

TSOKOS READING ACTIVITY

Section 11-1

1. Essential Idea: The majority of electricity generated throughout the world is generated by machines that were designed to operate using the principles of electromagnetic induction.
2. Nature Of Science:
 - a. Experimentation: In 1831 Michael Faraday, using primitive equipment, observed a minute pulse of current in one coil of wire only when the current in a second coil of wire was switched on or off but nothing while a constant current was established. Faraday's observation of these small transient currents led him to perform experiments that led to his law of electromagnetic induction.
3. Theory Of Knowledge:
 - a. Terminology used in electromagnetic field theory is extensive and can confuse people who are not directly involved.
 - b. What effect can lack of clarity in terminology have on communicating scientific concepts to the public?
4. Understandings:
 - a. Electromotive force (emf)
 - b. Magnetic flux and magnetic flux linkage
 - c. Faraday's law of induction
 - d. Lenz's law
5. Applications And Skills:
 - a. Describing the production of an induced emf by a changing magnetic flux and within a uniform magnetic field.
 - b. Solving problems involving magnetic flux, magnetic flux linkage and Faraday's law.
 - c. Explaining Lenz's law through the conservation of energy.
6. Guidance:
 - a. Quantitative treatments will be expected for straight conductors moving at right angles to magnetic fields and rectangular coils moving in and out of fields and rotating in fields.
 - b. Qualitative treatments only will be expected for fixed coils in a changing magnetic field and ac generators.
7. Data Booklet Reference:
 - a. $\phi = BA \cos \theta$
 - b. $\varepsilon = -N \frac{\Delta\phi}{\Delta t}$
 - c. $\varepsilon = Bvl$

d. $\varepsilon = Bv\ell N$

- 8. Utilization: Applications of electromagnetic induction can be found in many places including transformers, electromagnetic braking, geophones used in seismology, and metal detectors.
- 9. Aims: The simple principles of electromagnetic induction are a powerful aspect of the physicist's or technologist's armoury when designing systems that transfer energy from one form to another.
- 10. Read section 11-1, pages 435-441, in your textbook.
- 11. Write a question regarding some aspect or characteristic of each of the terms listed below, one that would be suitable for a data-based question on an exam. The questions must start with either the word "How" or "Why". Then give the answer to your question.

a. Wire moving in a magnetic field

Question: _____

Answer: _____

b. Induced EMF

Question: _____

Answer: _____

c. Motional EMF

Question: _____

Answer: _____

d. Magnetic Flux

Question: _____

Answer: _____

e. Faraday's Law

Question: _____

Answer: _____

f. Lenz's Law

Question: _____

Answer: _____

12. Answers may be typed or neatly printed. Drawings may be freehand, but try to make use of the 'Shapes' or 'Insert Clipart' functions of MS Word. Don't forget to also try the MS Equations function! If you submit this assignment electronically, the filename must be in the following format, "LastnameFirstinitialPerXReadActX-X".