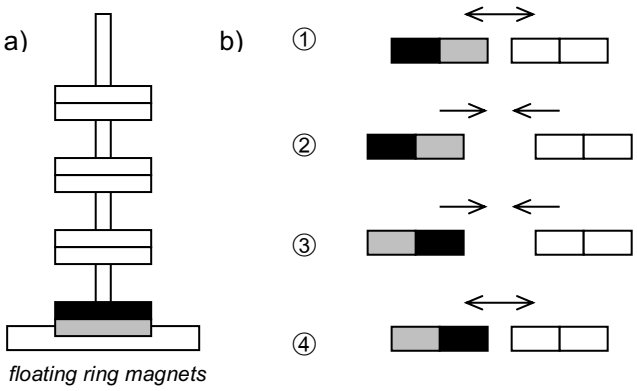
1. Pictured to the right are two experiments with magnets. Complete the pictures by coloring the magnets to show their poles.
black → (north pole)
gray → (south pole)

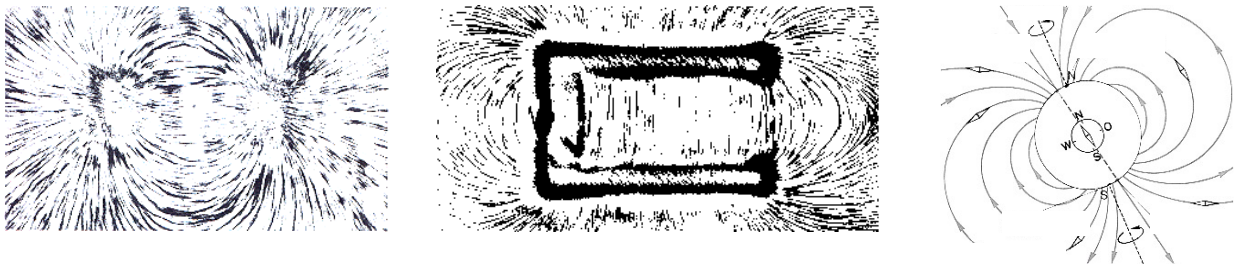


floating ring magnets

2. The north pole of a compass points to the geographic north pole of the earth.
Is the geographic north pole of the earth a magnetic south pole or a north pole?

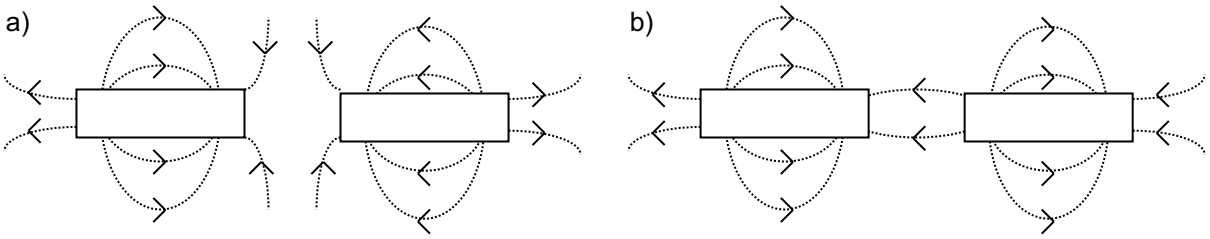
3. Here are the field line patterns of two magnets. Compare them to the magnetic field of the earth. Which one of the magnetic fields is similar to the field of the earth?

Bar magnet: Horseshoe magnet: Earth:



4. Label the magnetic poles as N (north pole) and S (south pole):

a) b)



5. Two magnetic materials describe themselves:

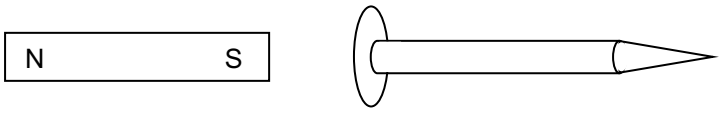
a) I am a permanent magnet. I am made of ..... (*soft* / *hard*) magnetic material. It is ……. (*easy* / *difficult*) to bring my magnetic domains into alignment or out of alignment.

b) I am a soft iron nail. I am made of ..... (*soft* / *hard*) magnetic material. It is ……. (*easy* / *difficult*) to bring my magnetic domains into alignment or out of alignment.

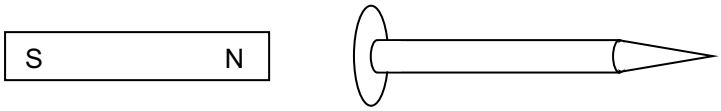
6. A soft iron nail is placed next to a permanent magnet.

a) How do the magnetic domains align? Draw little arrows in the nail pointing in the direction of the north poles of the nail's magnetic domains.

b) Do the nail and the magnet attract or repel each other? Give reasons for your answer.



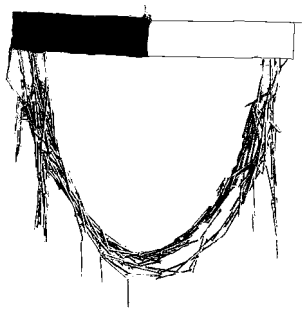
c) What happens if the permanent magnet's poles are flipped? Draw little arrows in the nail pointing in the direction of the north poles of the nail's magnetic domains. Do the nail and the magnet attract or repel each other? Give reasons for your answer.



7. A bar magnet is placed in a box of soft iron nails and then pulled upwards. The result of this procedure is pictured to the right.

a) Why do the nails not stick to the magnet all over but mostly in two places?

b) Some of the nails do not even touch the magnet. How come that they also stick to each other?



8. A bar magnet is held vertically and two thin and long iron nails are placed at the bottom of the lower pole of the magnet, where they stick and from where they hang down.

a) How do the magnetic domains in the nail align? Draw a picture.

b) Do the other ends of the nails (the ones that are not touching the magnet) attract, repel each other, or are there no forces acting between them? Give reasons for your answer.