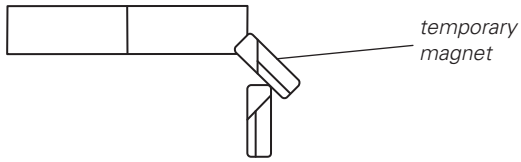
7.3 Types of magnets

- **Permanent magnets** — are able to retain their magnetism for long periods. They can be found around us as fridge magnets, bar magnets or button magnets used in games, or lodestones (natural magnets).
- **Temporary magnets** — are sometimes called **induced** magnets. They refer to magnetic materials that have been placed within a strong magnetic field and become magnets. These magnets lose their magnetism once they are removed from the magnetic field. Temporary magnets can be found in telephones, electric motors, and cranes at refuse dumps.



A paper clip that has been magnetised by a bar magnet becomes a temporary magnet that is able to attract another paper clip.

Earth's shifting magnetic field

- At present, the Earth's magnetic North is somewhere in northern Canada, but it is shifting northwards at about 40 km per year. Scientists predict that the Earth's magnetic north may reach Siberia in a few decades. *<http://science.nasa.gov/headlines/y2003/29dec_magneticfield.htm>*

- Materials that are more **easily magnetised** tend to lose their magnetism more quickly. They are referred to as '**soft**' magnetic materials. Examples include iron and alloys like Mumetal™ (a nickel—iron alloy). '**Hard**' magnetic materials, on the other hand, are much less easily magnetised, but they **retain their magnetism** for a longer time, e.g. steel.
- **The Earth** behaves like a giant magnet. Just like any magnet, it has two *magnetic* poles — North and South. These poles are not the same as the *geographic* North and South Poles that we see on world maps. The north-pole of a freely suspended bar magnet, such as that in a compass, points to the Earth's **magnetic North**, which is near to its geographic North.

7.4 Methods of making magnets

'Stroke' method

- A piece of magnetic material can be turned into a magnet if it is stroked by a magnet. As the magnet moves along the magnetic material, it causes the **magnetic dipoles** in the magnetic material to become **aligned** in one direction and give rise to a **magnetic field**.