SUBJECT: Physics YEAR: 10 MTP TITLE: Electricity calculations and circuits HALF TERM: 3 NO. OF LESSONS (approx): 8

Deliberate and specific retrieval of expected prior knowledge (be specific)

From KS3:

- Basic understanding of electrical components (cells, bulbs, switches, wires, ammeters and voltmeters)
- Knowledge of how to construct simple series and parallel circuits.
- Understanding of current as a flow of charge.
- Awareness that components can affect current (e.g. more bulbs = dimmer light).
- Safety awareness around electricity (e.g. don't touch live wires, importance of insulation)

Academic transformation (be specific)

Students will understand:

- Differences between current, potential difference (voltage), and resistance.
- Definition and mathematical application of efficiency
- Circuit symbols for resistors and variable resistors
- Use of key equations:
  - Charge = current × time)
  - Voltage = Current x Resistance (Ohm's Law)
- Understanding of how components behave in series and parallel:
  - Current same in series, splits in parallel.
  - Voltage splits in series, same in parallel.
- Investigating and interpreting resistance in wires, bulbs, and resistors (e.g. filament lamp vs ohmic resistor).
- Required practical: measuring resistance of wire

Personal transformation (2 or 3)

- How the concepts apply to real-world contexts:
  - Understanding why homes use parallel circuits.
  - How efficiency affects electricity bill costs.
  - Why resistors are used in everyday electronics, along with importance of fans in reducing heat build up
  - Careers in electrical engineering, renewable energy, and electronic product design.

Can I Learning Questions

Can I define key properties within the electricity topic?

Can I choose and apply the correct equations to electricity maths questions?

Can I describe the circuit rules for series and parallel?

Can I carry out a practical to determine the voltage and current of a length of wire?

Literacy and Oracy

Writing:
Explanation of current/voltage/resistance differences in various circuit setups.

Verbal Discussion:
Peer explanation of how current and voltage behave in different circuits.

Website Links for Research & Engagement:
https://phet.colorado.edu/en/simulations/circuit-construction-kit-dc

https://www.iop.org/strategy/limit-less

https://www.tomorrowsengineers.org.uk/

Misconceptions (5 or 6 examples)

- Current is used up in a circuit - Students often think current decreases as it travels around.

- Voltage is a property of the battery only- Students may not grasp that voltage is measured across components and can split.

- Resistance only comes from resistors- Overlooking that all components (even wires) have some resistance.

- Current behaves the same in series and parallel- Confusing the current flow rules for both types.

- The brightness of bulbs doesn't tell you anything about current/voltage- Students might not connect observations to data.