

PHYSICS  
**Induction**

• **Historical Review:**

- Over 13 scientists independently discovered electromagnetism.
- \_\_\_\_\_ in USA – Lightning is Electricity
- \_\_\_\_\_ in Italy - Battery
- \_\_\_\_\_ in Denmark – Electricity produces Magnetism
- \_\_\_\_\_ in England – Generator, Motor, Transformer
- \_\_\_\_\_ in Germany – Field

• **Induction:** voltage is induced by \_\_\_\_\_ between a conductor and a magnetic field.

Examples: credit card, traffic light, tape recorder, metal detectors.

• **Two of the most important laws in Physics:**

\_\_\_\_\_ Law: An electric field is created in any region of space in which a magnetic field is changing with time.

• \_\_\_\_\_ Law: A magnetic field is created in any region of space in which an electric field is changing with time.

• **Better Generators**

Generators often \_\_\_\_\_ coils. This naturally makes AC current.

• **Nikola Tesla**

- Tesla built \_\_\_\_\_, AC \_\_\_\_\_, and \_\_\_\_\_ that are still in use today.
- The \_\_\_\_\_ is a tuned transformer. It is tuned to make best use of the *resonant frequency* of a circuit to optimize voltage.

• **Transformers**

- Two coils that are aligned cause a transfer of energy. The magnetic field induced in the first coil generates current into the second coil.

• **Self Induction:** every coil induces its own magnetic field that induces a voltage that opposes the original.

This is called a back \_\_\_\_\_ or back emf.

