

1. A) Which part of the compass is the magnet?

The needle

B) Why does the lodestone look furry?

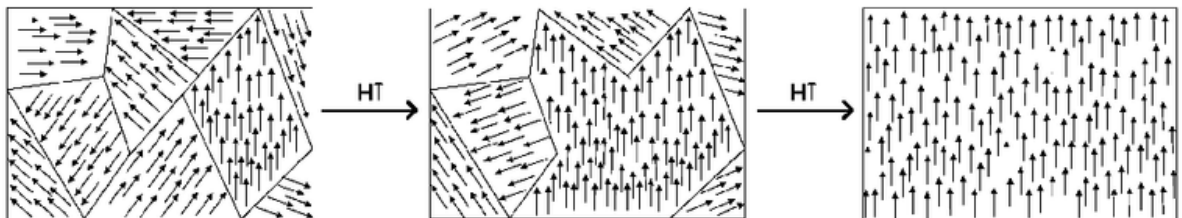
It's being attracted to iron filings.

C) What elements could be inside the ring magnet (bottom right-hand corner)



Fe, Co, Ni or Nd. These are all the ferromagnetic elements

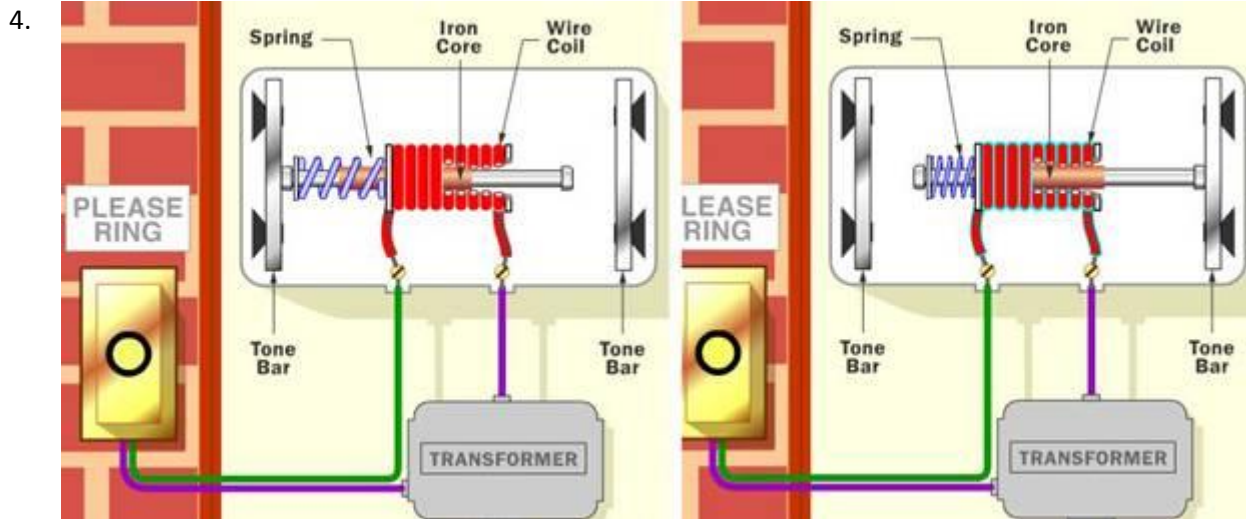
2. Explain what is happening below:



The magnetic domains are aligning themselves in a magnetic field. So this is what's happening to the groups of atoms inside a material like iron when it's stuck to a magnet.

3. What is a magnetic domain?

It's a group of atoms whose magnetic poles point in the same direction.



Explain why pushing the button makes the doorbell ring.

When electricity flows it generates magnetism. The field gets stronger when the wire makes loops(see red part above). In this case it acts like a bar magnet and suck the iron core into the coil, against the spring and then it recoils into the tone bar.

5.

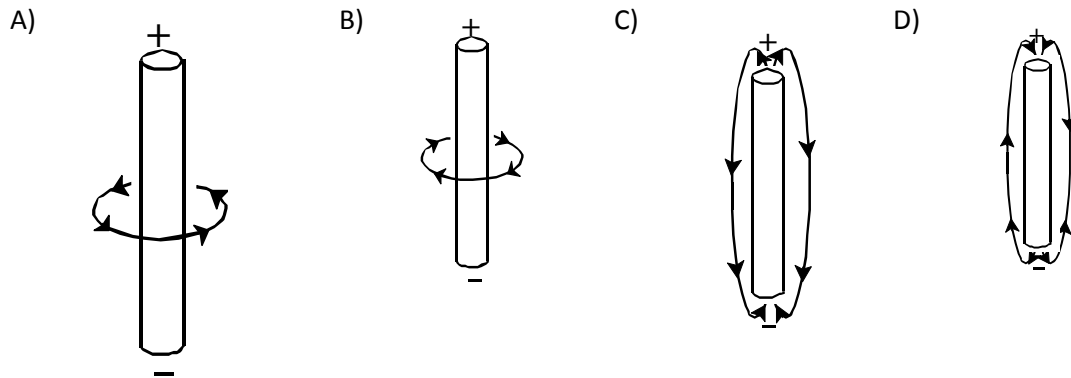
Draw the magnetic field pattern and direction around this bar magnet.



The arrows at the poles(N and S) should be pointing to the right. Remember the compass needle is the North end of a magnet. But on the sides the field points to the left.

6. An electric current flows through a *straight wire* and produces a magnetic field.

Which of the following diagrams correctly represents this magnetic field?



**Answer B** Use the left hand rule where the thumb points up because electrons flow from (-) to (+)

7. Which gear system connects toothed gears in sequence?

**Gear train**

8. Which gear system connects untoothed gears with a belt?

**Belt and pulley**

9. What is the advantage of a worm-worm gear system over a train system?

**The worm moves fast and easily: good to connect to a motor. The circular worm gear moves slowly but it has a lot of turning force.**