Electromagnets

4. Magnets

CONCEPT 2

LESSON GUIDE

USING FIELDS

PRECISE LEARNING POINTS

KNOW

I know how two permanent magnets interact with each other.

APPLY

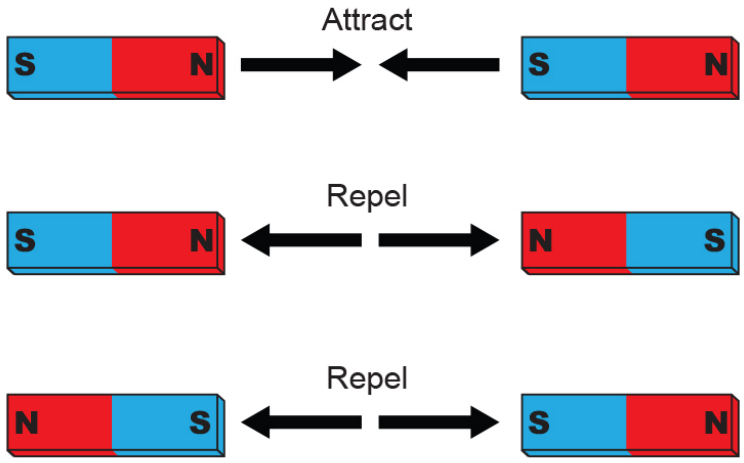
I can apply my knowledge to explain how the Earth's magnetic field interacts with other permanent magnets.

EXTEND

I can extend my knowledge to explain the magnetic field between two permanent magnets.

NOTES

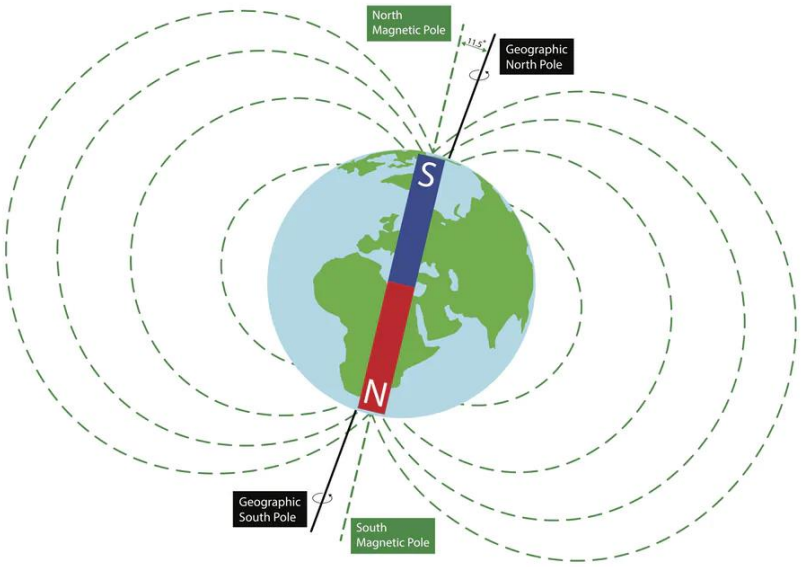
If the poles of 2 permanent magnets are brought together then they either attract (move towards each other) or repel (move away from each other). Like poles repel, opposite poles attract as shown below:



Whilst any magnetic material will be attracted to a permanent magnet, only a permanent magnet will repel another permanent magnet. This gives a neat way of testing to see if a material is just magnetic or a permanent magnet!

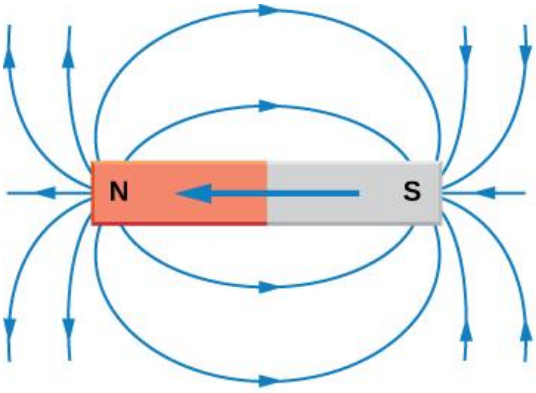
Believe it or not you are living on one enormous permanent magnet: the Earth! Our planet behaves as though there is a huge bar magnet inside it with the south pole of the magnet near the Earth's geographic North.

The Earth's Magnetic Field



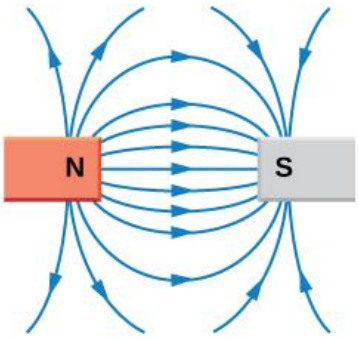
We still don't fully understand what produces the Earth's magnetic field but for centuries it has come in very useful for navigation. If you hang a permanent magnet up on a piece of cotton it will line up in a direction pointing north to south. This is because the permanent magnet aligns itself with the magnetic field of the Earth.

In the same way that we investigated the magnetic field lines for a single permanent magnet, we can use iron filings or a compass to plot the field lines when two magnets are brought together.



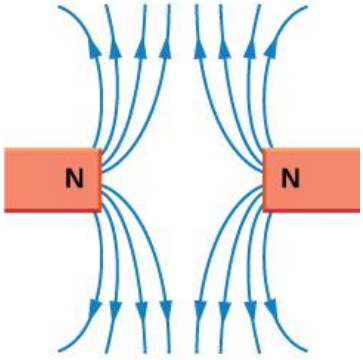
Magnetic field lines of a bar magnet

(a)



Magnetic field lines between unlike poles

(b)



Magnetic field lines between like poles

(c)

When opposite poles are brought together the field lines are close together and run from one magnet to the other North to South. This shows a strong force of attraction.

When like poles are brought together there is an absence of field lines between the magnets and the field lines of each magnet point away from each other. This shows a strong force of repulsion.