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Magnetosphere - Student Worksheet

Our Solar System's three "Goldilocks" planets, Mars, Earth and Venus are constantly being bombarded by solar winds. Radiation from the Sun contains energy and ionised particles (charged particles that are either positive or negative) that can cause death or mutation to living things.

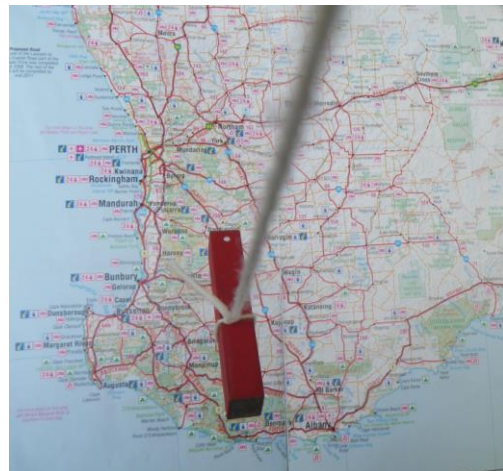
Earth has a mobile liquid nickel iron outer core which generates a magnetic field which surrounds the planet. This can deflect most of the solar winds round the planet and sends them off into space.

Mars may at one time have had a similar magnetosphere as was suggested by data from the *Mars Global Surveyor*. Although its rocks have some remnant magnetism in patches, its magnetosphere is 40 times less than Earth's.

Venus has no magnetosphere. At its surface it is hot enough to melt lead. Most magnets will de-magnetise if heated.

Magnetic Spheres and Magnets

Earth's magnetic field can be demonstrated by hanging a magnet on a piece of string. The magnet's north pole will point to Earth's Magnetic North Pole.



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This explains how a compass can be used to align a map north to south.

Our magnetic field repels the parts of cosmic radiation, which can damage life.

Data and Inference

We cannot always observe what causes a change but we can **INFER** its presence but observing the effect it has on other things.

Can we see the force of gravity? _____

Can observe the sphere of magnetism around a magnet?

Magnets and Magnetosphere

Materials per group

- Two bar magnets separately wrapped in cling wrap.
- A sheet of white A4 paper.

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- Magnetic filings (and a teaspoon if required).
- A piece of string or wool about 30cm long.

Method

1. First find out the north poles of the magnet. Some have this marked with an "N" or dot. If your magnets aren't marked, then tie the string to the magnets and let them hang loosely. And they will align north to south. Untie the string.
2. Holding a magnet in each hand about 10 cm apart, gently move the two north poles together. What did you observe and which sense did you use to make this observation?



3. Again holding the magnets in each hand about 10cm apart, approach the north pole of one with the south pole of the other. What did you observe and which sense did you use to make this observation?



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4. Place one magnet under a sheet of white A4 paper and gently sprinkle the iron filings over the paper. Draw what you observed.

What can you infer from your observations?



5. Return the filings carefully to the container. Place the two magnets as we did in step 2, only with the north poles only 3 cm apart. Put the sheet of white paper on top and sprinkle the filings on top. Draw what you observed.



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Data and Inference

Data is what you observe. Inference is working out unseen properties by analysing the data available.

Data A student runs with a bucket of water and pours it over another screaming student's head. The screaming stopped and the second student thanked them.

Inference The second student was on fire.

Using your observations, from this experiment (data) what can you infer from your observations?

If Earth is surrounded by a magnetic field, what effect will that have on incoming magnetised radiation?

