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**LANGDON PARK SIXTH FORM**

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| **Subject: Physics** | **Year: Y13** | **Topic: 3.7.5 Electromagnetic Induction** |

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| ***What and Why*** “How is voltage produced in a generator? How does a transformer work? Why is the voltage stepped up in the National Grid? Why is it possible to charge up an electric toothbrush without any wires?” |

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| **Key terms**  Back emf  Coil  Eddy currents | Faraday’s law  Fleming’s right hand rule  Flux linkage  Generator | Hysteresis curve  Induced emf  Laminated core  Lenz’s law | Magnetic flux density  National Grid  Tesla  Transformer |

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| **Specification point** | **Pre-reading** | **Application and Assessment (date)** | **Home learning** | **Extension – Cultural Capital and Reading** |
| **3.7.5.4:** I can define Faraday’s law and Lenz’s law. To describe the emf induced in a coil rotating in a magnetic field.  I can sketch a flux linkage and a flux density graph versus time.  **3.7.5.5:** Use an oscilloscope as a dc and ac voltmeter, to measure time intervals, frequencies, display ac waveforms and determine root-mean-squarecurrent or pd  **3.7.5.6**: I can describe the functioning and inefficiencies of a transformer and how to reduce this.  Explain transmission of electrical power at high voltage including calculations of power loss in transmission lines. | Use the Oxford AQA A2 textbook p.140 to 155. Look at other textbooks in the library for alternative ideas, explanations and diagrams.  **YouTube Videos:**  (1) [How Giant Tesla Coils Work (with ArcAttack)](https://www.youtube.com/watch?v=4m6EjnEYEEg)  (2) [Lenz's Law Demonstration - Penn Physics](https://www.youtube.com/watch?v=k2RzSs4_Ur0)  (3) [Explaining how the national grid works](https://www.youtube.com/watch?v=P0j5VeRtGKo)    **Websites:**  [**https://en.wikibooks.org/wiki/A-level\_Physics\_(Advancing\_Physics)/Generators**](https://en.wikibooks.org/wiki/A-level_Physics_(Advancing_Physics)/Generators)  [**https://courses.lumenlearning.com/physics/chapter/23-7-transformers/**](https://courses.lumenlearning.com/physics/chapter/23-7-transformers/) | **Practicals:**  (1) Required practical 11:  Investigation, using a search coil and oscilloscope, of the effect on magnetic flux linkage of varying the angle between the search coil and magnetic field direction  (2) Investigating Lenz’s law  (3) Analysing transformers  **Assessment**:  Minitest on Electromagnetic Induction (2nd week Dec)  Multiple choice test on Capacitors, Magnetic Fields and Electromagnetic Induction (1st week Jan) | (1) Use data from the transformer investigation to verify the transformer equations and calculate the efficiency of the laboratory transformer  Make notes on each topic and complete the exam style practice questions | (1) What is a 3 phase generator at  a power station and how does the  National Grid deal with power  surges at various times  (2) Visit edf energy centre. Kent  **Reading:**  The Invisible Rainbow: A History of Electricity and Life  By Arthur Firstenberg |

**Pre-assessment content review**

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| I feel secure in | I need to focus on | My action plan |

**Pre-assessment skills review**

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| I feel secure in | I need to focus on | My action plan |

**Post-assessment review**

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| Weaknesses in content knowledge | Skills I need to focus on | My action plan |
| Retest / review – teacher and student comment | | |

**Revision planning**

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| Spec point | Notes complete | Revision materials | Past paper Qs | Timed conditions |
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