prior learning explicitly highlighted to support non-verbal reasoning
- Texts used/alternative texts available with a consideration to reading age
- Activities are scaffolded with over-learning of previous content to encourage independence