On-level Physics
Magnetism

This unit will allow each student to:

a. gain a better understanding of magnetism
b. continue making proper scientific measurements and calculations
c. define and properly use all vocabulary
d. properly apply all terms and concepts in describing/explaining real world examples
e. continue making and interpreting scientific graphs
f. teach someone else the concepts discussed
g. practice proper laboratory safety

This will be accomplished by each student that is able to:

1. recognize and relate SI and USCS units of current, resistance, and voltage
2. explain how the movement of electric charge is the source of magnetism
3. list properties of magnets and magnetic poles
4. model magnetism using domains
5. describe and sketch magnetic fields
6. explain the magnetic effects produced by an electric current in a wire
7. explain how to make an electromagnet
8. explain the magnetic effects produced by an electric current in a wire
9. explain how a galvanometer works and describe two uses of a galvanometer
10. describe how electric motors use electricity and magnetism to do work
11. state Faraday's law and use it to explain the generation of electricity
12. describe how work and magnetism are used in generators to produce electricity
13. distinguish between AC and DC electricity
14. explain how transformers change the voltage of alternating current

Textbook Reference – Physics: Principles and Problems
Chapter 24 – Magnetic Fields; Chapter 25 – Electromagnetic Induction

Key Terms – *write the definitions of the boldface terms on your own paper, definitions are available at thetetersz one.net*

electromagnet, magnetic domain, magnetic field, magnetic pole, magnetism, magnet, **electric motor, electromagnetic induction,** Faraday's law**, generator, transformer,** compass

Magnetism review sheet – **Answer on a separate sheet of paper**

A. What type of field surrounds a stationary electric charge? a moving electric charge?

B. What is the cause of magnetism?

C. Where on a magnet is the magnetic field the strongest?

D. What is the rule of magnetic pole interaction?

E. Sketch and describe the structure and properties of a magnet. Include, label, and define: magnetic domains, magnetic poles, and magnetic field lines.

F. Explain how a piece of iron is temporarily magnetized when near a magnet.

G. In what way are magnetic poles very different than electric charges?

H. Explain the difference between an unmagnetized iron nail and a magnetized iron nail?

I. Why will dropping an iron magnet on a hard floor make it a weaker magnet?

J. Will either pole of a magnet attract a paper clip? Explain what is happening inside the attracted paper clip.

K. The north pole of a compass is attracted to the north pole of the Earth, yet like poles repel. Can you resolve this apparent dilemma?

L. Your friend says that when a compass is taken across the equator, it turns around and points in the opposite direction. Your other friend says this is not true, that southern-hemisphere types use the south pole of the compass to point toward the nearest pole. You're on; what do you say?

M. What happens to the direction of the magnetic field around an electric current when the direction of the current is reversed?

N. Why is the magnetic field strength greater inside a current-carrying loop of wire than about a straight section of wire?

O. Explain how an electromagnet is created. Include all necessary parts and their arrangement. Sketch a simple electromagnet.

P. What must change in order for electromagnetic induction to occur?

Q. Describe two ways that voltage can be induced in a wire?

R. Briefly describe how a simple electric motor operates.

S. Briefly describe how a simple electric generator operates.

T. What is the primary difference between an electric motor, and an electric generator?

U. Why does a generator produce alternating current?

V. Why is a generator shaft harder to rotate when it is connected to a circuit and supplying electric current?