**Tēnā koutou katoa**

**Ko Jonathan au** (a-hoe)

Good afternoon everyone,

As you can see I’ll be talking to you about why are magnets useful? (2 sec pause)

But, before I can answer this question, I need to tell you a bit about the project first.

**Project description**

The Electrical and Computer engineering department are developing **STEM** projects for year 8 to 10 High School students.

They intend to excite and encourage students who haven’t already gained an interest in engineering yet.

They require an electrical equivalent of the mousetrap car as shown on the slide, while using the principles of physics.

**What is a STEM Project?**

STEM stands for, science, technology, engineering, and mathematics. It also normally means combining two or more of these areas together to create a successful project.

**Project Overview**

The three questions I asked myself while designing the project were:

What,

Why, and

How

**What is this project about?**

So, what is this project about? This project is about finding out **why magnets are useful.** (2 sec pause)

**What will they learn?**

What, they will learn the basic principles of both Magnetism and Electromagnetism.

While performing experiments with magnets they will learn both how and why they work.

They will learn how and why electromagnetic induction works. And how this is applied in the real world.

**Why should they learn this?**

Why,

Well, if Electric current could be created without using a battery and with magnet’s instead, it would

help reduce the world’s chemical footprint.

Chemicals are toxic and highly flammable, making chemical manufacturing plants extremely dangerous as shown on the next slide.

This image was taken from the China Dialogue paper, the image show’s an explosion that occurred in Eastern China on the 25th of March last year.

**How will they learn this?**

They will conduct 3 experiment to determine **why magnets are useful.**

In Experiment 1, they will make a compass. This will teach them the basic principles of magnets.

In Experiment 2, they will perform Faraday’s experiment, which is similar to the one shown on the slide. This experiment will teach them about electromagnetism, electromagnetic induction, and finding the direction of current flow.

In Experiment 3, they will make a Faraday flashlight. This is a practical use case that follows from Experiment 2.

**Experiment I – Making a Compass**

In experiment 1, they will learn the principles of magnetism. The goal is to determine the direction of the magnetic field of the magnet as shown on the slide.

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This will teach them how magnets work and they will be able to use this information to make a compass.

To make this, you glue a small Neodymium magnet to a piece of cardboard and then place it on the water’s surface.

**Experiment II – Faraday’s Experiment**

In experiment 2, they will perform Faraday’s experiment which teaches them about electromagnetic induction. The goal is to determine which coloured led will turn on first when the magnet passes through the coil.e

(next slide)

They should understand why a changing magnetic field induces a current through a coil.

And will use the Right-hand curl rule to determine the direction of current flow. Thumb = magnetic field, Fingers = direction of current

**Experiment III – Faraday’s Flashlight**

In experiment 3, they will make a flashlight as shown on the slide. The goal is see who can keep their flashlight on for the longest amount of time.

Circuit converts AC voltage to DC and stores charge in 1 Farad Super Capacitor.

**Summary**

A moving magnet is useful as it induces a current through a coil. This basic principle called electromagnetic induction is used a lot in electric motors and in generators. And also, less chemicals in the world would mean a cleaner planet for the future.

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Shows mechanical energy powering the motor, which powers the generator.

Inconclusion,

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Magnetism provides us with numerous important advances.

At its simplest level you saw a compass which is vital for navigating around the world.

I also talked to you about the advantages of moving a magnet through a coil to generate electricity.

Finally, and probably most importantly, magnets are vital components to the electric motor. Electric motors are currently being refined and stand to replace the combustion motor which will have a huge impact on our carbon footprint in the future.