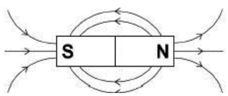
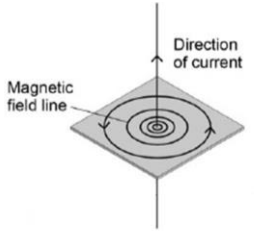
Meden School Curriculum Planning							
Subject	Physics	**Year Group**	10	**Sequence No.**		**Topic**	Energy Resources and magnetism

Retrieval	Core Knowledge	Student Thinking
What do teachers need **retrieve** from students before they start teaching **new content**?	What **specific ambitious knowledge** do teachers need teach students in this sequence of learning?	What real life examples can be applied to this sequence of learning to **development of our students thinking, encouraging them to see the inequalities around them** and 'do something about them!'
Y8 Generating electricity Know that renewable energy resources are: tidal, wave, hydroelectrity, solar, wind biomass and geothermal. Renewable energy resources can be replaced; non-renewables will run out. Non-renewables include the fossil fuels. Electricity can be generated by steam turning a turbine, which in turn turns a generator and produces electricity. **Y7 Magnets** A magnet has a north pole and a south pole. Opposite poles attract, like poles repel. You can identify a magnetic field using iron filings. A wire produces a magnetic current when a current flows through it. A piece of iron with a current carrying wire coiled around it is called an electromagnet.	**L1:** The main energy resources available for use on Earth include: **fossil fuels (coal, oil and gas), nuclear fuel, bio-fuel, wind, hydro- electricity, geothermal, the tides, the Sun and water waves**. The uses of energy resources include**: transport, electricity generation** and **heating.** Non-renewable resources will run-out one day and all damage the environment. Renewable resources are made at the same **rate** they are being used. They don't provide as much energy as non-renewable. **L2&3**: Wind power is produced by rotating blades turning a generator. They spoil the view, are noisy and do not work when there is no wind or is very windy. Solar power is generated from sunlight. There is no pollution, but do not work when cloudy or at night. Geothermal power can be used to generate electricity or heat buildings directly. Although there aren't many suitable locations and can be expensive to build. Hydro-electric power is generated by water passing through turbines. They involve the flooding of valleys but are very reliable. Wave power is produced by lots of small wave-powered turbines connected to a generator. They produce no pollution but are fairly unreliable – no wind means no waves. Tidal power is generated by the ebb and flow of tides turning turbines. There is no pollution, but they can prevent free passage of boats. Bio-fuels are created from plant products or animal dung. They are reliable but do contribute greenhouse gases to the atmosphere. **L4**: Fossil fuels stocks may **run out** within a hundred years. Fossil fuels and nuclear energy are **very reliable**. These power plants can respond quickly to changes in demand. Burning fossil fuels release **greenhouse gases** and add to the greenhouse effect. They also cause acid rain; mining coal spoils the landscape; oil spills can affect habitats. Nuclear power is clean but disposal of nuclear waste is	Europe's largest geothermal lake-loop system heating system is located at Kings mill hospital in Sutton in Ashfield. Decline of mining industry in local area, how has affected community and local economy.

Y9 Electromagnets You can increase the strength of an electromagnet by increasing the number of coils or increasing the current. Electromagnets are used in bells, scrap yards and cars	dangerous. **L5**: In the 20th century electricity use in UK **increased**, during 21st century this trend has slowly **reversed.** Most electricity is still generated using fossil fuels, although there is a shift towards more use of non-renewables. This is driven by **environmental concerns**, awareness of the **limited supply** of non-renewables and **pressure** from other countries and the public. Energy suppliers build new power plants utilizing renewables and car companies have developed electric cars. The use of renewables is limited by **reliability, money and politics**. **L6:** Magnets can produce an **attractive** or a **repulsive** force. Magnetic force is a **non-contact** force. The force between a magnet and a magnetic material is always one of attraction. **Iron, steel, cobalt** and **nickel** are examples of magnetic materials. **L7**: The region around a magnet where a force acts on another magnet or on a magnetic material is called the **magnetic field**. The strength of the magnetic field depends on the **distance** from the magnet. The field is **strongest at the poles** of the magnet. The direction of the magnetic field at any point is given by the direction of the force that would act on another north pole placed at that point. The direction of a magnetic field line is from the **north** (seeking) pole of a magnet **to the south** (seeking) pole of the magnet. You cannot see a magnetic field but it can be shown using iron filings. You can plot a magnetic field by using a plotting compass. The magnetic field around a bar magnet can be displayed like this:  **L8:** A material that always generates a magnetic field is known as a **permanent magnet**. A material that only generates a magnetic field when in the magnetic field of a permanent magnet is known as an **induced magnet**. A magnetic compass contains a small bar magnet. The Earth has a magnetic field. The compass needle points in the direction of the Earth's magnetic field. The behaviour of a magnetic compass is related to evidence that the **core of the Earth** must be **magnetic**.	Consequences of nuclear accidents at Chernobyl and Fukushima. Tesla now worlds most profitable car company. The magnetic field produced by the Earth periodic flips (approx. 100 times in a 20 million year period). Currently the location of magnetic North is moving southwards by 30 miles a year, leading some scientists to think a magnetic flip is taking place. How might this affect powerlines, telecommunications, animal locations (e.g. salmon going back to breeding rivers) and protection from sun's radiation.

L9 When a **current flows** through a conducting wire a **magnetic field** is produced around the wire. The strength of the magnetic field depends on the current through the wire and the distance from the wire. The magnetic effect of a current carrying wire can be demonstrated using a plotting compass. The direction of the magnetic field can be calculated using the **right hand thumb rule**. The magnetic field around a current carrying wire can be displayed as follows:



L10 Shaping a wire to form a **solenoid** increases the strength of the magnetic field created by a current through the wire. The magnetic field inside a solenoid is **strong and uniform**.

The magnetic field around a solenoid has a similar shape to that of a bar magnet. Adding an iron core increases the strength of the magnetic field of a solenoid. An **electromagnet** is a solenoid with an **iron core.**

L11 Electromagnets can be used in scrap yards, car ignition systems, electric bells etc..

L12 (HT only) When a conductor carrying a current is placed in a magnetic field the magnet producing the field and the conductor exert a **force** on each other. This is called the **motor effect**.

Fleming's left-hand rule represents the relative orientation of the force, the current in the conductor and the magnetic field. The thumb represents the direction of force (motion), the first finger represents the direction of magnetic field, the second finger represents the direction of current.

The magnitude of the forces increases with strength of magnetic field and also with the size of the current.

For a conductor at right angles to a magnetic field and carrying acurrent:

force = magnetic flux density × current × length

	F = B I l *Where force, F is in Newtons, N; magnetic flux density, B is in Tesla, T; current, I is in amperes, A; length, l is in metres m* **L13 (HT only)** A coil of wire carrying a current in a magnetic field tends to **rotate**. This is the basis of an electric motor. The coil is on a spindle so rotates, a **split-ring communicator** swaps the current every half turn the keep the motor rotating in the same direction. The **direction** of the motor can by **reversed** by swapping the **polarity** of the current or swapping the poles of the magnetic field. The speed of a motor can be increased by increasing the current, adding more turns to the coil or increasing the magnetic density flux.	