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# How to detect and draw magnetic fields

**Dr George Dransfield**: How do we detect and draw magnetic fields?

We can detect the shape of the magnetic field around a bar magnet using some iron filings.

Drawing them with a plotting compass also shows the direction of the magnetic field.

Here, you can see how a plotting compass is following a field line in real time.

And you can also see how the magnetic field is three-dimensional rather than just flat on paper.

Put your magnet down on the paper and draw around it.

Put your compass next to it near the north pole.

Make a dot where the needle's north tip points.

Slide the compass so that the south tip is on that spot.

Make a new dot where the needle is pointing now.

Repeat this process until you get back to the magnet.

Now, connect your dots.

That's one magnetic field line.

Add an arrow pointing from the north to the south pole.

Move the compass back up to the North Pole and repeat this process all around the magnet.

Now you have a very clear picture of the magnetic field, including its direction.

This also shows some important features of magnetic fields.

First, magnetic field lines never cross or even touch.

The lines are continuous, so make sure you don't have any gaps in your lines.

The lines are closest together at the poles, showing us that the magnetic field is strongest at the poles.

Finally, the direction of a magnetic field at any point shows the direction of force acting on a north pole placed at that point.

Remember, when drawing magnetic field lines around a magnet, the arrows on your lines must always point from the north pole to the south pole.