**St. CATHERINE HIGH**

**Department of Science**

**Physics**

**Module 2**

**Grade 9**

**MAGNETISM**

Similar to the study of Electricity, Magnetism is similar in many ways that they are eventually are merged as one to be called electromagnetism which is electrical and magnetic properties. Let’s take a look at some of those properties.

We can examine a material if it has magnetic property only by using a material that is already magnetized, which is called a permanent magnet. Discover in the ancient time it has been used as healing properties and serve as a compass.

Magnets has two poles north (N) and south (S) *magnetic dipoles* similar to positive and negative electrical charges. If we hang a magnet on a string attached to a wood support, eventually the magnet will spin until it is aligned with the north thus the south. This is described as pole seeking magnet, as the magnet tries to align its self to the poles of the earth. This indicates another feature as well that the earth is itself a magnet.

*Forces between magnets*

Using the same example above, by putting another magnet close to hanging magnet, causes the swinging magnet to be attracted or repelled based on which pole is place where. Placing the north pole of a magnet in hand to the north pole of the swinging magnet causes a *force* of repulsion as like poles repel each other as compared to electrical charges. A *force* of attraction is observed when unlike poles attract each other, north to south poles. Here are some facts to be aware of.

Force of attraction acts at a distance thus all magnets are dipoles where both poles cause a force field produce by magnet. Fields go from north to south poles in direction, again similar to electric field lines. <https://www.youtube.com/watch?v=IgtIdttfGVw>

*Electromagnetic induction*

When we studied electricity we learnt of potential difference or voltage. This voltage comes from the energy and charge.$ E=QV,$ then $V=E/Q$ and $Q=I t$, I is current. This brings a relationship between voltage and current.

This principle was defined by Ohm’s law which states, *current through a metallic conductor, at constant temperature, is directly proportional to potential difference between its ends.*$ V∝I$

From his experiments, he concluded that a resistance arises as electrons give up some potential energy carried from the battery. This resistance depends on two factors of a conductor which are its dimensions and the material it is made from.

Thus the complete relation of voltage to current is,$V=IR$, where the voltage is equal to the current multiplied by resistance. THIS IS FOR SERIES CIRCUITS ONLY

During early 1800’s Oersted and Faraday conducted experiments relating magnets and coils of wire which were forms of electromagnetic induction. <https://www.youtube.com/watch?v=jeTmIa00_rc>

<https://www.youtube.com/watch?v=3HyORmBip-w&t=113s>

From the understanding of these principles we were able to develop electromagnets

<https://www.youtube.com/watch?v=oWiB_vguULY>

How they work, <https://www.youtube.com/watch?v=TTFIXmubvkQ>

*Uses of electromagnets*

<https://www.youtube.com/watch?v=aCcuOHjL_cQ>

As you can see from our study of electromagnets how important this principle converted of so many uses for our society and the development of the industrial revolution.

Please make notes from these videos and understand the principles behind the concept.

Module 2 questions for understanding are posted next.

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