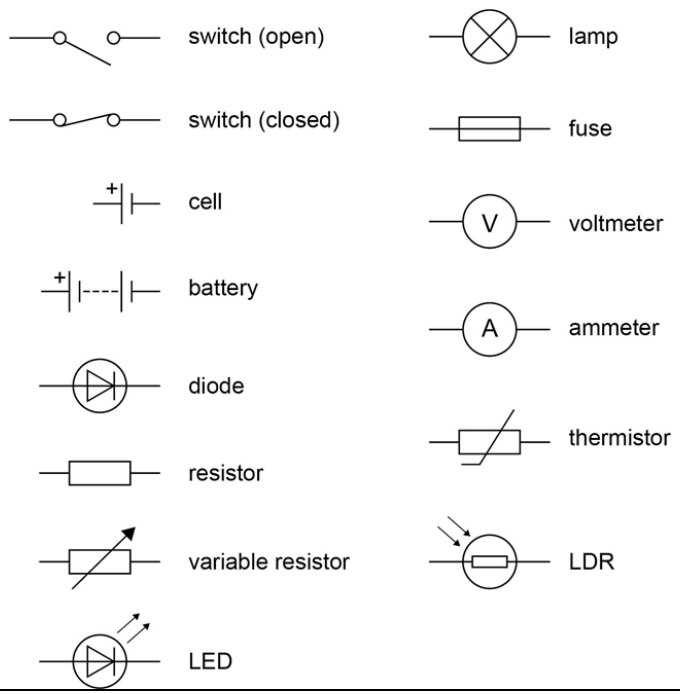
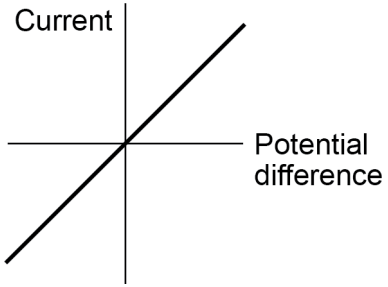
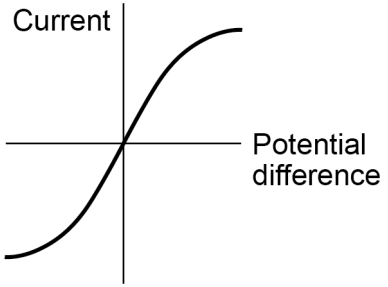
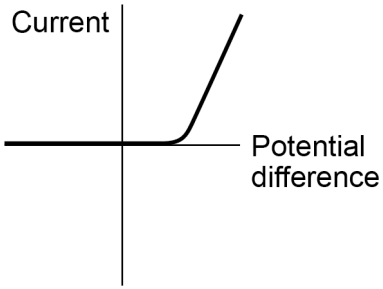
Meden School Curriculum Planning							
Subject	Physics	**Year Group**	11	**Sequence No.**	19	**Topic**	Electricity P2a & Static

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!'
KS2 Circuit diagrams and symbols. Concept of a complete circuit. More batteries = brighter bulbs. Higher voltage batteries = brighter bulbs. More bulbs in a series circuit = dimmer bulbs KS3 Y7 Simple Circuits: electricity is a flow of charge (electrons). Current is measured using an ammeter and has the units Amps. Series and parallel circuits. Y9 Electricity and Resistance. Current and Potential difference trends in series and parallel. What is resistance, Ohms Law and resistance of a wire practical. Domestic electricity and wires in a plug. **L2**: Revision from KS3 Current is measured using an ammeter which needs to be connected in series with the components. Series circuits only have one pathway for current to flow round. The current is the same	**L1:** 6.2.1.1 Standard circuit diagram symbols **Circuit diagrams** use standard symbols. Convention is power supply at the top, circuit is rectangular 	

anywhere in a series circuit. Parallel circuits have more than one pathway for current to flow through. Current divides between the branches. The sum of the current in each individual branch is the total of the current leaving the power supply. Potential difference is measured using a voltmeter, voltmeters need to be connected in parallel across a component, power supply or series of components. In a series circuit the sum of potential difference across each individual component equals the potential difference of the power supply. In a parallel circuit each branches PD adds up to the PD of the power supply.	6.2.1.1 Electrical charge and current For **electrical charge** to flow through a closed circuit the circuit must include a source of potential difference. **Electric current** is a flow of electrical charge. The size of the electric current is the rate of flow of electrical charge. **Charge flow**, current and time are linked by the equation: *charge flow = current × time or Q = I t* **charge flow, Q, in coulombs, C** current, I, in amperes, A (amp is acceptable for ampere) time, t, in seconds, s A current has the same value at any point in a single closed loop. Students should be able to recall and apply this equation. **L2**: **6.2.1.3 Current, Resistance and Potential Difference**, The **current (*I*)** through a component depends on both the **resistance (*R*)** of the component and the **potential difference (*V*)** across the component. The greater the resistance of the componentthe smaller the current for a given potential difference (pd) across the component. Current, potential difference or resistance can be calculated usingthe equation: *potential difference = current × resistance* *V = I R* potential difference, V, in volts, V current, I, in amperes, A (amp is acceptable for ampere) resistance, R in ohms, Ω Students should be able to recall and apply this equation. **L3/4**: **Required practical activity 3:** use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits involving combinations of resistors in series and parallel. **L5/6:** : **Required practical activity 3:** use circuit diagrams to set up and check appropriate circuits to investigate the effect of the length of a wire on the resistance **L7**: **6.2.1.4 Resistors**	

	Students should be able to explain that, for some resistors, the value of *R* remains constant but that in others it can change as thecurrent changes. The current through an ohmic conductor (at a constant temperature) is directly proportional to the potential differenceacross the resistor. This means that the resistance remains constant as the current changes.  The resistance of components such as lamps, diodes, thermistorsand LDRs is not constant; it changes with the current through the component. The resistance of a filament lamp increases as the temperature ofthe filament increases.  The current through a diode flows in one direction only. The diodehas a very high resistance in the reverse direction.	

	 The resistance of a **thermistor** decreases as the temperatureincreases. The applications of thermistors in circuits eg a thermostat isrequired. The resistance of an **LDR** decreases as light intensity increases. The application of LDRs in circuits eg switching lights on when it gets dark is required. Students should be able to: • explain the design and use of a circuit to measure the resistance of a component by measuring the current through, and potential difference across, the component • draw an appropriate circuit diagram using correct circuit symbols. Students should be able to use graphs to explore whether circuit elements are linear or non-linear and relate the curves produced totheir function and properties. **L8/9: Required practical activity 4:** use circuit diagrams to construct appropriate circuits to investigate the I–V characteristics of a variety of circuit elements, including a filament lamp, a diode and a resistor at constant temperature. **L10 6.2.2 Resistance in Series and Parallel Circuits** There are two ways of joining electrical components, in series andin parallel. Some circuits include both series and parallel parts. For components connected in series: • there is the same current through each component	

	• the total potential difference of the power supply is sharedbetween the components the total resistance of two components is the sum of theresistance of each component. $R_{total} = R_1 + R_2$ resistance, *R*, in ohms, Ω For components connected in parallel: • the potential difference across each component is the same • the total current through the whole circuit is the sum of thecurrents through the separate components • the total resistance of two resistors is less than the resistanceof the smallest individual resistor. Students should be able to: • use circuit diagrams to construct and check series andparallel circuits that include a variety of common circuitcomponents • describe the difference between series and parallel circuits explain qualitatively why adding resistors in series increasesthe total resistance whilst adding resistors in parallel decreases the total resistance • calculate the currents, potential differences and resistances indc series circuits • solve problems for circuits which include resistors in seriesusing the concept of equivalent resistance. explain the design and use of dc series circuits for measurement and testing purposes **L11 Static Charge** When certain insulating materials are rubbed against each other they become electrically charged. Negatively charged electrons are rubbed off one material and on to the other. The material that gains electrons becomes negatively charged. The material that loses electrons is left with an equal positive charge. When two electrically charged objects are brought close together they exert a force on each other. Two objects that carry the same type of charge repel. Two objects that carry different types of charge attract. Attraction and repulsion between two charged objects are examples of non-contact force. **L12 Electric Fields**	

	A charged object creates an electric field around itself. The electric field is strongest close to the charged object. The further away from the charged object, the weaker the field. A second charged object placed in the field experiences a force. The force gets stronger as the distance between the objects decreases. Students should be able to: • draw the electric field pattern for an isolated charged sphere • explain the concept of an electric field • explain how the concept of an electric field helps to explain the non-contact force between charged objects as well as other electrostatic phenomena such as sparking. **L13 Revision** **L14 EOTT** **L15 GPA**	