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**Knowledge Rich Curriculum Plan**

Science – Physics

Year 12

| **Science**  **Year 12 Physics** | **Unit: Electricity** |  |  |
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| **Lesson/Learning Sequence** | **Intended Knowledge:**  *Students will know that…* | **Tiered Vocabulary** | **Prior Knowledge:**  *In order to know this students, need to already know that…* |
| **Lesson:**  **Electricity Basics** | * Students will know how to use the relationship of charge = current x time to complete problems * Students will know how to use the relationship of potential difference = current x resistance to complete problems * Students will know how to use the relationship of potential difference = work done / charge to complete problems |  | * ***Students need to already know that current is the flow of charge*** * ***Students need to already know that potential difference is work done per unit charge*** * ***Students need to already know that the unit of current is amps, potential difference is volts, charge is Coulombs and resistance is ohms*** |
| **Lesson:**  **I-V Characteristics** | * Students will know that examples of semiconductors are thermistors and diodes * Students will know that in diodes resistance is very high in one direction and very low in the other. * Students will know that thermistors are components in which the resistance decreases as temperature increases |  | * ***Students need to already know that for an Ohmic Conductor resistance and current are directly proportional*** * ***Students need to already know how to draw the I-V graph for a filament lamp*** * ***Students need to already know how to draw the I-V Graph for a diode*** |
| **Lesson:**  **Resistivity** | * Students will know that resistivity is dependent on the material * Students will know that resistivity is measured in ohm metres * Students will know how to use the resistivity equation to calculate resistance, area or length * Students will know that superconductors have zero resistivity * Students will know that you can lower the resistivity of a material decreases with temperature * Students will know that resistivity decreases to – when a material is cooled down to below its critical temperature. * Students will know that without resistance there is no heat produced, meaning no energy is wasted. * Students will know that normal superconductors have a temperature of 10 K, which means a lot of money is needed. * Students will know that superconductors are used in power cables, strong magnets and electronic circuits. | Superconductor: substance with zero resistivity  Critical temperature: the temperature a substance is cooled at for it to become a superconductor | * ***Students need to already know that resistance is measured in Ohms*** * ***Students need to already know that a micrometer can be used to measure small diameters*** |
| **Required Practical 5: Determination of resistivity** | * Students will know how to practically determine the resistivity of a wire. |  |  |
| **Lesson:**  **Emf and internal resistance** | * Students will know that batteries and cells have resistance caused by electrons colliding with atoms and losing energy to other forms. * Students will know that the resistance within a battery is known as internal resistance. * Students will know that the amount of electrical energy a battery produces per coulomb of charge is called the electromotive force. * Students will know that some energy is lost due to overcoming the internal resistance, and the energy wasted per coulomb is referred to as lost volts. * Students will know how to use the emf and internal resistance equations to solve a variety of problems. |  | * ***Students need to already know cells are sources of chemical energy*** |
| **Lesson:**  **Required practical 6: investigating emf and internal resistance** | * Students will know how to investigate internal resistance and the emf of a circuit. |  |  |
| **Lesson: Conservation of Energy and Charge** | * Students will know that current is conserved going in and out of a branch * Students will know that the total emf around a series circuit is equal to the sum of the p.d.s across each component. * Students will know how to solve problems involving conservation of charge and energy within a circuit. |  | * ***Students need to already know that charge is measured in coulombs*** |
| **Lesson:**  **Potential Divider** | * Students will know that potential dividers are used to supply constant or variable potential difference from a power supply. * Students will know that potential divider circuits often include LDRs and thermistors to vary the potential difference. * Students will know how to solve potential divider problems |  |  |