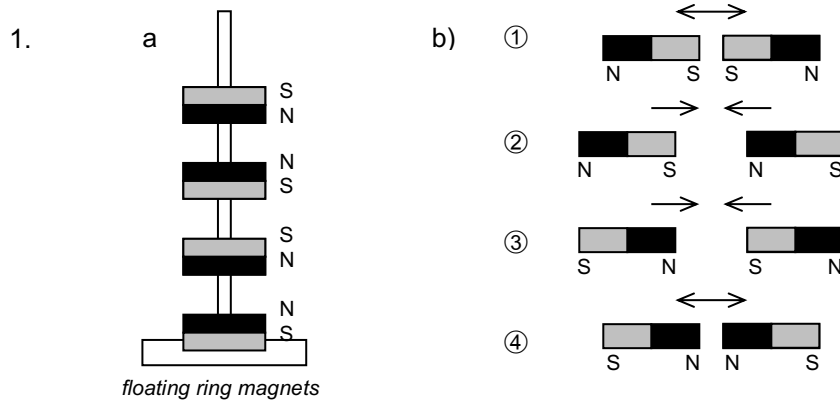
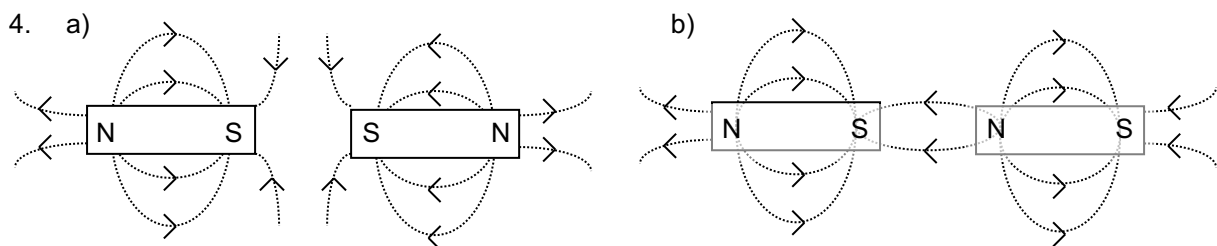




2. The geographic north pole of the earth is a magnetic south pole. The magnetic north pole of a compass needle is attracted by a magnetic south pole; therefore, if it points in the direction of the geographic north pole of the earth, this pole must be a magnetic south pole!

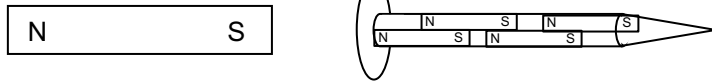
Or: The magnetic field lines point to the geographic north pole. By definition, the direction of the field lines shows the direction in which a magnetic north pole is pushed. If you place a compass needle on a field line its magnetic north pole will point to the geographic north pole of the earth; thus the geographic north pole of the earth is a magnetic south pole.

3. Bar magnet



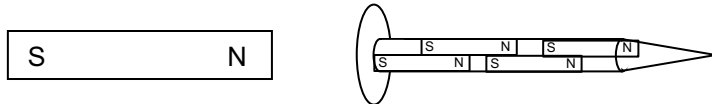
5. a) I am a permanent magnet. I am made of **hard** magnetic material. It is **difficult** to bring my magnetic domains into alignment or out of alignment.
- b) I am a soft iron nail. I am made of **soft** magnetic material. It is **easy** to bring my magnetic domains into alignment or out of alignment.

6. a)



- b) They attract. The magnetic domains in the nail align due to the magnetic field of the permanent magnet in such a way that the north poles of the magnetic domains point to the south pole of the permanent magnet (see picture).
The north poles of the magnetic domains are closer to the permanent magnet than their south poles. Thus, the attractive force between the north poles of the magnetic domains and the south pole of the permanent magnet is stronger than the repulsive force between the south poles of the magnetic domains and the south pole of the permanent magnet.

c)



They attract. The magnetic domains in the nail align due to the magnetic field of the permanent magnet in such a way that the south poles of the magnetic domains point to the north pole of the permanent magnet (see picture).
The south poles of the magnetic domains are closer to the permanent magnet than their north poles. Thus, the attractive force between the south poles of the magnetic domains and the north pole of the permanent magnet is stronger than the repulsive force between the north poles of the magnetic domains and the north pole of the permanent magnet.

7. a) The magnetic force is strongest at the ends of the poles of a magnet.
b) The iron nails are magnetised and therefore become magnetic. They behave like magnets and exert forces upon each other.

8. The iron nails are magnetised. The magnetic domains in the nails align in such a way that two like poles stick to the lower end of the bar magnet (see picture).
Therefore, two other like poles are formed at the other ends of the nails which repel each other.

