Australian National University

THE COMPASS: AN ADVENTURE IN TIME

Materials required:

- Compass
- Bar or horse-shoe magnets
- Rare earth magnet balls
- Bare copper wire
- PVC tube
- Magnetic field visualisation sheet
- AAA battery

Instructions:

1. Take the compass outside and find magnetic north. It will be roughly towards the sun at noon. Buildings can influence the compass as it's lining up with the earth's magnetic field which is very weak. It's also worth considering that the sun for us will be in the North at noon; so an accurate watch helps and if we were on a sailing ship this could help fix our position.

Over time the position of magnetic north has moved in relation to true north. This is due to movement in the core of the earth of the nickel-iron masses. As this movement continues the magnetic poles will eventually swap over. This has happened in the past and has been identified to contribute to our understanding of continental drift.

2. Look at the magnetic fields of the different magnets using the magnetic field visualisation sheet. The earth has a similar magnetic field that protects us from harmful solar radiation. We see displays at the North and South magnetic poles where the particles enter the atmosphere.

3. Bring the bar magnets up close to your compass. Which is stronger, your magnet or the earth's magnetic field?

4. These exercises will briefly introduce you to electromagnetism and how electric and magnetic fields interact. You have a coil of copper wire with no insulation and this is used to make a magnetic train. Wind the wire around the PVC pipe to make a coil. Carefully remove the coil and attach a ball magnet to either end of an AAA battery. Push the battery into the coil and see if you can get it to travel through the coil. It may be necessary to turn the magnets around to alter the polarity.

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